Lean Season Price Risk and Transfer Investments*

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Abstract

Prices in African grain markets are highly seasonal and vary widely from season to season. In Malawi, where these price fluctuations are particularly severe, we investigate the impact of a cash-plus intervention that combines cash transfers with an intensive behavioral change intervention on households' diets. Using intensive recall data, we demonstrate that dietary quantity and quality deteriorate significantly during a lean season, when maize prices increase by 86 percent. Only in our most intensive intervention arm, which combines large transfers with the behavior change intervention, do we see evidence of consumption smoothing. The majority of this smoothing can be explained by increases in maize harvests, suggesting that households make preemptive investments in agriculture to self-insure against post-harvest price shocks.

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1 Introduction

Seasonal fluctuations in grain prices are common in agricultural settings, particularly in Eastern and Southern Africa. These seasonal price patterns are the aggregate consequence of cyclical agricultural production cycles and various constraints that prevent households from exploiting the arbitrage opportunity these fluctuations create (Burke et al., 2019; Stephens and Barrett, 2011). Absent this arbitrage behavior, these price cycles and the uncertainty surrounding their severity from season to season create significant and salient risks to households' well-being and food security.

In theory, large fluctuations in price should encourage households to benefit from arbitrage by storing their food to sell when prices are highest. This is especially true in East Africa, where grain storage is relatively cheap and would cost only an estimated 2.5 percent of the potential profit from arbitrage (Burke et al., 2019). However, it is well-documented that savings (Mukherjee et al., 2024) and credit (Stephens and Barrett, 2011) constraints force them to over-supply their harvest to the market at a time when prices are low to alleviate liquidity constraints. This results in a "sell low buy high" behavior, which limits agricultural profits and means that households are most exposed to the market, with the lowest level of storage, when prices are at their highest.

This paper focuses on Malawi, where households consume between 65 and 71 percent of their calories from maize. Here, seasonal fluctuations in maize prices are predictable in pattern but unpredictable in scale. We begin with a description of these patterns using national coverage, daily maize price data collected between 2017 and 2025. We demonstrate that the intra-seasonal pattern of prices remains consistent from one season to the next. In each season we observe, prices rise to a peak late in Malawi's "lean season"[1] between January and March, before April harvests place deflationary pressure on grain markets. There is high season-over-season variation, however, and the scale of the price variation we observe is notable. In the least severe case, prices inflate by only 21 percent, whereas in the most severe case, they inflate by 225 percent.

This price risk has meaningful consequences for households. We utilize high-frequency survey data to demonstrate seasonal patterns in food security that align with the price patterns we observe. Furthermore, this data indicates that household grain stores decrease sharply shortly after harvest, leaving them overexposed to the grain market during the lean season, with limited ability to insulate themselves from price increases.

In this context, where grain prices are highly seasonal, we test the ability of cash transfers and a complementary nutrition intervention to enable households to maintain their food security over the lean season. We conduct a cluster randomized controlled trial that enrolls mothers with young children and compares the government's standard

[1] Malawi's lean season runs from November to March. Harvest typically occurs in April, often extending into May.

of care for early childhood development to an enhanced nutritional social behavior change (SBC) intervention, with two additional treatment arms that add cash transfers of varying amounts to this enhanced package.

Before presenting results from our trial, we use our evaluation data to further describe the lean season patterns that households experience. Between our baseline survey, conducted in May and June 2022, and our evaluation survey conducted in November and December 2023, households consumed 380 fewer calories per adult equivalent per day. Almost the entirety of these calories comes from maize, which suggests that households exhibit surprisingly little substitution. At baseline, households consume roughly 71 percent of their calories from maize, relative to 65 percent during our evaluation survey. What shifts more is the source of these calories, as households consume far more of their calories from purchased food during the 2023/2024 lean season.

Our results suggest that neither the nutritional SBC nor the nutritional SBC plus the smaller of the transfers was able to prevent these caloric losses or the deterioration in food security that these households experienced. However, while households that receive the larger of the transfers do experience some deterioration, these trends are much less pronounced. During our lean season evaluation survey, these households consume 222 calories more per adult equivalent per day, exhibit substantially improved food security, and consume more diverse diets.

Interestingly, the majority of these additional calories seem to be gained through households' own production. This, combined with the fact that the nominal value of the transfers remained stagnant and thus their real value deteriorated severely during the 2023/2024 lean season, suggests that the predominant mechanism is not simply a relaxation of budget constraints (although that is certainly at play). We show that, instead, households that receive the most intensive package are more likely to invest their transfers in agricultural inputs and livestock. This allows them to increase their maize production during the preceding harvest by 19.1 percent, and increase the amount of maize on hand during the lean season by over 163 percent, likely allowing them to partially insulate their diets from price increases.

Ex-ante, it is unclear whether the rational decision for households is to invest their transfers in agricultural production rather than savings, given that African agriculture tends to be low-productivity and risky (World Bank, 2007), and farmers tend to be risk-averse. As such, we include a model that rationalizes additional agricultural investments under a lean season price risk regime. This model shows that, so long as farmers exhibit risk-averse consumption preferences, unknown post-harvest prices induce additional agricultural investments relative to a regime where prices are known. The key insight of this model follows Gadenne et al. (2024), who suggest that food is price-neutral, whereas cash-on-hand is not. Our results contribute to that work by showing that, not only would households prefer to receive food aid over cash aid in highly inflationary settings,

but they may also be willing to incur a cost, in this case by undertaking risky agricultural production, to "convert" existing cash into food.

Lacking a counterfactual world where post-harvest prices are known, we create a maize price inflation index that allows us to leverage spatial variation in price changes to study how households fare in different inflationary environments. Comparing households that had strong harvests to those that had weak harvests (compared to pre-baseline harvests), we validate the insight from our model that maize production "insures" households against inflationary pressures by showing that households with strong harvests are better able to smooth consumption as prices rise.

The rest of this paper is as follows. Section 2 uses multiple data sources to describe the lean season, and presents the experiment. Section 3 discusses the experimental data and strategy. Section 4 presents the main results of the trial. Section 5 explores the mechanisms underlying these results and presents the model described above. Section 6 concludes.

2 Setting and Experimental Design

2.1 Price Risk in Malawian Maize Markets

Grain price seasonality in East Africa is well-documented. Across these grain markets, the intra-seasonal variation in prices is often between 25 and 40 percent of post-harvest prices (Cardell and Michelson, 2023). This stands in comparison to intra-seasonal swings of only five percent in American commodity markets (Burke et al., 2019). We begin our analysis by demonstrating that, even within the region, Malawi experiences significant price fluctuations. To do so, we utilize data from IFPRI Malawi's Maize Price Monitor, which collects daily maize prices from 26 markets throughout the country[2] (IFPRI, 2025).

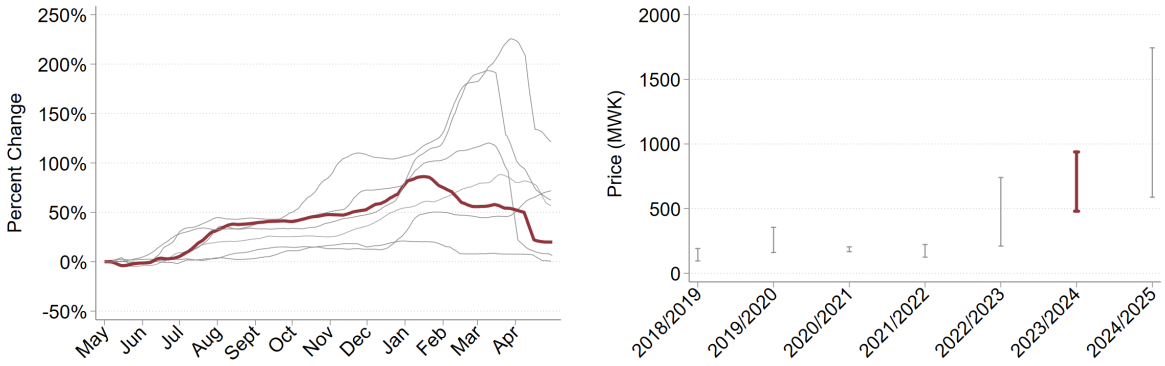
We report this data in Figure 1, which displays the intra-seasonal percent change of maize prices in panel (a) and the intra-seasonal range of nominal maize prices in panel (b). From this figure, three stylized facts about maize markets become clear.

STYLIZED FACT 1: Maize price patterns are remarkably predictable.

From panel (a), we can see that, across our observation window, prices reliably increase following the immediate post-harvest sales period, they then remain largely stable between August and November, when we often begin to see a sharp upward trend in prices throughout the lean season, before they peak often around March. In all but one season, we observe a sharp decrease in prices in April as the new maize harvest begins to enter the market.

[2]Maize prices are collected via telephone interviews with market sellers. Prices are reported per kilogram.

Figure 1: Intra-Seasonal Maize Price Fluctuations in Maize Monitor Data



(a) Seasonal Percent Change in Maize Prices

(b) Seasonal Maize Price Range

Panel (a) reports the intra-seasonal price change of maize that enters the market after the most recent harvest using May 1st as the baseline. Each line represents a season spanning from the 2018/2019 season to the 2024/2025 season. The bold red line represents the 2022/2023 season during which our evaluation survey took place.

Panel (b) intra-seasonal range in the nominal price of maize during each season represented in the Maize Monitor. Prices are reported per kilogram of maize. The bold red line represents the 2022/2023 season during which our evaluation survey took place.

STYLIZED FACT 2: There is inter-seasonal variation in the scale of price inflation.

Once again, from panel (a), we see that, while the patterns are predictable, it is difficult to predict the extent to which prices will inflate. In the least severe year, the price curve looks almost flat, and at their peak, prices were only 20 percent higher than May 1st prices. However, in the most severe case, households experienced a 225 percent increase in prices.[3] In this paper, we refer to the uncertainty households experience regarding the severity of post-harvest price increases as "price risk".

In the context of the discussion of arbitrage in Section 1, the pattern stability we observe above suggests that food storage and price arbitrage would likely be a profitable strategy for households in all seasons. While it is almost certainly true that households do not undertake this storage due to credit constraints, this variation in the potential returns from arbitrage supports the argument from Cardell and Michelson (2023) that, even without these constraints, loss aversion may prevent households from undertaking storage. Further, if households are risk-averse, the severity of this inter-seasonal variation in price peaks may reduce their willingness to undertake credit to facilitate the arbitrage behavior.

STYLIZED FACT 3: Price risk in Malawian maize markets is a distinct phenomenon from persistent inflation.

Although there is some persistent inflation across years, particularly in recent years

[3]Within our observation, the least severe price increases are observed in the 2020/2021 season, while the most severe case is observed in the 2022/2023 season.

as the kwacha has been devalued raising the nominal price of imported maize (Jegwa, 2023), we see from panel (b) that in the early portion of our sample, there is fairly limited variation in minimum prices.[4] A simple comparison across panels reveals that inter-seasonal variation in post-harvest prices is relatively small compared to intra-seasonal price spread. Even in recent years, as season-over-season inflation has increased, so too has the scope of the price risk. In this way, the entry of new harvests that place downward price pressure on grain means that price risk is the predominantly salient risk to households' food security.

2.2 Household's experience of price risk

As we have discussed, a large body of literature has shown that households often do not take advantage of the opportunities provided by the price trends that we describe. While we have not demonstrated this in our context, the existence of these trends suggests that households are not engaging in arbitrage on a scale that would generate equilibrium consequences and smooth the price curves, as in Burke et al. (2019). If households do not utilize lean season price increases as an opportunity, a key question then becomes the extent to which they are a risk, and how they impact household well-being.

To answer this question descriptively, we combine the maize price data with high-frequency survey data from the Rapid Feedback Monitoring Survey (RFMS). The RFMS is a monthly survey conducted via phone (with annual in-person visits) by Catholic Relief Services (CRS) and Cornell University (Knippenberg et al., 2019). The data are nationally representative and intended to serve as an early warning system of catastrophic-level food insecurity for CRS and other NGOs working in Malawi. We utilize it in our context to illustrate how seasonal trends in food security are correlated with price increases.

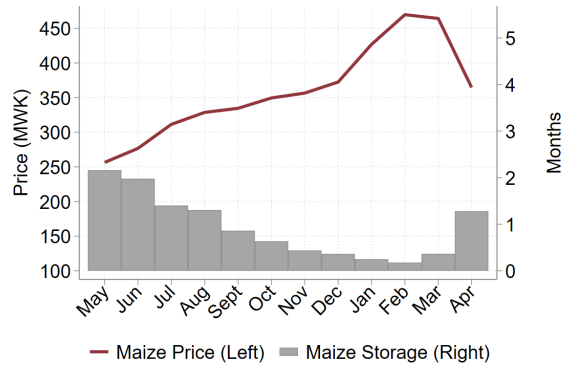
We report this data in Figure 2. From this figure, we can add two stylized facts regarding how households experience lean seasons.

STYLIZED FACT 4: On average, households understore food after harvest, and are most exposed to markets when prices are highest.

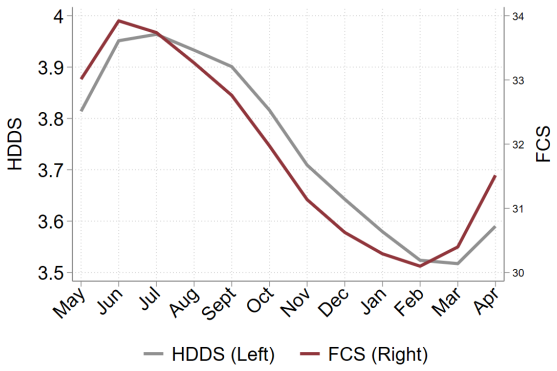
In panel (a), we see that, on average, households store roughly 2.5 months' worth of maize post-harvest. This is despite a twelve-month agricultural cycle. While it is certainly possible that households are underestimating their storage due to aversion to the risk of running out of storage, the discordance between the reported storage and the agricultural cycle, combined with the seemingly linear downward trend in storage, would suggest that households are exposed to the markets at all points and store food primarily as a means of consumption insurance. This storage allows them to partially draw from their storage at all times, while also partially drawing from the market. This suggests

[4] During all years in our observation window, the minimum price is achieved in May.

Figure 2: Trends in price, storage, and food security



(a) Seasonal Patterns in Maize Prices and Storage



(b) Seasonal Patterns in Food Security

Panel (a) presents the average monthly maize price from the maize monitor data on the left axis, and the amount of food storage households report maintaining in the RFMS, measured in months' worth of storage, on the right axis.

Panel (b) reports the monthly averages for the household dietary diversity score (HDDS) on the left axis and the food consumption score (FCS) on the right axis. Both trends are reported from the RFMS

that they are not primarily storing food for arbitrage, for if they were, we would expect to observe a sharp drop in storage during the lean season. Instead, we see that stores have mostly run out by the time households reach the lean season, suggesting that the coping strategy of insuring ones consumption through storage often fails precisely when prices are highest.[5]

STYLIZED FACT 5: Seasonal patterns in food security are nearly the perfect inverse of seasonal price patterns.

We see from panel (b) that, as we expect, food security is lowest when prices are highest. While this correlation itself is not surprising, it is important to note the scope of these changes. We see that, as measured by both the food consumption score and the household dietary diversity score, food security during the lean season decreases by over 12 percent relative to the period when households are flush with cash from post-harvest sales in June. Although we expect food security to be at its worst when food prices are at their highest, the scale of these seasonal patterns is congruent with field anecdotes, which suggest that these price fluctuations are among the most salient risks that households face, and that they may have limited ability to cope with price shocks.

[5]Indeed, we will show later in the paper, that households go from consuming roughly 50 percent of their calories from storage around the time of harvest, to only 10 percent during the lean season.

2.3 Experimental Design

In this context, where prices and food security are highly seasonal, we test the effectiveness of a "Cash+" intervention designed to improve the quality of diets of mothers and their children. Below, we provide an abbreviated description of this trial. Readers seeking a more detailed description can find additional details published in Gelli et al. (2024), the accompanying protocol paper. Based on the conversation above, Gelli et al. (2024) prespecified estimations to study the effectiveness of these interventions during the lean season, which motivates the evaluation survey used in this paper.

The Maziko[6] trial is a cluster RCT designed to evaluate the effectiveness of a cash+ intervention at improving the diets, nutrition, and development of young children and their mothers in the rural Malawian districts of Balaka and Ntcheu.[7] The trial recruited households for inclusion in the study if they contained a woman who self-reported as pregnant or had a child who was younger than 24 months of age at baseline.[8] A total of 2,682 households were selected for inclusion in the trial.

Selected households were clustered by the catchment areas for community-based care centers (CBCCs). 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, as well as training for caregivers and parents of children between 0 and 8 years of age (Gelli et al., 2019). The Maziko trial follows a precursor trial, the NEEPIE[9] trial, in using CBCCs as a delivery platform for nutrition programming. CBCC catchment areas do not map perfectly to villages. In our sample, 55 percent of catchment areas include only one village, but they can include as many as six villages. In total, our sample comprises 156 catchment areas and 262 villages, resulting in an average cluster size of approximately 17 households.

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

[6]The word Maziko means foundation in Chichewa, the predominant language in Malawi. The trial is named as such because it aims to provide foundational nutrition to children during the first 1,000 days, from their conception to their second birthday.

[7]Balaka and Ntcheu were selected as the site of the trial based on the following criteria: (1) having higher stunting prevalence than the national average, (2) identified service delivery gaps, (3) the presence of implementing partners, and (4) priority districts for the Government.

[8]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.

[9]NEEPIE stands for Nutrition Embedded Evaluation Programme Impact Evaluation.

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 (Black et al., 2013). These recommendations are operationalized through village-based care groups. These care groups aim to improve 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 conduct home visits to share what they have learned with their neighbours and friends. Care group sessions utilize the SUN 1,000 Special Days Community Counseling package, which encompasses topics related to maternal nutrition and infant and young child feeding practices, including breastfeeding, dietary diversity, micronutrients, and growth monitoring. Our SBC intervention operates in the context of these care groups, aiming to "boost" their implementation through augmentation.

2.3.1 Maziko Interventions

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

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 the household's (high) nutritional needs (Schneider, 2022). For an average household with 4.4 members, the cash transfer values represented 22 and 38 percent of estimated monthly expenditures at baseline, respectively.

Importantly for our later discussion of mechanisms, the value of the transfers was not indexed to inflation, meaning the purchasing power of the transfers 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 percent in 2021 to 20.8 percent in 2022 and 30.3 percent in 2023 (International Monetary Fund, 2024), meaning the value of these transfers decreased by as much as 56 percent during our observation window. This inflation was partially driven by a change in the value of the kwacha, which the Government of Malawi devalued against the dollar twice during the period of our study: by 25 percent in May 2022 and again by 44 percent in November 2023, as well as the relative import dependence of the Malawian consumption basket.

NUTRITIONAL SOCIAL BEHAVIOR CHANGE: 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, resources, and gender-based violence.

Nutrition-Sensitive Livelihoods was the most intensive of these interventions, adapting the Government of Malawi's Integrated Homestead Farming approach to promote the production of climate-resilient, nutrient-dense crops. It included agricultural training offered by agricultural extension workers, CBCC-based demonstration plots, and meal preparation demonstrations, seed distribution,[10] and the establishment or strengthening of Village Savings and Loans Associations (VSLA) to help women save and borrow to invest in income-generating activities.

2.3.2 Randomization

Following a baseline survey that was conducted between May and June of 2022, clusters were randomized via a stratified[11] design into one of four treatment arms:

1. A **standard of care (SOC)** arm where households received the standard of care early childhood development package described above.
2. A **SBC only** arm, where households received the nutritional SBC intervention, which augmented the SOC described above.
3. A **SBC + low cash** arm, where households receive the lower value of the two cash transfers in conjunction with the nutritional SBC.
4. A **SBC + high cash** arm, where households receive the lower value of the two cash transfers in conjunction with the nutritional SBC.

This randomization scheme allows us to identify the main effects of each package by comparing each treatment arm to the standard of care. We are also able to identify the marginal effect of each cash transfer by comparing those treatment arms to the SBC-only arm. Finally, we can identify the "dose-response" effect of cash by comparing the two treatment arms to one another. It is important to note, however, that we are unable to identify the effect of cash itself, unmoderated by the nutritional SBC intervention, since we exclude a cash transfer-only arm from our design.

[10] The seeds distributed include groundnut seeds and inoculants for the main harvest season and okra, Ethiopian mustard (*Kamganje*), and amararanthus seeds for winter cropping. In addition, CBCCs received biofortified provitamin A seeds and NPK and Urea fertilizer.

[11] The randomization was stratified by District.

3 Data and Methods

3.1 Lean Season Evaluation Survey

Data for our analysis comes primarily from a lean season evaluation survey conducted to evaluate the protective effects of the above intervention during Malawi's recurrent and severe lean seasons. This survey was conducted between November and December 2023. From Figure 1, we see that during this time, prices had already risen by 50 percent from the immediately post-harvest prices, and rose through the period of our survey, before peaking, roughly 80 percent higher than post-harvest prices, in January.

Our evaluation survey focused on women who were pregnant at baseline for two reasons. The first was logistical, as we sought to enroll children into the larger study that had not yet been born at baseline. The second is that these children are, mechanically, the youngest in the study sample, and as such, they may face the largest impediments to their growth patterns due to lean season dietary deterioration. As such, the protocol for this survey sampled all pregnant women at baseline, with procedures in place for random replacement of attritted women with women who had young children at baseline. In total, 1,307 women were surveyed during our evaluation survey, roughly half of the sample, XX of which were pregnant?, and approximately eight women per cluster.

Our evaluation survey focused on the trial's pre-specified primary outcome, the nutrient adequacy of diets. It also collected information on secondary outcomes, including children's anthropometry, food security, as well as information on potentially mediating pathways related to agricultural income, women's empowerment, and transfer spending.

Our main outcomes related to dietary quality are collected via a multi-pass 24-hour dietary recall. This recall is a multi-stage process. During the first pass, respondents recall the list of all foods, drinks, and snacks consumed during the previous 24 hours. During the second pass, precise descriptions of all foods consumed are obtained, including recipes and details for all mixed dishes. In the third pass, respondents estimate portion sizes of what was consumed and what was left over using predefined methods for each of the foods consumed, including weighing a replica, volume measurements, using clay, wooden, or plastic models, calibrated household measures, or by collecting the costs of actual purchases. For validation purposes, a second recall was conducted with approximately 10% of the sample on a non-consecutive day by a different enumerator. For measurement, we convert food intakes into nutrients using food composition tables for Malawi.[12]

In Table 1, we present baseline summary statistics for the subset of women included in our sample. This table also allows us to validate that the overall balance of the trial holds in our lean-season subsample.

[12]In cases where information on specific foods is missing from Malawian food composition tables, information from the closest comparable region where the information is available is used. In most cases, this information comes from the West African food composition tables.

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
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 education	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 education	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 education	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]							
Observations	353	290	354	308							

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.

Focusing on our control group, we observe that the average household at baseline consists of 4.2 members. Men tend to be more educated than women. Ninety-three percent of men have some form of education, whereas 61 percent of women report no formal education. Twenty-four percent of children are stunted. This is even though, on average, households consume almost 2,600 calories per adult equivalent per day. While this suggests fairly suitable diets, at least in terms of quantity, as a sign of what is to come for these households, we already see that households spend 55 percent of their expenditures on food, despite consuming 52 percent of their calories from their own harvest.

In terms of balance, we observe that both men and women in the SBC-only arm tend to be more educated than those in other arms. Otherwise, the validity of the original randomization appears to hold in the subset of households included in our lean season subsample.

3.2 Implementation fidelity

Before beginning our analysis, it is important to discuss the timing and fidelity of the Maziko interventions. Malawi's maize growing season spans from November to May, with planting typically occurring in November and December, and harvest taking place in April and extending into May. This means that the relevant harvest for our lean season evaluation survey took place between November 2022 and May 2023.

Using this maize season as a benchmark, households began to receive transfers at roughly the beginning of the planting season in November 2022, after a registration period that started alongside our baseline survey in May 2022. While the care groups began operation only slightly later in December 2022, the caring for the caregiver and male champion portion of the intervention commenced directly before our evaluation survey in October 2023. This means that our estimates are unlikely to detect effects from these interventions. Instead, we interpret our treatment effects on the SBC arm as primarily representing the effect of the nutrition-sensitive livelihoods intervention, which provided households with agricultural training and winter cropping seeds in March 2023, intended to be harvested in July 2023.

One challenge we face in this study is the discordance between self-reported cash transfer enrollment and administrative data on transfer receipts. According to self-reports, 55 percent of women assigned to the lower cash transfer and 67 percent of women assigned to the higher cash transfer received transfers. These data contradict administrative data from the implementing NGO, GiveDirectly, which suggests that nearly 100 percent of assigned participants were enrolled in the transfer program and were actively receiving their transfers. For this study, we treat the administrative data from GiveDirectly as the ground truth for two reasons. First, after seeing the low levels of self-reported enrollment

from our evaluation survey, GiveDirectly conducted an internal audit and concluded they were satisfied with their enrollment process.[13] Second, in a complementary qualitative study conducted with our implementing partner, Save the Children, it was identified that among those interviewed, several had misunderstood the survey question, did not recognize that GiveDirectly provided the transfers, or expressed concern that self-reporting transfer enrollment would affect their eligibility for future programs. It is possible that this latter concern can explain the imbalance in self-reports across transfer arms, since those receiving smaller transfers may have a greater need for future aid. Although we treat the administrative data as the ground truth, we also include a descriptive analysis of self-reported program exposure in Appendix A.

This discordance in treatment fidelity reporting limits us in two ways. First, we opt to focus our analysis on an intent-to-treat specification. This is partially because these treatment effect estimates are unaffected by which of our information sources is correct, but also because, in the context of a multi-component intervention such as the SBC, it is unclear how to define treatment compliance. In Appendix B, we complement this analysis with a treatment on the treated estimate that focuses on the cash transfer groups,[14] and uses self-reported enrollment to define compliance. As expected, our estimated treatment effects grow, but much of the analysis we conduct below remains qualitatively similar.

Second, later in the paper, we will present an analysis of households' self-reported transfer spending. Due to the skip patterns of our survey, these data are only collected from households that self-report transfer enrollment. This analysis is primarily descriptive and was used to motivate our mechanism analysis; therefore, we still believe it is useful. However, it is important to acknowledge that these data come from what we believe may be a selected subsample.

3.3 Treatment Effect Estimates

Our primary specification regresses outcomes Y_{ict} for household i in CBCC catchment area 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:

$$Y_{ict} = \beta_0 + \beta_1 S_{ict} + \beta_2 L_{ict} + \beta_3 H_{ict} + \beta_4 Y_{ic,t-1} + \delta_c + \epsilon_{ict} \tag{1}$$

Where S_{ict} is a binary indicator that takes the value one if the household was randomly

[13] Through this audit, it was discovered that a small number of women had self reported pregnancy during our baseline and were thus assigned to the study sample but were not pregnant during their registration, potentially due to miscarriages or misidentified pregnancy symptoms, and were thus ineligible for the program.

[14] We achieve this by dropping the control group, such that the entire sample has received the SBC

assigned to the SBC only arm, L_{ict} is a similarly defined indicator for assignment to the SCB + low cash arm, and H_{ict} is an indicator for assignment to the SBC + high cash arm. $Y_{ic,t-1}$ is the baseline value of the outcome of interest. δ_c represents a strata (district) fixed effects. Standard errors are clustered at the level of treatment assignment, the CBCC catchment area.

β_1, β_2 and β_3, then identify the intent-to-treat effect of each treatment arm. We are, however, 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 several linear combinations of these coefficients. $\beta_2 - \beta_1$ identifies the marginal effect of the low cash treatment, while $\beta_3 - \beta_1$ identifies the marginal effect of the high cash arm relative to the SBC treatment. Finally, $\beta_3 - \beta_2$ identifies the dose-response effect of moving from the low cash treatment to the high cash treatment.

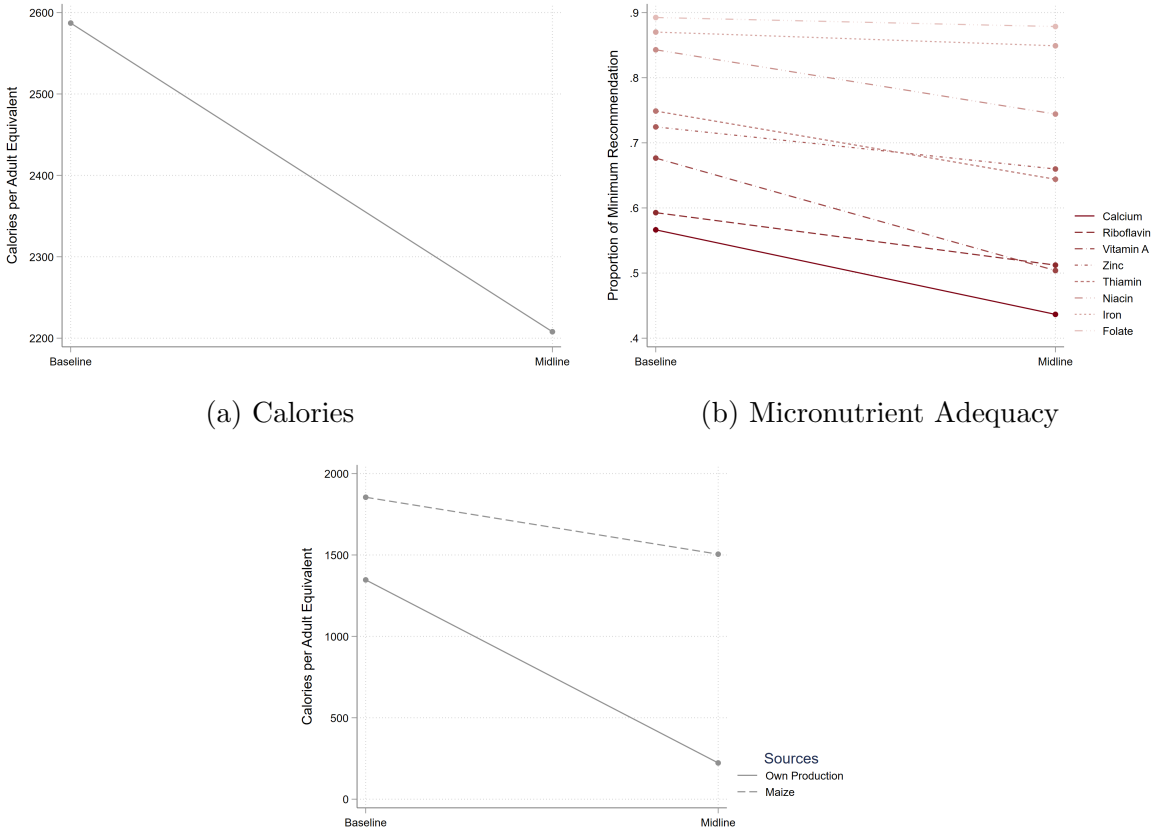
4 Experimental Results

4.1 Lean Season Trends

Although our evaluation survey is mainly intended to elicit the causal effects of the Maziko interventions during the lean season, the nature of our diet data allows us to expand on our discussion in Section 2.2 by describing how household diets develop between our baseline, conducted post-harvest, and our evaluation survey, conducted during the 2023/2024 lean season. We present this description in Figure 3. This figure, which is restricted to the standard of care group to avoid internalizing any treatment effects from the Maziko intervention, displays the change in dietary composition and caloric sources between our survey waves.

From panel (a), we see that households go from consuming 2,587 calories per adult equivalent per day at baseline to 2,207 during our lean season evaluation survey, a loss of 380 calories per day. If we assume a person loses one pound per week from cutting 500 calories per day (Wishnofsky, 1958), this would suggest that members of these households can expect to lose roughly 16 pounds over the course of a 21-week lean season. Furthermore, this dietary deterioration appears to extend beyond quantity. In terms of dietary quality, we observe severe deterioration in the consumption of several crucial micronutrients. Panel (b) displays the proportion of the recommended micronutrient quantities that household diets contain across survey waves. Here, we see severe deterioration across several essential micronutrients, all of which only appear in minimal quantities in maize. While households only consume 56 percent of the recommended calcium intake at baseline, that number falls to 43 percent during the 2023/2024 lean season. Vitamin A intake, which is highly correlated with child survival (Stevens et al., 2015), drops from 67 percent of recommended values to 50 percent during the lean season. Similarly, zinc, which

Figure 3: Change in Diets Across Surveys



(a) Calories

(b) Micronutrient Adequacy

(c) Calorie Sources

Notes: The sample is restricted to households randomly assigned to the standard of care arm. Panel (a) reports the average caloric availability of household diets between survey waves. Panel (b) reports the proportion of the daily recommended value household diets contain for eight micronutrients across waves. Panel (c) reports the amount of calories in household diets are taken from their own production and maize.

contributes to cellular growth and, by extension, children's growth patterns, falls from 72 percent of the recommended values to 65 percent during the lean season. While these deteriorations are likely to have negative consequences for the health of household members, it is also worth noting that households are close to the recommended intake of iron and folate at both baseline and during the lean season, which is promising considering that our sample is made up of predominantly pregnant women, and iron and folic acid contribute strongly to fetal growth.

Panel (c) allows us to observe changes in the composition of household diets across waves. We first see that the majority of household caloric losses come from maize. At baseline, households consume 1,854 calories per adult equivalent per day from maize. As expected, given the lean season price increase, this intake falls to 1,504 calories during our evaluation survey, representing a 350-calorie loss. Thus, reductions in maize consumption account for 92 percent of the total calorie losses observed across waves. Congruent with

Figure 2, we also see a large shift in caloric composition across waves. Whereas, at baseline, 52 percent of caloric consumption comes from the household's own harvest, this composition shifts drastically during the lean season, when households consume only 10 percent of their calories from food they produce. This once again drives home the point that households' diets are most exposed to market price fluctuations when prices are highest.

4.2 Treatment Effects

We begin our analysis of the effects of our intervention by examining the extent to which these interventions can mitigate, or provide protective effects against, the deterioration in diets and food security during the lean season that we have observed thus far. To begin, Table 2 presents the treatment effects of the interventions on various food security indicators and a measure of the total caloric content of households' diets. To reduce the dimensionality across these effects, we also include a food security index, which is an Anderson (2008) summary weighted index of our indicators. Table 2 reports the treatment effect estimates, β_1, β_2, and β_3, as well as the relevant linear combinations that allow us to isolate the effects of the additive cash transfers.

Table 2: ITT Effects - Food Security

	Food Security Index	HFIAS	HDDS	Ln(Consumption)	Ln(Food Consumption)	Calories
	(1)	(2)	(3)	(4)	(5)	(6)
β_1: SBC only Effect	-0.0054	0.22	0.028	0.033	0.012	-1.52
	(0.11)	(0.85)	(0.21)	(0.066)	(0.056)	(117.5)
β_2: SBC + Low Cash Effect	0.061	0.15	0.16	0.035	0.023	46.7
	(0.11)	(0.76)	(0.19)	(0.062)	(0.059)	(109.1)
β_3: SBC + High Cash Effect	0.34***	-2.07***	0.40*	0.16***	0.16***	222.4*
	(0.11)	(0.70)	(0.20)	(0.060)	(0.056)	(117.4)
β_2 - β_1: Low Cash Effect	0.067	-0.075	0.134	0.002	0.011	48.224
	(0.109)	(0.932)	(0.154)	(0.062)	(0.057)	(120.863)
β_3 - β_1: High Cash Effect	0.350***	-2.294**	0.370**	0.131**	0.146***	223.963*
	(0.108)	(0.880)	(0.161)	(0.061)	(0.053)	(128.023)
β_3 - β_2: Cash Dose Response	0.283***	-2.219***	0.235	0.129**	0.136**	175.739
	(0.103)	(0.792)	(0.147)	(0.055)	(0.056)	(119.689)
Control Mean	-0.000	14.077	7.602	10.202	9.848	2207.905
Control SD	1	7	2	1	1	1298
Observations	1314	1314	1290	1293	1293	1293
Baseline Control?	Y	Y	Y	Y	Y	Y

Robust standard errors clustered at the CBCC cluster level in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. All models include a district (strata) fixed effect, and the baseline value of the outcome when availabile. The food security index is a summary weighted index of the other variables. The household food insecurity access scale (HFIAS) ranges from 0-27. The household dietary diversity scale (HDDS) ranges from 0-7. Log consumption and log food consumption are measured in Malawian Kwacha and represent the monetary value of all household consumption and household food consumption. Calories is measured in kilocalories per adult equivalent per day.

We see from column (1) that there is no evidence of an improvement in food security among households in the SBC-only or SBC + low cash arms. Given that the intervention groups were largely balanced at baseline, this suggests that these households experienced similar deterioration in their well-being as the control group above. This conclusion holds across our indicators. Conversely, we observe strong evidence of welfare improvements in the SBC + high cash arm. These households perform roughly one-third of a standard

deviation better on our summary weighted food security index than households assigned to the control arm. Due to the lack of observed treatment effects in the other intervention arms, this treatment effect holds when comparing SBC + high cash households to either SBC only or SBC + low cash households as well. More concretely, relative to the control group, households that receive the larger transfer in conjunction with the SBC intervention experience 14.7 percent higher food security as measured by the HFIAS, consume 0.4 more food groups per day, have 16 percent higher consumption[15] overall and of food specifically, and consume 222.4 more calories per adult equivalent per day. We note that, while the majority of these treatment effect estimates are significant at the one percent level, our estimates of the treatment effect for dietary diversity and calories are only significant at the 10 percent level. While in most of these comparisons, we are also able to reject the null hypothesis of equal treatment effects across treatment arms, we do not see strong evidence that the treatment effect on dietary diversity or calories is differential across cash transfer arms.

This combination of results would suggest that the treatment effects we observe are specific to the larger of the two cash transfers. Furthermore, they suggest that these transfers enabled households to smooth their consumption across the lean season. We say "smooth," as opposed to "improve," because it is important to note that the households in the SBC + high cash arm are still worse off than they were at baseline. The daily calorie consumption per adult equivalent in these households decreased from 2,497 calories at baseline to 2,427 calories during our lean season evaluation survey. This loss of 70 calories is significantly less severe than the 380-calorie loss experienced by households in the control group, but it is still a decrease in dietary quantity nonetheless. Thus, we must interpret these treatment effect estimates as a protective effect against lean season dietary deterioration, rather than as an intervention that leaves households in a higher state of well-being.

We complement our results on food security in Table 3 with treatment effect estimates of our interventions on measures of micronutrient intake. We follow the same format as Table 2 and, once again, include an Anderson (2008) summary weighted index of the tested components. Relative to our findings on food security, our results for micronutrient intake are more mixed. While the results displayed in column (1) suggest that the overall effect on the micronutrient composition of household diets is directionally and compositionally similar to our results on food security, we are unable to reject there is null hypothesis that there is no overall effect in any of our treatment arms. Instead, we observe increases in the consumption of selected nutrients that are once again concentrated among households in the SBC + high cash arm. Specifically, we observe evidence that

[15]Note that our measure of consumption includes the imputed value of all self-produced consumption (i.e., autoconsumption). In section 5, we present results for expenditures that do not include this imputed value.

Table 3: ITT Effects - Nutrient Availability

	Micronutrient Index	Calcium	Iron	Zinc	Vit A	Thiamin	Riboflavin	Niacin	Folate	Vit B12	Vit C
	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
β_1: SBC only Effect	-0.034	-2.09	-0.19	-0.039	-0.15	0.061	0.0087	0.17	-4.02	-0.0027	-6.94
	(0.10)	(16.8)	(1.30)	(0.88)	(21.5)	(0.11)	(0.038)	(1.04)	(22.5)	(0.24)	(23.8)
β_2: SBC + Low Cash Effect	-0.0060	-3.68	-0.10	0.43	-1.66	-0.039	0.013	0.40	5.08	-0.090	22.6
	(0.084)	(16.7)	(1.16)	(0.76)	(21.0)	(0.100)	(0.034)	(0.79)	(24.0)	(0.20)	(22.1)
β_3: SBC + High Cash Effect	0.12	35.3*	1.05	0.51	36.0	0.33***	0.039	1.42*	59.4**	-0.19	8.15
	(0.091)	(18.0)	(1.31)	(0.81)	(21.7)	(0.11)	(0.035)	(0.76)	(24.6)	(0.21)	(23.9)
β_2 - β_1: Low Cash Effect	0.028	-1.594	0.088	0.469	-1.506	-0.100	0.005	0.231	9.103	-0.087	29.531
	(0.105)	(16.327)	(1.330)	(0.939)	(22.209)	(0.110)	(0.040)	(1.081)	(22.815)	(0.191)	(25.592)
β_3 - β_1: High Cash Effect	0.157	37.400**	1.240	0.551	36.127	0.270**	0.031	1.252	63.417***	-0.183	15.095
	(0.111)	(18.067)	(1.454)	(0.973)	(23.325)	(0.119)	(0.041)	(1.049)	(23.725)	(0.203)	(27.004)
β_3 - β_2: Cash Dose Response	0.129	38.994**	1.152	0.083	37.633	0.370***	0.026	1.021	54.314**	-0.096	-14.436
	(0.092)	(17.861)	(1.326)	(0.856)	(22.884)	(0.108)	(0.037)	(0.795)	(25.040)	(0.152)	(25.141)
Control Mean	-0.000	333.304	23.233	10.520	315.962	1.068	0.688	12.678	389.651	1.861	150.895
Control SD	1	194	13	8	240	1	0	10	246	2	233
Observations	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293	1293
Baseline Control?	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y	Y

Robust standard errors clustered at the CBCC cluster level in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. All models include a district (strata) fixed effect, and the baseline value of the outcome when availabile. The micronutrient index is a summary weighted index of the intake of each measured micronutrient. Calcium, iron, zinc, thaimin, riboflavin, niacin, and vitamin C are measured in miligrams (mg). Vitamin A, folate, and vitamin B12 are measured in micrograms (mcg).

households in the intervention arm increased their calcium consumption by 10.5 percent, their thiamin consumption by 31 percent, their niacin consumption by 11.2 percent, and their folate consumption by 15.2 percent compared to the control group. In each case, besides niacin, we are also able to reject the hypothesis of equal treatment effects across intervention groups. Additionally, although the coefficients are not statistically significant, our point estimates would suggest that SBC + high cash households also increased their consumption of vitamin A, zinc, iron, and vitamin C at more moderate levels.

5 Mechanisms

The interpretation of our results is mixed. On the one hand, it is promising that the Maziko interventions were able to attenuate the deleterious effects of the lean season in some households. On the other hand, it is somewhat puzzling that these effects are heavily concentrated in the most intensive intervention arm. Furthermore, the fact that the dose-response effect of cash is most often similar in size to the effect of the intervention itself suggests that the effects of the Maziko cash transfers are not incremental or linear in transfer size.

There may be several reasons for this non-linearity. First, it may be reasonable to assume that there is a threshold effect, such that a small transfer may cover some routine expenses that a household would have otherwise foregone or undertaken on credit. However, a larger transfer allows households to cover these expenses with some cash on hand to improve their diets. Second, previous literature has shown that households mentally account for large versus small transfers differently. As such, it is possible that

the composition of transfer spending differs across intervention arms in a way that benefits households that received larger transfers.

Table 4: Mechanisms - Expenditures and Calorie Sources

	Ln(Non-durable Expenditures) (1)	Ln(Food Expenditures) (2)	Calories from Own Production (3)	Calories from Maize (4)
β_1: SBC only Effect	0.11	0.023	28.9	35.4
	(0.13)	(0.053)	(47.7)	(97.0)
β_2: SBC + Low Cash Effect	0.077	-0.049	50.6	49.7
	(0.12)	(0.056)	(50.5)	(90.3)
β_3: SBC + High Cash Effect	0.24**	0.081	125.4**	119.1
	(0.11)	(0.055)	(50.9)	(97.8)
β_2 - β_1: Low Cash Effect	-0.030	-0.072	21.704	14.321
	(0.110)	(0.053)	(57.056)	(104.035)
β_3 - β_1: High Cash Effect	0.133	0.058	96.486*	83.670
	(0.109)	(0.051)	(56.951)	(110.179)
β_3 - β_2: Cash Dose Response	0.163*	0.130**	74.782	69.350
	(0.095)	(0.054)	(59.142)	(103.544)
Control Mean	8.680	9.376	222.747	1504.944
Control SD	1	1	436	1097
Observations	1293	1293	1293	1293
Baseline Control?	Y	Y	Y	Y

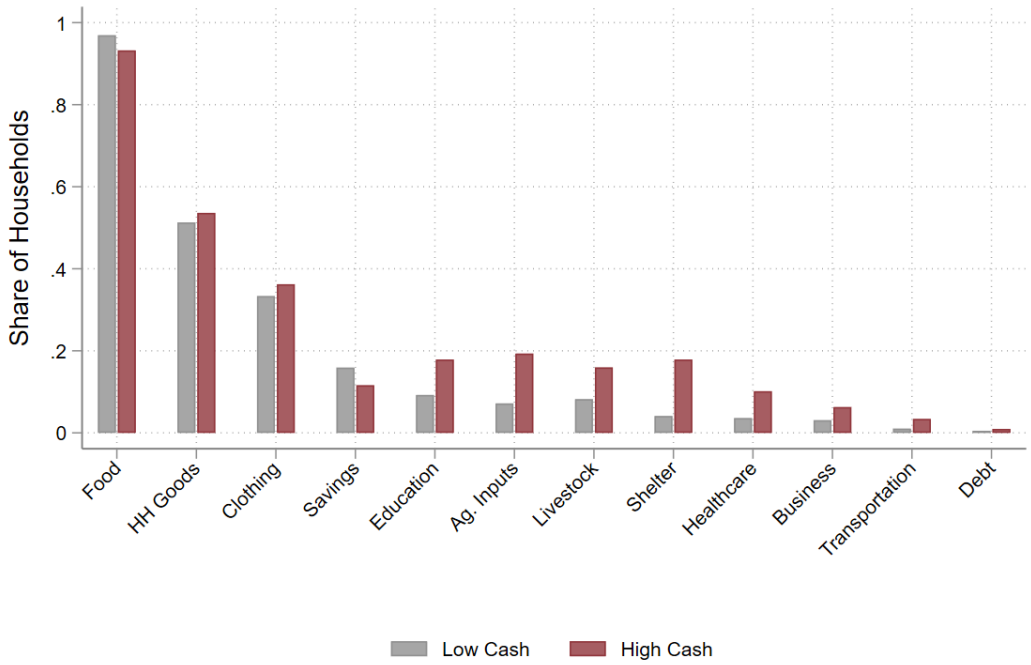
Robust standard errors clustered at the CBCC cluster level in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. All models include a district (strata) fixed effect, and the baseline value of the outcome when availabile.

We begin our investigation into these differences in Table 4, where we report the treatment effects of our intervention on household expenditures[16] and their calorie sources. Although the majority of the coefficients are imprecisely measured, these results reveal several clear patterns. First, as expected, households that receive the larger cash transfers are spending more. However, the majority of this spending goes toward non-durable items, where SBC + high cash households spend 24 percent more than the control group, and 16 percent more than the SBC + low cash households. Still, they do spend more, 13 percent more, on food than the low cash households as well.

While these expenditure differences certainly explain a portion of the effects that we observe on our primary outcomes, it is also insightful to study if the interventions create changes in the composition of households' consumption, as we do in columns (3) and (4). Here, we see that relative to the control group, households in the high cash intervention arm consume 125 additional calories from their own consumption and 119 additional calories from maize, although the latter coefficient is noisy and not significant, during our lean season evaluation survey. If we take these point estimates seriously and

[16]Expenditures, as a distinct measure from consumption reported in Table 2, do not include the value of any consumption of household-produced foods or goods.

Figure 4: Transfer Spending by Treatment Group



Notes: figure displays the proportion of households in each treatment group that report spending a "significant portion" of their transfer on each category.

momentarily ignore the uncertainty in our coefficients, it suggests that increases in auto-consumption account for roughly 56 percent of the increase in caloric intake observed as a result of the SBC + high cash intervention. Further, although the dose-response coefficient in column (3) is not statistically significant, it would suggest that increases in auto consumption would explain 42 percent of the (also not statistically significant) dose-response effect on calories.

One potential explanation for the increase in calories consumed from a household's own production is that cash transfers alleviate post-harvest liquidity constraints, thereby facilitating food storage and price arbitrage. This mechanism would essentially be the same as that explored in Burke et al. (2019), except without the potential for cost recovery. However, if households mentally account for the larger transfers such that they are more likely to save or invest their transfers, the differential may also result in overall changes in production. We begin to investigate these potential channels in Figure 4, which reports the proportion of households that report spending a portion of their transfer on a selection of categories. While this figure provides an incomplete picture of spending, as money is fungible, it is helpful in that it allows us to visualize how households themselves account for their transfer spending. We accompany this figure with Appendix D, which reports spending across disaggregated groups and tests for differences.

Several striking conclusions can be drawn from households' self-reported transfer

spending. First, the majority of households report spending their transfers on food. However, if anything, households that receive smaller transfers are more likely to report food spending, 97 percent versus 93 percent, and this difference is significant at the ten percent level. Next, slightly over one-half of households report spending on household goods, and one-third report spending on clothing; however, we observe no evidence of differences across cash transfer arms. Finally, where we observe large differences in spending is in the tertiary spending categories. Among these categories, households that received the larger of the transfers are 12 percentage points more likely to report spending on shelter materials, and eight percentage points more likely to report spending on school fees. Crucial for our discussion of mechanisms, they are three percentage points more likely to report spending on seeds, six percentage points more likely to report spending on livestock,[17] and 12 percentage points more likely to report spending on other agricultural inputs such as fertilizer or tools. These differences in agricultural investment are important for our investigation of mechanisms because they suggest that, while the transfers may have facilitated storage and price arbitrage, households that received the larger transfers may have also increased their overall production.

5.1 Maize Production and Storage

To understand if the investments that households made into agricultural inputs translated into agricultural production, we present the treatment effects of the Maziko interventions on maize production and storage during the harvest preceding our evaluation survey[18] in Table 5, which, as with previous tables, also includes a summary weighted index of our maize outcomes.

The headline result from this table is that households receiving the larger transfers grow more maize, are more likely to store it, and store more both directly after harvest and during the lean season survey than households in the control group. Specifically, households that receive the larger transfers grow 19.1 percent more maize, are seven percentage points more likely to dry and store maize, and more than double their post-harvest and lean-season maize stores. These results would suggest that the increases in agricultural investments do indeed pass through to production. Further, the relative size of the effects on storage compared to production suggests that the increase in storage that we observe is perhaps a composite of an increase in production, and households dedicating more of their production to storage to facilitate price arbitrage.

Unlike in our main treatment effects presented in Section 4.2, here we cannot reject the null hypothesis of equal treatment effects across groups. However, our point estimates tell

[17] Although it is important to note that this entirely comes from spending on small livestock, as very few households report spending on large livestock. So, this is unlikely to reflect a difference in the number of draft animals used during sowing and planting.

[18] The relevant harvest took place in April-May of 2023.

Table 5: Agricultural Production Mechanisms

	Maize Index	Maize Harvest	Any Post-Harvest Storage	Post-Harvest Storage	Lean Season Storage
	(1)	(2)	(3)	(4)	(5)
β_1: SBC only Effect	0.12	8.55	0.057	18.6	1.10
	(0.098)	(15.2)	(0.039)	(27.4)	(5.55)
β_2: SBC + Low Cash Effect	0.10	11.6	0.059	21.0	19.2
	(0.10)	(13.7)	(0.043)	(21.3)	(11.9)
β_3: SBC + High Cash Effect	0.22**	34.3**	0.070*	46.1**	16.5**
	(0.093)	(13.6)	(0.040)	(21.8)	(7.89)
β_2 - β_1: Low Cash Effect	-0.021	3.007	0.002	2.368	18.054
	(0.115)	(16.800)	(0.046)	(29.318)	(11.678)
β_3 - β_1: High Cash Effect	0.104	25.783	0.014	27.522	15.357*
	(0.106)	(16.510)	(0.042)	(29.884)	(8.003)
β_3 - β_2: Cash Dose Response	0.125	22.775	0.012	25.155	-2.698
	(0.110)	(15.255)	(0.047)	(23.751)	(12.859)
Control Mean	-0.000	179.547	0.224	41.839	10.133
Control SD	1	168	0	206	52
Observations	1273	1273	1273	1273	1273
Baseline Control?	Y	Y	Y	Y	Y

Robust standard errors clustered at the CBCC cluster level in parentheses. *, **, and *** indicate statistical significance at the 10, 5, and 1 percent levels, respectively. All models include a district (strata) fixed effect, and the baseline value of the outcome when availabile. The maize index is a summary weighted index of the other variables. Maize harvest, and storage variables are reported in kilograms. Maize harvests are winsorized at the 5th and 95th percentiles.

a similar story, suggesting that the treatment effect on production is three times higher in the SBC + high cash arm than in the SBC + low cash arm. However, while they suggest that high-cash households may have doubled their storage after the harvest relative to low-cash households, our estimates, although noisy, suggest that low-cash households may actually store more maize during the lean season.

Imprecision in our cross-intervention arm estimates aside, these results suggest that increases in production account for a substantial portion of the observed consumption increases. If we assume that a kilogram of maize flour[19] contains 3,670 calories (van Graan et al., 2019), the 46.1 additional kilograms of maize stored at harvest would translate to 169,187 additional calories per household from the harvest. Given the average family size in our sample of roughly 4.2 members, this would imply an additional 40,282 calories per person, or 110 additional calories per person per day over the course of a year. The fact that this back-of-the-envelope calculation aligns with the results from Table 4 is reassuring, and once again suggests that perhaps as much as half of the overall treatment effects observed in consumption can be explained by changes in production and storage.

5.2 Price Risk Induced Agricultural Investments

At this point, we have shown that during a severe lean season, the most intensive version of the Maziko interventions improves dietary quantity and some aspects of dietary quality

[19]In Malawi, maize is most often consumed as nsima, a flour porridge, and so maize flour is the most appropriate form to use to approximate calorie intake.

by protecting against deterioration. What is perhaps more surprising is that a significant portion of this effect stems from production. Given that large bodies of work have shown that African agriculture tends to be risky, less productive than other regions (World Bank, 2007), and that farmers tend to be risk averse, it is ex-ante unclear that the rational decision, given some exogenous transfer income, is to invest that transfer income in agricultural investments. Instead, it can be shown that the uncertainty in post-harvest prices that farmers experience expands the potential set of rational transfer investments available to them.

To do this, we start with a simple two-period model in which a farmer receives exogenous transfer income T. In period one, the farmer has the opportunity to invest T into an agricultural technology that yields $\{y_1, y_2\}$ in period 2, or they can save their income via interest and risk-free savings. If the farmer invests in the technology, he receives y_1 with probability q and y_2 with probability $(1-q)$. The farmer exists in a single good market where they can sell their agricultural output for revenue or consume it themselves.

If we first assume that the farmer can anticipate post-harvest prices, p, and has risk-averse preferences over consumption y such that $u(E[y]) > E[u(y)]$, then the farmer will invest in the agricultural technology if:

$$u\left(\frac{T}{p}\right) < qu\left(\frac{py_1}{p}\right) + (1-q)u\left(\frac{py_2}{p}\right)$$
$$u\left(\frac{T}{p}\right) < E[u(y)]$$

or, put plainly, they will invest if the known utility generated by using the exogenous transfer income to purchase y post-harvest is less than the expected utility generated by the transfer investments.

Next, we introduce post-harvest price uncertainty into this model, such that the price of y is realized following the harvest. With probability r, the prevailing price is p_1. With probability $(1-r)$ the price is p_2. For simplicity, we assume that $E[p] = p$. In this state of the world, the farmer would choose to invest so long as:

$$ru\left(\frac{T}{p_1}\right) + (1-r)u\left(\frac{T}{p_2}\right) < r\left(qu\left(\frac{p_1y_1}{p_1}\right) + (1-q)u\left(\frac{p_1y_2}{p_1}\right)\right) + (1-r)\left(qu\left(\frac{p_2y_1}{p_2}\right) + (1-q)u\left(\frac{p_2y_2}{p_2}\right)\right)$$
$$E\left[u\left(\frac{T}{p}\right)\right] < E[u(y)]$$

That is to say that they will invest in the technology if the utility of the expected output is greater than the utility of goods purchased with the expected post-harvest

purchasing power of the transfers.

PROPOSITION: There exists a set of investments that the farmer would not undertake if post-harvest prices are known, that are induced by post-harvest price risk.

We know by the concavity of risk-averse preferences that it must always be true that $E\left[u\left(\frac{T}{p}\right)\right] < u\left(\frac{T}{p}\right)$. Thus, there exist three potential types of investments:

1. $E[u(y)] < E\left[u\left(\frac{T}{p}\right)\right] < u\left(\frac{T}{p}\right)$: The farmer does not invest regardless of the price regime.
2. $E\left[u\left(\frac{T}{p}\right)\right] < E[u(y)] < u\left(\frac{T}{p}\right)$: The farmer invests if prices are uncertain but not if prices are known.
3. $E\left[u\left(\frac{T}{p}\right)\right] < u\left(\frac{T}{p}\right) < E[u(y)]$: The farmer invests regardless of the price regime.

From this, it is clear that the set of potentially rationalizable investment decisions is monotonically larger in a setting with price risk. Further, the difference in the rationalizable sets is directly related to $u\left(\frac{T}{p}\right) - E\left[u\left(\frac{T}{p}\right)\right]$, which grows with the concavity of consumption preferences (i.e. as farmers become more risk-averse) and with uncertainty on prices.[20]

The insight in this result aligns with Gadenne et al. (2024), which is driven by the fact that food production is price-neutral in a setting where households act as both producers and consumers in the same market. This means that, in settings with a high degree of price risk, households can "insure" themselves against price risk through agricultural production by diversifying the risks they face, thereby substituting production uncertainty for price uncertainty.

In the context of our mechanism analysis, this fairly intuitive result suggests that perhaps households would have preferred food transfers to cash transfers. In that sense, one way to interpret our mechanism results is that, due to the uncertainty Malawian households face in post-harvest prices, they are willing to introduce production risk into their income streams as a means of "converting" their cash to food, to reduce the risk that price risk poses to their consumption portfolio.

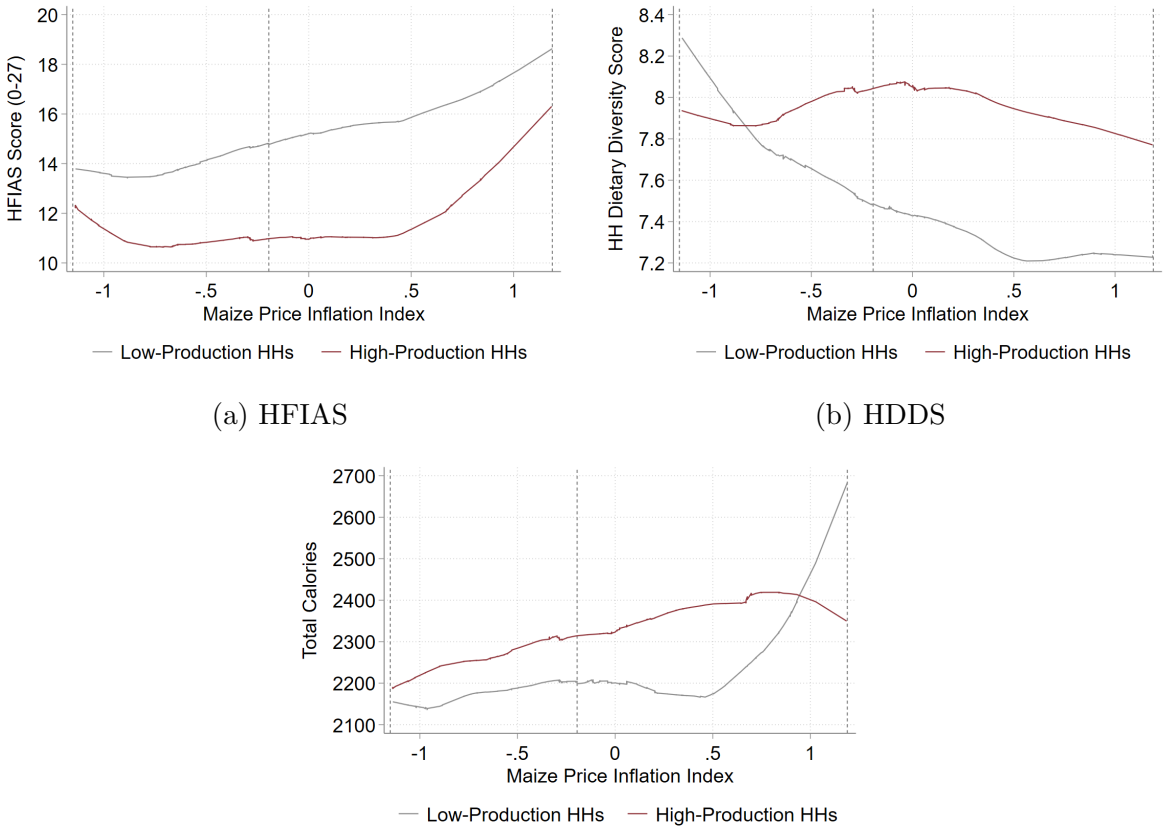
5.3 Agricultural Investments as a Risk Reduction Strategy

Ideally, we would be able to test this model directly. However, without a counterfactual situation where post-harvest prices are known, that is outside the scope of this paper. However, we can leverage spatial variation in price changes to study whether maize production insures households against price-related consumption decreases.

[20] This uncertainty can increase because of an increase in the spread of the potential prices or r moves closer to 0.5.

To achieve this, we utilize the median reported maize prices from our baseline and evaluation surveys to create a maize price inflation index at the village level. This inflation index is a summary-weighted index of price increases across five maize items: maize flour, fine maize flour, bran maize flour, maize grain, and whole green maize. This index is designed to capture the spatial variation in the increase in maize prices across villages in our sample, and is further summarized in Appendix D.

Figure 5: Change Food Security and Consumption Across Inflation Index



(a) HFIAS

(b) HDDS

(c) Calories

Notes: Lowess curves are restricted to the 10th and 90th percentile of the inflation index. The sample is restricted to households that report producing any maize. Households are considered high production if they report a maize harvest above the 50th percentile.

To investigate whether production protects against maize price inflation, we plot our food security indicators against this index, splitting our sample into "high" and "low" production households. This analysis is descriptive, and therefore, we define a household as having "high" production if it reports a maize harvest above the 50th percentile in our sample.

We display these trends in Figure 5. Although these trends are not well-behaved at the endpoints, especially in panel (c), this figure does show a clear pattern. In a cross-section, as inflation increases, low-productivity households experience a deterioration in

food security, as indicated by the increasing trend in HFAIS scores and the decreasing trend in dietary diversity. Interestingly, their calorie intake remains relatively stable, likely because they reduce the diversity of their diets to maintain their consumption levels.

We observe sharply different trends among high-production households, who largely maintain their food security and dietary diversity across inflation regimes. Additionally, consistent with a situation where high-production households benefit from selling at high prices, we observe that caloric consumption in these households increases as inflation rises.

Although this figure is descriptive, it confirms that high-production households are better able to mitigate the negative impacts of maize price shocks, and in some ways may benefit from higher prices. This also lends itself to our interpretation of the treatment effects on maize production, as well as our model presented in Section 5.2, which suggests that households may invest their transfers in agricultural production as a means of self-insuring against post-harvest price risk.

6 Discussion

Households in Sub-Saharan Africa face a multitude of uninsured risks that inhibit their escape from poverty. In this paper, we have focused on one of these risks, price risk created by uncertain price fluctuations in grain markets. We have focused on one setting, Malawi, and used high-frequency data to show that these grain price fluctuations are severe and have commensurate implications for household food security.

We have studied the effectiveness of an intervention that combines cash transfers with an intensive behavioral change intervention in protecting against this price risk and improving dietary outcomes. Our results suggest that our intervention was successful in that task, but only in the most intensive version of our intervention. Furthermore, our design enables us to disaggregate results across the combined intervention and suggest that the improvements we observe are almost exclusively attributable to the large cash transfer given to households.

While intuition would suggest these effects are a result of increased spending at a time when prices are highest, we show that over half the results can be explained by an increase in maize production among households that received the large transfers. We can rationalize these agricultural investments using a simple model and provide suggestive evidence that households make agricultural investments as a means to mitigate the risk posed by post-harvest price shocks.

These results have several direct policy implications. First, the gradient in our results suggests that in the presence of severe price shocks, intensive interventions are necessary to stabilize household consumption. We observe no evidence of an effect on diets among

households that receive either only the SBC intervention or the SBC intervention plus the smaller of the transfers. This suggests that, in a world where policymakers must make trade-offs between coverage and intervention intensity, opting for lower coverage programs may yield greater overall welfare gains.

Second, as has been shown elsewhere (Premand and Stoeffler, 2022), transfer timing is likely a crucial determinant of effects. In the case of our intervention, transfers began during the planting season, which preceded or was around the start of our observed lean season. Given that much of our results are driven by improvements in production and storage, it is likely that these results would be attenuated had transfers begun directly before the lean season.

Third, consistent with findings in Gadenne et al. (2024), Hirvonen and Hoddinott (2021), and Berkouwer et al. (2022), the behavior of households that received the intervention suggests that they may have preferred food to cash in our setting. Here, our simple model suggests that the price-neutral property of food aid in highly inflationary settings may make food a preferable option to cash for households living in these contexts.

Our work has several limitations. First, the conflicts in intervention compliance reporting described in Section 3.2 limit our analysis to intent-to-treat specifications and restrict our description of transfer spending to households that report receiving the transfers, which they do at a markedly lower proportion than administrative data would suggest. Second, without experimental or quasi-experimental variation in prices, the mechanism analysis that forms the basis of much of this paper is descriptive and relies heavily on theory.

Finally, in the context of global aid cuts, it is not clear that high-intensity cash transfers like the ones that generate most of the effects here will be a viable development strategy.[21] However, if the trends displayed in Section 2 continue, it is reasonable to expect this price volatility to only grow in the coming years. As such, there is a significant need to investigate whether alternative solutions, such as credit schemes or forward contracts, can enable households to manage this price risk without the resource-intensive nature of cash transfers.

References

Anderson, Michael L., "Multiple Inference and Gender Differences in the Effects of Early Intervention: A Reevaluation of the Abecedarian, Perry Preschool, and Early

[21]It is worth noting that aid organizations like USAID funded relatively few transfer programs, but to the extent that government spending is fungible and will need to be used to fill funding gaps, especially in the health sector in a country like Malawi, transfer programs will become more difficult to deliver at scale.

Training Projects," *Journal of the American Statistical Association*, December 2008, *103* (484), 1481–1495. Publisher: Taylor & Francis. 16, 17

Berkouwer, Susanna B., Pierre E. Biscaye, Steven Puller, and Catherine D. Wolfram, "Disbursing emergency relief through utilities: Evidence from Ghana," *Journal of Development Economics*, May 2022, *156*, 102826. 27

Black, Robert E, Cesar G Victora, Susan P Walker, Zulfiqar A Bhutta, Parul Christian, Mercedes de Onis, Majid Ezzati, Sally Grantham-McGregor, Joanne Katz, Reynaldo Martorell, and Ricardo Uauy, "Maternal and child undernutrition and overweight in low-income and middle-income countries," *The Lancet*, August 2013, *382* (9890), 427–451. tex.ids= black_maternal_2013-2. 8

Burke, Marshall, Lauren Falcao Bergquist, and Edward Miguel, "Sell Low and Buy High: Arbitrage and Local Price Effects in Kenyan Markets*," *The Quarterly Journal of Economics*, May 2019, *134* (2), 785–842. 1, 3, 5, 20

Cardell, Lila and Hope Michelson, "Price risk and small farmer maize storage in Sub-Saharan Africa: New insights into a long-standing puzzle," *American Journal of Agricultural Economics*, 2023, *105* (3), 737–759. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/ajae.12343. 3, 4

Gadenne, Lucie, Samuel Norris, Monica Singhal, and Sandip Sukhtankar, "In-Kind Transfers as Insurance," *American Economic Review*, September 2024, *114* (9), 2861–2897. 2, 24, 27

Gelli, Aulo, Jan Duchoslav, Melissa Gladstone, Daniel Gilligan, Mangani Katundu, Ken Maleta, Agnes Quisumbing, Lilia Bliznashka, Marilyn Ahun, and The Maziko Trial Team, "Impact evaluation of a maternal and child cash transfer intervention, integrated with nutrition, early childhood development, and agriculture messaging (MAZIKO-IE): a study protocol for a cluster-randomised controlled trial," *Trials*, January 2024, *25* (1), 46. 7

_ , Phuong Hong Nguyen, Marco Santacroce, Aisha Twalibu, Amy Margolies, and Mangani Katundu, "A Community-Based Early Childhood Development Center Platform Promoting Diversified Diets and Food Production Increases the Mean Probability of Adequacy of Intake of Preschoolers in Malawi: A Cluster Randomized Trial," *The Journal of Nutrition*, October 2019, p. nxz245. 7

Hirvonen, Kalle and John Hoddinott, "Beneficiary Views on Cash and In-Kind Payments: Evidence from Ethiopia's Productive Safety Net Programme," *The World Bank Economic Review*, May 2021, *35* (2), 398–413. 27

IFPRI, "Malawi Maize Price Monitor," May 2025. 3

International Monetary Fund, *World Economic Outlook— Steady but Slow: Resilience amid Divergence*, Washington, DC: IMF, 2024. 8

Jegwa, Peter, "Malawi kwacha: 44% drop in value against US dollar sparks unease," *BBC*, November 2023. 5

Knippenberg, Erwin, Nathaniel Jensen, and Mark Constas, "Quantifying household resilience with high frequency data: Temporal dynamics and methodological options," *World Development*, September 2019, *121*, 1–15. 5

Mukherjee, Sanghamitra Warrier, Lauren Falcao Bergquist, Marshall Burke, and Edward Miguel, "Unlocking the benefits of credit through saving," *Journal of Development Economics*, October 2024, *171*, 103346. 1

Premand, Patrick and Quentin Stoeffler, "Cash transfers, climatic shocks and resilience in the Sahel," *Journal of Environmental Economics and Management*, October 2022, *116*, 102744. 27

Schneider, Kate R., "Nationally representative estimates of the cost of adequate diets, nutrient level drivers, and policy options for households in rural Malawi," *Food Policy*, June 2022, p. 102275. 8

Stephens, Emma C. and Christopher B. Barrett, "Incomplete Credit Markets and Commodity Marketing Behaviour," *Journal of Agricultural Economics*, 2011, *62* (1), 1–24. _eprint: https://onlinelibrary.wiley.com/doi/pdf/10.1111/j.1477-9552.2010.00274.x. 1

Stevens, Gretchen A., James E. Bennett, Quentin Hennocq, Yuan Lu, Luz Maria De-Regil, Lisa Rogers, Goodarz Danaei, Guangquan Li, Richard A. White, Seth R. Flaxman, Sean-Patrick Oehrle, Mariel M. Finucane, Ramiro Guerrero, Zulfiqar A. Bhutta, Amarilis Then-Paulino, Wafaie Fawzi, Robert E. Black, and Majid Ezzati, "Trends and mortality effects of vitamin A deficiency in children in 138 low-income and middle-income countries between 1991 and 2013: a pooled analysis of population-based surveys," *The Lancet. Global Health*, September 2015, *3* (9), e528–536. 14

van Graan, Averalda, Joelaine Chetty, Malory Jumat, Sitilitha Masangwi, Agnes Mwangwela, Felix Pensulo Phiri, Lynne M. Ausman, Shibani Ghosh, and Elizabeth Marino-Costello, "Malawian Food Composition Table," Technical Report 1st Edition, MAFOODS, Lilngewe, Malawi 2019. 22

Wishnofsky, MAX, "Caloric Equivalents of Gained or Lost Weight," *The American Journal of Clinical Nutrition*, September 1958, *6* (5), 542–546. 14

World Bank, "World Development Report 2008: Agriculture for Development," 2007. ISBN: 9780821368077 Publisher: Washington, DC. 2, 23

A Appendix A: Program Exposure

Table A1: 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.

B Appendix B: Treatment on the Treated Effects

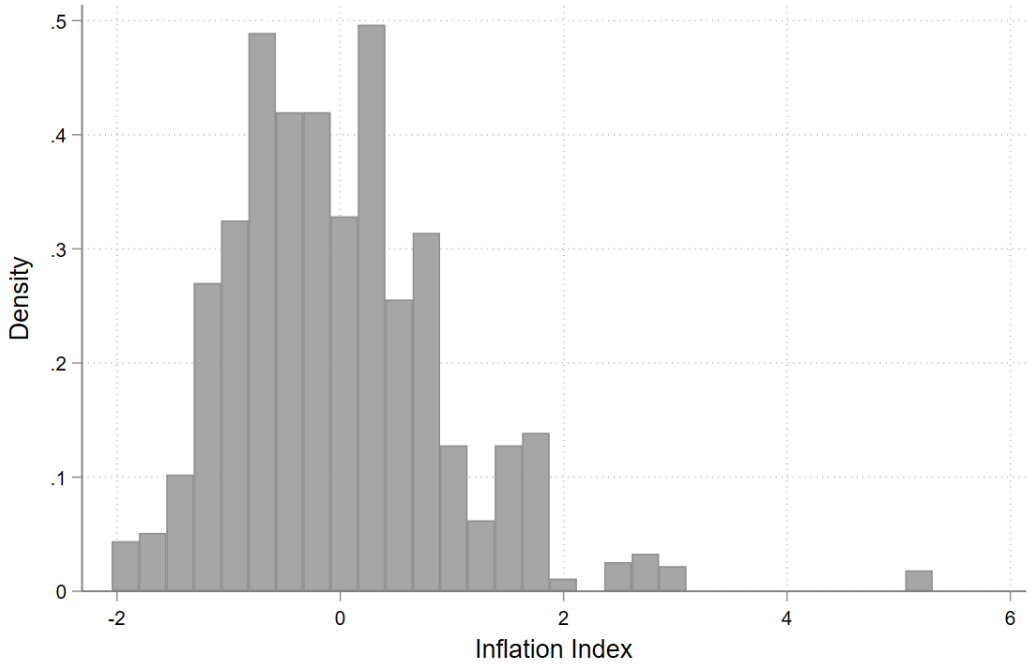
Table B1: LATE, Food Access

	HFIAS	HDDS	Per-AE Expenditures	Per-AE Food Expenditures	Per-AE Consumption	Per-AE Food Consumption
	(1)	(2)	(3)	(4)	(5)	(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

C Appendix C: Transfer Spending

Figure D1: Distribution of Inflation Index



D Appendix D: Maize Inflation Index

Table C1: What did households spend their cash transfers on?

	SBC+Low Cash	SBC+High Cash	P-value
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)	
Observations	195	207	

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.