Do Conditional Cash Transfers Increase Food Consumption?

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ABSTRACT

We compare results from 11 recent studies evaluating the effect of conditional cash transfers on total food consumption. Combining data from experiments run across the globe, we test the external validity of the notion that conditional cash transfer (CCT) programs increase food consumption in target populations. We encounter an overall positive effect; however, we also find evidence of a publication bias and extensive heterogeneity across studies. We conduct a meta-regression analysis to fine-tune model specification further and glean insights about the study characteristics which contribute more to effect sizes than others, as well as the extent to which they explain the effects observed. Using the data, the study attempts to address the observed heterogeneity and suggests a replicable framework to evaluate future research.

Keywords: conditional cash transfer, food consumption

1 INTRODUCTION

The rising popularity of social protection programs that aim to target poverty through periodic transfers has been supported by the increasing evidence that these programs succeed in improving welfare outcomes (Daniel et al., 2014; Gentilni, 2017). One important outcome is food consumption, which has been shown by previous research to rise consistently by 3-10% through such program treatments. In this meta-analysis, we revisit the question of whether these programs indeed succeed in increasing food consumption in targeted households, and if so, which aspects of the study design amplify these heterogeneous effect sizes across studies.

The results indicate that there is indeed a positive effect of CCTs on food consumption of approximately 4%, and that many of the program and study characteristics contribute to the differences in observed effect sizes.

The remaining paper is organized as follows. First, we delve briefly into the literature and prior evidence on conditional cash transfers' impact in section II. In section III, we present our search process and inclusion criteria along with a brief review of the eleven studies used, representing nine such development programs. In section IV, we explore the first question: What does the evidence from RCTs tell us about the average effect of CCTs on Food Consumption? Next, we address heterogeneity in section V and explore the second question: What factors explain the heterogeneity in the reported effect sizes? The results are presented in section VI. Finally, we conclude our meta-analysis with key takeaways and a discussion of the limitations of this study, along with avenues for future research.

2 THEORETICAL BACKGROUND AND PRIOR EVIDENCE

The basic structure of cash transfer programs is that they provide monetary transfers to low-income families or adults, either conditional on them fulfilling a commitment or without a condition (Cecchini & Madariaga, 2011). In this sense, cash transfer programs are divided into unconditional cash transfer programs (UCT) and conditional cash transfer programs (CCT).

As the name tells, in the former scheme, cash contributions are made without prior condition. This kind of measure resembles a lot of the social security system present in high-income countries. Of course, in this scheme, recipients need to fulfill certain criteria to be eligible for the cash transfer. Nevertheless, the cash transfer is not based on a condition of them fulfilling a certain commitment.

In the case of CCT, cash transfers are made conditional on the recipient fulfilling a certain commitment. The transfer can be targeted at individuals or households based on certain criteria. Usually, CCTs are targeted at families with school-aged children and below a certain poverty line, while conditionalities in CCTs are usually related to health and education, e.g., keeping children attending school and properly vaccinated, it aims to improve citizens' quality and characteristics, leading to a healthy society.

In this sense, CCTs provide two effects: The cash transfer acts as a stimulus that increases consumption and investments for the recipient. Moreover, the policy-maker can incentivize certain behavior, which has additional beneficial effects for the recipient. Findings support the hypothesis that families would behave differently if the cash transfer were not

handed out conditionally (Das, Do, & Ozler, 2005). For example, Bourguignon, Ferreira and Leite (2004) find that for the Bolsa Escola scheme in Brazil, school attendance could be increased by conditional cash transfers, but not significantly by unconditional cash transfers. Also, if the cash transfer is tied to certain spending, this has a different effect than unrestricted (Cecchini & Madariaga, 2011).

CCTs started in Brazil in the 1990s, with its most prominent exponent PROGRESA in Mexico, which started in 1997. It was a tool to support families living in extreme poverty under the obligation that they make some commitment to improving their children's education (Cecchini & Madariaga, 2011). Since then, CCTs have become a valuable tool for governments and NGOs to reduce poverty and increase living and educational standards for poor regions and families (Bastagli, Hagen-Zanker, Harman, & Barca, 2016; Cecchini & Madariaga, 2011). According to Bastagli et al. (2016), today, CCTs are implemented in over 63 countries.

Before the CCT program is rolled out on a full scale, there is usually a trial period, where the program is implemented as an RCT, and the treatment is distributed randomly (Cahyadi et al., 2020). After this short pilot phase, the control group is also treated. The phase-in period provides valuable data to study the short-run effects of the CCT on the outcome variables, but it does not provide data for studying the long-run dynamic impacts of the program (Cahyadi et al., 2020; Cecchini & Madariaga, 2011). Therefore in the long-run, quasi-experiments have to suffice to study the sustained effect of a CCT program.

3 META-ANALYSIS DATA

In this section, we discuss the search strategy and inclusion criteria for our report. We then briefly present the included quantitative evidence that has surfaced in recent years from randomized and quasi-randomized studies. We follow the Meta-Analysis of Economics Research Network guidelines provided by Stanley et al. (2013). The coding was carried out by the authors and we also attach the dataset used in this report.

3.1 Search for studies

We run a Google search with the keywords "Conditional + Cash + Transfers + Food + Consumption". We also run separate searches for the top four journals - World Development Journal, Journal of Development Economics, Food Policy Journal, The Journal of Development Studies and The World Bank Economic Review. We also follow the citations and references of the studies we encountered in order to capture unpublished study results. For a detailed survey of our sampling procedure, please refer to our csv attachment named 'Search'.

3.2 Inclusion Criteria

Next, we select our inclusion criteria:

1. We use studies that had some measure of food consumption as the dependent variable and some measure of conditional cash transfers as the independent variable.

2. Since the last meta-analysis on the topic was conducted in 2012 by Kabeer et al. [1], the majority of the studies used in this meta-analysis were published after the date.

3. We discard studies that failed to capture baseline statistics and used RCT-based data wherever possible. However, some studies are quasi-experiments since not all government-rolled out CCTs have a phase-in period with an RCT.

4. We use two unpublished studies.

5. We use econometric estimates wherever possible, although in two studies, we use descriptive statistics as well.

6. Lastly, we exclude studies targeted at specific groups, such as children or pregnant women, to keep effect sizes comparable.

During the effect-size standardization process, we also excluded two studies (Miller, Tsoka & Reichert, 2011 and Wagner A. Kamakura et al., 2015), which do not provide sufficient information for us to calculate the effect sizes.

3.3 Overview of programmes included

Because the welfare programs were implemented in diverse contexts, it will be useful to briefly consider each of the programs individually to understand the potential sources of heterogeneity better.

A. PROGRESA in Mexico

PROGRESA was an innovative Mexican program that provides cash transfers to poor rural households, conditioning children's regular school attendance and health visits. With a budget of approximately $777 million, the program had already covered around 2.6 million households by the end of 1999. Hoddinott & Skoufias (2004) reports that recipients increased their caloric acquisition compared to the eligible families without receiving the transfer of PROGRESA, consistent with the finding from Manuela Angelucci et al. (2009) that treatment households increased their consumption primarily on food.

[1] Kabeer N, Piza C, Taylor L (2012) What are the economic impacts of conditional cash transfer programmes? A systematic review of the evidence. Technical report. London: EPPI-Centre, Social Science Research Unit, Institute of Education, University of London.

B. Red de Protección Social (RPS) in Nicaragua

The Red de Protección Social Programme (RPS) was a small-scale CCT program, running from 2000–2005. It targeted explicitly extremely low-income families and finally reached 165 000 persons (approximately 3% of the population). Except for improving the health and education situation, the program also aimed at increasing households' spending on food. In the pilot phase starting in 2000, RPS had an $11 million budget, and in the second phase of the additional three years, it had a $22 million budget. Conditioned on attending health and education workshop requirements, RPS participants received a food security transfer equivalent to $18 per month. In the studies we included, Maluccio & Flores (2004) finds that RPS resulted in both an increase in food expenditure and an improvement in the diet of beneficiary households.

C. Familias en Acción programme in Colombia

Familias en Acción, launched in 2002, was a CCT program covering approximately 400,000 households (5% of the population). This program aimed to help households below the national poverty line, to be more specific, to increase levels of school attendance and nutritional intake among poorer families. Meeting the conditionalities of school attendance or medical checkups, the program's participants can receive a monthly transfer between US5*andUS*17. Attanasio, O. et al. (2004) and Attanasio and Mesnard (2006) show that Familias en Acción effectively increased households' total consumption driven by its major part, food consumption. Moreover, they also find that the program improved the food quality that beneficiaries consumed.

D. Bolsa Família Program in Brazil

As one of the largest-scale CCT program, the Bolsa Família Program (PBF) was created in 2003 from the merger of four existing programs: Bolsa Escola, Bolsa Alimentação, Cartão Alimentação, Auxílio-Gás, and the Child Labour Eradication Program. On average, the Bolsa Família Program reached 11.1 million families (over 46 million people) per year. Households committing to keep their children attending school and having regular health checkups would receive a monthly monetary transfer ranging from US$ 7 to US$ 45. It is easy to expect the program would increase households' consumption of food because of increased total income. However, Naiara Sperandio et al. (2017) finds PBF had a negative impact on recipients' food consumption, which was mainly caused by the decrease in consumption of processed foods.

E. JUNTOS in Peru

JUNTOS was a large-scale CCT program covering about 37,000 households, implemented in Peru since 2005. The objective of this program was to fight against poverty and child malnutrition. Fulfilling school attendance and vaccination conditionalities, participants would receive a transfer of approximately 35 US$ per month. The results of Garcia (2017) show that the JUNTOS program had a significantly positive impact on beneficiaries' spending on food consumption.

F. Pantawid Pamilyang Pilipino Program in Philippine

Pantawid Pamilyang Pilipino Program (4Ps), introduced in 2007, was a CCT program covering more than 4.6 million poor households and in which its beneficiaries can receive a maximum of Php1,400 cash grants per month. Along with the health and education conditionalities, Pantawid Pamilya aimed at alleviating poverty, and it is noteworthy that one of this program's objectives is to "raise the average consumption rate in food expenditure of poor households." Estimates from Melba V. Tutor (2014) show that the beneficiaries of 4Ps significantly increased their food spending, especially the spending on carbohydrate foods.

G. Opportunity NYC–Family Rewards in the U.S.A.

Opportunity NYC – Family Rewards was the first experimental CCT program in a developed country. Launched in 2007 by New York City's Center for Economic Opportunity, Family Rewards aimed to help families break the cycle of poverty. With conditionalities in education, health visits, and productive activities, Family Rewards transferred over $8,700, on average, to families during the three-year implementation. James Riccio (2013) finds that it created some improvement in reducing poverty and material hardship, including food insecurity, though the effect weakened after the transfer ended.

H. World Food Program in Ecuador

The World Food Program (WFP) introduced in 2011 provides cash-based assistance to refugees Designed to compare the differential impacts of cash, food, and vouchers on food consumption, this study by Hidrodo et al. (2013) looks at a 6-month intervention by the World Food Program in Ecuador between May and October 2011. They find that all three modalities lead to an increase in overall food consumption.

I. The Transfer Modality Research Initiative(TMRI) in Bangladesh

TMRI was a two-year (from 2012 to 2014) pilot safety net program implemented in rural Bangladesh. The aim of TMRI is to address household poverty and food insecurity problems. Unlike the traditional form of CCT programs, beneficiaries in TMRI can receive a cash transfer, a food ration, a half cash and half food transfer, or cash/food transfer with nutrition BBC (nutrition behavior change communication). According to Ahmed, Hoddinot, Roy & Sraboni (2019), both cash and food transfers positively affect household food consumption.

Table 1 summarises the above

Table 1. Overview of Studies

Author	Method	Dependent Variable	Total observations	Country	Start Year
Hoddinott & Skoufias (2004)	FE Regression	log(total calories)	13142	Mexico	1998
Hidrobo et. al. (2013)	ANCOVA	dollars (food consumption)	2087	Ecuador	2011
Gilligan et. al (2014)	FE	log(dollars)	2111	Uganda	2007
Garcia (2017)	FE	Fraction of food consumption	11394	Peru	2005
Maluccio & Flores (2004)	DiD	Annual average on per capita food expenditure	5236	Nicaragua	2000
Attanasio & Mesnard (2006)	DiD	log(food consumption)	12200	Colombia	2002
Ahmed, Hoddinot, Roy & Sraboni (2019)	ANCOVA	Monthly food consumption per capital	4895	Bngladesh	2012
Attanasio, O. et al. (2004)	Propensity Score Matching	monthly food consumption per household in pesos	11462	Colombia	2002
Naiara Sperandio et.al.(2017)	Propensity Score Matching + the nearest-neighbor pairing algorithm	Northeast: caloric consumption	4259	Brazil	2003
Melba V. Tutor (2014)	Propensity Score Matching	food expenditure (Nearest neighbor N=1)	5252	Philippine	2007
James Riccio (2013)	OLS	Food security (1 = low; 4 = high)	1982	USA	2007
Manuela Angelucci et.al (2009)	Propensity Score Matching	Log consumption	7,320	Mexico	1998

3.4 Calculating Effect Sizes

In this section, we answer the first question: What does the evidence from RCTs tell us about the average effect of CCTs on Food Consumption? As studies report the estimated impact in different ways: food consumption in calories or currency, food expenditure, and food security according to respondents' answers, it is necessary for us to standardize the estimates and make them dimensionless first. Because most of the studies we included use regression, our preferred method is to use partial correlations [2] as the standardized effect size since it overcomes the heterogeneity in scale and measure type. For other few non-econometric studies, we then use mean differences and Cohen's d [3]

One study (James Riccio, 2013) already reports the effect size, which is the difference between experimental and control group outcomes expressed as a proportion of the standard deviation of both groups' outcomes. Hence, we directly use it as the standardized mean difference. Further, we calculate the standard error of the effect size and thus get the 95% confidence interval.

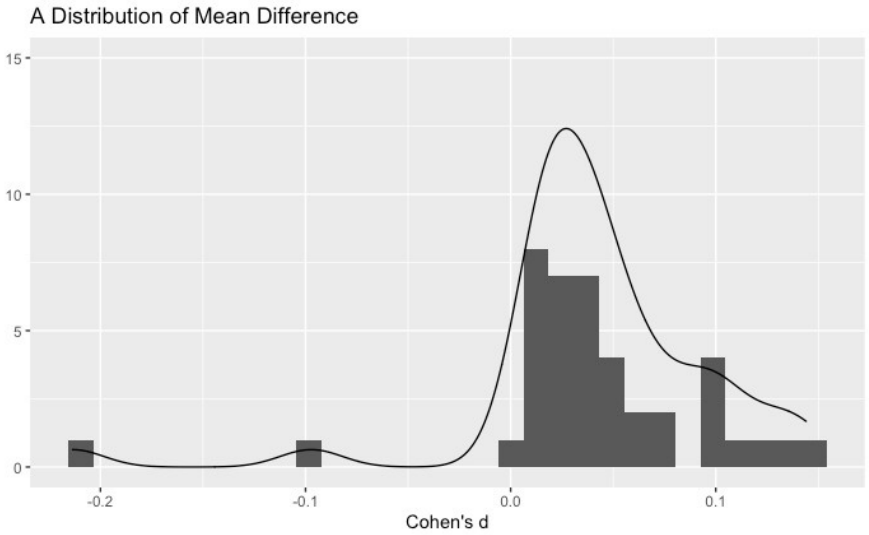

Figure 1. Distribution of the Effect Sizes

3.5 Synthesizing Effect Sizes

The eleven papers we finally selected are from 9 different CCT programs, which means the studies may differ from many aspects: the population, the cash transfer amount, the program's period, the eligibility conditions, etc. Assuming the effect sizes are similar but not identical across studies, we use a random-effects model to pool our effect sizes and seek to extrapolate the effect size beyond the CCT programs in our sample. Since most of our studies have more than one estimate of the CCT program's impact on food consumption, we combine all estimates from all studies by directly using the random-effects model. Here we choose the most widely-used DerSimonian-Laird ("DL") method to estimate the variance of the distribution of true effect sizes, i.e., τ^2, and also use the HKSJ adjustment to produce more robust estimates of $var(\tau^2)$. Combining the effects, we find a very small but positive overall treatment effect of less one 1%. In contrast, we find a weighted average effect (DeCoster, 2004) size of 3.5%.

After synthesizing the effect sizes, the first thing we would like to assess is the between-study heterogeneity. We use three measures to quantify the degree of heterogeneity:

1. Cochran's Q = 73.22, the difference between the observed effect sizes and the fixed-effect model estimate of the effect size, which is then squared, weighted, and summed;

[2] We use formulae: $p.c. = t/\sqrt{t^2+df}$

[3] We use formulae: $g = t \times \sqrt{\frac{1}{n_e}+\frac{1}{n_c}}$

2. Higgin's & Thompson's I^2 = 0.0005, the percentage of variability in the effect sizes which is not caused by sampling error;

3. Tau-squared = 45.4%, the between-study variance in our meta-analysis.

Besides these, the prediction interval from -0.0099 to 0.0866 also sheds light on interpreting heterogeneity. All three measures reveal a high degree of heterogeneity. Please refer to the code attached for details.

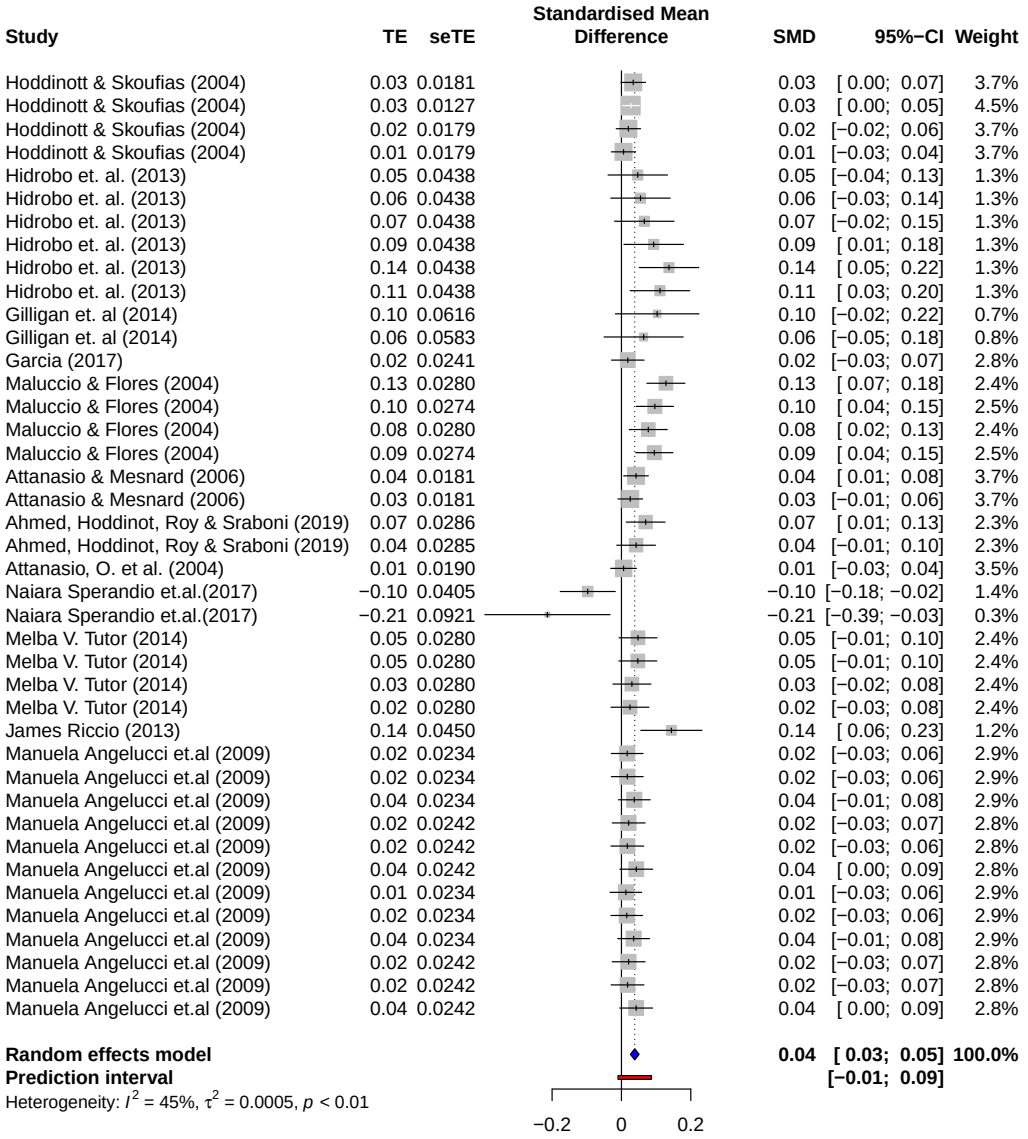

Figure 2. Forest Plot

We also worry that some extreme values will distort our overall effect size. Therefore, we try to detect if there are statistical outliers and influential cases in our meta-analysis by employing the DIFFITS value, the Cook's distance, the covariance ratio measures, and generating the Baujat Plot. Studies on the right side, especially in the lower part, of the Baujat Plot contribute a lot to the heterogeneity, and as what we can see from Figure 3, it is the paper by Naiara Sperandio et al.(2017) with negative effect size of CCT program on food consumption which is mainly driven by the decrease of the consumption of processed foods. By contrast, recipients increase the levels of consumption of fresh foods, indicating that the CCT program to some extent improved treated groups' diet and food quality.

3.6 Publication Selection Bias

In an ideal setting, we would find that the effect sizes calculated in the study are uncorrelated with their standard errors. However, the researcher's preferences for significant results are well-known. Moreover, publication biases that arise due to researcher's biases are less adverse than the publication biases that could potentially arise as a result of a need to build public consensus around a developmental activity such as conditional cash transfers. And we find that six out of the total eleven studies in our final list are journals, two are research reports (Attanasio, O. et al., 2004 and James Riccio, 2013), two

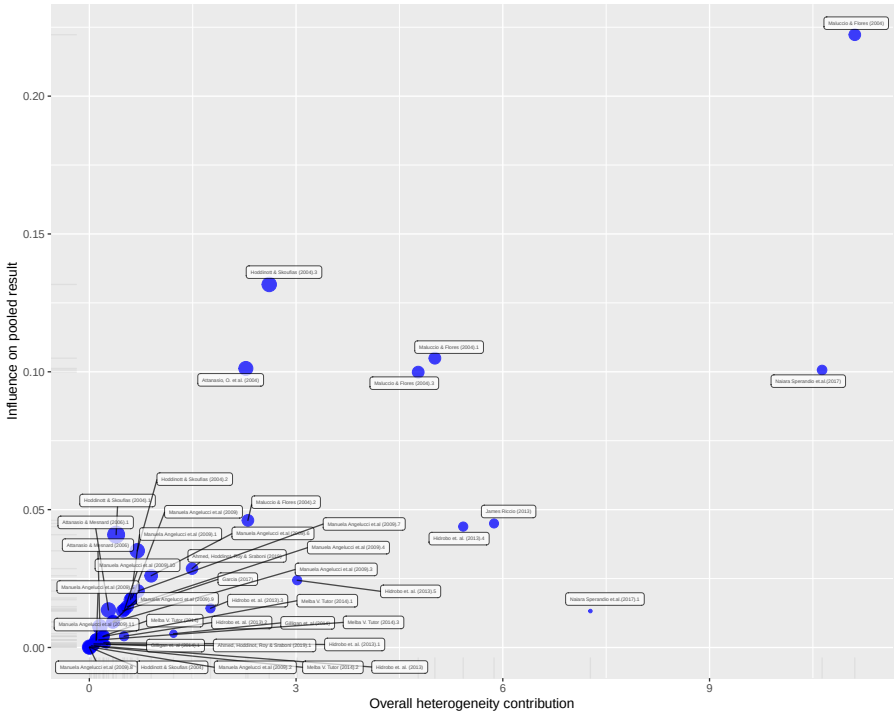

Figure 3. Baujat Plot

are discussion papers (Ahmed, Hoddinot, Roy & Sraboni, 2019 and Melba V. Tutor, 2014) and one is a book (Maluccio & Flores, 2004).

To make our meta-analysis all the more pertinent, we begin by investigating a funnel plot (as Figure 4 shows) of effect sizes against the standard error. We find a highly asymmetrical form in our plot indicating the presence of a publication bias, which is exacerbated by the absence of negative estimates, especially for small studies. Moreover, we can see that many studies with effect sizes centered on zero are not statistically significant (lying on the white background).

4 MODELING HETEROGENEITY

The funnel plot reveals substantial heterogeneity as one would expect given the diverse contexts of program implementation. This is confirmed by the high value of Cochran's Q statistic (28). Therefore we model heterogeneity using the following MRA model:

$$r_{ij} = \beta_1 + \sum \beta_k Z_{ki} + \beta_0 SE_{ij} + \varepsilon_{ij}$$

where r is the standardized effect size (partial correlation in most cases) of conditional cash transfers on food consumption from i estimates using j studies. In our case, i= 41 and j=11. Z is a vector of variables that explain the relationship between conditional cash transfers and food consumption. This meta-regression model is based on the work by Stanley et al. (2013). We expect β_0 to be significantly different from 0 owning to publication bias. We use weighted least squares using inverse variance as weights to give more importance to studies which are more precise. The following groups of variables are included in the Z vector:

1. *Measures of Total Consumption*: When total consumption (in food and non-food items) is part of the econometric estimation, we are more likely to observe the food consumption increases are less a result of the income effect, than of a change in the relative portion of income spent on food. This would definitely bring down the effect size, and studies which have done so must be controlled-for using dummies.

2. *Country*: Most of these studies are carried out in diverse contexts with varying levels of poverty ranging from the relatively better-off poor of the United States to the highly impoverished Uganda. Because of the small sample size it is likely, however, that country dummies will fail to differentiate between the heterogeneity due to level of development, and other aspects of heterogeneity that we are interested in. We have therefore not used country dummies and instead used value of the cash transfer as a percentage of total consumption to capture this effect. In very poor nations such as Uganda this value is 80% whereas in wealthier nations like the US and Mexico, this value is between 5-10%.

3. *Wealth of the household*: Studies which control for the baseline wealth of the household will have more accurate effect sizes.

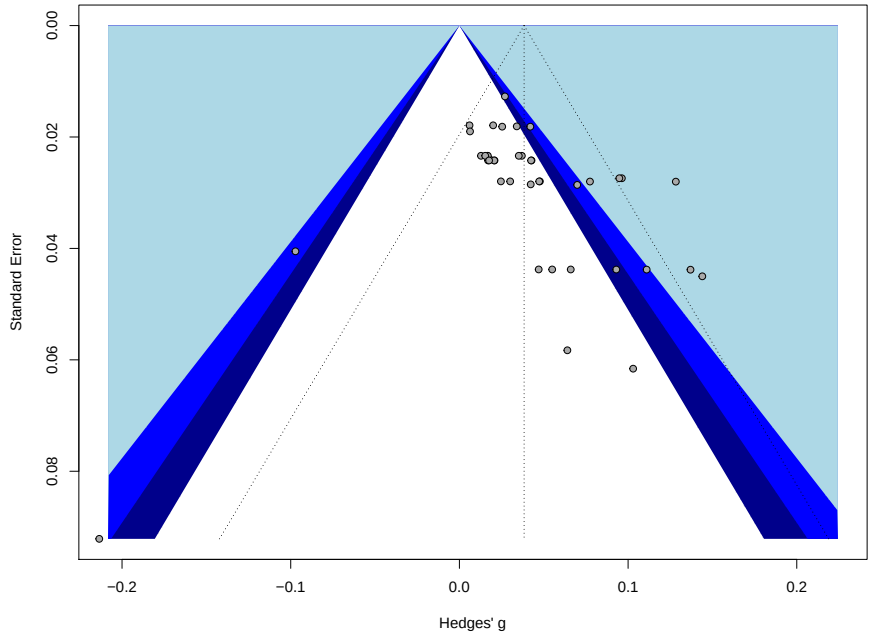

Figure 4. Funnel Plot

4. *Duration of the experiment*: We have controlled for the duration of the experiment in months. We expect the treatment effect to be larger for longer-run programs as subjects have a longer time period to experience the benefits of higher food consumption.

5. *Frequency of Transfers*: More frequent, smaller-sized transfers could potentially lead to reinforcement of food expenditure habits. We expect this to be positively correlated with effect size. We use the number of transfers per year to measure this effect.

6. *Geographical Fixed Effects*: Even within the countries, the experiment would vary considerably depending on the locality in which it was implemented, and the unit in which it was randomised. We find that almost all the studies we encountered were sensitive to this fact and controlled for geographical fixed effects in appropriate units as applicable such as regions, municipalities or localities as applicable. However some studies failed to capture this and we expect the treatment effect to vary on this basis. The direction cannot be speculated upon with the data at hand.

7. *Targeting Women*: Many of these programmes were targeted at women to increase their bargaining power within the household and allow them to make food consumption decisions as they are likely to spend more of their income on food (Angelucci, M., & Attanasio, O., 2013). We expect the studies which target women to have a larger effect size compared to those that don't.

8. *Household Head Characteristics*: Accounting for the age, gender and education level of the household head would improve the accuracy of the study results. Female heads have been consistently shown to spend more of their income on food than men (Angelucci, M., & Attanasio, O., 2013). Age, experience and education could play a similar role. We expect the results of the studies which control for these characteristics to be different from those that don't.

9. *Food Diversity*: Many studies we encountered simultaneously measured differences observed in the relative amounts spent among the food groups, with many studies reporting an increase in consumption of fresh produce as a result of the cash transfer and nutrition awareness campaign. This is a very valuable signal of the quality of the study as it indicates a large investment in the survey process itself.

10. *Basis of Conditional Cash Transfer(CCT)*: The 'conditional' aspect of the above-mentioned food programmes is mostly linked to school and clinic attendance. We have labelled the dummy representing this as Basis of Conditional Cash Transfer(CCT): The 'conditional' aspect of the above-mentioned food programmes is mostly linked to school and clinic attendance. We have labelled the dummy representing this as *School.CT*. A few experiments proceed by making the awareness workshops mandatory, these have been labelled *Awareness.CT*.

11. *Rural/Urban Divide and Well-functioning Markets*: We expect differential effects depending on whether the market for food was efficient. If not, the cash transfers could potentially drive up the prices of food, thereby reducing the

purchasing power not just of the target population, but of the entire population. We would expect markets to be more efficient in urban areas.

12. *Publication*: We account for the difference between published and unpublished studies via the variable *Published*. We expect that studies published in major journals such as the World Development Journal, Journal of Development Economics, Food Policy Journal, The Journal of Development Studies and The World Bank Economic Review to have slightly more significant effect sizes than others.

In Table 2 the above variables have been summarised together with their mean and standard deviations. The binary variables include the noise that was artificially generated to create invertible matrices. The coding of the variables is as per MAER-Net's recommendations of Stanley et. al. (2013). For a copy of our dataset , please refer to our csv attachment named 'Rdata'.

Table 2. Meta Regression Variable Definitions

Statistic	Definition	N	Mean	St. Dev.	Min	Pctl(25)	Pctl(75)	Max
Total.Consumption	= 1 if included in the study	41	0.252	0.446	−0.196	−0.040	0.200	1.132
Duration	= duration of study in months	39	29.723	20.947	5.844	12.088	36.163	108.044
Cash	= 1 if included in the study	40	0.339	0.464	−0.184	−0.024	0.852	1.185
Rural_urban	= 1 if included in the study	41	0.200	0.472	−0.199	−0.115	0.168	1.190
Wealth	= 1 if included in the study	41	0.825	0.392	−0.173	0.825	1.077	1.197
Age	= 1 if included in the study	40	0.755	0.468	−0.175	0.637	1.114	1.195
Food.Diversity	= 1 if included in the study	40	0.479	0.518	−0.168	0.012	1.046	1.198
Head.Education	= 1 if included in the study	40	0.862	0.350	−0.183	0.854	1.079	1.161
Head.Gender	= 1 if included in the study	40	0.936	0.293	−0.134	0.884	1.092	1.193
Geographical.FE	= 1 if included in the study	40	0.492	0.480	−0.197	0.070	0.983	1.178
Markets	= 1 if included in the study	41	0.161	0.393	−0.196	−0.071	0.172	1.160
Cash_percent	= cash as a percentage of total consumption	37	0.204	0.251	−0.008	0.096	0.202	1.004
Published	= 1 if included in the study	41	0.862	0.378	−0.164	0.825	1.119	1.191
Frequency	=number of transfers per year	33	10.217	3.294	0.652	10.990	11.892	12.923
School.CT	= 1 if conditioned on school attendance	41	0.802	0.368	−0.112	0.821	1.055	1.172
Awareness.CT	= 1 if conditioned on awareness workshop attendance	41	0.756	0.445	−0.197	0.816	1.042	1.180
Women.Targeted	= 1 if women targeted in the study	41	0.306	0.493	−0.194	−0.022	0.851	1.186
n	=number of observations	41	6,663.763	4,751.545	1,053.123	4,261.446	7,321.479	26,598.860
d	= effect size	41	0.040	0.059	−0.214	0.018	0.066	0.144

5 MRA RESULTS

The MRA addresses our second question: What factors explain the heterogeneity in the reported effect sizes? The MRA results are summarised in Table 3. We use inverse variance of the effect sizes as weights for all estimates in order to place greater emphasis on more precise estimates as suggested by Hedges and Olkin (1985). We also cluster standard errors by study to correct standard errors from dependence arising from the same study.

Column 1 reports Stanley's (2008) FAT-PET test results where the coefficient for standard errors is significantly different from 0, suggesting a strong publication bias, as expected from the previous section. In column 2, we add program characteristics such as *Cash_percent*, *Duration*, *Frequency*, *School.CT*, *Awareness.CT* and *Women.Targeted* in order to test whether these differential program characteristics have differential impact. Column 3 adds study characteristics such as *Total.Consumption*, *Rural_urban*, *Wealth*, *Age*, *Food.Diversity*, *Head.Education*, *Head.Gender*, *Geographical.FE*, *Markets* and *Published*. In column 4, we use robust estimates.

Because of our small sample size, all results found can only hint at probable relationships at best. Therefore, we avoid making any conclusive remarks and instead use a more practical interpretation of coefficients.

1. *Impact of Cash Value*: The variable Cash_percent seems to have a large positive effect on on food consumption. This is intuitively sensible as larger sums of money will lead to an income effect. It also demonstrates that most of the studies samples here targeted undernourished households who would spend more, on average, on food, if given more cash.

2. *Impact of duration and frequency of cash transfers*: Counter-intuitively the duration and frequency of transfers has a mixed-small negative effect on the size of the increase in food consumption. One reason for this could be poor implementation whereby over time the program implementation weakens and transfers are missed, and then given out in lumps, or sometimes cancelled as was the case in Mexico (Hoddinott, 2004). This could demotivate target households. However, the effect is very small in magnitude and requires an augmented dataset for further analysis.

3. *Basis of Conditional Cash Transfer(CCT)*: Both *School.CT* and *Awareness.CT* have a positive effect on food consumption, the effect being slightly larger for the latter value. While both modes of conditionalities of cash transfer are effect, the results suggest that awareness workshops are particularly helpful in this regard.

Table 3. Meta Regression Results

	Dependent variable:			
	d			
	OLS			*coefficient test*
	(1)	(2)	(3)	(4)
Cash_percent		0.029	0.106	0.194***
		(0.176)	(0.342)	(0.0003)
Duration		0.0003	−0.0004	−0.001***
		(0.0004)	(0.001)	(0.00000)
Frequency		−0.003	−0.005	−0.004***
		(0.002)	(0.007)	(0.00001)
School.CT		−0.032	−0.045	0.009***
		(0.028)	(0.049)	(0.0001)
Awareness.CT		0.046*	0.049	0.064***
		(0.024)	(0.031)	(0.00002)
Women.Targeted		0.005	0.012	−0.005***
		(0.019)	(0.043)	(0.00004)
Total.Consumption			−0.021	−0.017***
			(0.015)	(0.00001)
Rural_urban			−0.005	−0.007***
			(0.027)	(0.00002)
Wealth			0.012	0.015***
			(0.024)	(0.00002)
Age			−0.002	0.007***
			(0.035)	(0.00001)
Food.Diversity			−0.003	0.014***
			(0.043)	(0.00005)
Head.Education			−0.007	−0.031***
			(0.052)	(0.0001)
Head.Gender			0.004	−0.006***
			(0.043)	(0.0001)
Geographical.FE			−0.015	−0.032***
			(0.013)	(0.00001)
Markets			−0.025	−0.006***
			(0.045)	(0.0001)
Published			−0.020	−0.039***
			(0.027)	(0.00002)
d_sd	1.185*	1.827	2.131	3.365***
	(0.619)	(1.156)	(1.571)	(0.003)
Constant	0.007	−0.011	0.039	−0.022***
	(0.016)	(0.051)	(0.186)	(0.0002)
Observations	41	28	28	
R^2	0.086	0.673	0.828	
Adjusted R^2	0.062	0.559	0.535	
Residual Std. Error	1.310 (df = 39)	0.594 (df = 20)	0.610 (df = 10)	
F Statistic	3.665* (df = 1; 39)	5.883*** (df = 7; 20)	2.827** (df = 17; 10)	
Note:				*p<0.1; **p<0.05; ***p<0.01

4. *Econometric Specification*: In general including measures of *Total.Consumption, Rural_urban, Head.Education, Head.Gender, Geographical.FE, Markets* and *Published* tends to depress the effect size slightly. The only exceptions are *Wealth, Age* and *Food.Diversity* which show a significantly positive effect. All these variables have statistically significant coefficients and influence the partial correlation between the treatment effect and food consumption. They should therefore be included in any future study exploring the same.

5. *Average Effect of CCTs on Food Consumption*: Using these MRA coefficients we derive an estimates of the overall effect of 4%, similar to the previous section. This should be interpreted with caution, as not all studies reported the above coefficients and therefore the dataset contains many missing values.

The small study size prevents any meaningful predictions of the effect size using observed coefficients. However, together these variables do explain a majority (over 82%) of the variation observed in effect sizes.

6 CONCLUSION

This meta-analysis raises important questions about the effect of conditional food transfers and gives pointers for future analysis. On average, conditional cash transfers seem to increase food consumption by 4%, a more conservative estimate than that claimed by many of the studies in the sample.

Moving past conventional effect-size meta-analysis, which could readily give false positives (Stanley, 2019), the present analysis also points at variables which could explain the difference in observed effect sizes. In particular, the duration, frequency, and monetary scope of the program matter in the success of the program.

Any future analysis should control for geographical fixed effects. The demographic characteristics of the household head are also of crucial importance to the success of the program. Mandatory nutritional awareness workshops seem to be very effective tools of behavior change, nudging participants to invest more in their health. We now have a replicable framework to evaluate future research, which is one of the aims of meta-analysis (Stanley, 2001).

7 LIMITATIONS AND AREAS OF FURTHER RESEARCH

The present meta-analysis faces several limitations. The cash transfer sizes are hardly comparable as most studies report dollar amounts and the percentage that these dollar amounts make up of the total consumption of the control group, while in reality, the purchasing power is not the the same across countries (For example, people cannot buy the same thing using the same amount of money in different countries). This is not sufficient to truly compare the food purchasing power of the households.

Secondly, only one study by Gillian et al. (2014) explores the Engel Law, whereby the share of food in total consumption declines as income increases. This curve is violated in extreme poverty cases, as food expenditure continues to rise with income, increasing in some cases. If the cash transfers are inframarginal (Gillian et al., 2014), i.e., families are already spending enough on food, then they will simply use the cash transfers on other goods. On the other hand, if the transfers are extramarginal, i.e., families are not consuming food in sufficient quantities, then these transfers will increase food consumption. Future studies must capture these dynamics to test whether the behavioral changes that result from nutritional awareness workshops are 'sticky' and lead to an increase in consumption going to food or are merely temporary behaviors.

In the end, we were able to distill out 11 different studies from 9 different CCT programs. The appropriateness of the transfer and program design depends on the geographical, social, economic, and cultural context in which it is implemented (Gentilini, 2016). Robust comparisons are therefore hard to come by. In general, there is not as much literature on the impact of CCT's food consumption compared to outcome variables such as health and income. RCT, being the gold-standard for experiments, should be used more often by researchers to generate the required volume of data to analyze the present question more effectively, with greater comparability. Replication experiments must be published online and actively funded.

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