

**Faculté des bioingénieurs**

# **Do Conditionalities Matter? A Meta-Analysis of Conditional Cash Transfer Programs and Child Nutrition in Latin America**

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## Abstract

This meta-analysis investigates the impact of conditional cash transfer (CCT) program conditionalities on child height-for-age z-scores in Latin America. Two research questions guided the study: whether different conditionalities produce varying effects on child nutrition outcomes, and whether stringent monitoring program design influences program effectiveness. A systematic search identified 22 studies with a total number of 30 observations for inclusion, published between 2003-2023. Results indicate no significant association between the type of conditionalities and child height. This could imply publication bias and thus was inspected accordingly. In addition, the CCTs' impact on child stunting is inconsistent and influenced by various factors, including program design, implementation, and the broader socioeconomic and political context. These findings suggest that while CCTs may influence other child health and development indicators, their impact on child stunting may be more complex and dependent on factors beyond program design.

**Keywords:** Conditional Cash Transfer, Child Nutrition, Latin America, Meta-analysis, HAZ

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## List of Acronyms

CCT	Conditional Cash Transfer
ECLAC	Economic Commission for Latin America and the Caribbean
HAZ	Height-for-Age Z score
RPS	Red de Protección Social
SD	Standard Deviation
SMD	Standardized Mean Difference
WHO	World Health Organization
WLS	Weighted Least Squares

# I. Introduction

## Background of the study

In the recent report of UNICEF and WHO (2023), 148.1 million children under age 5 worldwide still suffer stunting because of malnutrition in the early stage of childhood. Stunting negatively affects a child's attainment of their full possible height and their brain's development to their full cognitive potential. A multidimensional problem such as child malnutrition cannot be sufficiently solved with a single program in isolation, thus social safety nets are introduced to low and low-middle-income countries to combat this. These social safety nets specifically Conditional Cash Transfer (CCT) programs are made to stimulate investments from households towards health, nutrition, and children's education or improving human capital through endorsing the services provided as a condition to receive cash (Ruel, Alderman, & the Maternal and Child Nutrition Study Group, 2013).

Most common conditionalities are health care visits and school attendance. Visits to local clinics increase knowledge and awareness about healthy practices, while school attendance promote access to healthy school meals or educational programs on nutrition (de Groot, Palermo, Handa, Ragno, & Peterman, 2017). While some argue that beneficiaries focus on compliance and not understanding the incentive benefits. Administrative burden – increase demand, lacking in the supply side, which negatively affects the quality of the healthcare supply provided to the CCT program beneficiaries, and the overall population. A study by Manley and Gitter (2013) showed that CCTs have positive impact on child nutrition (decreases stunting) however the effect is small and not statistically significant, also some conditionalities inhibit child growth. This contrasts with a study conducted by de Groot et al (2017) in Sub-Saharan Africa where there is an overall positive impact on child nutrition, but only specific conditions attached to the cash transfers can influence their effectiveness. This calls for a recommendation to have more research intending to understand the mechanisms by which conditions impact child nutrition.

Systematic reviews such as Manley, et al., (2020) and Onwuchekwa, Verdonck, & Marchal (2021) used meta-analysis to disseminate and collectively assess studies relating to the impact of CCT on child health and health services.

Synthesizing evidence from multiple studies gives a more comprehensive picture of the overall effect. Conclusions that are more universal to other CCT programs can be drawn. Investigating Effect Sizes in Meta-analysis can provide robust estimate of CCT average impact on child nutrition. Meta-analysis also helps identify patterns and potential inconsistencies as studies on CCTs might report mixed findings. With this method, the characteristics of CCT programs such as its design features, the socio-economic contexts, or methodological differences that might influence the observed effects can be further explored. In this study, meta-analysis will be used to assess the impact of a component of CCT programs, that is the conditionalities required by these programs to their beneficiaries, on child nutrition anthropometric outcome in Latin America.

## Significance of the study

The prevalence of childhood stunting in Latin America decreased 23% in 1990 to 10% in 2020 (Montenegro, et al., 2022). A factor to this huge decrease is from the intended effects of CCT programs in the region such as Mexico's PROGRESA and Red de Protección Social (RPS) in Nicaragua (Hoddinott & Bassett, 2009). Investigating the effectiveness of a CCT program design will provide clearer insights into how to optimize CCT program design that can result to maximizing their impact on child nutrition in Latin America. Additionally, this research is crucial because even though the region has seen a significant decline in stunting, disparities likely persist within and between countries. Understanding which program features are most effective can inform policy decisions and resource allocation to ensure all children benefit from improved nutrition.

## Objectives of the study

The main objective of this study was to analyze the differences and the effect of different conditionalities associated to the CCT programs in Latin America on child nutrition. It will specifically investigate and attempt to answer the following research questions:

Research Question 1: Is there a difference in the effectiveness of different conditionalities in improving child nutrition anthropometric outcomes?

Research Question 2: Do CCT programs with more flexible approaches to fulfilling conditionalities (e.g., alternative ways to demonstrate healthcare attendance) have a similar effect on child height-for-height Z-scores compared to programs with stricter requirements in Latin America?

## Scope

The study only investigated the conditional cash transfer programs in Latin America on their impact on child nutritional anthropometric outcomes. This includes 12 CCT programs from 9 countries in Latin America (The number of programs and countries involved depended on the studies found during data collection).

This research was focused on the effects of the conditionalities on child nutritional anthropometric outcome specifically on Height-for-age of children under 5 years old. This is in accordance with the WHO (2008) Child Growth Standards in interpreting growth indicators to identify stunting or whether a child is underweight or extremely underweight.

The region Latin America was chosen for this study since the trend of establishing CCT programs is pioneered by Mexico's influential implementation of Progres a or OPPORTUNIDADES. As such, other low and medium-low income countries have their CCT programs inspired by the OPPORTUNIDADES. Furthermore, focusing on a single region allows for more comparability and more controlled in-depth analysis that can contribute valuable insights to policymakers within the region.

## II. Review of Related Literature

The impact of Conditional Cash Transfer programs has been extensively researched throughout its years of implementation. Although much of research indicates positive effects on specific nutritional outcomes, the broader or long-term impact of these programs on overall outcomes remains inconclusive. Thus, a need for more thorough study is needed to investigate the effects of CCTs on child nutrition.

This chapter provides a general idea of CCT programs, and their design features proceeded by the conceptual framework on the impact pathways of CCT design features affecting child nutrition. Furthermore, a summary of the findings from systematic reviews and related meta-analysis to understand the mechanisms of the program influencing the outcomes on child nutrition.

### CCT Programs and Their Design Features

The popularity of CCT programs began in 1990s with Mexico's Progresa and Brazil's Bolsa Escola where this type of social assistance was seen as a new approach promising to combat poverty and to foster social inclusion in the idea of linking cash to behavior through providing money. By 2011, CCT programs have been adopted by 17 countries (see Figure 1) in total in the region alone reaching about 129 million beneficiaries (Stampini & Tornarolli, 2012; Gonnet, 2020). Most countries over the years have maintained the programs, however, have changed some of its features.



*Figure 1. Conditional Cash Transfer programs in Latin America (1990-2010) with starting years indicated in the brackets*

Source: Gonnet (2020)

During this period, targeting quality and program coverage were increased such as the selection of beneficiaries to provide leakage or keeping out the non-poor beneficiaries. Leakage to non-poor reduces the effectiveness of the program for poverty reduction and development of human capital which however can be limited through good program design.

Good CCT program design requires good beneficiary targeting. CCT program beneficiaries are usually targeted through geography and household level. In Jamaica, poverty incidence data by collecting annual consumption is used to identify poor households, in Mexico, they identify their beneficiaries using a census data in the community level, while in Honduras, they use height data of first grade school children providing level of malnutrition in the municipality level (Rawlings & Rubio, 2003). A well-developed targeting mechanism depends on the local context of the region, such as when communities have different conception of poverty, and thus needs to be applied with caution (Stoeffler, Mills, & del Ninno, 2016). However, even with a comprehensive strategy in targeting, increasing the use of education and health services cannot only be boosted by the cash component of the program alone (Fiszbein & Schady, 2009). CCT programs are known to be effective in increasing

the use of health (Lagarde, Haines, & Palmer, 2009) and education services (Barham, Maluccio, & Macours, 2024) due to their conditionalities. Conversely, the conditions are important at least if the purpose of a program is to increase the level of school enrollment and the use of preventative health care.

According to Das, Do, and Özler (2005), conditionalities in cash transfer programs are a feature of CCT programs to force individuals to take action they do not normally do on their own. Conditions usually take into form of education and health such as attending counseling sessions providing mothers knowledge about caring and feeding practices to induce changes in household preferences for better diets, allocation of resources in favor of the children. Another type of condition is for a parent to visit health care facilities and/or vaccinations for their children which can lead to reducing instances of child illnesses and improving nutrition. School attendance is another requirement of a CCT program that is usually associated to the long-term objective of the program on increasing the quality of human capital.

Aside from checking beneficiaries' compliance, conditionalities are also used as a form of monitoring for complex outcomes. With the requirement of visiting health centers periodically, this gives incentives for the administration to observe children's health such as height and weight (Rawlings & Rubio, 2003). Similarly, when attending school, a child's cognitive skills are indirectly monitored on the basis of the country's educational system (Barham, Maluccio, & Macours, 2024).

## Conceptual framework

The research questions of this study delve around the program conditions required by the CCT and their impact on child nutrition. To investigate mechanics by which CCT might affect health outcomes for children under-five, Leroy, Ruel, & Verhofstadt (2009) illustrated in Figure 2 their impact pathway model.

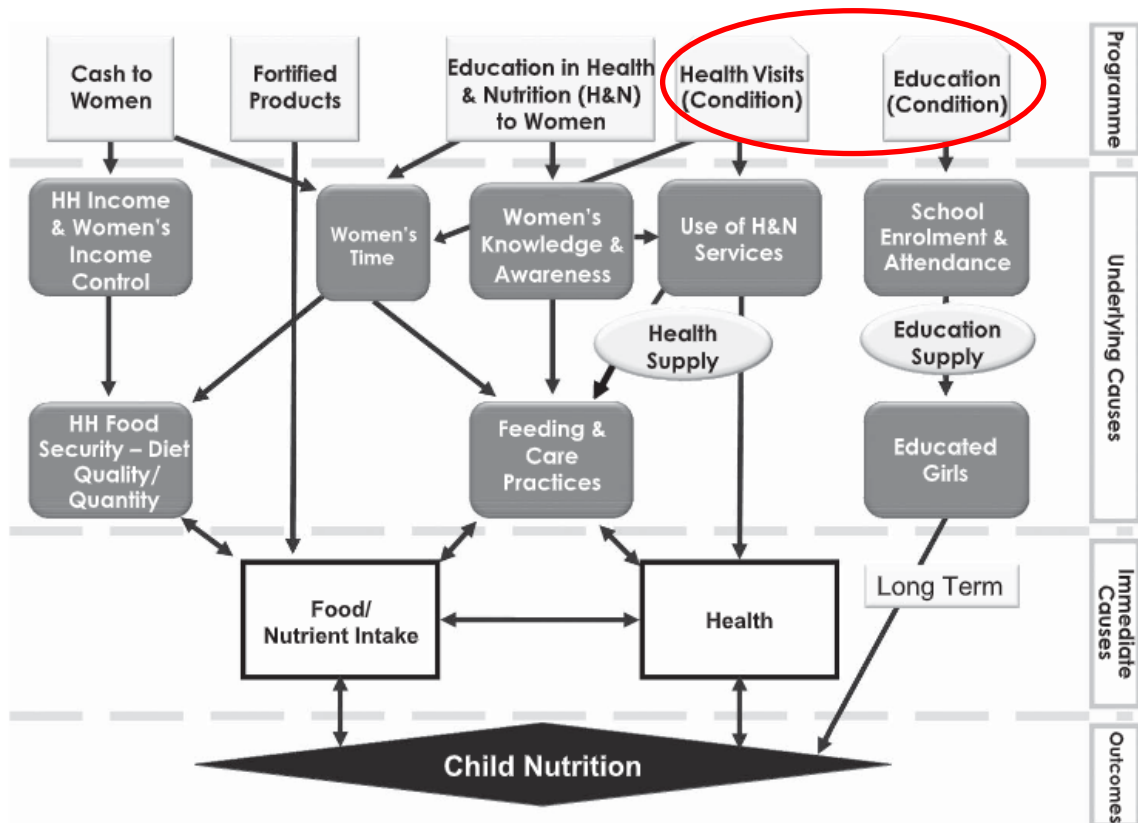


Figure 2. Mechanisms by which CCT Programs might affect nutritional status. HH = Household

Source: Leroy, Ruel, & Verhofstadt (2009)

As shown in Figure 2, on the upper leftmost part, CCT programs direct recipient is usually women as part of its target strategy. This design grants the woman in the household to take control over the resources relative to child nutrition and health, which is found on the underlying causes part of the model. With the CCTs' aim to increase income of the beneficiary households, the beneficiaries are allowed to purchase more food and with higher diet quality thus resulting to an impact on the child nutrition outcome. If a CCT program also includes providing fortified food products or supplements, then this program feature directly flows to the immediate causes on food/nutrient intake which then affects child nutrition. Another common CCT program design is educating women on health and nutrition, such that women in the household, usually mothers, are encouraged or required to attend seminars on nutrition and health. With that, women's knowledge and awareness on

feeding and care practices increases that immediately impacts food/nutrient intake and general health for child nutrition.

This model pathway includes the CCTs' common conditionalities: Education and Health Visits, and through its underlying and intermediate causes such as the school enrolment & attendance, and use of health & nutrition services and complimented by supply on education and health, respectively, influence child nutrition. This research focuses on the CCT program conditionalities, investigating how they differ on their impacts on the anthropometric measures of children under-5 as well as the intensity or strictness on its implementation.

According to Leroy, Ruel, & Verhofstadt (2009), the programme condition requiring program participants to follow a schedule of regular health-care visits, or vaccination may reduce child illnesses which in turn increases the use of Health and Nutrition Services and thus likely to have a direct impact on improving children's nutritional status. However, this program condition may also have negative effect on women's time especially when they have to travel long distances (de Groot, Palermo, Handa, Ragno, & Peterman, 2017) thus affecting the "Women's time," one of the mechanisms on the model's underlying cause. The education condition that specifically requires participants to enroll and maintain school attendance (around 85%) can have long term, intergeneration effects. Additionally, good nutrition in early childhood may improve cognitive development and educational attainment which leads to higher productivity at adulthood.

## Existing evidence on the impact of CCT on Child Nutrition

### i. The impact of the cash transfer programs

A systematic review of the long-term impact of CCTs on children in Latin America by Molina-Milan et al. (2016) assessed the experimental and non-experimental impact evaluations on three CCT programs: Mexico's Progresa, Nicaragua's Red de Proteccion Social (RPS), and Colombia's Familias en Accion. Despite having consistent significant positive impacts from experimental literature on schooling and cognitive skills, the evidence for significant positive impact on anthropometric measures was found inconclusive. In Nicaragua's RPS, insignificant long-term effects on anthropometrics are consistent even though there are positive short-term absolute effects as reported by (Maluccio & Flores, 2005). The opposite is

observed in Columbia where a study conducted by García, Romero, Attanasio, and Pellerano (2012) found positive and significant impacts of exposure for children under-5 years of age on anthropometric measures.

In Sub-Saharan Africa, a systematic review by Onwuchekwa, Verdonck, and Marchal (2021) on the impact of CCTs on child health suggested that CCT can improve household and childhood diet quality by augmenting household income. However their review also reported that there is inconsistent evidence for an association between CCT and improved childhood nutrition based on anthropometric measurement. Possible reasons for this according to the authors are the weaker health systems in Sub-Saharan Africa compared to Latin America, as well as that the conditions are considered not too strict in many programs and that no penalties enforced for noncompliance.

## ii. Impact of conditionalities on Child Nutrition

A review conducted by Lagarde, Haines, and Palmer (2009) showed that the relative size of the effects of CCT programs is linked to the nature and types of requirements to be complied. Some of the programs required the beneficiaries to attend nutrition and health education workshops, which is likely to have an impact influencing health outcomes of those who attended. Moreover, the quality and availability of the health services are also a pre-requisite to the success of a CCT. Beneficiary households tend to avoid health services due to their poor quality, and perhaps even to encourage the use of these services through financial incentives would not be sufficient.

On the aspect of the education conditionality, Gitter, Manely & Barham (2013) developed a theoretical household model demonstrating how CCTs' educational requirements affect nutritional status of children. Intriguingly, they found that there are trade-offs between investment in education and early childhood nutrition. When older children do not attend school, they generate labor earnings or participate in childcare. Their study recommended increasing the transfer amount enough to cover the supposed earnings of the older children attending school.

In summary, the related literature above found that CCTs have showed positive effect on targeted behavioral changes that is improving health-seeking

behaviors, educational enrollment, vaccinations and other specified conditions. There are studies that have reported significantly positive impacts on anthropometric measures, however mostly in the short-term. On the other note, evidence for the long-term impact of CCTs on anthropometric measures is inconsistent and insignificant or mixed results are found. The impact of conditionalities on child nutrition is complex and varies across programs. While some programs with stricter conditionalities and additional support services like nutrition education have shown positive effects, others have not. Moreover, the effectiveness of CCTs is influenced by broader contextual factors, such as the quality of health services and the overall socioeconomic environment.

While CCTs have shown promise in improving certain aspects of child nutrition and related behaviors, their impact on child height and overall nutritional status is more complex and varies across different contexts. Further research is encouraged to better understand the mechanisms through which CCTs work and to identify the optimal program design for maximizing their effectiveness on child nutrition outcomes, and thus is the objective of this meta-analysis would like to achieve.

This study used the height-for-age z scores as an indicator of the impact of conditionalities of the programs. Height-for-age z-score is a measurement that expresses a child's height relative to the median height of other children of the same age and sex (World Health Organization, 2008). A positive HAZ or scores above 0 means the child is taller than average while negative indicates that a child is shorter than average. The threshold standardized by WHO is the HAZ score -2, if child's height falls more than two standard deviations below the median for their age group, it means stunting.

Various systematic reviews and meta-analysis relating to the impact of CCTs showed that heterogeneity in findings across studies is highly possible due to the differences between program design and impact evaluation methods used of each study (Lagarde, Haines, & Palmer, 2009; Molina-Milan, Barham, Macours, Maluccio, & Stampini, 2016; Manley, Alderman, & Gentilini, 2022; García & Saavedra, 2017). Thus, having high heterogeneity is likely to be seen in the results of this meta-analysis.

### III. Methodology

In this meta-analysis, the following criteria for study inclusion were implemented to complete the database:

- Quantitative estimates of the effect of a CCT program (z-scores according to WHO Standards), this includes national and subnational, government and non-government, in both development and humanitarian context, on child health or nutrition outcomes for children, with data sufficient to identify not only average program effects but also marginal effects with standard errors
- Studies based on clear counterfactuals: control groups
- Studies with sample sizes of at least 300
- Analysis of primary outcomes are limited to those examining children under the age of 60 months or 5 years old, and to those that include nutritional outcomes in anthropometric measures, specifically: height-for-age z-score (HAZ)

#### Data collection:

- Using the World Bank's Conditional Cash transfers Country Overview, and Economic Commission for Latin America and the Caribbean (ECLAC), retrieving CCT programs in Latin America
- Using various academic search engines through broad terms: “[Name of the Conditional Cash Transfer Program]” “child nutrition” “[Name of Latin American Country]” in English and Spanish translation
- Through snowballing method, references are identified through one key resource to another
- Articles published from 2003 to 2023 were used.

#### On data extraction, the following information are built:

- |  |                                     |
|--|-------------------------------------|
| ➤ Name of authors and year published               | ➤ If the document was peer-reviewed |
| ➤ Study Location                                   | ➤ Method used                       |
| ➤ Name of CCT program                              | ➤ Sample size                       |
| ➤ Program characteristics including conditionality | ➤ Outcome tracked: HAZ              |
|  | ➤ Years tracked                     |

- Baseline stunting rate
- Program effects in z-score
- Standard Error and p-values per outcome
- Notes on the CCT Program by the author

## Quality Assessment:

The studies found have undergone a quality assessment developed by Onwuchekwa, Verdonck, & Marchal (2021). Although this assessment was not purposely constructed to assign quality score to studies, this research will attempt to categorize the studies on its quality and provide an overview of the quality assessment. The elements and questions designed by Onwuchekwa et al. (2021) are presented in Figure 3.

Element	Question asked
Study method	Was the study method appropriate to the question the study set out to answer?
Sample size	Was the sample size measured prospectively? Was sample size justified?
Outcome assessment	Were outcome assessors blinded to the allocation of the respondent?
Randomisation	Did any event occur during conduct of the study that could have compromised randomisation? (include contamination)
Outcome measurement	Were all outcomes measured in a valid or objective way?
Analysis	Was the analysis appropriate? (include control for confounding, appropriate consideration for time trend)
Adequate comparison	Were the groups comparable at baseline?
Attrition or loss to follow-up	Was loss to follow-up or attrition significant? (more than 5%) Was loss to follow-up or attrition different between groups?
Conflict of interest	Was there potential conflict of interest between authors or sponsors and the CCT implementing institution?

*Figure 3. Elements of the quality assessment instrument designed by Onwuchekwa et al. (2021)*

## For the Statistical Analysis

To analyze the association between different types of conditionalities and their impact on the anthropometric outcome (HAZ) within each study, the Fisher test was used. This test is suitable for analyzing data in contingency tables, particularly when dealing with small sample sizes or low expected values in the table cells (Ufondu, et al., 2023).

## Meta-analysis Approach

For each comparison of conditionalities (e.g., healthcare attendance vs. school attendance), the p-values are combined from individual studies using Fisher's method to assess the overall evidence for a statistically significant difference in the prevalence of the chosen anthropometric outcome between the compared groups. Then, random effects meta-regression models with only one effect estimate (mean) as a function of program conditionalities are estimated (Harrer, Cuijpers, Furukawa, & Ebert, 2021).

## Publication Bias Assessment

Publication bias was assessed using methods like funnel plots to evaluate the potential for studies with statistically significant results to be more likely published.

## Data Analysis Software

The statistical software R was used to conduct the Fisher's exact tests, and random effects meta-regression.

## IV. Results and Discussion

### Description of Studies and Quality

There were 249 records retrieved after implementing the search string. Once duplicates were removed, 49 studies were left. On the phase of screening and exclusion, 14 studies did not use HAZ as measurement for the nutritional outcome and were not peer-reviewed. Out of the 35 studies assessed for eligibility, 13 were removed since they did not detail counterfactual nor standard errors (see Figure 4 for a diagram selection flow). Thus, a total of 22 studies reporting 30 total observations are included in the meta-analysis. Table A1 in the appendix summarizes the key characteristics of the included studies. Furthermore, the studies included, or at least every new article found have referenced the studies that are used in this study which could imply a full sample.

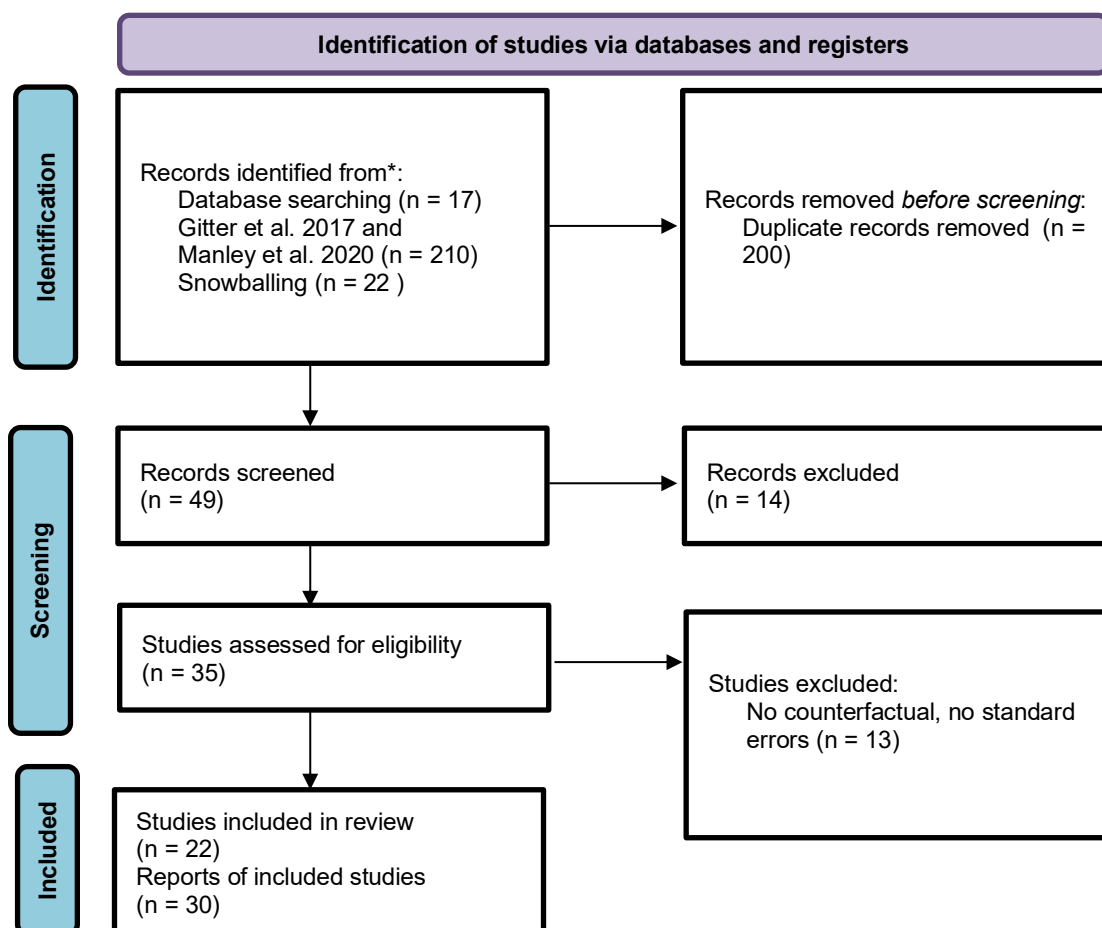


Figure 4. Prisma Flow Diagram

Listed in Table 1 are the results of the quality assessments for the 22 studies included in this study. About half of the included studies used Difference-in-Difference, five studies used Propensity Score Matching approaches, and two studies used a regression discontinuity approach. Three studies used other approaches such as Nearest Neighbor Matching, Pooled OLS, and Targeted Maximum Likelihood Estimation. Even though blinding of participants is difficult in CCTs, one study (Maluccio & Flores, 2004) mentioned a single-blind where the participants are unaware of their group assignment. The studies of Fernald & Hidrobo (2011) and Lowes (2007) mentioned that there was very little contamination of the intervention, not significant enough to impact the outcome of the study. Moreover, 18 out of 22 studies did not address the possibility of contamination by the CCT on control groups.

**Table 1. Components of Quality Assessment**

<b>Subject</b>	<b>Question</b>	<b>Studies by Category</b>
Study Method	Was the method appropriate to the question the study set out to answer?	DD = 12, PSM = 5, RDD = 2, NNM = 1, POLS = 1, TMLE = 1
Sample Size	Was the sample size measured prospectively? How large is the sample size per report? The sample is realized as large or small depending on its effect size.	Large = 7 Medium = 3 Small = 20
Outcome assessment	Were outcome assessors blinded to the allocation of the respondent?	Yes = 0, Unclear = 22
Analysis	Are there any contamination or event that might have affected the randomization of the study?	None = 2, Little = 2 Unclear = 18
Adequate comparison	Were the groups comparable at baseline?	Yes = 22, No = 0
Attrition or loss of follow-up	Was loss to follow-up or attrition significant?	Yes = 0, No = 22
Conflict of Interest	Was there potential conflict of interest between the authors or sponsors and the CCT implementing institutions?	Yes = 0, No = 22

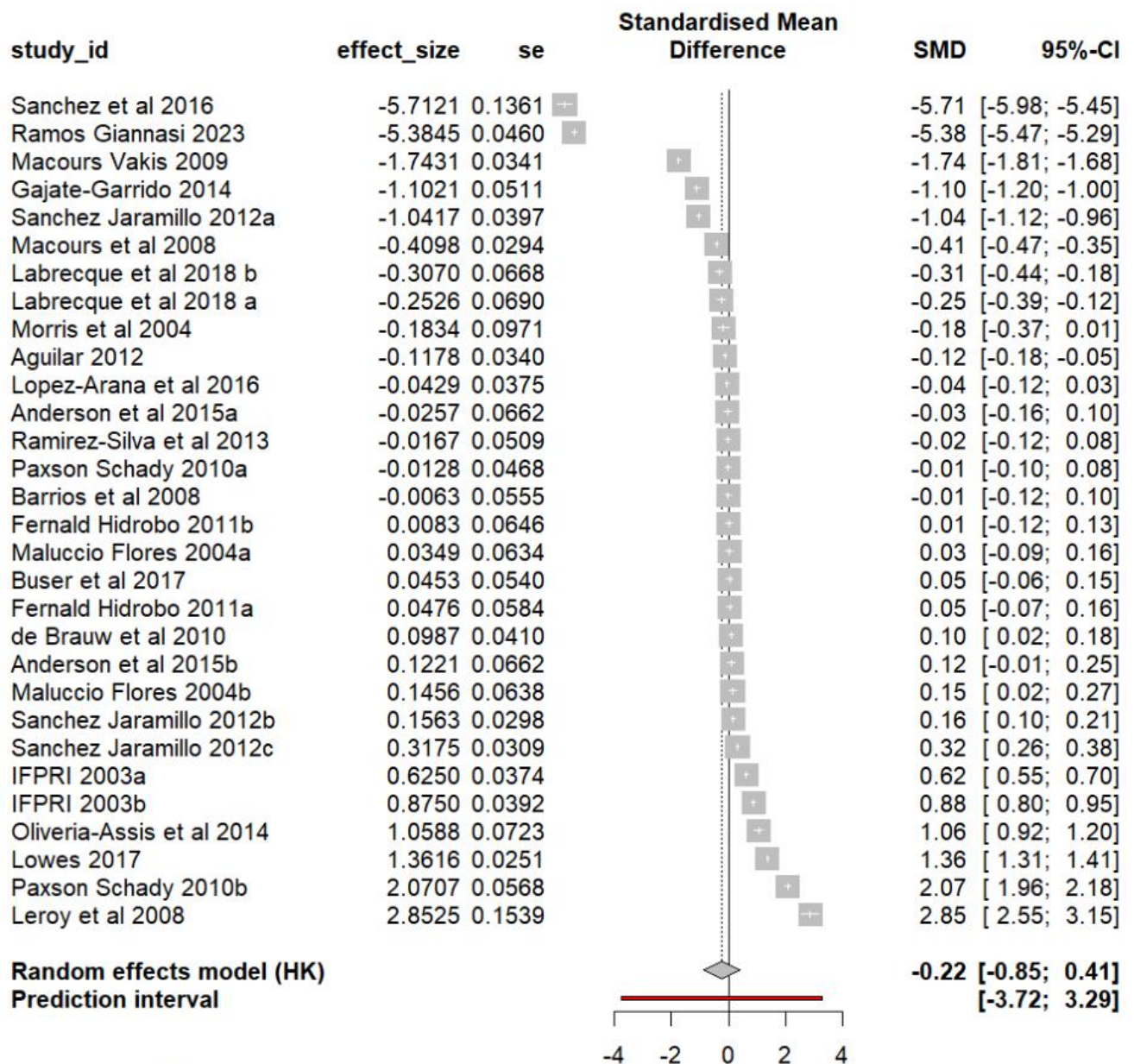
Despite the limitations mentioned above, the combined evidence is considered reasonably reliable. Notably, all studies clearly explained their causal identification strategy, ensuring comparability at baseline, and controlled differential attrition when present.

## Baseline results

For the baseline results, presented on Figure 5 is the forest plot to visualize the results of a meta-analysis which includes the observed effects, weight and confidence interval of each study. On the left side, the studies reviewed are named with their specific id according to the name of its authors and year published, and if the study has multiple years of observation, it bears an additional letter for differentiation. The study ids are listed corresponding to their effect size in ascending matter. Graphical representation of the effect size is shown in the middle which shows point estimates of the studies on the x-axis. Every point estimate is surrounded by a square, in different sizes that represents the size of the weight: studies with larger weight are given a larger square, whereas if it has smaller weight then it has smaller square. The diamond at the bottom represents the average effect and its length symbolizes the confidence interval of the pooled result on the x-axis. The vertical dotted line crossing most of the squares is a reference line indicating the point on the x-axis equal to no effect.

In Figure 5, effect sizes were aggregated across reports using a random effects model. The average overall effect size, as indicated by a black diamond at the bottom, is 0.22 Standard deviations (SDs) in the composite of HAZ measures (95% CI: -0.85, 0.41; given by the width of the diamond).

Heterogeneity, as calculated by the  $I^2$  index, is extremely high and that there is too much variation between studies. To account for the impact of this substantial heterogeneity, a 95% predicted interval is calculated. The estimated 95% prediction interval, given by the dashed line bisecting the black diamond in Figure 5, suggests that 95% of similar future studies would be expected to fall between -3.72 and 3.29 SDs in the composite of HAZ measures.



**Figure 5. Forest Plot**

To further investigate the heterogeneity or the excessive variation between studies, a funnel plot is shown in Figure 6. Funnel plots visualize the distribution of study results, inspecting the small study effects. The x-axis represents the effect size of each study, presented with dots, while the y-axis indicates the study's precision (standard error). Importantly, the y-axis is reversed, so studies, with smaller standard errors (higher precision) appear closer to the top of the plot (Harrer, Cuijpers,

Furukawa, & Ebert, 2021). If there is no publication bias, the data points should form an almost symmetrical, an inverted funnel. On the top part of the plot, studies must be found closely together, should not be scattered away from the pooled effect size. The opposite must be observed on the lower area of the plot, the studies must be further away from each other either to the left or right of the pooled effect, since they have increasing standard errors.

The funnel plot in Figure 6 presents the standard errors plotted against effect size, and the mean effect is shown as a gray dotted vertical line. The funnel plot is asymmetrical with few studies on one side which might indicate publication bias.

Having fewer studies on the left suggests a potential bias towards publishing studies with statistically significant or larger effects. This could inflate the overall effect size estimate in the meta-analysis. An Egger's regression test was used to quantitatively regress the standard error on the effect size. The test did not reflect the null of the funnel plot symmetry ( $p = 0.473$ ), supporting the interpretation of the plot in Figure 5.

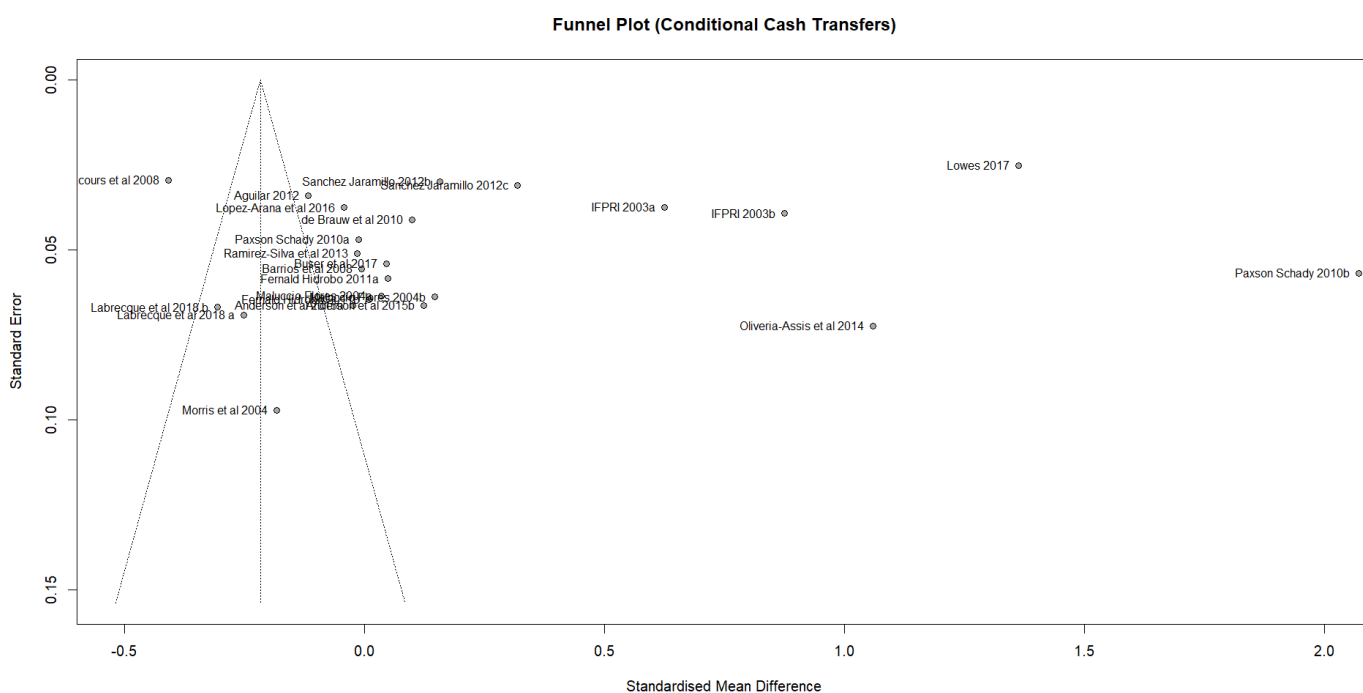


Figure 6. Funnel Plot

## Publication Bias

The problem of publication bias could be resulted from various difficulties in conducting program evaluations of CCT effectiveness on health outcome especially when an impact evaluation is performed even when a CCT program is relatively recent. Even when a program is created years ago and program administrators were more interested in evaluating the current incarnation of the program instead of evaluating some earlier version that perhaps was run by a previous administration (Fiszbein & Schady, 2009).

On one hand, some of the studies (Sanchez et al., 2016; Ramos & Giannasi, 2023) shown huge negative effect size, perhaps due to their large sample size as both reported that CCT programs, Peru's Juntos and Argentina's Asignación universal por hijo, respectively, do not have an impact on children's height-for-age and stunting. On the other, studies by Leroy et al. (2008) and Paxson & Schady (2010) that showed high positive effect size which means that Mexico's Progresa and Ecuador's Bono de Desarrollo Humano have significantly positive impact or that it improves the height of children under-5. Having results that either show very big positive impact or no impact could be influenced by who supports the study which indicates publication bias and selective reporting (Saavedra & Garcia, 2012)

There are also the practical difficulties as when collecting CCT-treated and control households many years after the collection of the database data such as possibility of changing on the status of beneficiaries from becoming control to treated or vice versa. Attrition rates may be unacceptably high and not reported, thus resulting to problematic estimation bias.

## Meta Regression and Moderator Analysis

As shown in Table 2, four models were tested with different weighting arrangements: (1) No Weights, (2) Weighted by Sample Size, (3) Weighted by Standard Error, (4) Weighted Least Squares (WLS). None of the models show statistically significant intercept estimates, indicating no significant baseline effects. The education condition variable shows a marginally significant positive effect in

Model (2) but is not significant in other models, holding other factors constant. The health variable does not show significant effects in any of the models.

**Table 2. Main Results**

		<i>Dependent Variable:</i>							
		Effect Size ( $y_i$ )							
		(1)		(2)		(3)		(4)	
Term		Estimate	p-value	Estimate	p-value	Estimate	p-value	Estimate	p-value
Intercept		-0.536	0.6875	-1.2612	0.4136	0.0442	0.9755	-7.3314	0.5666
		(1.3344)		(1.5426)		(1.4413)		(12.7930)	
Education		0.9794	0.1210	1.3719	0.0788	0.5716	0.4525	0.5850	0.2149
		(0.6288)		(0.7804)		(0.7607)		(0.4717)	
Health		-0.2153	0.8642	0.5754	0.6919	-0.4683	0.7268	-0.1306	0.8351
		(1.2582)		(1.4520)		(1.3406)		(0.6272)	
Number of reports		30		30		30		30	

This means that despite the mixed results from individual experimental studies on the impact of CCT programs on child's nutrition, this meta-analysis proves that conditionalities have no influence on the outcomes of children's nutrition specifically on height. A possible reason for this, as discussed by some reports and articles (Fiszbein & Schady, 2009; Gopalan, et al., 2014) are implementations issues on the duration of the program, such as the decrease in quality of services (health and education) due to the sudden rise of demand related to the CCT program that the supply side could not keep up.

Another reason that some of the studies may show no significant effect is because anthropomorphic measurements can take a long time to change, and some impact evaluation only cover a short period (Bastagli, et al., 2016).

The result could also mean that the program conditions and height of children under-5 do not have relationship and cannot be compared. The child nutrition indicator, height-for-age z-score (HAZ), might be questionable to use as a measurement to study the effectiveness of conditionalities of CCTs on child nutrition.

The varying effect between studies show that studying the height of children under-5 to see the effect of CCTs' when a beneficiary complies or not with its conditions can be misleading. Therefore, this measurement should be cautiously used for impact assessments in the future.

The results of this study further shows the lack of studies produced in evaluating the impact of conditional cash transfers in Latin America on child stunting as such that it is still an ongoing concern worldwide. Feasibly, various CCTs have program design differences sub-specific into its conditionalities imposed that make them significantly or insignificantly impactful on child's height, for example the inclusion of supply-side (complimentary) measures of a CCT program. Especially on health services, where with the sudden increase of demand on using health services, and the supply (quality and/or quantity of the service) is not part of the program implementation, the CCT program itself will lead to negative impact (Bastagli, 2011). Lacking on the supply-side funding for services may limit the impact of CCTs in which is a barrier to the long-term impact of cash transfer programs as mentioned by several studies (Owosu-Addo & Cross, 2014; Fernald, Gertler, & Hidrobo, 2012; Ranganathan & Lagarde, 2012). These aspects should be carefully inspected to make comparable results focusing on the CCTs' conditionalities. Furthermore, should further evidence point to the same result as this study, then imposing conditionalities cannot guarantee in improving children's nutrition.

Additionally, this research could contribute to a more comprehensive understanding of CCT programs by examining their broader implications rather than focusing solely on conditionalities and beyond their impact on specific behaviors. The core purposes and causing principles that drive the establishment of CCT programs by governments perhaps should be a relative topic to be investigated. In political behavior studies of Tobias, Sumarto, and Moody (2014), and Baez, Camacho, Conover, and Zarate (2013), they found out that CCT program increases vote shares for legislative candidates from the incumbent president's party, and more than that, it decreases competition among presidential candidates. Their studies present a notion that CCTs are also benefitted by the administering governments for political advantage.

Another perspective that can be looked on with the results of this paper is to inspect further on the underlying rationale that motivates governments in implementing conditional cash transfer program over the unconditional ones. Conditional transfers are favorable in political economy since policy makers tend to view CCTs as more politically acceptable to voters and taxpayers due to its attractive deliverables of health and education (Wong, 2014). Such as in the case of Bolsa Familia where there is a general consensus among analysts that it has been used to strengthen a president's electoral support (Hall, 2012). Aside from getting votes from the country's taxpayers, governments design the program with conditionalities in order to gain support from specific constituents such as international institutions that act as donors. This implies that CCTs can be used for political abuse thus a factor for insignificant impact on its intended outcomes.

## V. Conclusion

Conditional Cash transfer (CCT) programs are one of the most prevalent anti-poverty interventions in the developing world. This study attempts to incorporate quantitatively, the most recent and comprehensive available evidence on the nutritional impacts CCT programs' conditionalities.

In this study, the impact of CCT program conditionalities in Latin America on child's nutrition specifically on physical outcome: height is meta-analyzed using 30 observations from 22 studies evaluating 11 CCT programs across 9 Latin American countries. The interpretation of the empirical findings of this meta-analysis is guided and interpreted through the help of a simple framework provided by Leroy et al. (2009) on the pathway of how CCTs might affect health outcomes for children under-five.

The framework of this study for analysis and data allowed the field of CCT impact evaluation advance the understanding of the interplay between CCT conditionalities and anthropometric outcomes of children under 5 in low and low-middle income countries. Relative to the systematic reviews and meta-analysis, this study has lower number of studies but was carefully tailored to specifically observe the HAZ outcome, which is the first to quantitatively meta-analyze impact of conditionalities for HAZ estimates.

The empirical evidence found in this study validated some theoretically-derived predictions for the relationship between heterogeneity in program conditionalities and heterogeneity in HAZ impact estimates. It was found that, with all else constant, both education and health conditions as required by the program to receive cash has no significant impact with the effect sized in HAZ for children under-5. This finding is consistent with the meta-analysis of Onwuchekwa, Verdonck, & Marchal (2021) but is not consistent with the meta-analysis of Manley, et al. (2020). On explanation for this inconsistency is that Manley, et al. (2020) had a bigger number of CCT programs, wider scope including Asia and Sub-Saharan Africa, and that it investigated the whole program design, not just the conditionalities.

Consistent with Onwuchekwa, Verdonck, & Marchal (2021), however conducted in a different region, this study followed that conception that there is inconclusive evidence on the relationship between these variables. Moreover, neither health conditionality (that is visiting health centers) nor education conditionality (enrolling to and attending school) are associated with height-for-age effect sizes.

Previous narrative reviews (Lagarde, Haines, & Palmer, 2009; Gitter, Manley, & Barham, 2013) also supported the view that program implementations can be a cause of the insignificance where the supply side of the program is lacking, or that there is a trade-off between the school attendance and nutrition.

A novel contribution of this paper is reviewing the indicator HAZ if it is still a fitting indicator for comparison, especially for future meta-analysis. It is important to emphasize that meta-regression results are associations and do not imply causation. There may be other anthropometric outcome indicators (BMI or Weight) that may be suitable to compare conditionalities of the programs. Improving on this domain is also an area of potentially promising future research.

This study additionally raises interesting implication in which it highlights the nuanced impact of CCT programs on child nutrition. While CCTs have demonstrated the capacity to influence targeted behaviors, their effectiveness in improving child height outcomes is ambiguous. The evidence suggests that program design, particularly the inclusion of complementary interventions such as improved health services, is crucial for maximizing the nutritional benefits of CCTs. Furthermore, the role of political factors in shaping program design and implementation cannot be overlooked. Future research should delve deeper into these complexities to carefully inspect the impact of CCT programs on child nutrition.

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## Appendix

Table A.1 Program and Studies Characteristics

Country	Program	Year Started	Year Ended	Education Condition	Health Condition	Brief Citation	Sample Size	Method
Mexico	Opportunidades (Formerly known as Progresas)	1997	2019	Yes	Yes	Leroy et al 2008 Aguilar 2012 Ramirez-Silva et al 2013	3475 432 1601	RDD DD DD
Brazil	Bolsa Familia	2003	Ongoing	Yes	Yes	de Brauw et al 2010 Labrecque et al 2018	2465 983*	PSM TMLE
Brazil	Bolsa Alimentacao	2001	2003	Yes	No	Morris et al 2004 Oliveria-Assis et al 2014	573 1847	DD DD
Ecuador	Bono de Desarrollo Humano	2003	Ongoing	No	Yes	Buser et al 2017 Paxson Schady 2010 Fernald Hidrobo 2011a	1374 2069* 1253*	DD DD DD
Colombia	Familias en Accion	2000	Ongoing	No	Yes	Lopez-Arana et al 2016	2874	DD
Nicaragua	Red de Protección Social - RPS	1999	2006	Yes	Yes	Maluccio Flores 2004 Lowes 2017	995* 7792	DD PSM

Nicaragua	Atencion a crisis	2005	2006	Yes	Yes	Macours et al 2008 Macours Vakis 2009	4710 4736	DD DD
Peru	Juntos	2005	Ongoing	No	Yes	Sanchez Jaramillo 2012 Sanchez et al 2016 Anderson et al 2015 Gajate-Garrido 2014	8976* 1096 960* 1977	DD POLS PSM PSM
Honduras	Programa de Asignación Familiar (PRAF)	1990	2009	Yes	Yes	IFPRI 2003	3001*	DD
Paraguay	Tekoporã	2005	Ongoing	Yes	Yes	Barrios et al 2008	2394	NNM
Argentina	Asignación Universal por Hijo	2009	Ongoing	No	Yes	Ramos Giannasi 2023	8882	PSM

\*Multiple years observed

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