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The impact of conditional cash transfer programmes on child nutrition: a review of evidence using a programme theory framework

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The authors reviewed the evidence regarding the impact of conditional cash transfer (CCT) programmes on child nutrition outcomes, using a programme theory framework. They developed a programme impact model and synthesised evidence regarding the pathways through which CCTs may improve child nutrition. CCT programmes significantly improve child anthropometry but have very little impact on micronutrient status. The programmes also have a positive impact on several of the outcomes in the pathways to improved nutrition. The authors found an enormous gap in knowledge about the mechanisms by which CCT programmes improve nutrition. In order to reach their full potential, the programmes need to have a better defined set of nutrition actions grounded in programme theory.

Keywords: conditional cash transfer programmes; programme theory; child; nutrition; micronutrients; poverty

Introduction

Millions of children worldwide, particularly in low and middle income countries, suffer from nutritional deficiencies affecting their survival, health, development, and well-being (Black *et al.* 2008). The landmark *Lancet Series on Maternal and Child Undernutrition* argues that effective, targeted nutrition interventions exist, and that if implemented at scale during the window of opportunity (pregnancy and up to the child's second birthday), these interventions could reduce undernutrition-related mortality and disease burden by 25 per cent in the short term (Bhutta *et al.* 2008). The targeted nutrition interventions recommended include breastfeeding promotion, behaviour change and communication strategies to improve complementary feeding practices, supplementation and food fortification to improve micronutrient status, health interventions aimed at reducing infectious diseases among infants and young children, and the effective management of severe acute malnutrition. Common to all of these strategies is the fact that they address the immediate causes of childhood undernutrition, that is, inadequate food and nutrient intake, and poor health (UNICEF 1990). The sustainability of these interventions, however, is questionable if they are implemented without simultaneously addressing the key underlying determinants of undernutrition. Childhood undernutrition is rooted in poverty, food insecurity, gender inequity, and lack of access to health and other services. The failure to address the underlying causes of malnutrition – or the global context in which malnutrition occurs – is likely to

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undermine the long-term impacts and sustainability of interventions focusing only on the immediate determinants of undernutrition.

Conditional cash transfer (CCT) programmes are an example of such programmes that combine actions aimed at addressing both the underlying and the immediate determinants of childhood undernutrition. These programmes, which were first designed and implemented by the Mexican government in the late 1990s, provide monetary transfers to poor households conditional upon their complying with a number of programme requirements. Beneficiaries are usually required to use maternal and child preventive health, nutrition, and care services and to enrol and maintain school-age children in school. Some programmes also provide a micronutrient (MN)-fortified food or a MN supplement. The overall aim of these programmes is to reduce household vulnerability in the short term and break the intergenerational transmission of poverty by investing in human capital formation.

The first CCT programme, *PROGRESA* (Program for Education, Health, and Nutrition, now called *Oportunidades*), was launched in 1997 by the Mexican government (Levy 2006). The Mexican example was soon followed by a number of countries both in the region and beyond. Currently approximately 20 countries have CCT programmes and a number of other countries are studying their feasibility or planning to implement them (Adato and Hoddinott forthcoming-a).

This paper reviews the evidence regarding the impact of CCT programmes on child nutrition. We pay special attention to documenting the evidence regarding potential pathways of impact using a programme theory framework. We conclude with a discussion of what is needed – in terms of design, implementation, and evaluation research – to capitalise on these programmes and achieve larger, faster, and more sustainable improvements in child nutritional status.

Methods

We searched EconLit and *Index Medicus* using 'conditional cash transfer' as the search term to identify original research articles documenting the impact of CCT programmes on different outcomes. We also searched the websites of organisations such as the International Food Policy Research Institute, the World Bank, and the Institute for Fiscal Studies for publications on CCT programmes. We further reviewed existing synthesis papers that summarise the impact of CCTs on outcomes such as poverty, food security, education, health service utilisation, and health and nutrition outcomes (Adato and Bassett 2007, Glassman *et al.* 2007, Lagarde *et al.* 2007, Bassett 2008, Adato and Hoddinott forthcoming-b). No date or language restrictions were imposed. The searches were conducted in September 2008. We only included evaluations that studied at least one nutrition outcome. Provided that the included evidence was not limited to published results, we believe that the possibility of publication bias is minimal. Due to the large heterogeneity of both interventions and outcome measures, we did not conduct a meta-analysis.

We first reviewed the evidence on the impact of CCTs on child anthropometry and micronutrient status. We then used a *programme theory* framework to review the evidence regarding the pathways through which CCTs may improve nutrition outcomes. Programme theory refers to the definition of the processes by which a programme is intended to achieve its impacts (Rossi *et al.* 2004). It encompasses three aspects: 1) a *programme impact* theory, which refers to the hypothesised cause-and-effect pathways that connect a programme's activities to its expected outcomes; 2) a *service utilisation* plan, which relates to the assumptions of how and why intended recipients actually use the programme; and 3) a programme's *organisational* plan, which relates to the implementation and operational

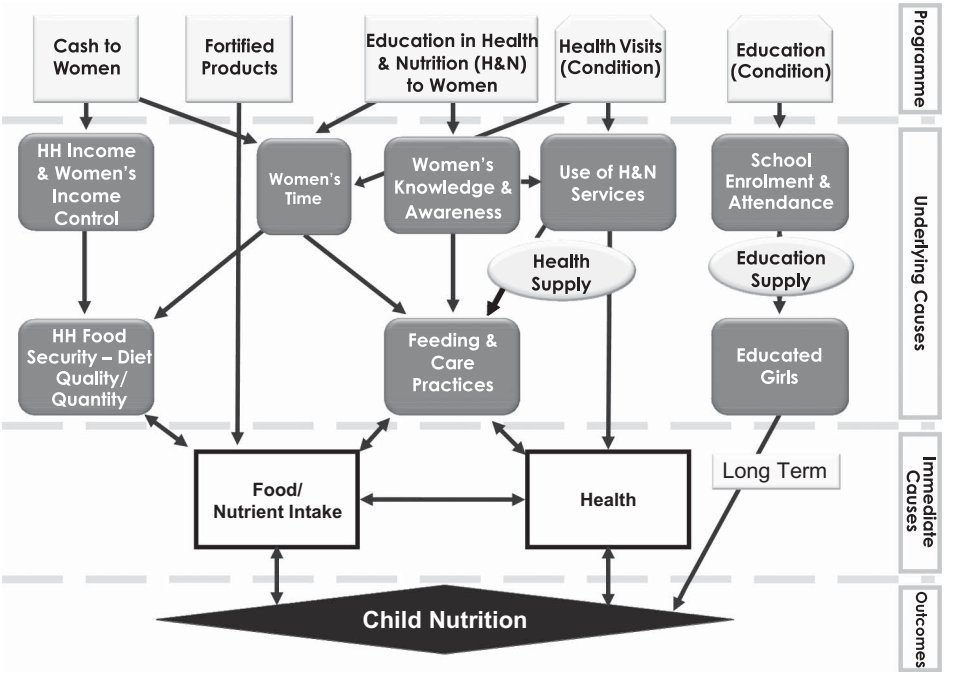

Figure 1. Mechanisms by which CCT programmes might affect nutritional status. HH = household.

aspects of the programme and its resources. For this review, we focused on programme impact theory and developed the impact pathway model shown in Figure 1.

As illustrated in Figure 1, we hypothesised that CCT programmes affect nutrition through a number of different mechanisms. The cash transfers may increase income in beneficiary households, which, in turn, may allow households to purchase more and better (that is, more nutrient dense) foods and increase household food security and diet quality (*the household income, food security and diet quality pathway*). The programme targeting strategy, which often involves giving the cash transfers to women, may increase women's control over resources, women's empowerment, and their decision-making power relative to child nutrition and health (*the women's income and control over resources pathway*). Programmes that include a MN-fortified food or MN supplements may directly improve the micronutrient status and overall nutritional status of the child; the additional income and women's empowerment may lead to improved child diets (*the child dietary intake pathway*). The nutrition and health education component, also usually targeted at women, may change households' preferences for nutrient-rich foods, shift the intrahousehold allocation of foods in favour of children, and may lead to improved child feeding and caregiving practices; health education may also improve household practices related to water and sanitation and improve child health (*the women's knowledge and awareness pathway*). The programme condition requiring that mothers, children, and other family members follow a schedule of regular primary health-care visits may increase overall use and coverage of health services and reduce child illnesses, especially infectious diseases. Improved health, in turn, is likely to have a direct impact on improving nutritional status. The potential health impact depends on the quality and capacity of the health supply (*the health services utilisation and child health pathway*). The programme conditions may have a negative effect on women's time,

especially if women have to travel long distances to receive their payment, comply with the health visit schedule, and/or attend the nutrition/health education sessions (*the women's time pathway*). The programme condition to enrol and maintain school-age children in school can also have long-term, intergenerational effects on nutrition through the well-documented pathway linking female education and positive child nutrition, health, and survival outcomes (*the long-term girls' education pathway*). Better nutrition in early childhood may further improve cognitive development and educational attainment, leading to higher economic productivity (for example, wages) at adulthood (Hoddinott *et al.* 2008, Ruel and Hoddinott 2008), and hence potentially better child nutrition in the next generation. This pathway was not included in this review because of the lack of information on these long-term outcomes.

It must be noted that the impact theory framework used in this review is inevitably a simplification of reality. Other potential pathways between the different CCT programme components and nutritional outcomes may exist. Within every pathway, there are a large number of intermediary variables not shown in Figure 1. Additionally, there a large number of variables that may modify the impact achieved through different pathways. Even though not explicitly shown in the figure, we did review the evidence on the intermediary and modifying variables where available.

Results

Brief description of the evaluated programmes

Table 1 summarises the key characteristics of the five CCT programmes reviewed. All programmes were implemented in Latin America: Mexico, Nicaragua, Colombia, Honduras, and Brazil. The programmes provide a basic cash transfer, although the contribution to household income varies widely. At least four of the programmes target the cash incentive to women in the household, with the rationale that women are more likely than men to invest in the health, nutrition, and education of their children (Quisumbing *et al.* 1995). A MN-fortified food and a MN supplement were provided in Mexico and Nicaragua, respectively. Health and nutrition education is offered in all but one of the programmes (Honduras); and all programmes either encourage or are conditioned upon the use of preventive health-care services for children and in some programmes for all family members according to a predetermined schedule of visits. Details on the age specific nutrition and health requirements and benefits have been published elsewhere for Mexico (Fernald *et al.* 2008), Nicaragua (Maluccio and Flores 2005), Colombia (Ministerio de la Protección Social no date, Attanasio *et al.* 2005), Honduras (Bassett 2008), and Brazil (Morris *et al.* 2004b).

Except for Brazil, all programmes provide scholarships to encourage families to send their children to school (primary, secondary, or both).[1] The scholarships are conditional upon families enrolling their children in school and attending a fixed percentage of school days. In an effort to promote greater female education, the scholarships in the Mexico programme are slightly higher for girls than for boys in secondary school.

Evaluation designs of programmes reviewed

With the exception of Brazil, all of the evaluations used controlled before and after designs. A cluster randomised design was used in rural Mexico, Nicaragua, and Honduras. In Honduras, communities were randomly assigned to one of four groups to either receive: 1) cash transfers (demand); 2) resources provided to local health teams with a community-based nutrition intervention (supply); 3) a combination of both (demand and supply); or 4)

Table 1. Programme components of the reviewed CCT programmes.

	Basic cash transfer			Health services and conditions		
Programme (country)[a]	Targeted at women	Estimated % of total expenditure	Nutrition supplement	Health and nutrition education	Preventive health checkups	Scholarships for whom?
Oportunidades (Mexico) (Rivera *et al.* 2004, Leroy *et al.* 2008a)	Yes	Rural: 25% Urban: 15% to 20%	*MN-fortified* [b] *food for:* 1) All 6–24 mo old children 2) 24–60 mo (low WAZ) 3) Pregnant and lactating women (different composition)	Condition for: Household members (>15 y)	Condition for: 1) 0–5 y old: GMP, immunisation 2) Al household members: health checkups 3) Pregnant and lactating women: Pre- and post-natal visits	Primary (starting 3rd grade), Secondary (girls have higher stipend than boys)
Red de Protección Social (Nicaragua) (Maluccio and Flores 2005)	Yes	18%	*Iron supplements for*: Children 0–5 y	Condition for: Mothers	Condition for 0–5 y old: deworming, vitamin A and iron supplementation, immunisation (according to MOH protocol)	7–13 y old (not completed 4th grade)
Familias en Acción (Colombia) (Attanasio and Mesnard 2006)	Yes	24%[c]	–	Condition for: Mothers	Condition for 0–6 y old	Primary and secondary 6–17 y old

(*Continued*)

Table 1. (Continued)

Programme (country)[a]	Basic cash transfer		Nutrition supplement	Health services and conditions		Scholarships for whom?
	Targeted at women	Estimated % of total expenditure		Health and nutrition education	Preventive health checkups	
Programa de Asignación Familial (Honduras) (Morris *et al.* 2004a)	Yes	4%	–	?[d]	Condition for: 1) 0–3 y old 2) Pregnant women: prenatal classes	6 –12 y old (not completed 4th grade)
Bolsa Alimentação (Brazil) (Morris *et al.* 2004b, Olinto *et al.* 2003)	?	8%	–	Condition for: mothers	Condition for: 1) 0–7 y old: immunisation, GMP 2) Pregnant women: prenatal classes	–

[a]Key references are provided. For additional references, see text.
[b]The fortified food is to be prepared as a porridge and to be consumed daily. If used as recommended, the fortified porridge provides the daily recommended dietary allowance of zinc, iron and a number of essential vitamins and approximately 20% of energy needs for children less than 2 years of age (Leroy *et al.* 2008a).
[c]Estimated from Attanasio and Mesnard (2006).
[d]A conditional cash transfer to incentivise institutional births was part of the design of the program in Honduras, but was not implemented (Glassman *et al.* 2007).
Abbreviations: MOH = Ministry of Health; y = years; mo = months; MN = micronutrients; GMP: growth monitoring and promotion; ? = these aspects of the programme were unclear in the documentation available.

no intervention (control group). The evaluation studies in urban areas in Mexico and Colombia used a cluster matched design. A cross-sectional design was used in Brazil, where beneficiaries were matched to eligible individuals who were quasi-randomly excluded from the programme (Morris *et al.* 2004b, Lagarde *et al.* 2007, Leroy *et al.* 2008a).

Evidence of nutrition impact

Micronutrient status. Only three of the CCT programme evaluations so far (Mexico, Nicaragua, and Honduras) have looked at the impact on micronutrient status (Table 2). The Mexico programme was evaluated for its impact on anaemia in both rural and urban areas. In rural areas, anaemia was assessed among children younger than 12 months at baseline. Blood samples were collected at the first and second year follow-up, but not at baseline. One year into the intervention, children from beneficiary households were found to have a statistically significantly[2] higher mean haemoglobin than children from the control group (11.12 versus 10.75 g/dl). These differences translated into significantly lower anaemia rates among beneficiary children (44%) compared to the control group (55%). Note, however, that close to half of the children were still anaemic after one year of exposure to the intervention (Rivera *et al.* 2004). Gertler compared intervention and control children who were 12 to 48 months of age after one year of programme exposure and showed that the probability of anaemia among intervention children was 18.4 percentage points lower than among children in the control group (Gertler 2004).

In urban areas, the impact of the Mexico programme on mean haemoglobin and anaemia prevalence was assessed using two repeated cross-sectional surveys (one of which was at baseline) of children two to four years of age. No differences between groups were found at baseline. Comparing beneficiary and control children in the follow-up survey, the mean haemoglobin of beneficiary children two to three years of age was 0.4g/dl higher. This difference was not associated with a statistically significant difference in the prevalence of anaemia. No effect was found in the older children. Iron, zinc, and vitamin A status were also compared between the groups in a small subsample of children at follow-up. No differences were found in the serum concentration of ferritin or soluble transferrin receptor (sTfR), or in the serum zinc or serum retinol concentration. Differences did emerge, however, when comparing beneficiary children who had consumed the fortified porridge with those who had not: serum retinol concentration was statistically significantly higher (by 1.7 μg/l) in children consuming the fortified porridge (Neufeld *et al.* 2006).

Overall, the Mexico programme showed modest impacts on childhood anaemia and iron status. Low rates of utilisation of the fortified food appear to be responsible at least in part for these findings – only half of the 6–24 months old children in the intervention group consumed the supplement at least once a week in urban areas, and of those, only two-thirds consumed it regularly (four to six times a week); in rural areas, 57 per cent of the beneficiary group consumed the fortified food four or more times a week. In both urban and rural areas, problems of sharing of the fortified food with other family members, inadequate preparation, and overall low intake by targeted children were reported (Adato *et al.* 2000b, Rivera *et al.* 2004, Neufeld *et al.* 2006). The use of reduced iron, which is not absorbed well, is another potential factor explaining the limited impact on iron status and anaemia. This problem was resolved by the programme in 2005 (Shamah Levy *et al.* 2008).

In Nicaragua, iron supplements had no impact on haemoglobin or anaemia. Approximately one-third of children 6–60 months of age were anaemic at baseline, and there were no changes associated with programme exposure (Maluccio and Flores 2005). Low utilisation of the supplements by mothers has been suggested as a key reason for the lack

Table 2. Impact of CCT programmes on children mean haemoglobin and anaemia prevalence.

Programme (country)	Exposure (mo)	Age[a] (mo)	Mean haemoglobin (g/dl)		Anaemia prevalence (%)	
			Baseline[b]	Impact[c,d]	Baseline[b]	Impact[c,d]
				Difference at endline (intervention-control)		Difference at endline (intervention-control)
Oportunidades (Rural Mexico)	12	12–24	–	0.37 (*) (B: 11.12 C: 10.75)	–	10.6 pp (*) (B: 44.3 C: 54.9)
(Gertler 2004, Rivera *et al*. 2004)	12	12–48	–	–	–	18.4 pp[e] (*) (B 48.3 C 41.1)
Oportunidades (Urban Mexico) (Neufeld *et al*. 2006)	24	24–36 36–48	B: 11.2 C: 11.4 B: 11.7 C: 11.6	0.4 (*) −0.1 (NS)	B: 40.5 C: 38.4 B: 28.8 C: 32.5	−1.9 pp (NS) +1.1 pp (NS)
				Double difference		Double difference
Red de Protección Social (Nicaragua) (Maluccio and Flores 2005)	24	6–60	B: 11.4 C: 11.4	−0.2 (NS)	B: 32.7 C: 33.0	2.7 (NS)
Programa de Asignación Familial (Honduras) (International Food Policy Research Institute 2003)	24	12–24	Demand group: 11.2 Demand & supply: 11.4 Supply group: 11.7 Control group: 11.4	Demand vs. control: 0.1 (NS) Demand & supply vs. control: −0.1 (NS) Supply vs. control: 0 (NS)	Demand group: 40 Demand & supply: 29.1 Supply group: 22.0 Control group: 33.9	Demand vs. control: −1.5 (NS) Demand & supply vs. control: 7.8 (NS) Supply vs. control: 4.1 (NS)

[a]Age refers to the age of follow-up in rural Mexico (Gertler 2004; Rivera *et al*. 2004); and to the age in the baseline and follow-up survey in urban Mexico (Neufeld *et al*. 2006), Nicaragua (Maluccio and Flores 2005) and Honduras (International Food Policy Research Institute 2003).
[b]Entries refer to values at baseline among beneficiary (B) and control (C) households, respectively.
[c]Impact estimates are double difference estimates for Mexico (urban), Nicaragua and Honduras. Double differences are calculated by differencing the changes over time in the intervention and control groups. The estimates for Mexico (rural) are the difference between intervention and control at endline.
[d]* = statistically significant impact; NS = non-statistically significant; pp = percentage point.
[e]Calculated using the Delta-p statistic based on the coefficient and prevalence reported by Gertler.

of impact. Qualitative research indicated that mothers thought their children did not like the supplement. Mothers also believed that the supplements damaged their children's teeth and were associated with vomiting and diarrhea (Adato and Roopnaraine 2004).

In Honduras, anaemia prevalence among 12–24 month old children was 32.5 per cent at baseline, ranging from 22 per cent to 40 per cent between the different comparison groups. The programme had no impact on mean haemoglobin or anaemia prevalence, which was not surprising, given that the programme did not include any specific micronutrient intervention. The amount of the cash transfer, averaging at 4 per cent of household expenditure, was also most likely too small to have an impact on improved household food availability and subsequently child dietary quality (Caldes *et al.* 2004).

These findings point to a very limited documented impact of CCT programmes on child micronutrient status. Both problems of programme design and of poor utilisation of the micronutrient intervention appear to be responsible for the lack of impact of CCT programmes on this outcome.

Child anthropometry. The impact of the CCT programmes on child anthropometry is summarised in Table 3 and Figure 2. For the programmes using a before and after design (all but Brazil), we report 'double difference' results, that is, the difference between intervention and control groups in changes from baseline to post-intervention survey. The Brazil evaluation used a cross-sectional design and the impact results reported are the difference between intervention and control at end line.

A substantial positive impact on linear growth was found in Mexico, Nicaragua, and Colombia (Rivera *et al.* 2004, Attanasio *et al.* 2005, Maluccio and Flores 2005, Leroy *et al.* 2008a). No impact was found in Honduras and Brazil (Table 2). As noted above, the lack of an effect in Honduras was most likely due to the small size of the cash transfer. The programme also suffered some implementation problems with the health supply component (International Food Policy Research Institute 2003). A small negative effect was found on child weight in Brazil, assumed to be due to the erroneous perception that programme benefits would be discontinued if the child grew well (Morris *et al.* 2004b). This hypothesis, however, was not verified in further analyses of the data (personal communication, Eduardo Nilson).

Comparing the growth results across studies is difficult because of the difference in age groups, exposure, and programme components. Nonetheless, Figure 2 shows that programmes with larger cash transfers (that is, Mexico, Nicaragua, and Colombia) tended to have the largest impact. There is also a clear tendency for younger age groups to benefit more.

Evidence on pathways of impact

Household income, food security, and diet quality pathway. Overall, the programmes reviewed had a large impact on short-term poverty alleviation, irrespective of the poverty measure used (headcount, gap, severity) (Table 4a). All programmes reviewed, except the one in Honduras, also showed significant positive effects on total household expenditure (a proxy for income). The same is true for household food expenditure, which improved markedly among participating households in all programmes, except in Honduras. Hoddinott and Wiesmann found that the impact on household calorie availability (in Honduras, Mexico, and Nicaragua) was larger in households in the lowest income tertiles (Hoddinott and Wiesmann, forthcoming). A rise in local food prices in communities receiving the programme could have reduced the impact on expenditures. The only study that has looked at this outcome, however, found no evidence that prices in rural areas in Mexico increased as a consequence of the programme (Hoddinott *et al.* 2000).

Table 3. Impact of CCT programmes on child anthropometry.

Programme (country)[a]	Exposure (mo)	Age[a] (mo)	Height, height-for-age or stunting[b]		Weight, weight-for-length/height or wasting[c]	
			Baseline[d]	Impact[e,f]	Baseline[d]	Impact[e,f]
				Double difference		Double difference
Oportunidades (rural Mexico) (Rivera *et al*. 2004)[g]	18	0–6	B: −0.45 C: −0.25 SD B: 58.0 C: 58.9 cm	+1.1 cm[h] (*)	B: 0.46 C: 0.45 SD	–
		6–12	B: −1.04 C: −1.03 SD B: 68.3 C: 68.4 cm	? (NS)	B: −0.01 C: 0.07 SD	–
Oportunidades (urban Mexico) (Leroy *et al*. 2008a)	24	0–24	B: −1.29 C: −1.40 SD B: 70.9 C: 70.2 cm	–	B: 0.30 C: 0.33 SD B: 8.62 C: 8.46 kg	–
		0–6		+0.41 SD (*) +1.53 cm (*)		+0.46 SD (*) +0.76 kg (*)
		6–12		+0.23 SD (NS) +0.73 cm (NS)		−0.17 SD (NS) +0.03 kg (NS)
		12–24		+0.02 SD (NS) −0.07 cm (NS)		+0.10 SD (NS) +0.09 kg (NS)
Red de Protección Social (Nicaragua) (Maluccio and Flores 2005)	24	0–60	B: −1.73 C: −1.77 SD B: 39.8 C: 39.5%	+0.13 SD (NS) − 5.5 pp (*)	B: 0.8 C: 0.4%	−0.3 pp (NS)
Familias en Acción (Colombia) (Attanasio *et al*. 2005)	12	0–24	22.1%	+0.16 SD (*) − 6.9 pp (*)	2.5%	–
		24–28	23.1%	+0.01 (NS) +0.4 pp (NS)	0.7%	–
		>48	23.0%	+0.01 (NS) − 2 pp (NS)	1.8%	–

Programa de Asignación Familial (Honduras) (International Food Policy Research Institute 2003)	24	0–60	Demand group: −2.05SD, 52.0% Demand & supply: −2.11 SD, 54.3% Supply group: −1.88 SD, 46.6% Control group: −2.16 SD, 55.4%	Demand vs. control: −0.02SD (NS), −0.3pp (NS) Demand & supply vs. control: +0.02SD (NS), −0.8pp (NS) Supply vs control: S: −0.03SD (NS), +0.5pp (NS)	Demand group: −0.08 SD, 1.5% Demand & supply: −0.12 SD, 1.3% Supply group: −0.02 SD, 1.1% Control group: −0.07 SD, 1.4%	Demand vs. control: 0.0 SD (NS), +0.7pp (NS) Demand & supply vs. control: 0.0SD (NS), +0.3pp (NS) Supply vs. control: −0.05 SD (NS), +0.1 pp (NS)
				Difference at endline (intervention-control)		Difference at endline (intervention-control)
Bolsa Alimentação (Brazil) (Morris *et al*. 2004b)	5.9	0–24	B: −0.90 C: −0.78 SD	−0.11 SD (NS)	–	− 0.183 kg (*) (all)
		24–48	B: −0.85 C: −0.63 SD	−0.19 SD (NS)	–	− 0.274 kg (*) (0–12 mo)
		>48	B: −0.95 C: −0.93 SD	−0.04 SD (NS)	–	

[a]A panel was used in Mexico (age refers to the age at baseline); repeated cross-sections for children in Nicaragua, Colombia, and Honduras (age refers to the age in both cross-sections); cross-sectional data were used in Brazil (age refers to age in the beneficiary and non-beneficiary group).
[b]SD refers to Z-scores, cm to absolute height, % to prevalence of stunting and pp to percentage points; NS indicates $p > 0.05$.
[c]SD refers to Z-scores, kg to absolute weight, % to prevalence of wasting and pp to percentage points; NS indicates $p > 0.05$.
[d]Entries refer to values at baseline among beneficiary (B) and control (C) households, respectively; Colombia: values are for children in the beneficiary areas, no values were reported for controls; Brazil: values at follow-up.
[e]Impact estimates are double difference estimates for Mexico (urban and rural), Nicaragua, Colombia, and Honduras.
[f]* = statistically significant impact; NS = non-statistically significant; ? = unclear in the documentation available.
[g]Impact estimations are based on Rivera *et al*. (2004).
[h]Effect in children living in the poorest households. Not statistically significant in children living in less poor households.

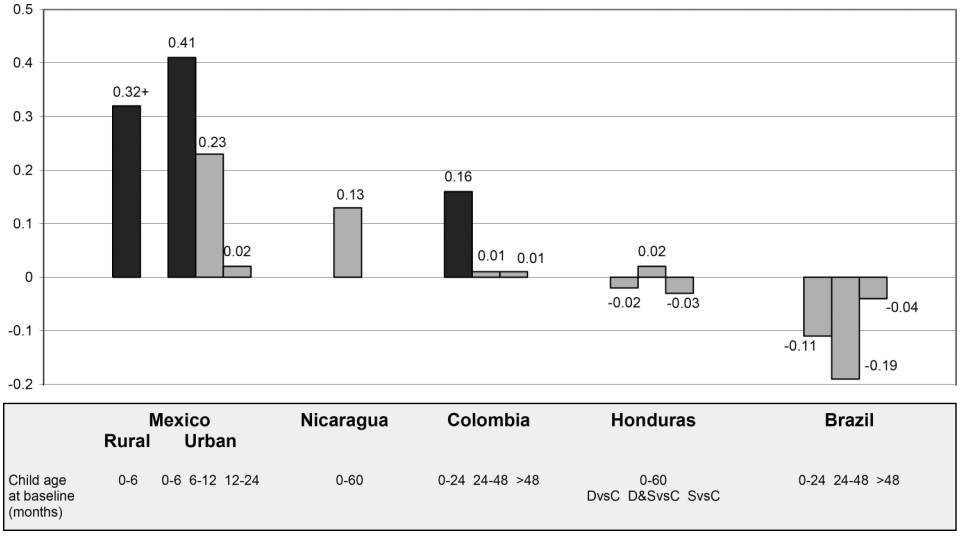

Figure 2. Impact of CCT programmes on child height-for-age Z-score. Solid bars indicate statistically significant effects ($p < 0.05$).
[+]Based on the authors' calculations. The impact for Mexico (rural) was based on the change in length from baseline to follow-up and the mean height, the mean age and the percentage females at baseline.

In all studies, the quality of the diet improved, as shown in increased spending on animal source foods. The studies in Mexico, Nicaragua, and Brazil also found a positive impact on the consumption of fruits and vegetables. Of concern is the significant increase in expenditure on fats in Nicaragua and Colombia, and on sweets in Nicaragua. No impact was found in Honduras, probably due to the small size of the cash transfers and/or the low frequency of the payments (twice a year) (International Food Policy Research Institute 2001, Olinto *et al.* 2003, Hoddinott and Skoufias 2004, Angelucci *et al.* 2005, Maluccio and Flores 2005, Skoufias 2005, Attanasio and Mesnard 2006, Adato and Bassett 2007).

The specific role of cash in improving child nutritional status in the Mexico programme was studied by Fernald and collaborators (Fernald *et al.* 2008). They estimate that a doubling of the cumulative transfers received by households over time was associated with an increase of 0.2 Z-score in height-for-age and a 10-percentage-point drop in the prevalence of stunting. A limitation of the study is that it did not control for the endogeneity of the transfers received, that is, that the decision to send children to school (and thus receive additional cash) was most likely related to parental attitudes, which could also have had positive effects on the measured outcome (child nutritional status) (Fernald *et al.* 2008).

Women's income and control over resources pathway. The impact of the Mexican programme on women's status, bargaining power, and intrahousehold relations was studied using both quantitative and qualitative methods. The results show that women benefited from the programme in several ways that contribute to their empowerment – defined as increased self-confidence, awareness, and control over their movements and household resources. By putting additional resources in the hands of women and focusing on improving their health and nutrition, the programme contributed to lifting some of the basic obstacles to their empowerment (Adato *et al.* 2000b). The programme also gave women more opportunities to leave the house, educated them on health and nutrition issues, provided new spaces in which to communicate with other women (through the health/

Table 4a. Evidence on pathways through which CCT programmes may improve child nutritional status, Part 1.

	Poverty[a,b]				Household expenditure[a,c]	
Programme (country)	Headcount	Gap	Severity	Total	Food	Quality of household diet
Oportunidades (Rural Mexico) (Hoddinott and Skoufias 2004, Skoufias 2005) *Note: baseline data 1998*	Estimation: −11.7 pp (−17%) (*) Simulation: −10%	Estimation: −12.9 pp (−36%) (*) Simulation: −30% (*)	Estimation: −11.5 pp (−46%) (*) Simulation: −45% (*)	+14.53% (*)	*kcal:* mid 99: +3.3% (*) end 99: +3.4% (*)	*kcal*: AP: +10,+13% (*) Grains: +3.1% (*) F&V: +17,+16% (*) Other: NS (mid, end 99)
Oportunidades (Urban Mexico) (Angelucci *et al*. 2005, Angelucci and Attanasio 2009) *Note: baseline data 2002*	–	–	–	2003: +12% (*) 2004: +22%[d] (*)	2003: +16∼21% (*) 2004: +23∼26% (*)	Protein[e]: +11∼25% (*) F&V: +8∼18% (*) Carb: NS
Red de Protección Social (Nicaragua) (Maluccio and Flores 2005, Adato and Bassett 2007) *Note: baseline data 2000*	Poverty: 2001: −10 pp (*) 2002: −6.7pp (*) Extreme poverty: 2001: −21 pp (*) 2002: −15 pp (*)	2001: −13.3 pp (*) 2002: −9.8 pp (*)	2001: −11.3 pp (*) 2002: −8.7 pp (*)	Household: 2001: ∼+20% (*) 2002: ∼ +14% (*) Per capita: 2001: ∼ +25% (*) 2002: ∼ +18% (*)	Per capita: 2001: ∼ +33% (*) 2002: ∼ +24% (*)	Meat: +64% (*)L Fats: +54% (*) F&V: +71% (*) Sweets: +34% (*) Carb., beans, milk: NS *DD*: +33% (*)

(*Continued*)

Table 4a. (Continued)

	Poverty[a,b]				Household expenditure[a,c]	
Programme (country)	Headcount	Gap	Severity	Total	Food	Quality of household diet
Familias en Acción (Colombia) (Attanasio and Mesnard 2006, Adato and Bassett 2007)	Poverty: NS Extreme poverty: Rural: −5.9 pp (*) Urban: −5.8 pp (*)	−3.7 pp (*) (Rural and urban)	–	Urban[f]: +14.7% (*) Rural: +14.5% (*)	Urban[f]: +15.8% (*) Rural: +15.7% (*)	AP: +20% (*) Cereals: +9∼17% (*) Fats: +15∼24% (*) F&V, tubers, legumes, sweets: NS
Programa de Asignación Familial (Honduras) (International Food Policy Research Institute; Adato and Bassett 2007)	NS	NS	−2.0 pp (*)	NS	NS	NS
Bolsa Alimentação[g] (Brazil) (Olinto *et al*. 2003)	–	–	–	–	+9% (*)	*DD*: +9% (*)

[a]Based on Adato and Bassett (2007) and own calculations. See the Adato and Bassett paper for sources. * = statistically significant impact; NS = non-statistically significant.
[b]pp = percentage points.
[c]Estimates are in monetary value, unless stated otherwise (*kcal* or *DD*); AP = animal protein, F&V = fruits and vegetables, Carb = carbohydrates (cereals, tubers, bread, …), DD = dietary diversity.
[d]Algebraic calculation summing the estimated effect on food and non-food expenditure. Impact on total expenditure was not estimated by Angelucci and Attanasio.
[e]Note that the estimates for total and food expenditure come from a published paper (Angelucci and Attanasio 2009), the expenditure on separate food groups come from a report submitted to the programme (Angelucci *et al*. 2005). Both sources provide different estimates on the total and food expenditure.
[f]Mean from urban and rural areas, calculated from estimated absolute changes reported by the authors (Attanasio and Mesnard 2006).
[g]Household expenditure estimates are from a preliminary report.

Table 4b. Evidence on pathways through which CCT programmes may improve child nutritional status, Part 2.

	Children[a]			Women		
Programme (country)	Diet and supplement intake[b]	Health-care utilisation	Health status	Income and control over resources	Health and nutrition knowledge	Time availability
Oportunidades (Rural Mexico) (Adato *et al.* 2000b, Gertler 2000, Gertler 2004, Barham 2005, Duarte Gómez *et al.* 2005, Ramirez-Silva *et al.* 2008) *Note: baseline data 1998*	*Beneficiary vs. control*: Fe: +0.8mg (*), Zn:+0.7mg (*) vit A:77.2μgRE (*) *Beneficiary consumer vs. control* : Fe: +7.7mg (*), Zn: +7.6mg (*), vit A: +399μgRE (*) *Beneficiary non-consumer[a] vs control*: NS (12–60 mo)	*Preventive*: +5pp (*), 13pp (*), 7pp (*)(<24mo) +5pp (*), 10pp (*), NS (<24–48 mo) after 8, 15 & 20 mo of exposure *Immunisation*: NS[c] *Curative*: all: NS (<60mo) hospital:−0.007 visits/mo (*) (<36 mo) private: −0.012 visits/mo (*) (<36 mo)	Overall illness −23.3% (*) Longer exposure associated with lower illness (<36 mo)	No change in decision making domains. May increase women's autonomy	+ general knowledge and practices (did not include child health or nutrition)	+ time burden, in general not perceived as problematic
Oportunidades (Urban Mexico) (Duarte Gómez *et al.* 2005, Gutiérrez *et al.* 2006, Neufeld *et al.* 2006, Escalante-Izeta *et al.* 2008) *Note: baseline data 2002*	*Beneficiary vs. control*: Fe: +0.5mg (*) *Beneficiary consumer vs control*: Fe: +2.7~5.6mg (*) Zn: +2.9~5.1mg (*) FA:+20mg (*) Vit A: NS (6–38 mo) Double difference: NS	*Preventive*: 2004: +52.1pp (*) *Immunisation*: – *Curative*: 2004: NS (all <72mo)	Overall illness: −0.97d/mo (*)	–	*Idem.* Lack of effect of education on appropriate use of fortified food	–
Red de Protección Social (Nicaragua) (Adato and Roopnaraine 2004, Maluccio and Flores 2004) *Note: baseline data 2000*	–	*Preventive (children < 36 mo)*: 2001: +19.5pp (*) 2002: +11.0pp (*) *Immunisation*: NS (12–24 mo) *Combined preventive + curative*: 2001: +28.9pp (<36mo) (*) 2002: +17.5pp (<36 mo) (*)	–	Increased self-esteem, empowerment, increased confidence	–	–

(*Continued*)

Table 4b. (Continued)

Programme (country)	Children[a]			Women		
	Diet and supplement intake[b]	Health-care utilisation	Health status	Income and control over resources	Health and nutrition knowledge	Time availability
Familias en Acción (Colombia) (Attanasio *et al*. 2005)	AP: e.g. chicken +0.25∼0.38d/wk (*) V: +0.91∼1.23d/wk (*) F: NS (24–60 mo)	*Preventive*: +22.8pp (*) (<24 mo) +33.2pp (*) (24–48 mo) NS (>48 mo) *Immunisation* (DPT): +8.9pp (*) (<24 mo) NS (>24 mo)	Urban: Diarrhea: NS Resp. Dis: NS Rural: Diarrhea: −11% (*) Resp. Dis: NS (<48 mo)	–	–	–
Programa de Asignación Familial (Honduras) (International Food Policy Research Institute 2003, Morris *et al*. 2004a, Morris, forthcoming)	–	*Preventive*: +15.6∼21.1pp (*) (demand) +14.6∼17.6pp (*) (demand & supply) NS (supply) *Immunisation*: DPT: +6.9pp (*) (demand) +9.1pp (*) (demand & supply) NS (supply) Measles: NS *Combined preventive + curative:* +20.2pp (*) (demand) +14.9pp (*) (demand & supply) NS (supply) (all <36 mo)	Diarrhea: NS	–	–	–

[a]Beneficiary consumer refers to beneficiary child who consumed the fortified food; beneficiary non-consumer refers to the beneficiary child who did not consume the fortified food; pp = percentage point, * = statistically significant impact, NS = non-statistically significant.
[b]Nutrient intakes expressed per day.
[c]See text for details.

nutrition training sessions), and educated girls to improve their position in the future (Adato *et al.* 2000b). Similar findings were documented in a qualitative study of the Nicaragua programme (Adato and Roopnaraine 2004). The programme provided women with an independent source of income that had a positive effect on their self-esteem and raised their status both in the household and in the community. The opportunity to leave the house and participate in programme activities empowered women, and increased their confidence and awareness of women's issues, such as women's rights and family planning. Moreover, it gave them a chance to speak up in public, and share their experiences and feelings with other women (Adato and Roopnaraine 2004). Both studies found little evidence of increased tensions within the household as a result of women receiving the cash. Acceptance of this aspect of the programme was assumed to be a result of communities associating the programme with women's traditional roles of caring for the family and children, and of managing household food purchases and consumption (Adato *et al.* 2000b, Adato and Roopnaraine 2004).

Child dietary intake pathway. Only two programmes, the Mexico and the Colombia programmes, evaluated the impact on child dietary intake (Table 4b). In Mexico's rural areas, the diet of children in the control group was compared to all beneficiary children and to two subgroups of beneficiary children: those consuming the fortified food and those not consuming it. Beneficiary children 12 to 60 months of age consumed more iron, zinc, and vitamin A than non-beneficiary children. The largest effects were found in children 12 to 24 months. An increase in energy consumption was found in the same age group. Fortified food consumers (12 to 60 months) had statistically significantly greater intakes of iron, zinc, and vitamin A than the control group. The diet of beneficiary children not consuming the fortified food was not different from that of control children with the exception of zinc, which was higher among beneficiary children 12–24 months of age compared to control children (Ramirez-Silva *et al.* 2008).

In urban areas in Mexico, beneficiary children (6–38 months) consumed more iron, but less energy and protein than control children. As in rural areas, fortified food consumers had a greater intake of several micronutrients, namely iron, zinc, and folic acid. Zinc consumption was significantly *lower* in beneficiary children not consuming the supplement compared to control children. There was no impact on vitamin A consumption or on indicators of dietary diversity (Neufeld *et al.* 2006). Thus, the impact of the Mexico programme on dietary intake both in urban and rural areas was mostly due to the consumption of the fortified food rather than to changes in children's regular diet.

The Colombia evaluation shows a positive impact of the programme on the frequency of animal source food and vegetable consumption among children 24–60 months of age. The number of days per week children consumed chicken, for instance, was 0.25 to 0.38 higher in the beneficiary than in the control children. The impact of the programme on vegetable consumption was 0.91 to 1.23 days per week. No significant impact was found on the frequency of fruit consumption (Attanasio *et al.* 2005).

Women's time pathway. There is a dearth of information on the impact of CCT programmes on women's time availability. A qualitative study in rural Mexico showed that travelling to receive the transfers and attending meetings place an extra burden on women's time. Women also have to do the household work previously done by children who are now in school. Only a few women, however, perceived the time burden to be a problem (Adato *et al.* 2000b). No other evaluations studied this outcome.

Women's knowledge and awareness pathway. The impact of the health and nutrition education on general health knowledge and practices was evaluated only in Mexico, where a positive impact was found. The evaluation, however, did not include knowledge or practices related to child nutrition or health-care seeking for childhood illness (Duarte Gómez *et al.* 2005). A qualitative study specifically aimed at assessing the barriers and facilitators for adequate use of the fortified food in rural areas showed that women knew that the vitamins in the fortified food had a beneficial impact on their children (Escalante-Izeta *et al.* 2008). An important barrier was the belief that foods for young children needed to have a more liquid consistency than recommended for the preparation of the fortified food. This led to an over-diluted porridge of reduced micronutrient density than per formulation. Other barriers identified included the use of the Spanish language in indigenous areas and of technical terms in training mothers to use the fortified food. No other programmes have evaluated their impact on maternal knowledge.

Health services utilisation and child health pathway. The impact of CCT programmes on the use of health-care services was evaluated in Mexico, Nicaragua, Honduras, and Colombia (Table 4b). All studies found significant and large positive effects on health-care visits for preventive services. The programmes in Colombia and Honduras had a positive impact on immunisation rates but no effect was found in Mexico or Nicaragua.

In rural Mexico, growth monitoring visits for children up to 48 months increased significantly, while immunisation rates for tuberculosis (children under 12 months at baseline) and measles (children 12 to 24 months at baseline) did not increase after 12 months. This may be due to the fact that baseline immunisation rates were already high (between 88% and 96%) (Barham 2005). No effect on overall curative health-care utilisation was found in children younger than 60 months. Public hospital visits and private provider visits, however, fell by 0.007 and 0.012 visits per month in children 0 to 36 months of age (Gertler 2000), which could be the result of improved health among beneficiary households. The urban programme increased the proportion of children taken to well-baby visits by 52 percentage points, equivalent to one additional visit in the last six months. Changes in immunisation rates were not assessed. No effect was found on curative health-care utilisation in either the private or public system (Gutiérrez *et al.* 2006).

The Nicaragua programme had a positive effect on the number of children being taken for a well-baby check-up in the previous six months (increases of 19.5 and 11.0 percentage points after one and two years, respectively). The effect was even larger for the percentage of children taken to a health-care provider and weighed during the visit (28.9 and 17.5 percentage points after one and two years, respectively). The effects were largest for the extremely poor. No programme impact on immunisation coverage was observed, which is likely due to the fact that vaccination delivery improved in control communities as well, as a result of the programme (Maluccio and Flores 2004).

The Colombian programme had a significant effect on compliance with the growth and development programme in children up to 48 months, but no effect on older children. Adequate diphtheria, pertussis, tetanus (DPT) vaccination increased by 8.9 percentage points ($p < 0.1$) in children less than 24 months, but not in the older age groups (Attanasio *et al.* 2005).

The Honduras programme increased the percentage of children under three years being weighed in the past 30 days and receiving DPT1 vaccination in the groups that received the demand-side or the demand + supply-side interventions, but not in the group receiving only the supply-side intervention. Measles vaccination did not improve with the programme. The percentage of children who had been taken to a health centre at least once in the last 30 days increased by 20.2 and 14.9 percentage points in the demand and the demand + supply-side intervention groups, respectively. It is not clear, however, whether these were preventive or curative visits or a combination of both (Morris *et al.* 2004a).

The impact of CCTs on actual child health outcomes was evaluated in Mexico, Honduras, and Colombia (Lagarde *et al.* 2007). In rural Mexico, the programme lowered child illness in the four weeks prior to the survey as reported by the mother by 23.3 per cent in children aged less than three years at baseline. Longer programme exposure was associated with larger reductions in the prevalence of illness symptoms reported: children who had been in the programme for 8, 14, and 20 months were 25 per cent, 16 per cent, and 40 per cent (all $P < 0.05$) less likely to have been reported ill compared to non-beneficiary children, respectively. The illness symptoms were not specified by the author (Gertler 2004). In urban areas, the programme lowered child illness by one day per month after two years of exposure (Gutiérrez *et al.* 2006). The Honduras programme did not show an impact on morbidity as measured by childhood diarrhoea (International Food Policy Research Institute 2003). The results, however, might have been affected by a seasonality problem (Morris, forthcoming). In Colombia, the programme lowered the probability of reported diarrhoea symptoms in children 12–48 months living in rural areas by 11 percentage points. No effect was found for children in urban areas or children older than 48 months and respiratory illnesses were not affected by the programme (Attanasio *et al.* 2005). It is important to point out that the reported morbidity impact may be an underestimation of the true impact. As pointed out by Glassman *et al.*, reported illness as a measure of impacts on morbidity has important limitations in this context. The programmes may have effectively led to fewer episodes of illness through improved health knowledge and the greater use of preventive care. Both the increased knowledge and preventive health-care utilisation, however, may have also increased the probability that caregivers accurately diagnosed and reported illnesses (Glassman *et al.* 2007).

Only one study investigated to what extent the health supply may modify the effectiveness of CCT programmes on health services utilisation and health outcomes. Bautista and colleagues found that in clinics with strong supply constraints in rural Mexico, the programme's impact on health care utilisation was significantly reduced (Bautista-Arredondo *et al.* 2008). The quantitative component of the operations evaluation of the rural Mexico programme (Adato *et al.* 2000a) also shows that 98 per cent of the beneficiaries reported no deterioration in the health services since the programme had started; and more than 50 per cent actually reported some improvements in various aspects of the health services such as the disposition and attention of the staff, the availability and cost of medicines, the waiting time, and the cost of services. The doctors interviewed during the qualitative study, however, reported that resources and supplies had not paralleled the increases in demand for health services following the introduction of the programme in rural communities. These supply-side findings provide useful insights, but they were not linked to programme impacts.

Long-term girls' education pathway. None of the CCT programmes have been operating long enough to evaluate the impact of additional years of schooling on the health and nutrition of the beneficiary girls' offspring. There is, however, substantial evidence that CCT programmes improve child education outcomes for both boys and girls, with effects in the range of 0.5 to 0.9 additional grades (Adato and Bassett 2007, Behrman and Walker forthcoming). The largest effects are found at the juncture of entering and progressing through secondary school. The impact on secondary school enrolment in Mexico was found to be larger for girls (9 percentage points) than for boys (5 to 6 percentage points) (Behrman and Walker forthcoming). Due to the relatively short time CCT programmes have been around, there is no direct evidence from these programmes that the impact on education positively affects long-term outcomes. Given the well-documented importance of maternal education for a host of child health and nutrition outcomes (Schultz 1989), however, it is likely that CCT programmes that significantly improve girl's education, especially at the

secondary school level, will confer long-term benefits on their children's welfare. A cross-country analysis of data from 63 developing countries, for instance, estimates that improvements in female secondary school enrolment rates were responsible for 43 per cent of the total 15.5 per cent reduction in child underweight observed in these countries during the 1970–1995 period (Smith and Haddad 2000). Evidence suggests that more educated mothers are better able to 'manipulate' the world. Not only do they know better where services can be found, they are also more successful in using those services (Caldwell 1979, Cleland and Van Ginneken 1988, Thomas *et al.* 1990, The Cebu Study Team 1991, Zeitlyn *et al.* 1992, Caldwell 1994, Carmichael *et al.* 1994). By fostering female education, CCT programmes have a great potential to improve the well-being of future mothers and their offspring.

Discussion

Summary of findings on the impact of CCT programmes on child nutrition outcomes

Our review finds consistent evidence of a positive impact of CCT programmes on child anthropometry. Effects are generally larger for height compared to weight indicators; for children exposed to the programme at younger ages; and in countries where the size of the transfer is larger (for example, Mexico, Nicaragua, and Colombia – where transfers represent 15 to 25 per cent of total household expenditures). The larger impact found among younger children is consistent with the literature, showing that interventions to improve growth are more efficacious when they reach children during their first two years of age rather than later, and the younger within this critical age range, the greater the impact (Lutter *et al.* 1990, Allen 1994, Schroeder *et al.* 1995, Rivera and Habicht 1996, Rivera and Habicht 2002). Results suggesting greater impacts with larger cash transfers are in line with the analysis of the Mexico data, which shows a 10-percentage point drop in stunting with the doubling of the cumulative transfers received by households over time (Fernald *et al.* 2008). Overall, the review confirms that the documented impacts of CCT programmes on child anthropometry are highly plausible.

The review shows a modest impact of the CCT programme on MN status in Mexico and no impact in the other two countries that examined this outcome (Nicaragua and Honduras). In Mexico, the programme resulted in a modest increase in mean haemoglobin in both urban and rural areas, and a reduction in anaemia prevalence in rural areas. Mexico was the only programme that incorporated a targeted intervention in its CCT programme – the distribution of a MN-fortified food – to specifically address MN deficiencies. Yet, the programme had no impact on vitamin A, iron, or zinc status, and only a modest impact on haemoglobin and anaemia prevalence. These disappointing results have been attributed to the low rates of utilisation of the fortified food by programme recipients, as well as problems of sharing with other family members and of over dilution of the product (Adato *et al.* 2000b, Rivera *et al.* 2004, Neufeld *et al.* 2006). In Nicaragua, iron supplements were distributed as part of the routine services offered in health clinics, but compliance was not monitored and was found to be poor in a qualitative assessment. Honduras had no specific MN intervention included in the CCT programme. Thus, the limited impact of CCT programmes on MN status can be attributed to a combination of design constraints (ill designed or missing MN intervention) and poor utilisation of the products by programme beneficiaries.

Summary of findings on the pathways of impact on child nutrition outcomes

Underlying determinants of child nutrition. The CCT programmes reviewed had a positive impact on several of the outcomes hypothesised to be part of the pathways leading to

improved nutrition. For instance, most programmes showed considerable poverty-alleviation effects and significant gains in household income and food security. In several countries, greater benefits on per capita caloric availability were found among poorer households, where childhood undernutrition is most prevalent. Several programmes also improved household diet quality as seen by increased consumption of micronutrient-rich foods, such as animal source foods, dairy products, and fruits and vegetables. Positive effects on women's control over resources were found in the two countries where it was assessed (Mexico and Nicaragua); similarly, maternal health knowledge and practices increased among programme beneficiaries in Mexico, the only country where this outcome was measured. The CCT programmes also had a consistent positive impact on the use of health services, especially for preventive services, and on school enrolment. Few of the quantitative evaluations measured all the outcomes listed above, and none looked at the potentially negative consequences of CCT programmes on aspects such as the increased burden on women's time and related consequences for child care, and the potential changes in the dynamics of intrahousehold resource allocation.

Immediate determinants of child nutrition. Dietary intake and health, the two immediate determinants of child nutrition, were studied in Mexico and Colombia and the programme's impact on childhood diarrhoea was studied in Honduras. In Mexico, the modest impact on intake of zinc, iron, and vitamin A was explained almost entirely by consumption of the MN-fortified food. With the exception of zinc, the diet of programme beneficiary children who did not consume the fortified food was similar to that of control children. Thus, the strong impacts shown on household food security and on expenditures on high-quality, micronutrient-dense foods in Mexico did not translate into improved diets for young children. By contrast, the 20 per cent increase in household expenditure on animal protein among beneficiaries of the Colombia programme was paralleled with an increase in the frequency of intake of animal source foods among children. These findings suggest that programme impacts on children's dietary intake in these two countries operated through two different pathways. It is important to note, however, that the type of dietary intake information available in the two programmes (quantitative 24 hour recall in Mexico and food frequency recall in Colombia) is not fully comparable, and direct pathway analysis was not carried out in either programme evaluation.

The Mexico and Colombia programmes also documented some reductions in childhood illnesses, whereas the Honduras programme showed no impact on diarrhoea prevalence. The reduction in child morbidity is a potentially important mechanism for improving micronutrient status and growth, and vice versa – improved nutrition also has positive effects on reduced morbidity from infectious diseases. This bi-directional pathway was not explored directly in any of the evaluations.

Overall, the CCT programmes reviewed had positive impacts on most of the key underlying and immediate determinants of child nutrition assessed – poverty; food security and diet quality; women's knowledge, awareness, and control over resources; use of health and education services; and diet and health – all of which are along the impact pathways by which CCTs are hypothesised to improve nutrition (Figure 1). None of the evaluations, however, specifically modelled these pathways to assess their relative importance in improving child nutrition outcomes.

Key programmatic implications

The two main conclusions of the review are that CCT programmes benefit poor households in several ways, including child nutrition, but the mechanisms by which they

improve child nutrition are not well understood. The review also brings to light the fact that CCT programmes can provide an excellent entry point for improving child nutrition for a number of reasons. First, they provide inputs that address several of the immediate and underlying determinants of child nutrition. Second, they are targeted at – and are effectively reaching – poor populations who suffer the highest burdens of nutrition deficiencies (Coady 2006, Rivera Domarco *et al.* 2008). Third, the coverage of CCT programmes is usually high, and in some cases reaching national scale (Leroy *et al.* 2008b). Finally, these programmes have received widespread support from politicians as well as donors and are perceived as a major breakthrough in poverty alleviation programmes.

Notwithstanding the enormous potential of CCT programmes to contribute to reducing childhood undernutrition, this potential has yet to be unleashed: the programmes are far from eliminating linear growth retardation, and their impact on micronutrient nutrition is disappointingly small. In order to contribute more fully to eradicating childhood undernutrition, CCT programmes will need to be strengthened in several ways. First, the design of the nutrition and health package will need to be carefully revisited to tailor to the specific needs of the targeted population. Formative research should be used to carefully assess the key childhood health and nutrition problems, to determine the current child feeding, health seeking, and care practices, and to identify the main constraints (and facilitators) to the adoption of optimal practices. This information should be used to design an effective nutrition and health package to incorporate in a country's CCT programme. A second key aspect is the targeting of the programme and of its health and nutrition components. CCT programmes usually target families with school-age children, pregnant or lactating women, and/or children less than five years of age. It is now well recognised that the window of opportunity for improving nutrition is pregnancy and the first two years of the child's life (Shekar *et al.* 2006). Our CCT programme review also supports previous evidence showing that children under two years of age benefit more from nutritional interventions than older children. Programmes should therefore put special emphasis on ensuring that the health and nutrition intervention package effectively reaches these groups. A third aspect that needs attention is the quality of the services, especially the nutrition and health education and its effectiveness at increasing maternal knowledge and at eliciting behaviour change. The relative effectiveness of the health education received at educational talks compared to advice and training received during health check-ups is unknown. Future studies should investigate how these different settings and different educator-types impact health/nutrition knowledge and practice. Information on quality of services is extremely scant and where collected, associations with health and nutrition outcomes have not been assessed. The delivery and quality of the programmes' health and nutrition services needs to be closely monitored and, where needed, improved through the use of operations research. The existing administrative data (including information on compliance with programme conditionalities) should also be analysed and strengthened where necessary.

CCT programmes also offer a unique opportunity to specifically address micronutrient nutrition using interventions of known efficacy. There are several options available to tackle micronutrient malnutrition, including fortified foods such as the products used in Mexico, and newer strategies such as micronutrient sprinkles (currently being tested in Mexico (Neufeld 2007)) and lipid-based fortified products that provide both macro and micronutrients (de Pee and Bloem 2009). These micronutrient interventions should be embedded in the overall behaviour change and communications strategy aimed at improving child feeding and maternal health seeking and caring practices.

Lessons learned from an evaluation perspective

Our review highlights an enormous gap in knowledge about how CCT programmes work, how their different components are implemented and how they interact, and what are the mechanisms by which programmes improve nutrition. We found scattered information documenting the impact of the programmes on different intermediary or final nutrition outcomes, but no study has explicitly identified and tested impact pathways in a systematic fashion.

Information on the pathways of impact is needed for several reasons. First, it would provide the information necessary to improve the effectiveness of current programmes. Second, it would facilitate the identification of generalisable principles that underlie the pathways by which the programmes exert their effect. With these principles in place, one would know ex ante which components are necessary to produce the desired result and how the components need to be delivered (given a specific programme context). We need to analyse and carefully document how the different inputs and programme components interact and contribute to the impact. We also need to understand the role of contextual factors and how they may reduce or enhance programme effectiveness. This information is essential if we want to design and implement more effective programmes, which can be successfully scaled up and replicated in different contexts.

The lack of impact pathway thinking is associated with a more general problem: the fact that most programmes do not use an explicit programme theory framework to plan the intervention components. A programme theory framework provides an explicit map of how the programme inputs are meant to produce the desired outcomes. It identifies all of the intermediary factors through which the programme may exert its impact and all of the factors that may modify or inhibit the desired effect (Rossi *et al.* 2004, Habicht *et al.* 2006). Once the programme theory has been developed, it should be used to guide the impact evaluation and help identify which variables to measure and how to carry out the analysis.

As a final point, our review clearly shows that the evaluation of these complex programmes requires a combination of quantitative and qualitative methods for the results to be programme and policy relevant. The lack of an impact on anaemia in Nicaragua (a quantitative result), for example, is only useful for programme decision-makers if accompanied by the qualitative insights revealing the reasons for this lack of impact – in this case the low utilisation of the supplement and the reason for this low utilisation.

Conclusion

CCT programmes provide a potentially powerful delivery mechanism for improving child nutrition. In order to reach their full potential, the programmes will need to be revisited and will need to have clearer nutrition objectives, a better defined set of nutrition actions, an implementation and integration plan grounded in a strong programme theory framework, and an effective monitoring and evaluation system.

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Notes

1. Brazil's new programme *Bolsa Familia* (family grant), which merged the previous *Bolsa Alimentaçaõ* (food grant) and *Bolsa Escola* (school grant), now includes both health and education benefits.
2. Throughout the document, all differences reported in the text are statistically significant ($p < 0.05$).

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