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CONDITIONAL CASH TRANSFER PROGRAMS AND NUTRITION IN LATIN AMERICA: ASSESSEMENT OF IMPACTS AND STRATEGIES FOR IMPROVEMENT

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CONDITIONAL CASH TRANSFER PROGRAMS AND NUTRITION IN LATIN AMERICA: ASSESSEMENT OF IMPACTS AND STRATEGIES FOR IMPROVEMENT

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CONDITIONAL CASH TRANSFER PROGRAMS AND NUTRITION IN LATIN AMERICA: ASSESSEMENT OF IMPACTS AND STRATEGIES FOR IMPROVEMENT

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Conditional Cash Transfer (CCT) programs provide monetary transfers to poor households conditional upon their compliance with program requirements. These requirements—typically related to preventive health visits, school enrollment, and sometimes activities to promote improved maternal and child health—are designed to improve the human capital of children and to reduce both short-term vulnerability and the long-term intergenerational transmission of poverty. Because investments in preschool nutrition lead to reduced risk of infant and child mortality and morbidity, and to improved societal welfare, improving child nutritional status of preschool children is an important policy objective in some CCT programs. However, outcomes have been mixed.

In this paper we examine the degree to which four CCT programs have improved preschool nutritional status and we consider options for design modifications that could enhance CCT impacts on nutritional status. We draw extensively on quantitative and qualitative data from CCT evaluations undertaken by the International Food Policy Research Institute (IFPRI), for the governments of four countries in Latin America: Brazil's *Bolsa Alimentação (BA)*, the *Programa de Asignación Familiar – Fase II* (*PRAF-II*) in Honduras, Mexico's *Programa de Educación, Salud, y Alimentación (PROGRESA)*, and *Red de Protección Social* (*RPS*) in Nicaragua[1].

First we describe CCT programs, including the philosophy behind such programs, their objectives, and their history. We then outline the nature of the problem of malnutrition in Latin America and the Caribbean as well as the characteristics of CCT programs that might be reasonably expected to affect nutritional status. We note that while *PROGRESA* in Mexico and *RPS* in Nicaragua are associated with improvements in child height that are sizeable in magnitude, *PRAF* in Honduras and *BA* in Brazil have essentially no effects on preschool nutritional status. Further, while improvements in iron status are observed in Mexico, these are not found in Honduras or Nicaragua, the other countries where this outcome was studied. We conclude with options for design modifications that could enhance CCT impacts on nutritional status in Latin America based on a review of best practices from the literature on nutrition interventions.

We discuss design modifications by type of nutrition problem. To address stunting, we discuss improved counseling sessions with age-specific messages highlighting simple, but critical actions parents can take to promote healthy child growth as well as take-home materials to reinforce these messages. We emphasize the importance of addressing hygiene and sanitation, with messages about hand-washing, hygienic food preparation, and safe disposal of child feces. To remedy micronutrient deficiencies, we consider the provision of iron and zinc for young children, iron-folate and f multiple micronutrient supplements for pregnant women. To address both stunting and micronutrient deficiencies, we explore the use of nutritional supplements for children and pregnant women with low BMI and dispersible micronutrient supplements for children 6-24 months because these supplements can both increase micronutrient intake and promote the timely introduction of complementary feeding.

1 For additional reviews of CCT programs, see Bassett 2008; Lagarde, Haines and Palmer 2007; Glassman, Todd, and Gardner 2007; and Adato and Bassett 2008.

BACKGROUND ON CCTS

Cash transfers ease constraints on household investment in human capital development by reducing out-of-pocket expenditures and opportunity costs (e.g. the lost labor contribution of children attending school). By making participation in certain activities a prerequisite for receiving payment, *conditional* cash transfers create specific incentives for beneficiaries to engage in positive behavior change in health, education, and nutrition. Behavioral conditions are particularly important to encourage participation among individuals or households that undervalue a good or service, do not realize its potent effect in the long run, or are not willing to take risks associated with using the good or service (Bassett 2008). The logic of CCTs assumes that household participation in health, education, and nutrition services is often based not only on "supply" constraints–that is, availability of health and education infrastructure, supplies, and staff—but also on "demand" constraints caused by a lack of information or the need for children to work rather than study in order to contribute to household income. By providing information on the value and availability of services and also requiring beneficiaries to participate in program activities, CCTs seek to overcome a broad range of constraints on household investment in human capital[2].

CCT programs have three defining characteristics. First, they are targeted interventions, with targeting generally based on socioeconomic data identifying the poor regions and households that will receive benefits. Second, they provide cash to beneficiaries, usually paid to the mother or primary caregiver in the household. Some programs also include in-kind transfers such as nutritional supplements. And third, in order to receive these transfers, recipients must commit to undertaking certain actions. The most common are enrolling children in school, attending health-care appointments, and seeing that preschool children receive vaccinations and regular growth monitoring. In addition to these features, some CCTs require women to attend regular health and nutrition education workshops. A fourth characteristic of many programs is a "supply-side" component, involving resources to improve the supply and quality of the schools and health-care facilities used by beneficiaries.

Of 20 CCT programs for which information is currently available, all require health check-ups for children (and some for pregnant women) and nearly two-thirds require child growth monitoring (with accompanying counseling or not). Six programs include group counseling on health and nutrition, although of these, two (Colombia and El Salvador) do not require and/or monitor participation. Only three programs provide micronutrient supplements and only one gives a nutritional supplement (Bassett 2008).

CONDITIONAL CASH TRANSFER PROGRAMS AND NUTRITION

There are several reasons why improving child nutrition is a sensible objective for CCT programs. Good nutrition is a component of good health and good health is an important component of well-being. So investments in preschool nutrition have intrinsic value insofar as they lead to improvements in societal welfare. Further, malnutrition is causally linked with greater risk of infant and child mortality and morbidity and so the costs associated with reducing malnutrition can be offset against the benefits of reduced demand for care of malnourished children who are more susceptible to infectious diseases and premature mortality.

Physical growth lost in early years as a consequence of malnutrition may be, at best, only partially regained during childhood and adolescence, particularly when children remain in poor environments.

2 A fuller discussion of the merits of conditionality is found in de Brauw and Hoddinott (2007).

The preschool period—in addition to the prenatal period—represents a window of opportunity to improve nutrition that, if not taken, is lost. Investments in nutrition make investments in schooling more productive. Poorly nourished children suffer deficits in cognitive development, start school later, progress through school less rapidly, and have poorer academic achievement. Lastly, investment in preschool nutrition is "good economics." Poor preschool nutrition leads to diminished physical stature and strength, less schooling, and poorer cognitive development, which in turn reduces productivity as an adult[3].

To understand how CCT programs affect child nutrition, we proceed in several steps. We first explain how nutritional status is measured and summarize the dimensions of nutritional status in Latin America and the Caribbean. We then outline a conceptual framework of the determinants of nutritional status and link this to the components and operation of these CCT programs in Brazil, Honduras, Mexico, and Nicaragua.

BACKGROUND ON NUTRITIONAL STATUS

Indicators of nutritional status are measurements of body size, body composition, or body function reflecting single or multiple nutrient deficiencies. Height-for-age reflects the cumulative impact of events affecting nutritional status and thus is an indicator of chronic nutritional deprivation. Two other measures are also used: weight-for-height and weight-for-age. Weight-for-height is an indicator of transitory nutritional deprivation; children become thin relative to their stature from deficits in energy-intake and/or disease-induced poor appetite, malabsorption, or loss of nutrients. Weight-for-age is a composite measure of nutritional status capturing both transitory and chronic aspects of nutritional deprivation. For preschool children, measures of height and weight will vary by age and sex, so height and weight data are converted to Z-scores. A Z-score is calculated by standardizing a child's height, given age and sex, against an international standard of well nourished children. Children with height-for-age Z-scores below –2 are classified as stunted; children with weight-for-height Z-scores below –2 are classified as wasted; and those with weight-for-age Z-scores below –2 are classified as underweight[4].

Tables 1 and 2 provide descriptive data on trends in stunting and the prevalence of stunting, underweight, and wasting in Latin America and the Caribbean, drawing on data found in ACC/SCN (2004). Table 1 indicates that steady, but slow, progress has been made in reducing stunting over the last 25 years. But, across the continent, still 13.7 percent of children (7.6 million) aged 0 to 5 years are stunted. Table 2 shows that for three countries studied here—Honduras, Mexico, and Nicaragua—stunting prevalences are above the continental average. In a well-nourished population, we would expect to see about 2.5 percent of children stunted. At the time the CCT programs were introduced, stunting prevalences are considerably higher than that figure in almost all countries, and in eight countries—Honduras, Mexico, Nicaragua, Guatemala, Bolivia, Ecuador, Peru, and Haiti—the prevalence of stunting exceeds 20 percent. By contrast, with the exception of a handful of countries, wasting is not a serious nutritional concern.

3 The literature supporting these claims is voluminous. Summaries and extensive sets of further references are found in Behrman, Alderman, and Hoddinott (2004).
4 The Z-scores we report are based on height and weight standards that have recently been changed (see WHO 2006). To ensure comparability with the published studies, we use the pre-2006 WHO standards.

TABLE 1: ESTIMATED PREVALENCE AND NUMBER OF STUNTED PRESCHOOL CHILDREN (0-5 YEARS) IN LATIN AMERICA AND THE CARIBBEAN, 1980-2005

	CARIBBEAN	CENTRAL AMERICA	SOUTH AMERICA	LATIN AMERICA AND THE CARIBBEAN
MILLIONS				
1980	0.7	4.8	7.2	12.7
1990	0.5	4.0	5.5	10.0
2000	0.3	3.3	4.0	7.6
2005 (est.)	0.2	2.9	3.4	6.5
PREVALENCE				
1980	20.0	32.2	21.3	24.3
1990	12.4	25.9	15.7	18.3
2000	7.4	20.4	11.3	13.7
2005 (est.)	5.7	18.0	9.6	11.8

Source: ACC/SCN (2004).

TABLE 2: MOST RECENT NATIONAL ESTIMATES OF STUNTING, UNDERWEIGHT, AND WASTING AMONG PRESCHOOL CHILDREN (0-5 YEARS) IN LATIN AMERICA AND THE CARIBBEAN

	LATEST SURVEY YEAR	STUNTING	UNDERWEIGHT	WASTING
All LAC	As of 2000	13.7	6.1	2.5
Brazil	1996	10.5	5.7	2.3
Honduras	2001	29.2	16.6	1.1
Mexico	1999	24.6	12.7	3.6
Nicaragua	2001	20.2	9.6	2.0
Argentina	1995-96	12.9	5.4	3.2
Bolivia	1998	26.8	7.6	1.3
Chile	2002	1.5	0.8	0.3
Colombia	2000	13.5	6.7	0.8
Costa Rica	1996	6.1	5.1	2.3
Cuba	2000	4.6	3.9	2.0
Ecuador	1998	26.4	14.3	2.4
El Salvador	2002-03	18.9	10.3	1.4
Guatemala	1998-99	46.4	24.2	9.5
Guyana	1997	10.0	11.8	11.4
Haiti	2000	22.7	17.3	4.5
Jamaica	1999	4.4	3.8	3.8
Panama	1997	18.2	8.1	1.0
Paraguay	1990	13.9	3.7	0.3
Peru	2000	25.4	7.1	0.9
Suriname	1999-2000	9.8	13.2	6.5
Trinidad and Tobago	2000	3.6	5.9	4.4
Uruguay	1992-93	9.5	4.4	1.4
Venezuela	2000	12.8	4.4	3.0

Source: ACC/SCN (2004). Notes: Country-specific results are taken from most current surveys. All LAC results are model-based estimates. Data are not available for other countries in LAC.

Micronutrient status is another important dimension of nutrition. Deficiencies in vitamin A intake compromise the immune system, leading to increased severity of infections and higher mortality in children. Vitamin A deficiency results from low intake of animal products containing high amounts of absorbable retinol or plant products high in beta-carotene. Diarrhea, fever, and some infections can interfere with the absorption or vitamin A or utilization of retinol. Adequate iron intake is necessary for brain development. Children can suffer from anemia, either as a result of low iron intakes or poor iron absorption, or as a result of illness. Iodine is needed for the synthesis of thyroid hormones that play a key role in cell replication; iodine deficiencies lead to increased infant mortality and irreversible impairment of mental capacities. Iodine deficiency results from low intake of iodine in the diet. Finally, micronutrient deficiencies can affect linear growth (Rivera et al., 2003).

Table 3 collates existing information on these micronutrient deficiencies for countries in Latin America and the Caribbean. Anemia among preschoolers is widespread in many countries, including Brazil, Honduras, and especially Nicaragua. Vitamin A deficiencies are less marked and, apart from Honduras, iodine deficiencies do not appear to be widespread among the general population.

TABLE 3: ESTIMATES OF MICRONUTRIENT DEFICIENCIES IN LATIN AMERICA AND THE CARIBBEAN

	VITAMIN A DEFICIENCY	**IRON DEFICIENCY**	**IODINE DEFICIENCY**
	Estimated percentage of children under 6 with subclinical vitamin A deficiency	**Estimated prevalence of iron deficiency anemia in children under 5**	**Percentage of population with UI < 100 µg/l**
Brazil	15	21	0
Honduras	15	34	31
Mexico	NA	NA	8.5
Nicaragua	9	47	0
Bolivia	23	59	19
Chile	NA	NA	0.2
Colombia	NA	NA	6
Costa Rica	NA	NA	9
Ecuador	NA	NA	0
El Salvador	17	28	5
Guatemala	21	34	14
Guyana	NA	NA	27
Haiti	32	66	NA
Panama	NA	NA	9
Paraguay	13	52	13
Peru	17	50	12
Venezuela	5	41	0

Source: Vitamin A and iron deficiency prevalences are taken from MI (2004); iodine deficiency is taken from ACC/SCN (2004). Note: Data are not available for other countries.

CONCEPTUAL FRAMEWORK: DETERMINANTS OF NUTRITIONAL STATUS AND PROGRAM DESIGN

To understand the pathways by which CCT programs can affect nutritional outcomes, it is helpful to begin with a brief review of the determinants of nutritional status. As a starting point, it is assumed that parental decisions to devote resources to improving child nutrition are motivated both by immediate concern about the welfare of the children and by longer-run concerns about investing in the human capital of their children. Parents may not have identical preferences regarding the use of family resources, but engage in (perhaps implicit) bargaining about such allocations, in which the strength of the bargaining position of each parent may depend on her/his access to resources, including those provided by CCT programs and other interventions.

Parents' ability to devote resources to the children's nutrition and health are constrained in several ways. There are resource constraints reflecting the amount of income and time available as well as prices faced by households. There is also a constraint arising from the biological processes that produce nutritional outcomes. These processes link nutrient intakes—the physical consumption of macronutrients (calories and protein) and micronutrients (minerals and vitamins), as well as time and inputs devoted to the production of health and nutrition (such as feeding and other dimensions of childcare), locality characteristics such as the presence and use of preventative and curative health facilities and the prevalence of infectious diseases, the individual's genetic make-up, and knowledge, skills and behaviors regarding the combination of these inputs to produce nutritional status.

The risk of malnutrition is particularly high during the first few years of life. Growth rates are highest in infancy, so adverse factors have a greater potential to cause retardation at this time. Younger children have higher nutritional requirements per kilogram of body weight and are also more susceptible to infections. They are also less able to make their needs known and are more vulnerable to the effects of poor care practices such as non-exclusive breastfeeding in the first six months of life and the failure to introduce safe complementary foods at the right time and in adequate quantities and frequency. For these reasons, almost all the growth retardation observed in developing countries has its origins in the prenatal period and the first two to three years of life (Martorell 1995).

This framework suggests a number of mechanisms through which these programs can affect nutrition. All four programs worked to relieve the constraints described above in three ways: by providing financial resources to mothers; by providing food supplements directly to children; and by providing new knowledge to mothers. The rationale for the cash transfers to mothers was that this would provide the means to increase food availability at the household level. While there remains some controversy over the extent to which increased income translates into increased nutrient consumption,[5] estimates for the *PROGRESA* sample indicate that a 10-percent increase in income translates into a 3-to-4.5-percent increase in caloric availability at the household level (see Hoddinott and Weismann 2008), with much of this increase going to foods richer in micronutrients. Our evaluations do not provide direct evidence on the intrahousehold distribution of foods and nutrients. However, studies on other poor populations have concluded that larger shares of resources that go to mothers are directed toward child health and nutrition than of resources directed to fathers and in part for this reason these programs chose to direct resources to mothers[6].

Supplementation works through several channels. It increases resources available to the household.

5 See Strauss and Thomas (1995) and Subramanian and Deaton (1996).
6 See Alderman et al. (1995) and Hoddinott and Haddad (1995).

If the supplement "sticks" to the child in the sense that receipt of the supplement does not cause parents to reduce the amount of food children receive, it will increase resources that flow to children. Further, given the links between micronutrient deficiency and illness and micronutrient deficiency and growth, these supplements will increase the biological efficiency with which macronutrients are used.

Lastly, an objective of all four CCTs was to increase maternal knowledge about the nutritional status of their children. In part, this was to be accomplished through growth monitoring and promotion, which, it is believed, may substantially increase the probability that parents or other caregivers become aware of nutritional problems before longer-run damage occurs and can be advised on how to act upon them in a timely fashion. In addition, *PROGRESA* participants were required to attend regular meetings (*pláticas)* at which, inter alia, health and nutrition issues and practices are discussed. These sessions are conducted by physicians and nurses trained in these specific topics (Rivera et al. 2000). As part of *RPS*, mothers attended bimonthly workshops covering topics such as household sanitation and hygiene, nutrition, reproductive health, and breastfeeding. If effective, nutrition education/behavior change activities may improve child nutrition and health through improved maternal knowledge and practices.

Table 4 summarizes ways in which these programs address the constraints that impede the attainment of good nutrition outcomes among children, noting difficulties in implementation. *RPS* contained the most extensive set of program components that directly affect nutritional status: cash transfers to mothers, micronutrient supplements for children; the transmission of knowledge and growth monitoring and promotion. *PROGRESA* contained all four components, but the initial delivery of benefits was somewhat less timely and the coverage somewhat less good (particularly the supplement) than that of *RPS*. Growth monitoring in supply-intervention areas of *PRAF* was low and the value of the cash transfer small. *BA* provided a somewhat larger cash transfer than *PRAF*, but apart from the transfer and regular growth monitoring, did not address other possible constraints affecting child nutrition.

TABLE 4: CONSTRAINTS TO GOOD NUTRITION AND PROGRAM COMPONENTS

CONSTRAINT ADDRESSED	PROGRAM	PROGRAM COMPONENT	COMMENTS ON IMPLEMENTATION
Mothers lack sufficient resources to purchase goods that will improve nutritional status of preschool children	BA	Mothers received a monthly cash transfer of 15 to 45 Brazilian reais (USD6.25 – 18.70)	
	PRAF	Mothers received a monthly cash transfer worth approximately USD3.85 for each child under 3 or pregnant mother (max of two beneficiaries).	Transfer coverage approximately 80%of intended beneficiaries
	PROGRESA	Mothers received a bimonthly cash transfer worth approximately 260 pesos (USD28) per month.	Transfers were not always received on a bimonthly basis
	RPS	Eligible households received a bimonthly cash transfer, the *bono alimentario* worth approximately USD18 per month and school attendance transfer worth approximately USD9 per month	
Children's diets are deficient in micronutrients	BA	No specific component	
	PRAF	No specific component	
	PROGRESA	Daily food supplement constitute 20% of calorie requirements and 100% of all necessary micronutrients provided to children between the ages of 4 months and 2 years and to children between 2-5 years if any signs of malnutrition are detected.	One year after implementation began, only 61-64% of eligible children aged 4-24 months received the supplement. Roughly half of children ages 24-36 and 36-48 months received the supplement.
	RPS	Provision of antiparasitics, multivitamins, and iron supplements	Some difficulty in distribution in first year of program.
Mother's require additional knowledge of good childcare and nutritional practices	BA	No specific component	
	PRAF	Community-based growth monitoring and counseling in supply-side intervention areas	
	PROGRESA	Monthly meetings (*platicas*) at which health and nutrition issues and practices are discussed. Sessions are lead by physicians and nurses trained in these topics.	
	RPS	Bimonthly workshops covering household sanitation and hygiene, nutrition, reproductive health, breastfeeding, and related topics.	
Growth monitoring - provide mothers with information about nutritional status	BA	Routine growth monitoring at health facilities.	
	PRAF	Routine growth monitoring at health facilities.	In supply-side intervention areas, coverage was approximately 18% of children under 2.
	PROGRESA	Regular growth monitoring.	Coverage was high.
	RPS	Monthly (0–2 year olds) and bimonthly (2–5 year olds) measurements and meetings with nurse and doctor.	

CCT IMPACTS ON NUTRITIONAL STATUS

Anthropometry

Three studies assess the impact of *PROGRESA* on anthropometric outcomes: Rivera et al. (2004), Gertler (2004), and Behrman and Hoddinott (2005). All three focus on aspects of preschooler height. Rivera et al. and Behrman and Hoddinott both examine differences in height growth between treatment and controls. Gertler examines height levels and prevalence of stunting at follow-up. At first glance, it is difficult to perceive common findings as there are significant methodological differences across these studies:

- Rivera et al. follow children exposed to *PROGRESA* for two years; Gertler and Behrman and Hoddinott have access to only one year of follow-up data. This should lead to a larger estimate of impact, particularly given the operational difficulties that existed in the first year of operation. However, as Rivera et al. note, because control localities began receiving benefits in late 1999, this biases downward estimates of the impact of *PROGRESA*.
- Rivera et al. and Behrman and Hoddinott define treatment in terms of a child residing in a *PROGRESA*-eligible household in a locality where *PROGRESA* was providing program benefits. They both define the control group as children residing in a *PROGRESA*-eligible household in a locality where *PROGRESA* was not providing benefits. Rivera et al. go one step further, interacting this representation of treatment by baseline socioeconomic status; making the reasonable assumption that this is uncorrelated with receipt of program benefits. By contrast, Gertler defines treatment as residing in a locality where *PROGRESA* was providing benefits. As such, his treatment group includes children residing in households that were not receiving any *PROGRESA* benefits. This should lead to more conservative estimates of impact.
- Each study takes a different approach to locality controls. Rivera et al. do not include any, arguing that randomization makes their inclusion unnecessary. Gertler estimates a single-difference model and includes locality-level wages as a control. Because he models treatment at the community level, he cannot estimate community-level fixed effects and instead opts for a random effects model. Behrman and Hoddinott use child-level fixed effects, thus differencing out all fixed child, household, and community characteristics. They also include changes in food prices to control for some, but not all, community-level time-varying factors.
- No study *explicitly* accounts for attrition, even though it is clearly substantial and, along certain dimensions (child age and treatment) it appears nonrandom. However, the Behrman and Hoddinott results difference out all time-invariant unobservables, including those that are associated with increased likelihood of attrition and, as such, provide some control for bias brought about from non-random attrition.

Given all this, one approach to adjudicating across these results is to start by identifying the most conservative estimates. These show that *PROGRESA* has no effect on average height but does reduce stunting by ten percentage points. Relaxing these standards in one of several ways, for example, using village-level random effects or the treatment-on-the-treated estimates, also indicates an increase in growth velocity.

By contrast, existing evidence shows that *RPS* had an unambiguously powerful impact in terms of improving preschooler height. Compared to children in control localities, stunting fell by 5.3 percentage points among children aged 0 to 5 years in treatment communities. The prevalence of children considered underweight also fell. These effects are larger than those observed for

PROGRESA, although this may partly reflect the fact that the *RPS* impact is measured two years after the introduction of the program, as opposed to one year in the case of *PROGRESA*. By contrast, neither the demand-side nor the combined demand-and-supply-side interventions undertaken as part of *PRAF* had any impact whatsoever on measures of child anthropometry. There are two assessments of the impact of *BA.* One, by Morris *et al.* (2004) finds that the program led to *reduced* weight gain, indicating that it had an adverse effect on nutritional status. A second assessment, reported in Olinto (2005), using the same methods but a different sample, shows that the program had a small, positive effect on weight gain.

Why are such divergent outcomes observed? In the case of *BA*, the study design controlled for preexisting differences between treatment and control groups as well as access to other welfare programs. Further, the program appears to have *increased* the availability of nutritious foods in the household. However, a predecessor intervention, a Brazilian federal program called *Incentivo para o Combate de Carências Nutricionais*, made milk powder available to mothers of underweight children but with the condition that children were dropped from the program should the child start to grow well. Morris *et al.* (2004) posit that while this was not a condition of *BA,* this change in program operation was not well advertised and many (probably the majority) of the mothers in our sample had previously been beneficiaries of the previous program. There were anecdotal—and impossible to substantiate—reports of *BA* beneficiary mothers deliberately keeping their children malnourished in the mistaken belief that this was necessary in order to continue to qualify for benefits. That said, the magnitude of the effect is small. The coefficient of 0.03 implies a reduction in weight gain of 0.36 kg/year, which, functionally, is not significant and of course, there is the results of the second study (Olinto, 2005) which report a small, positive effect.

The absence of any effect in the case of *PRAF* is somewhat easier to explain. The program provided relatively little in the way of cash transfers compared to the other interventions and coverage on the supply side—at only 18 percent of intended beneficiaries—was minimal. Given that the interventions under *PRAF* that might be expected to have any effect on nutrition were so minor in magnitude, it is not surprising that we find no impact. It is possible that the absence of impact is a consequence of the wider age range, 0-5 years, used in the *PRAF* study; for example, older preschoolers have less potential to gain from interventions that increase household income.

Iron Deficiency

As discussed earlier, iron deficiency is a serious nutritional concern in much of Latin America and the Caribbean and it has serious functional and economic consequences. Three of the evaluation studies (*PRAF*, *PROGRESA*, and *RPS*) assessed program impact on blood hemoglobin levels and on the prevalence of anemia. For Mexico, blood hemoglobin data were not collected at baseline but were collected in 1999 and 2000. Two studies, Rivera et al. (2004) and Gertler (2004)—both described above—use these data. Rivera et al. (2004) use as their sample children who were less than one year of age when the baseline survey was implemented in 1998 and thus were 12-24 months at time of the 1999 survey. They use a single difference methodology, comparing mean values in treatment and control localities of both hemoglobin levels and anemia. Gertler (2004) uses a larger sample, including children aged 12-48 months at the time of the survey. He estimates a random effects logistic regression of the determinants of anemia, where the random effects are at the village level.

These two evaluations show a large impact. The log odds difference of 0.745 reported by Gertler (2004) implies a reduction in the probability of being anemic of 25.5 percent. Rivera et al. find

a smaller impact (a reduction of 10.6 percent), but their estimate is also statistically significant. Although they use the same data source (the 1999 nutrition survey), the two *PROGRESA* studies use different statistical techniques and draw different subsamples from this common survey. This makes it difficult to ascertain why the magnitudes of these estimates of impact are so different.
Neither *PRAF* nor *RPS* had an impact on blood hemoglobin levels or on rates of anemia. The *PRAF* results are not especially surprising, given that *PRAF* had limited effects on diet quality and there is no guarantee that these would have trickled down to young children. By contrast, the absence of an observed impact in the case of *RPS* is particularly striking. *RPS* included the provision of iron supplements for children and the program had a significant effect on the percentage of mother's receiving ferrous sulfate for their children in the past four months; the double difference estimated average effect was 36.1 percent in 2002. Despite this, *RPS* did not reduce the prevalence of anemia nor did it raise average hemoglobin levels.

There are at least five possible explanations. While twice as many children in intervention areas had received iron supplements in the last four months compared to control areas, it is not possible to ascertain whether complete doses were received or whether the supplements were actually ingested. Program administration data show that there were severe shortages of vitamins, iron supplements, and antiparasitics during 2001, so it is likely that complete supplements were not received at each visit. Shortages and inconstant or incomplete delivery to children present one possible reason for the failure to improve hemoglobin in the population, as well as the fact that even though the program effect was massive, fully one-fifth of the children under age 5 in the intervention areas had not received a supplement in the past four months.

Second, while mothers often reported to both survey enumerators doing the quantitative surveys and the researchers doing the qualitative assessments of *RPS* that they were giving the supplements, field observation over time, combined with intensive interviewing on the topic, revealed that they often were not. Adato and Roopnaraine (2004) reported that the main reason why mothers did not give these supplements to their children was that children do not like them. In particular, mothers said that the children do not like the taste of the iron supplement, and that it upset children's stomachs, causing them to throw up or get diarrhea. A number of respondents were also concerned that the iron would adversely affect their children's teeth. For example, one mother stated: "at the beginning it was bad for him because it gave him diarrhea and made him feel sick, but since they say it is good for them, I kept giving it to him. However, it was also bad for his teeth; now his teeth are damaged" (Adato and Roopnaraine 2004).

Another possibility is that children are deficient in other micronutrients, potentially limiting the hematological response to iron supplementation. Allen et al. (2000) failed to find an improvement in hemoglobin in children ages 18–36 months supplemented with iron over 12 months in a controlled experiment. They concluded that the failure of the treatment could not be attributed to failure to take the supplement, inadequate length of supplementation, or inadequate absorption of the iron provided. One thing that can be expected from an iron supplementation intervention is an increase in the reserves of iron in the human body—for future evaluations of conditional cash transfer interventions, it may be valuable to measure changes in serum ferritin and other indicators to have a more complete picture of the effect on the state of iron nutrition.

Finally, while they find that exposure to *PROGRESA* leads to reductions in anemia, Rivera et al. (2004) note that even in treatment localities, anemia rates remained high, at over 44 percent. They argue that these high anemia rates cannot be explained by non-nutritional causes of anemia such as parasitic infections because malaria and hookworm infections are rare in these populations.

Instead, they note that relatively modest effects may be occurring because reduced iron, which is not absorbed well, was used for the fortification of the *papilla*.

CONCLUSIONS

Lessons learned about the role of nutrition in CCTs

There are many good reasons why policymakers should be concerned about improving preschool nutritional status. These provide a prima facie case for including the improvement of nutritional status as an objective of conditional cash transfer programs and ensuring that program components are designed so as to directly affect this outcome. So what is the impact of these four CCTs on nutrition?

In answering this question, it is important to note that the interventions were not the same in all countries, different evaluation studies used different methods, the time that elapsed between baseline and follow-up surveys differs, and the baseline extent of malnutrition—and therefore the scope for improvement—varied across countries. With these caveats in mind, a reasonable conclusion is that the outcomes are mixed. In two cases, *PROGRESA* in Mexico and *RPS* in Nicaragua, CCTs are associated with improvements in child height. These impacts are sizeable in magnitude. Frustratingly, however, our conclusions about *why* these positive effects emerge must be much more tentative. While *PROGRESA* and *RPS*, as well as Colombia's *Familias en Acción (FA),*[7] demonstrate positive and sizeable impacts on child height, the pathways by which this is attained remain unclear. All three programs incorporate regular growth monitoring, the provision of information about nutrition and good childcare practices, sizeable monetary transfers to mothers (equivalent to approximately 20 percent of household consumption levels in Mexico), and, in Mexico, nutritional supplements directly targeted to children. The fact that we obtain a larger positive impact for *PROGRESA* when receipt of the fortified supplement (containing zinc) is also taken into account suggests that in this case, the supplement played a key role in improving preschoolers' anthropometric status.

The other two programs, *PRAF* in Honduras and *BA* in Brazil, have no meaningful effects on preschool nutritional status and only *PROGRESA* improved measures of iron status. First, programs need to clearly convey program requirements to beneficiaries. We surmise that the failure to do so in the case of *BA* may have contributed to the negative effects observed in the Morris et al. (2004) Brazilian study, though we again caution that these were not replicated in a second study. They also need to ensure that beneficiaries understand why they are asked to undertake certain actions; the reluctance of Nicaraguan mothers to give iron supplements to their children being a good example. Second, constraints on implementation capacity will severely limit program impact. As noted in several studies, implementation difficulties may have made it more difficult for *PRAF* to achieve its objectives. Policymakers and program designers need to be realistic about what can be achieved on the ground.

CCT design modifications that could enhance impacts on nutrition

We have sufficient evidence to believe that CCTs can have a positive and sizeable effect on preschool nutritional status. While CCTs are not always the best intervention to address nutrition in a given

7 FA produced a 6.9 percentage-point decrease in the probability of stunting for a child under 24 months. This is an increase of 0.16 z-scores, or 0.43cms for a child of 12 months (Attanasio and Mesnard 2006).

country[8], these programs are gaining momentum worldwide and may be able to bring about important impacts in nutrition, especially if they are designed using optimal nutrition interventions. In this section we consider options for design modifications and additional program components that could increase CCT impacts on preschool nutritional status. As mentioned, it is difficult to disentangle the individual effects of CCT components—the cash itself vs. different program conditions, e.g. growth monitoring and promotion, nutrition education, micronutrient and food supplements—on nutrition outcomes. This, in turn, makes proposing program design modifications challenging. Our commentary is based on a review of best practices from the literature on nutrition interventions, drawing heavily from the January 2008 *Lancet* Series on Maternal and Child Undernutrition, which provides concrete evidence about the effectiveness of nutrition-related interventions (Bhutta et al. 2008), and the 2008 Copenhagen Consensus Challenge Paper on Hunger and Malnutrition, in which a panel of experts presents the most promising solutions for hunger and malnutrition (Horton, Alderman and Rivera 2008). We apply these practices to what we know of CCTs to date.

Our first observation is that CCT conditions should be tied to interventions that have a proven record in overcoming the major nutritional problems manifested in the program area, which in Latin America and the Caribbean are stunting and iron-deficiency anemia. Determining appropriate CCT design modifications for this region involves not only identifying best practices for addressing stunting and iron-deficiency, but also determining which of these practices can successfully be employed as a CCT condition. Appropriate conditions must be discrete activities that can be monitored at an individual or household level on a regular basis; they should also be activities for which participation rates among CCT beneficiaries (or potential beneficiaries) are low due to financial, time, and/or knowledge constraints and which can be made accessible at high quality to beneficiaries in a reasonable timeframe.

Because the optimal period for nutrition interventions extends from pregnancy through the first two years of life, a first step in reorienting CCTs would be to target nutrition-related conditions to reflect this "window of opportunity." Conditions focusing on preventing stunting should be applied to pregnant women and children 0-2 years of age, but conditions related to overcoming iron-deficiency should continue throughout childhood since this condition can affect learning, work performance, and productivity at all stages of life (Allen and Gillespie 2001).

There are several low-cost design modifications that could sharpen impacts, while building on the existing structure of CCTs. Many CCTs already employ conditions requiring mothers to attend education or counseling sessions to receive the cash transfer. According to the *Lancet* Series and the 2008 Copenhagen Consensus, nutrition education counseling about complementary feeding is a valuable intervention to address preschool stunting. Such counseling has been estimated to improve height-for-age Z-scores by 0.25 (0.01 – 0.49) in food-secure populations without accompanying food or cash (Bhutta et al 2008).

While CCT education and counseling sessions tend to include information about child feeding, these messages usually represent one theme of many (e.g. women's rights, community organization, reproductive planning, domestic violence, etc.). One way to increase CCT impact on nutrition, therefore, would be to focus more heavily on messages with proven impacts, such as those about complementary feeding. Also, because infant and child feeding messages are age-specific, providing segmented messages that reach mothers at the relevant learning moment could make CCTs more

8 Specific nutrition interventions may be more cost-effective than CCTs or may be better able to target specific nutritional problems (e.g. food fortification, health service improvements, or food supplementation).

effective at changing infant and child feeding behaviors. For example, a study in Haiti[9] comparing a preventive versus a recuperative nutrition intervention found age-specific messages to be effective. The preventive approach, with longer duration of behavior change communication and age-specific messages, resulted in improved nutritional status and slightly better maternal knowledge of infant and child feeding and general health and nutrition practices, as well as greater likelihood of awareness, trial, and adoption of new practices. However, because the food component made the greatest contribution to the outcomes in this study, it would be useful to test the effectiveness of age-specific messages separately to corroborate this finding (Menon and Ruel 2007).

According to the Copenhagen Consensus recommendations, effective delivery of messages about complementary feeding and child growth requires one-on-one discussion, generally with the mother (Horton, Alderman and Rivera 2008).[10] A cheaper, though less personalized, model is to have multiple group counseling sessions for specific child age groups. CCT counseling sessions could highlight key messages about infant and child feeding at key times, e.g. focusing on exclusive breastfeeding for mothers of children 0-6 months, promoting complementary feeding (including appropriate frequency, consistency, and content) for mothers of children 6-9 months, and appropriate feeding during illness for all ages. To further reinforce messages, CCTs could also provide take-home materials, such as "action posters" with illustrations conveying messages for specific age groups.

Another simple modification to education and counseling sessions required within CCTs is the addition of a component on hygiene and sanitation. According to the *Lancet* Series, effective hygiene interventions can significantly reduce child stunting. For example, a study of behavior change communication for child nutrition in Bihar, India found that improved hand-washing practices (e.g. after mother's defecation, after helping a child defecate, or before preparing food) were associated with improved nutritional status (Levinson, Barney, Bassett and Schultink 2007). A pooled analysis of 6 studies of hand-washing counseling indicated a 30 percent reduction in the risk of diarrhea. Because each additional episode of diarrhea is assumed to increase the odds of stunting by 4 percent, this reduction in diarrhea risk contributes to an important reduction in the probability of stunting (Bhutta et al. 2008). Hygiene promotion is estimated to cost about $3.35 per DALY[11] averted (Cairncross and Valdmanis 2006). CCTs could incorporate hygiene messages (e.g. hand-washing using soap and at critical moments, hygienic food preparation, and safe disposal of child feces) into the curriculum for required counseling. Other hygiene and sanitation interventions, including sanitary waste disposal and water supply and sanitation could be implemented in CCT areas to boost impact.

Not all low-cost design modifications will be effective. For example, the jury is still out on growth monitoring and promotion (GMP), a common element of many CCT programs, including each of the four programs we review. Evidence of the effectiveness of GMP programs is mixed[12]. The *Lancet* Series did not mention growth monitoring and promotion as one of the most promising interventions to address stunting, and the Copenhagen Consensus emphasizes that GMP can be an important tool with which to frame educational messages, but that weighing cannot be considered an end in itself

9 The preventive approach targeted all children 6-24 months with 18 months of food rations and a maximum of 18 monthly age-specific behavior change sessions. The recuperative approach targeted malnourished children under-5 with 9 months of food rations and 9 monthly standard BCC sessions.

10 Chile's *Puente* program uses a particular approach: intensive family-based support provided by a social worker to help families reach established levels of well-being (e.g. in health, education, and employment), often through links with other social programs (Rawlings 2004). This approach may be suited to Chile's situation where immunization coverage is high, health care services are widely used, and stunting rates are very low overall (1.5% of children 0-5 in 2002), suggesting that idiosyncratic problems matter more than in places with widespread poverty and malnutrition and poor services (ACC/SCN 2004; UNICEF).

11 A DALY, or Disability Adjusted Life Year, is a health gap measure that combines years of life lost to death and years of 'healthy' life lost by virtue of being in states of poor health or disability.

12 See Ashworth (2007); Galasso and Umapathi (2007); Griffiths and Del Rosso (2007).

(Horton, Alderman and Rivera 2008). It is widely recognized that growth monitoring alone does not change a child's (or pregnant woman's) growth and therefore tailored behavior change counseling is the cornerstone of an effective approach.

We suggest that if a CCT does employ a condition requiring parents to bring children to growth monitoring and promotion sessions, the program must ensure quality counseling tailored to the child's circumstances (e.g. adequacy of weight gain, health status, food intake, and caring practices), sufficient training and supervision of staff and volunteers, and functioning links to the health sector, all underpinned by strong program monitoring and evaluation. Furthermore, growth promotion should focus on children under two years of age, or as some experts suggest, on children under 12 months of age (but up to 18 months in cases of growth faltering) (Ashworth 2007). Because of growth patterns in young children, it is appropriate to monitor weight on a monthly basis for children under 12 months and on a semimonthly basis for children from 13-24 months (Marini et al. 2008). This condition should not be applied to children older than two.

Nutritional supplements can also play a key role in improving preschooler growth. The *Lancet* Series also highlights balanced supplements of energy and protein for pregnant women, which were found to reduce the risk of intrauterine growth restriction (IUGR), which is a strong predictor of size later in life—most infants born with IUGR do not fully catch up to normal size during childhood[13]—by 32 percent. These findings suggest that further experimentation with nutritional supplements in CCT programs for children and pregnant women with low BMI could be valuable.

The first CCT programs were right to think about micronutrient status as well as chronic malnutrition (stunting) in their program design. However, the record has not been as positive as one would like. Several design modifications could enhance CCT impact on micronutrient status[14]. Because a pregnant woman's iron status affects that of her child, CCTs could include maternal iron-folate and multiple micronutrient supplements. According to a pooled analysis of 8 studies, iron-folate supplementation during pregnancy was shown to increase hemoglobin levels at term by 12 g/L (95% CI 2.93 – 21.07) and reduce the risk of anemia at term by 73 percent (Bhutta et al. 2008). Iron supplementation for pregnant women costs $66 per DALY (Baltussen et al. 2004 as cited in Horton, Alderman and Rivera 2008). Because iron can have adverse effects on malaria, untargeted supplementation is recommended only in areas where malaria is not endemic.

Multiple micronutrient deficiencies often occur simultaneously when diets are poor and deficiencies in micronutrients other than iron (such as B vitamins, iodine, vitamin D, and antioxidants) can cause poor pregnancy outcomes (Allen 2004). Thus, in the absence of improving dietary quality, supplementation with multiple micronutrients during pregnancy has been a promising option. A systematic review and meta-analysis by Bhutta et al. (2008) found that pregnancy supplementation with three or more micronutrients was associated with a 39 percent reduction in maternal anemia compared to either two or more micronutrients or a placebo (relative risk 0.61, 95% CI 0.52 – 0.71) (Bhutta et al. 2008). However, although supplementation with multiple micronutrients is theoretically preferable to iron-folate supplementation in areas with numerous micronutrient deficiencies and although the *Lancet* does not raise concerns about this intervention, several studies have indicated that existing analyses have not revealed added benefits of multiple micronutrient supplements compared to iron-folate supplementation. Furthermore, these studies conclude that there is

13 See Allen and Gillespie (2001).

14 We do not comment here on vitamin A and iodine deficiencies because these are not significant problems in Latin America and because these problems are often addressed in ways not suitable to the structure of a CCT program—e.g. vitamin A supplementation at 6-month intervals and salt fortified with iodine, Also, although in other contexts helminthes are an important contributor to child anemia (Horton et al. 2008), non-nutritional causes of anemia are rare in Latin America.

insufficient evidence to identify likely adverse effects of multiple micronutrient supplementation and to determine whether excess supplementation during pregnancy is harmful to the mother or the fetus (Allen 2004; Ramakrishnan et al. 2004; Haider and Bhutta 2006).

There are also ways to revise CCT efforts to address micronutrient malnutrition, which directly affect micronutrient status and have complementary impacts on anthropometry. For example, treatment of zinc deficiency, which is associated increased risk of mortality and morbidity as well as poor physical growth, reproductive function and neurobehavioral development, can improve both micronutrient status and child growth (Hotz and Brown 2004; Horton, Alderman and Rivera 2008). A meta-analysis of randomized controlled trials looking at the effect of zinc supplementation on the growth of prepubertal children found an overall impact on height-for-age Z-scores of 0.35 (95% CI 0.19 – 0.51) (Brown, Peerson, Rivera and Allen 2002). The effect was greatest among children above 6 months with low initial height-for-age Z-scores. A more recent analysis of 40 studies limited to children under five found an overall effect of 0.07 z-scores (Horton, Alderman and Rivera 2008). Therapeutic zinc supplementation for children below 12 months is highly cost effective and recent work indicates that supplementing infants may also be cost-effective. Zinc supplements cost $0.16 per child per year plus the cost of accompanying counseling (Levin et al. 1994, as cited in Horton and Ross 2003; The Micronutrient Initiative 2007 forthcoming); therapeutic and preventive zinc supplementation have average costs of $73 and $406 per DALY gained, respectively. However, there is little evidence on preventive zinc supplementation programs at scale and insufficient evidence about appropriate timing and frequency of preventive supplementation (Horton, Alderman and Rivera 2008). Recognizing that there are some details of optimal supplementation to be examined, zinc supplementation could easily be incorporated into the CCT structure, for example, by conditioning receipt of the cash transfer on a household picking up a one-month supply of zinc supplements for their children at monthly visits to the health center.

Dispersible micronutrient preparations, such as *Sprinkles*, are another promising vehicle for CCTs to improve micronutrient status and anthropometry. Efficacy and effectiveness studies indicate that the consumption of dispersible micronutrient preparations can improve iron status significantly, especially among young, anemic children (Zlotkin et al. 2004; Menon et al. 2007; Bhutta et al. 2008).[15] And because dispersible micronutrients can be consumed with complementary foods, targeting this supplement to children 6-24 months also effectively promotes the appropriate introduction of complementary foods (Zlotkin et al. 2004). At a cost of approximately $0.88 per child per year (World Bank 2006), a cost per DALY of $12 (Sharieff, Horton and Zlotkin 2006) and a benefit-cost ratio of up to 37 (assuming a 4 month intervention for children 6-12 months) (Horton, Alderman and Rivera 2008), the impact of home fortification appears quite high. Furthermore, acceptability has been excellent among mothers, children and communities (Zlotkin et al. 2004), so requiring mothers to pick up a monthly supply of dispersible micronutrient preparations at healthcare visits could be an effective CCT design modification.

Beyond these program design modifications, it is clear that supply side improvements will also be critical in making CCTs more effective at improving preschool nutritional status. Accompanying CCT implementation with supply-side investments in areas where services and/or infrastructure are insufficient to support the increased demand associated with a CCT, or where service quality is poor, is essential for positive impact. Incentives for service providers could be tested to determine if this is an effective way to ensure high-quality services (e.g. counseling and delivery of key micronutrients).

15 According to efficacy studies in eight countries, anemia reduction ranges from 55-90% depending on the presence of malaria (Zlotkin et al. 2004). An effectiveness study in children 6-24 months in Haiti found improved hemoglobin levels and reduced anemia rates. Younger children and those who were anemic when they began to consume *Sprinkles* benefited more from the supplement (Menon et al. 2007).

Table 9 summarizes the design modifications explained above. While there may be potential gains from economies of scale by piggybacking the promotion of nutrition services onto an existing CCT program (in terms of staff, outreach, training, and logistics), we recommend further cost analysis based on specific program characteristics and beneficiary numbers before adopting any of these design modifications. In order to determine which of these design modifications has the most potential in specific contexts, further research is necessary. In particular, randomized studies aimed at disentangling the independent impacts of different types of conditions (and their various combinations) and the benefits conferred by supply-side enhancements on nutritional outcomes would be invaluable.

TABLE 9: DESIGN MODIFICATIONS TO IMPROVE CCT IMPACTS ON NUTRITION

GENERAL PROGRAM DESIGN

Program conditionality

- Conditions focusing on preventing stunting should be applied to pregnant women and children 0-2.
- Conditions related to overcoming iron-deficiency should extend throughout childhood since this condition can affect learning, work performance, and productivity at all stages of life.

DESIGN MODIFICATIONS TO ADDRESS CHILD STUNTING

Group counseling

- Focus on key nutrition messages with proven impacts (e.g. complementary feeding).
- Provide age-specific messages (e.g. focusing on exclusive breastfeeding for mothers of children 0-6 months, promoting complementary feeding (including appropriate frequency, consistency, and content) for mothers of children 6-9 months, etc.).
- Complement counseling with take-home materials with illustrated messages for specific age groups.

Hygiene and sanitation

- Provide counseling about hygiene and sanitation (e.g. hand-washing using soap and at critical moments, hygienic food preparation, and safe disposal of child feces).

Growth monitoring and promotion

- *Seek further evidence as impact results are lacking for this intervention.*
- If this is used as a CCT condition:
  - o Provide quality counseling tailored to the child's circumstances (e.g. adequacy of weight gain, health status, food intake, and caring practices).
  - o Guarantee sufficient training and supervision of staff and volunteers.
  - o Ensure functioning links to the health sector.
  - o Focus on children under two years of age (not older children).
  - o Monitor weight monthly for children <12 months and every 2 months for children 13-24 months.

Food supplements

- Experiment with energy and protein supplements for pregnant women with low BMI and for children.

DESIGN MODIFICATIONS TO ADDRESS MICRONUTRIENT DEFICIENCIES

Micronutrient supplementation

- Provide iron-folate supplements to pregnant women. (Untargeted supplementation is recommended only in areas where malaria is not endemic.)
- Experiment with multiple micronutrient supplements for pregnant women.
- Offer zinc supplements to children and follow emerging evidence on recommended timing and frequency of supplementation.
- Provide dispersible micronutrient preparations, such as *Sprinkles*, to children 6-24 months to improve iron status and promote appropriate complementary feeding.

COMPLEMENTARY SUPPLY-SIDE INVESTMENTS

Supply-side interventions

- Focus on areas where services and/or infrastructure are insufficient to support increased demand associated with a CCT or where service quality is poor.
- Test the use of incentives for service providers to determine if this is an effective way to ensure high-quality services (e.g. counseling and delivery of key micronutrients).

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