REVIEW

Conditional Cash Transfers for Improving Uptake of Health Interventions in Low- and Middle-Income Countries

A Systematic Review

Mylene Lagarde, MSc
Andy Haines, MD
Natasha Palmer, PhD

Context Cash transfers conditional on certain behaviors, intended to provide access to social services, have been introduced in several developing countries. The effectiveness of these strategies in different contexts has not previously been the subject of a systematic review.

Objective To assess the effectiveness of conditional monetary transfers in improving access to and use of health services, as well as improving health outcomes, in low- and middle-income countries.

Data Sources Relevant publications were identified via electronic medical and social science databases from inception to April 2006 (PubMED, EMBASE, POPLINE, CAB Direct, Healthcare Management Information Consortium, WHOLIS (World Health Organization Library Database), African Healthline, International Bibliography of the Social Sciences (IBSS), Eldis, British Library for Development Studies (BLDS), ID21, Journal Storage (Jstor), Inter-Science, ScienceDirect, Internet Documents in Economics Access Service (Research Papers in Economics) (IDEAS[Repec]), Latin American and Caribbean Health Sciences Literature (LILACS), MEDCARIB, Virtual Library in Health (ADOLEC), Pan American Health Organization (PAHO), FRANCIS, The Cochrane Central Register of Controlled Trials, the Database of Abstracts of Reviews of Effectiveness, and the Effective Practice and Organization of Care Group (EPOC) Register. Reference lists of relevant papers and "gray" literature resources were also searched.

Study Selection To be included, a paper had to meet study design criteria (randomized controlled trial, interrupted time series analysis, and controlled before and after study) and include a measure of at least 1 of the following outcomes: health care utilization, health expenditure, or health outcomes. Twenty-eight papers were retrieved for assessment and 10 were included in this review.

Data Extraction Methodological details and outcomes were extracted by 2 reviewers who independently assessed the quality of the papers.

Results Overall, the evidence suggests that conditional cash transfer programs are effective in increasing the use of preventive services and sometimes improving health status.

Conclusions Further research is needed to clarify the cost effectiveness of conditional cash transfer programs and better understand which components play a critical role. The potential success and desirability of such programs in low-income settings, with more limited health system capacity, also deserves more investigation.

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In the past 10 years, some Latin American countries have introduced programs that provide monetary transfers to households on the condition that they comply with a set of behavioral requirements. These requirements are typically linked to attendance for preventive interventions at primary health care facilities and educational enrollment for children.

These programs are justified by social equity concerns, especially when they target disadvantaged groups. As low-income individuals usually face the greatest barriers to access, such conditional cash transfer mechanisms can also help redistribute resources to reduce health inequities. They can potentially increase the use of health services by low-income individuals by providing funds to help overcome some financial barriers to access, including costs related to seeking health care or sending children to school.

Interest in conditional cash transfer programs has increased, and these programs are spreading beyond Latin America. There is discussion of similar programs in sub-Saharan Africa, and there are pilot programs aimed at improving uptake of maternal health services in Bangladesh and Nepal.[1,2] Until now, although a number of overviews have been carried out,[3,4] there has been no systematic review critically assessing existing evidence on this subject.

Author Affiliations: London School of Hygiene & Tropical Medicine, London, England.
Corresponding Author: Mylene Lagarde, MSc, Research Fellow, London School of Hygiene & Tropical Medicine, Health Policy Unit, Keppel Street, London, WCE1 7HT, England (mylene.lagarde@lshtm.ac.uk).

METHODS

A number of relevant databases (available from author on request) were searched using the following key terms, their combinations, or both: *cash transfer, conditional cash transfer, monetary incentive, social protection, safety nets, health services, health,* and *demand*. No limitation regarding publishing date was used. To identify "gray" literature studies, we systematically reviewed the bibliographies of all relevant publications, searched the System for Information on Gray Literature in Europe database (SIGLE), and explored online resources extensively (available from author on request).

The scope of the review was restricted to interventions in low- and middle-income countries as defined by the World Bank. We identified all studies that evaluated the effect of directly transferring money to households conditional on some requirements, at least 1 of which had to be related to health-seeking behavior. Studies on in-kind or unconditional cash transfers were excluded.

We included studies with the following study designs: randomized controlled trials, controlled before and after studies, interrupted time-series analyses, and multi cross-sectional studies using matching techniques. To be included, a study had to include a measure of at least 1 of the following outcomes: health care utilization or access to health care, household health expenditure, or health or anthropometric outcomes.

Two of the authors (M.L. and A.H.) independently sifted the titles and abstracts of retrieved publications and selected potentially relevant articles. In case of disagreement, full-text articles were retrieved and examined. All articles that were judged to meet criteria for this study were then independently reviewed (M.L. and A.H.). A data collection form was used to collect information on study design, intervention, setting, and outcome measures.

The quality of the selected studies was assessed independently by the 2 authors using criteria adapted from those of the Cochrane collaboration[5] and tailored to the features of the studies. Given the potentially spurious results that could arise from ignoring clustering effects,[6] attention was paid to assessing whether clustering effects were accounted for in the analyses. Discrepancies in quality ratings were resolved by discussion between the authors.

Given the heterogeneity of interventions, outcome measurements, and settings, statistical pooling of results was not attempted and a narrative synthesis was undertaken.

RESULTS

The review of titles and abstracts of more than 24 000 references from the main search led to the retrieval of 28 articles for full-text assessment. Ten articles that describe data and results from 6 studies (TABLE 1) were included in the final review. Of these 6 studies, 4 were randomized trials,[7,12-14] 1 was a quasi-randomized evaluation,[15] and 1 was a controlled before and after study.[16]

Description of Interventions

With the exception of 1 study in Africa, most included studies described large-scale conditional cash transfer programs in Latin America. In Mexico, the seminal *Progresa* program (later called *Opportunidades*)[7-11] aimed to improve health and education outcomes of low-income children. Households, selected on socioeconomic criteria, were given cash provided that children regularly attended both school and appointments for preventive health care. Participating children aged 4 to 23 months were also given food supplements. In Nicaragua, the *Red de Protección Social*[12] pilot program was designed in a similar manner to the program in Mexico. Disadvantaged households in low-income areas received a cash transfer provided they brought their children who were younger than aged 5 years to preventive health examinations (where they received antiparasitic drugs, vitamins, iron supplements, and vaccinations) and attended health education workshops. An additional cash transfer was contingent on enrollment and regular attendance at primary school. The program *Familias en Acción*[16] in Colombia was also similar. Targeting the poorest households in disadvantaged municipalities, it provided monetary transfers to mothers on the condition that their children who were younger than aged 7 years attended preventive health examinations, and another transfer if their children aged 7 to 17 years attended school regularly. Mothers were also encouraged to attend health education courses. In Honduras, any household in municipalities with high prevalence of malnutrition and benefiting from the *Programa de Asignación Familial*[14] had access to 2 types of monetary incentives: one conditional on school attendance of children aged 6 to 12 years, and the other conditional on undergoing monthly preventive health examinations for children and prenatal care attendance for pregnant women. Finally, in Brazil the program *Bolsa Alimentação*[15] was targeted to improve child and maternal health among low income populations. Mothers received capped transfers based on the number of beneficiaries (either children younger than aged 7 years or pregnant or lactating woman) in the household. Transfers were conditional on attendance at preventive health check ups and nutrition workshops for the women and adherence to vaccination schedules for children. The 1 study from Africa described a pilot program in Malawi[13] that tested whether financial incentives would increase the collection of human immunodeficiency virus test results.

Methodological Limitations of Included Studies

Lack of reliability of data was a problem for some studies. For instance,

Table 1. Description of Interventions

Source	Study Design	Setting and Participants	Transfer Size, US $	Other Benefits	Requirements	Methodological Limitations
Gertler,[7] 2000 Barham,[8] 2005 Gertler,[9] 2004 Behrman and Hoddinott,[10] 2005 Rivera et al,[11] 2004	Cluster randomized controlled trial	Mexico; eligible households (selected on poverty criteria) among selected communities (selected on poverty criteria)	Mean $20, $13 per family, $8-$17 per primary school child, $25-$32 per secondary school child, $12-$22/y for school supplies, ≈25% of household consumption	Children received nutrition supplements, allocation was not random, children in control areas could also receive these supplements	Attending primary and secondary school, regular health visits (children and pregnant women), current vaccinations, parents attending health education workshops	Leakage problems for the nutrition supplement; nonrandom assignment at the family level (beneficiaries tended to be poorer); attrition of the nutritional survey sample between 1998, 1999, and 2000 caused bias toward overrepresentation of low-income households (while the broader household survey only led to a 5% attrition rate); clustering effects not controlled for in some analyses; lack of data reliability for use of health services (facility registrars didn't discriminate between users who were in the conditional cash transfer clusters and other users); lack of data reliability for immunizations (problems of data recording likely leading to overestimates of positive results)
Maluccio and Flores,[12] 2004	Cluster randomized controlled trial	Nicaragua; 42 regions (*comarcas*) selected for the pilot phase, 50% randomly selected for intervention	Mean $25, $18 per family, $9 per family with school-aged child, $20/y for supplies, ≈20% of household consumption	Children received nutrition supplements	Attending educational workshops and bringing children to preventive health programs (mothers of children aged <5 y), attending school (children aged 7-13 y)	No details on sampling, 12% attrition bias in panel data (but analysis allowed for this and checked robustness of results)
Thornton,[13] 2006	Cluster randomized controlled trial	Malawi; individuals who underwent human immunodeficiency testing in rural areas	Mean $1.04, vouchers valued $0-$3 per individual were randomly assigned		Collecting human immunodeficiency test results	Problem in the random assignment of incentives (fewer zero incentive than probable, possibly because nurses had patients redraw when a zero was originally selected)
Morris et al,[14] 2004	Cluster randomized controlled trial	Honduras; low-income women and children living in designated beneficiary municipalities (selected on socioeconomic criteria)	Mean $17, $4 per family, $5 per child, ≈10% of household consumption		Attending primary school and regular health visits	Potential declaration bias with children's health outcomes reported by mothers
Morris et al,[15] 2004	Cluster quasi-randomized controlled trial	Brazil; poorest households from selected municipalities (selected according to infant malnutrition prevalence)	≤$18.25, $6.25 per person in the household (pregnant women or children <7 y)	Children received nutrition supplements	Attending educational workshops, regular physical examinations, and current vaccinations (pregnant and lactating women); maintaining current vaccinations and growth monitoring (children aged <7 y)	Compares the recipients of the programs with similar individuals selected for the same programs but who were accidentally excluded; absence of baseline is compensated by a complex reconstitution of initial values—potentially biased; control group was also more likely to receive another conditional cash transfer based on education conditionalities only (*Bolsa Escola*)
Attanasio et al,[16,17] 2005	Controlled before and after	Colombia; poorest households from selected municipalities (selected on poverty criteria)	Mean $50, $20 per family, $6 per primary school child, $12 per secondary school child; ≈30% of household consumption		Receiving health and nutrition examinations (children aged <7 y), attending school (children aged 8-18 y), attending health education workshops	Cluster correlation was not accounted for, differences at baseline between control and treatment sites are mentioned in the text (without further specification)

results entirely based on self-reported outcomes may have been unreliable, in particular when respondents believed that their answers could jeopardize enrollment in a program. The authors of the Honduras study acknowledged this as a possible limitation.[14] They found discrepancies between health cards and reports by mothers on their use of child growth-monitoring services, explained by self-report. Barham[8] also noted that some lack of specificity of survey instruments may have led the researchers to overestimate the effects of the program in Mexico on immunization.

Some studies had problems with the quality of their randomization. Behrman and Todd[18] show that the program in Mexico experienced a breakdown of randomization within the clusters, although randomization of the clusters was successful. In addition, leakage (within and between clusters) and selective distribution of the limited nutritional supplements to older children deemed by health workers to have poor nutritional status further weakened the study design.[10]

In the experiment on learning human immunodeficiency virus status in Malawi,[13] the randomization of the value of vouchers (valued between 0 and US $3) was not successful and the final distribution of cash vouchers was skewed toward higher values.

Several biases were detected in the nutritional subsample of the study in Mexico.[10,19] In addition to an important attrition bias of the follow-up survey, there were significant differences in the characteristics of control and treatment children, causing bias toward overrepresentation of children with poor nutrition in treatment groups. Finally, the absence of a baseline survey for this substudy[10,11] limited the possibilities to control for some of the biases mentioned.

In the nonrandomized study, the lack of comparability between control and intervention sites may have led to spurious conclusions.[20] However, all studies used rigorous statistical methods to address the specificities of some study designs (clustering effects) or to control for potential biases stemming from flawed implementation or design.[8,9,12,20] All studies but 1 used intention-to-treat estimators.[10] The analysis performed by Behrman[10] may have overestimated the effects of the program in controlling for leakage and implementation problems in the delivery of the nutrition complements (Papilla).

Due to the variety of methods used to analyze the effects of the interventions and the different ways each paper reported results, synthesis and sometimes even comparisons between publications on the same program were difficult.

Care-Seeking Behavior

Five studies reported that conditional cash transfers increased use of health services (TABLE 2).

The Malawi[8] pilot project to increase uptake of human immunodeficiency virus results found that participants were very responsive to any monetary incentive. The introduction of an incentive increased the percentage of individuals collecting human immunodeficiency virus test results by a mean of 27% (after controlling for distance). There was also a positive linear effect with the level of incentive (each extra dollar increased the collection of human immunodeficiency virus results by a mean of 9%).

Based on facility-level data, Gertler[7] found that the Mexico project scheme increased the mean number of visits to the health facilities by 2.09 visits per day in the areas where it was offered—beneficiary families visited the health facilities twice as frequently as nonbeneficiary families. Based on similar facility data, the Honduras program is said to have significantly increased use of health services by 23% for infants younger than aged 1 year and 42% for preschool children aged 1 to 5 years.[15] Morris et al[15] report that the program in Honduras also increased the mean percentage of individuals receiving prenatal care by 19 percentage points, routine pediatric examinations by 20 percentage points, and growth-monitoring visits for children by 16 percentage points. However, they found no effect on the percentage of women who received a 10-day follow-up visit after delivery.

Findings from the Nicaraguan program show a mean increase of 19 percentage points after 1 year and 11 percentage points after 2 years on the proportion of infants (aged 0-3 years) taken to health centers in the past 6 months.[12] This effect was only significant for disadvantaged children, who benefited from most of the increase (24 percentage points). Children from families with greater income levels did not improve their use significantly. Finally, according to household survey data, the Colombian program[16,17] led to an increase in children's preventive health care visits by 23 percentage points for children younger than aged 2 years and 33 percentage points for children aged 2 to 4 years. There was no significant increase for older children.

Immunization Coverage

Four studies detail the impact of conditional cash transfer programs on immunization coverage, with the results showing unclear effects (TABLE 3).

Barham[8] shows that immunization against measles increased by a mean of 3 percentage points 6 months after the beginning of the program in Mexico and that tuberculosis vaccination was 5 percentage points greater for children aged 12 to 23 months at baseline. However, the latter increase was due to a sudden decline in coverage in the control zones, and this increase disappeared 6 months later, once the control areas returned to their initial levels. In Mexico, immunization rates were already very high before the program began, even in areas covered by the program, where 88% of children younger than 12 months and 97% of children aged 12 to 23 months were immunized against tuberculosis.

The evaluation of the Honduras program[15] showed a mean increase of 6.9 percentage points in the coverage of the first dose of diphtheria, tetanus toxoids, pertussis (antigens unspecified)

Table 2. Impact on Care-Seeking Behavior

Source and Outcomes	Initial Rate (Intervention Areas)[a]	Final Rate (Intervention Areas)	Treatment Effect[b]
Mexico *(Progresa)*			
Gertler,[7] 2000			
Daily consultations per public clinic in program localities	9.11	12.84	2.09 (SE, 0.067)[c]
No. of visits to a public clinic in the 4 weeks preceding the survey—children aged 0-2 y[d]		0.066	–0.011 (*t*, –0.314)
No. of visits to a public clinic in the 4 weeks preceding the survey—children aged 3-5 y[d]		0.075	0.027 (*t*, 1.487)
No. of visits to a public clinic in the 4 weeks preceding the survey—children aged 6-17 y[d]		0.034	0.015 (*t*, 1.858)
No. of visits to a public clinic in the 4 weeks preceding the survey—adults aged 18-50 y[d]		0.050	0.015 (*t*, 1.624)
No. of visits to all facilities in the 4 weeks preceding the survey—children aged 0-2 y[d]		0.081	–0.032 (*t*, –0.871)
No. of visits to all facilities in the 4 weeks preceding the survey—children aged 3-5 y[d]		0.097	0.027 (*t*, 1.439)
No. of visits to all facilities in the 4 weeks preceding the survey—children aged 6-17 y[d]		0.041	0.016 (*t*, 1.893)
No. of visits to all facilities in the 4 weeks preceding the survey—adults aged 18-50 y[d]		0.071	0.011 (*t*, 1.019)
Nicaragua *(Red de Protección Social)*			
Maluccio and Flores,[12] 2004			
Children aged 0-3 y taken to a health center ≥1 in the past 6 mo, %	69.8	92.7	11.0 (SE, 5.9)[c]
Children aged 0-3 y taken to health control and weighed in the past 6 mo, %	55.4	89.1	17.5 (SE, 7.3)[e]
Children aged 0-3 y taken to health control and weighed in the past 6 mo—extremely poor group, %[f]	Not presented	Not presented	23.6 (SE, 9.3)[e]
Malawi			
Thornton,[13] 2006			
Individuals who went to a voluntary counseling and testing center to learn their results, %		72.0[g]	27.4 (SE, 2.8)[h]
Honduras *(Programa de Asignación Familial)*			
Morris et al,[14] 2004			
Women who completed >5 prenatal care visits, %	37.9	Not presented	18.7 (95% CI, 7.4 to 30.0)[h]
Women attending a 10-d postpartum physical examination, %	17.8	Not presented	–5.6 (95% CI, –15.6 to 4.5)
Children taken to a health center ≥1 in the past month, %	44.0	Not presented	20.2 (95% CI, 10.9 to 29.0)[e]
Colombia *(Familias en Acción)*			
Attanasio et al,[16,17] 2005			
Children aged <24 mo with current schedule of preventive health care visits, %	Not presented	40.0	22.8 (SE, 6.7)[e]
Children aged 24-48 mo with current schedule of preventive health care visits, %	Not presented	66.8	33.2 (SE, 11.5)[e]
Children aged >48 mo with current schedule of preventive health care visits, %	Not presented	40.4	1.5 (SE, 0.8)[c]

Abbreviation: CI, confidence interval.
[a] Empty cells denote that the outcome was not previously measured (as opposed to not presented by the author) and is not applicable.
[b] For the Mexican program, shows net variations in the number of visits/consultations; for all other programs, shows net variations in percentage points (taking into account comparison vs control groups).
[c] Significance at the 10% level.
[d] Computed with surveys carried out after the beginning of the intervention only.
[e] Significance at the 5% level.
[f] Maluccio and Flores classified households into 3 groups (extreme poor, poor, nonpoor) based on their annual total household expenditures measured in 2000, using 2001 national poverty lines developed by the World Bank.
[g] Mean attendance of people without incentives was 0.39; treatment effect is estimated with a model controlling for the impact of distance to the voluntary counseling and testing center.
[h] Significance at the 1% level.

pentavalent vaccine among children younger than 3 years, but no effect on measles vaccination or on tetanus immunization among pregnant women. The program in Colombia increased the probability that parents had complied with the diphtheria, tetanus toxoids, pertussis (antigens unspecified) pentavalent vaccination schedule for their children at age 24 months, although there was no noticeable effect on the immunization rates of older children.[16,17]

Finally, the program in Nicaragua[12] failed to demonstrate improved vaccination coverage, although this may have been caused by an indirect contamination effect in that efforts to deliver vaccines in program areas also had positive effects on vaccine availability in control zones.

Anthropometric Outcomes

Programs that monitored their impact on anthropometric measures commonly showed positive outcomes, but these are limited to some beneficiary subgroups only, which may hide smaller mean effects (see TABLE 4).

The Colombian experiment records an improvement in the nutritional status of newborns and infants.[16] There was a mean weight increase of 0.58 kg for newborns in urban areas of the treatment localities, which is likely to be attributable to improved nutrition of mothers during pregnancy. Attanasio et al[16] also showed that the program helped increase the height-for-age *z* score of infants younger than 2 years (by 0.161), which translated into a diminution of the probability of being malnourished. However the experiment failed to show any impact on the nutritional status of children older than 24 months, or on the weight of newborns in rural areas.

Three analyses of the program in Mexico estimated[9-11] various effects on heights of participants, using different statistical models, different populations, and different survey waves. Using data from 1998 and 2000, focusing on children younger than 12 months at baseline, Rivera et al[11] concluded that beneficial effects were

maximal for poorest children aged younger than 6 months. They found that an exposure of 2 years to the program, compared with a 1-year exposure at a later age (when aged 12-18 months), resulted in a mean incremental growth of 1.1 cm. Using 1999 data matched with 1997 socioeconomic data to control for covariates, Gertler[9] estimated that children aged 12 to 36 months after 1 year of exposure to the Mexico program (in September 1999) were 0.96 cm taller than children from control areas. However, it did not affect their probability of being stunted. Finally, trying to compensate for several biases, Behrman and Hoddinot[10] found similar results and showed that children aged between 12 and 36 months gained approximately 1 cm—one-sixth of the mean annual growth experienced in the absence of the program—after 1 year of exposure to the program. The authors further showed that this effect was principally captured by the oldest group—children aged 24 to 36 months at baseline—who experienced a height increase of 1.22 cm. This could be explained by the fact that nutritional supplements were given to children older than 2 years only when they were underweight,[11] thereby maximizing the potential effect of these supplements.

The analysis of the Nicaraguan program[12] showed that it had reduced the magnitude of stunting (net mean improvement of the height-for-age *z* score by 0.17) and the proportion of underweight children aged 0 to 5 years (a net impact of 6 percentage points after 2 years). On the other hand it did not have an impact on the proportion of wasted children aged 0 to 5 years, probably due to the very low level of wasting at baseline, which limits the statistical power to detect small changes.

However, the evaluation of the Brazilian program[15] shows no effect on height-for-age measures and even a negative impact on weight-for-age for children younger than 7 years. These unexpected findings may have come from a misunderstanding of the eligibility criteria for the program by participating mothers (see "Comment" section).

Health Status

Other health outcomes were reported from 3 of the 7 programs (Mexico, Nicaragua, Colombia) included in the

Table 3. Impact on Immunization Coverage

Source	Outcomes	Initial Rate (Intervention Areas)	Final Rate (Intervention Areas)	Treatment Effect[a]
		Mexico *(Progresa)*		
Barham,[8] 2005				
Impact after 6 mo	Children <12 mo (at baseline) vaccinated for tuberculosis, %	88.0	89.0	5.2 (*t*, 2.07)[b]
	Children aged 12-23 mo (at baseline) vaccinated for measles, %	92.0	96.0	3.0 (*t*, 2.03)[c]
Impact after 12 mo	Children <12 mo (at baseline) vaccinated for tuberculosis, %	88.0	92.0	1.6 (*t*, 0.66)
	Children aged 12-23 mo (at baseline) vaccinated for measles, %	92.0	91.0	2.8 (*t*, 1.00)
		Nicaragua *(Red de Protección Social)*		
Maluccio and Flores,[12] 2004	Children aged 12-23 mo with current vaccinations, %	36.4	71.7	6.1 (SE, 10.2)
		Honduras *(Programa de Asignación Familial)*		
Morris et al,[11] 2004	Children aged <3 y vaccinated with DPT1/pentavalent, %	72.0	Not presented	6.9 (95% CI, 1 to 12.8)[b]
	Children aged <3 y vaccinated for measles, %	84.0	Not presented	–0.2 (95% CI, –9.4 to 9.0)
	Mothers vaccinated for tetanus toxoid, %	56.0	Not presented	4.2 (95% CI, –9.7 to 18.2)
		Colombia *(Familias en Acción)*		
Attanasio et al,[16] 2005	Probability of compliance with DPT vaccination for children aged <24 mo	Not presented	Not presented	0.089 (SE, 0.047)[d]
	Probability of compliance with DPT vaccination for children aged 24-48 mo	Not presented	Not presented	0.035 (SE, 0.026)
	Probability of compliance with DPT vaccination for children aged >48 mo	Not presented	Not presented	0.032 (SE, 0.039)

Abbreviations: CI, confidence interval; DPT, diphtheria, tetanus toxoids, pertussis (antigens unspecified)/pentavalent.
[a] Shows net variations in percentage points or probability (taking into account comparison vs control groups).
[b] Significance at the 1% level.
[c] Significance at the 5% level.
[d] Significance at the 10% level.

review. They showed mixed effects on objectively measured health outcomes and positive effects on mothers' reports of health outcomes of their children (TABLE 5).

The impact on anemia was assessed by 2 of the programs. The program in Nicaragua showed no impact on anemia prevalence among infants.[12] Conversely, Rivera at al[11] show that after 1 year of benefits from the program in Mexico, children in the intervention group had a significant higher level of hemoglobin, and therefore a lower rate of anemia than the control group.

Table 4. Impact on Anthropometric and Nutritional Outcomes

Source	Outcomes	Initial Rate (Intervention Areas)[a]	Final Rate (Intervention Areas)[a]	Treatment Effect[b]
	Mexico *(Progresa)*			
Gertler,[9] 2004	Height (cm) of children aged 12-36 mo (in September 1999)		80.7	0.959 ($P < .004$)[c]
	Likelihood of children aged 12-36 mo (in September 1999) to be stunted[d]		Not presented	0.914 ($P > .495$)
Behrman and Hoddinott,[10] 2005	Height (cm) of children aged 4-12 mo (at baseline, August 1998)		Not presented	0.503 (*t*, 0.96)
	Height (cm) of children aged 12-36 mo (at baseline, August 1998)		Not presented	1.016 (*t*, 2.55)[e]
	Height (cm) of children aged 24-36 mo (at baseline, August 1998)		Not presented	1.224 (*t*, 2.05)[e]
	Height (cm) of children aged 36-48 mo (at baseline, August 1998)		Not presented	–0.349 (*t*, 0.66)
Rivera et al,[11] 2004	Growth (cm) of children aged <6 months (at baseline) from poorest households (after 2 y of program participation vs 1 y in the control group)[f]		26.4	1.1 ($P < .05$)[e]
	Growth (cm) of children aged 6-12 mo (at baseline) from poorest households (after 2 y of program participation vs 1 y in the control group)[f]		19.7	–0.6 (Not significant)
	Nicaragua *(Red de Protección Social)*			
Maluccio and Flores,[12] 2004	Height-for-age *z* score for children aged <5 y	–1.79	–1.65	0.17 (SE, 0.08)[e]
	Children aged <5 y who are stunted, %	41.9	37.1	–5.3 (SE, 3.1)[g]
	Children aged <5 y who are underweight, %	15.3	10.4	–6.0 (SE, 2.6)[e]
	Children aged <5 y who are wasted, %	1	0.4	–0.4 (SE, 0.5)
	Brazil *(Bolsa Alimentação)*			
Morris et al,[15] 2004	Height-for-age *z* score for children aged <24 mo		–0.68	–0.25 (SE, 0.13)
	Height-for-age *z* score for children aged 24-48 mo		–0.75	–0.11 (SE, 0.10)
	Height-for-age *z* score for children aged 4-7 y		–0.77	–0.08 (SE, 0.08)
	Mean height-for-age *z* score for children aged <7 y		–0.75	–0.13 (SE, 0.06)[e]
	Weight-for-age *z* score for children aged <24 mo		–0.90	–0.11 (SE, 0.13)
	Weight-for-age *z* score for children aged 24-48 mo		–0.85	–0.19 (SE, 0.11)
	Weight-for-age *z* score for children aged 4-7 y		–0.95	–0.04 (SE, 0.09)
	Mean weight-for-age *z* score for children aged <7 y		–0.90	–0.11 (SE, 0.06)
	Colombia *(Familias en Acción)*			
Attanasio et al,[16] 2005	Height-for-age *z* score of children aged <24 mo	Not presented	Not presented	0.161 (SE, 0.085)[g]
	Height-for-age *z* score of children aged 24-48 mo	Not presented	Not presented	0.011 (SE, 0.055)
	Height-for-age *z* score of children aged >48 mo	Not presented	Not presented	0.012 (SE, 0.033)
	Probability of chronic malnourishment for children aged <24 mo	Not presented	Not presented	–0.069 (SE, 0.034)[e]
	Probability of chronic malnourishment for children aged 24-48 mo	Not presented	Not presented	0.004 (SE, 0.022)
	Probability of chronic malnourishment for children aged >48 mo	Not presented	Not presented	–0.021 (SE, 0.014)

[a] Empty cells denote that the outcome was not previously measured (as opposed to not presented by the author) and is not applicable.
[b] Shows net variations in percentage points or net variations in scores (taking into account comparison with control groups).
[c] Significance at the 1% level.
[d] An estimate of 0.75 means that children benefiting from the treatment were 25% less likely than controls to be affected.
[e] Significance at the 5% level.
[f] Rivera et al classified households into 2 income-based groups: below the 50th percentile or at and above the 50th percentile.
[g] Significance at the 10% level.

Table 5. Impact on Health Outcomes

Source	Outcomes	Initial Rate (Intervention Areas)[a]	Final Rate (Intervention Areas)[a]	Treatment Effect[b]
	Mexico *(Progresa)*			
Gertler,[7] 2000	Children whose mother reported that they were ill in the past 4 weeks, aged <3 y at baseline, %	40.2	Not presented	−4.7 (*t*, −2.368)[c]
	Children whose mother reported that they were ill in the past 4 weeks, aged 3-5 y at baseline, %	28.0	Not presented	−3.2 (*t*, −2.591)[c]
Gertler,[9] 2004	Likelihood of children aged <3 y at baseline to be reported ill[d]			0.777 (0.000)[c]
	Likelihood of children aged <3 y at baseline to be reported ill (impact after 2 mo of program)[d]			0.940 (*P* = .24)
	Likelihood of children aged <3 y at baseline to be reported ill (impact after 8 mo of program)[d]			0.749 (0.000)[c]
	Likelihood of children aged <3 y at baseline to be reported ill (impact after 14 mo of program)[d]			0.836 (*P* = .005)[c]
	Likelihood of children aged <3 y at baseline to be reported ill (impact after 20 mo of program)[d]			0.605 (0.000)[c]
	Likelihood of children born during duration of *Progresa* to be reported ill[d]			0.747 (*P* < .01)[e]
Rivera et al,[11] 2004	Mean hemoglobin value (g/dL) of children aged <12 mo (at baseline), after 1 y of program participation vs no exposure in the control group		11.2	0.37 (*P* < .01)[e]
	Prevalence of anemia (%) for children aged <12 mo (at baseline), after 1 y of program participation vs no exposure in the control group		44.3	10.6 (*P* < .03)[e]
	Prevalence of anemia (%) for children aged <12 mo (at baseline), after 2 y of program participation vs 1 y in the control group		25.8	−2.8 (*P* < .40)
	Colombia *(Familias en Acción)*			
Attanasio et al,[16] 2005	Probability of diarrhea being reported for children in rural areas aged <24 mo	Not presented	Not presented	−0.106 (SE, 0.059)[f]
	Probability of diarrhea being reported for children in rural areas aged 24-48 mo	Not presented	Not presented	−0.109 (SE, 0.037)[e]
	Probability of diarrhea being reported for children in rural areas aged >48 mo	Not presented	Not presented	−0.015 (SE, 0.026)
	Probability of diarrhea being reported for children in urban areas aged <24 mo	Not presented	Not presented	0.150 (SE, 0.103)
	Probability of diarrhea being reported for children in urban areas aged 24-48 mo	Not presented	Not presented	−0.033 (SE, 0.041)
	Probability of diarrhea being reported for children in urban areas aged >48 mo	Not presented	Not presented	−0.042 (SE, 0.026)
	Probability of respiratory disease symptoms being reported for children in rural areas aged <24 mo	Not presented	Not presented	−0.056 (SE, 0.083)
	Probability of respiratory disease symptoms being reported for children in rural areas aged 24-48 mo	Not presented	Not presented	−0.005 (SE, 0.054)
	Probability of respiratory disease symptoms being reported for children in rural areas aged >48 mo	Not presented	Not presented	−0.012 (SE, 0.056)
	Probability of respiratory disease symptoms being reported, for children in urban areas, aged <24 mo	Not presented	Not presented	−0.094 (SE, 0.103)
	Probability of respiratory disease symptoms being reported for children in urban areas aged 24-48 mo	Not presented	Not presented	0.034 (0.101)
	Probability of respiratory disease symptoms being reported for children in urban areas aged >48 mo	Not presented	Not presented	−0.010 (SE, 0.080)
	Nicaragua *(Red de Protección Social)*			
Maluccio and Flores,[12] 2004	Hemoglobin for children aged 6-59 mo	11.2	11.4	−0.1 (SE, 0.2)
	Children aged 6-59 mo with anemia, %	33.7	32.8	−0.2 (SE, 6.8)

[a] Empty cells denote that the outcome was not previously measured (as opposed to not presented by the author) and is not applicable.
[b] Shows net percentage point or probability variations (taking into account the comparison with control groups).
[c] Significance at the 1% level.
[d] An estimate of 0.75 means that children benefiting from the treatment were 25% less likely than controls to be affected.
[e] Significance at the 5% level.
[f] Significance at the 10% level.

Table 6. Financial Sustainability of the Programs

Program	Total Budget, US $	No. of Household Beneficiaries	Average Cost per Family Beneficiary, US $	Actual Mean Transfer per Household, US $	Transfer Budget as a Proportion of the Total Budget
Colombia	125 000 000	400 000	312.50	50	0.16
Honduras	25 000 000	411 000	60.83	17	0.28
Mexico	2 800 000 000	5 000 000	560.00	20	0.04
Nicaragua	6 370 000	21 619	294.65	25	0.08

Dates are based on Handa and Davis with additional computations by the authors.[24]

Furthermore, these differences disappeared once the control group had been exposed to the program for 1 year. Using different sets of data than Rivera et al,[11] data from Gertler[9] show that children in the Mexico program aged 12 to 36 months between Octctober and December 1999 were 25% less likely to be anemic than those in the control sites. The accuracy of these results is challenged by leakage and nonrandomization in the allocation of the nutrition supplements,[19] which may have contributed to underestimating the true effects of this program.[10]

The impact of 2 programs on mothers' reports of the health of their children was also examined. In Colombia, a reduction in the probability of reported diarrhea symptoms for children aged younger than 48 months living in rural areas was reported. Again, older groups did not appear to have benefited.[16] The program did not appear to have an effect on the probability of experiencing respiratory symptoms. Gertler's[9] analysis of data from the Mexico program[7] concludes that the intervention led to a decrease in the reported prevalence of childhood illness in the past month by 4.7 percentage points for children younger than 3 years at baseline, and by 3.2 percentage points for children between the ages of 3 and 5 years. In another analysis in which the sample used is restricted to households eligible to the Mexico program, Gertler[9] shows that the program led to a 22% decrease in the probability of children younger than 3 years of age being reported as having been ill in the past month. Exploring the impact of the program in relation with how long children had benefited from it, the study further illustrated that in less than 1 year, beneficiary children (who were aged <3 years at baseline) were 25% less likely to be reported as having been ill, and this percentage rose to 40% after 20 months of exposure to the program. An analysis of data on newborns suggested that the Mexico program had a positive prenatal care effect because children born to mothers in this program were 25% less likely than those born in nonbeneficiary households to be reported as having been ill in the previous 4 weeks.

COMMENT

This review of evidence from 6 conditional cash transfer programs reveals a reasonably consistent picture of the effects of such programs on health-related behaviors and, to some extent, outcomes. These types of demand-side strategies seem successful in increasing use of health services and improving nutritional and anthropometric outcomes and preventive behaviors. However, their overall effect on health status remains less clear. This highlights the importance of a focus on the supply of adequate and effective health services for demand-side programs such as these to have a more reliable effect on health outcomes.

Further research is needed to investigate the impact of conditional cash transfer in different settings and to assess the pathways by which any effects are achieved. The methodological limitations found in existing studies emphasize the need for carefully designed evaluations. In particular, baseline data collection is needed to assess whether randomization has been effective and, where necessary, to adjust for differences in intervention and control groups. Cluster trials are the most appropriate design in many cases, but care needs to be taken to ensure that biases do not occur due to assignment of conditional cash transfers within the intervention clusters. Overlapping analyses of the data from 1 study (the Mexico program) demonstrates the extent to which large-scale evaluations in this area are still relatively uncoordinated. We found independent analysis by a number of different investigators[7-11] of the same data, giving rise to different articles reporting different analyses and results, and not citing each other. Subgroup analyses were frequent, particularly with regards to different age groups. Other commentators have pointed out how unplanned subgroup analyses of trials can lead to spurious conclusions.[21] Analyses of multiple outcomes was also common, which can lead to difficulties of interpretation.[22]

There is also a difficulty in disentangling the relative importance of different components of the programs, as underlined by Gertler.[9] For instance, health status and anthropometric measures are likely to be influenced by nutritional supplements provided to children,[7,12] better diet resulting from the increased available revenue of households,[23] or the benefits of mothers attending health education meetings. None of the included studies could investigate which barriers to access the programs had been particularly successful to help overcome (eg, financial, cultural, etc).

There are several further questions, not addressed by the studies in this review, but which are highly relevant to current discussions of the desirability of conditional cash transfer programs to settings such as sub-Saharan Africa.

TABLE 6 demonstrates that under conditional cash transfer programs, the flows of money required may be significant.[24] From this point of view, there are several key gaps in knowledge for future program design.

First, the cost-effectiveness of conditional cash transfer programs compared with classic supply-side interventions (eg, improving quantity and quality of infrastructure and services) has not been examined, as most conditional cash transfer programs have so far been implemented in settings with relatively adequate (health) infrastructures. Therefore, monetary transfers (and compulsory education workshops) were probably the most relevant strategies to address demand-side barriers (eg, financial or cultural ones). But in more resource-poor settings where public spending on health is low and access to effective interventions very limited, supply-side obstacles such as geographical inaccessibility or poor quality of services are critical as well.[25] In such settings, it is likely that expanding health system capacity may be a preliminary step before the introduction of conditional cash transfer programs.

Second, the size of the transfers needed in different settings requires more attention, due to 2 sources of inefficiency of conditional cash transfer programs as identified by de Janvry and Sadoulet.[26] On the one hand, such programs can yield very high costs per marginal visit/change induced, because money is given to all targeted individuals, regardless of their possible previous compliance with the conditionality of the programs. Consequently, the positive outcomes of conditional cash transfer programs should be weighted against their cost-effectiveness, in particular when both monetary incentives and initial uptake of services in the target population are already high.

On the other hand, the existence of possible threshold effects of incentives levels may lead to inefficiency because the cash transfers will either be too high or too low to induce the conditional action. Only 1 study tried to monitor the relative effects of different sizes of cash transfers,[13] but the amounts concerned might have been too small to capture any potential threshold effect.

These issues will be a particular priority if conditional cash transfer programs are expanded into areas where the eligibility criteria are relaxed or discontinued as means testing may be more difficult and costly in low-income settings because of the absence of reliable information systems such as the ones used in Latin American programs. If the entire population becomes eligible for payment, evaluating the cost-effectiveness of theses programs will become critical.

Expanding conditional cash transfer programs also raises issues of ethics and broader effectiveness, once unintentional effects are taken into account. Conditional monetary transfer programs create strong incentives to change behavior, but unanticipated perverse effects can also occur. In the studies included in this review, Stecklov et al[27] found that the Honduran program may have resulted in an increase in fertility of 2 to 4 percentage points, because pregnant women only were eligible for a subsidy. Morris et al[15] suggest that the unexpected small negative impact of the Brazil program on children's weight gain may be explained by a misinterpretation of eligibility rules. Beneficiaries may have mistakenly thought that having at least 1 malnourished child was necessary for continued membership of the program. It is clear that programs with such potentially strong effects must be designed with care, and it is important to develop measures of welfare that are broad enough to record intended and unintended effects. Due consideration must also be given to the ethical implications of a policy tool that can change the behavior of low-income or vulnerable groups. In particular, the ethics of some programs using monetary incentives to promote irreversible contraceptive methods have been criticized.[28-30]

The review suggests that conditional cash transfer programs constitute an effective approach to scaling-up access and use of preventive services in specific contexts when perverse incentives are avoided. However, the success of these strategies depends on the existence of effective primary health services and local infrastructures. In the case of the more complex Latin American programs, it is also dependent on effective systems for identifying and making payments to low-income families. It is important to consider the availability of these requirements in many of the other low-income settings in which conditional cash transfer might be considered. Further rigorous evaluations of future programs in low-income settings are needed, taking into account the lessons learned from the studies identified so far, and avoiding as far as possible the methodological pitfalls outlined.

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Study concept and design: Lagarde, Haines, Palmer.
Acquisition of data: Lagarde.
Analysis and interpretation of data: Lagarde, Haines.
Drafting of the manuscript: Lagarde.
Critical revision of the manuscript for important intellectual content: Lagarde, Haines, Palmer.
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