

Can Transfer Programs be Made More Nutrition Sensitive?

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Abstract: As is commonly presented, nutritional status reflects the interplay of food consumption, access to health and sanitation, and nutrition knowledge and care practices. Social protection programs typically increase income as well as influence the timing and, to a degree, the control of this income. Additionally, social protection programs may achieve further impact on nutrition by fostering linkages with health services or with sanitation programs, and specifically through activities that are related to nutrition education or micronutrient supplementation. This chapter discussed what might be expected from such programs as well as reviews some of the evidence from specific transfer programs.

Transfer programs reach a billion individuals in low income countries, often providing support that increases purchasing by twenty percent or more. Whether the mode of support is conditional or unconditional transfers most programs increase health care utilization as well as food consumption. There is, however, only modest evidence that such programs lead to measurable reductions in stunting or anemia with more encouraging results for very young children whose families receive assistance over much of the most vulnerable period in the child's growth. The review discusses possible reasons for this relative under performance.

The chapter also reviews recent evidence on the impact of cash transfers relative to in-kind support. While the differences in these modes of delivery is nuanced and context specific, in virtually every study reviewed it cost less to deliver cash, although in some situations, cash programs proved vulnerable to inflation.

The potential of transfer programs to be nutrition sensitive remains largely untapped. Better access to quality health services as well as more explicit nutrition objectives may close the gap between the potential and results.

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1. Introduction. A camel herder in Northern Kenya can take her identification card, embedded with her fingerprint and photo, to designated shop keepers and, within minutes, receive 2,700 Kenyan shillings of income support on a monthly basis in 2013. This example illustrates both recent changes in the willingness of governments as well as donors in low and middle income countries to provide support to low income households and the technology to do so effectively. This shift has been prompted, in part, by the accumulated evidence on the contribution of transfer programs to both equity and to asset creation (Das, Do, Özler, 2005; Alderman and Yemtsov, 2013). Thus, in the wake of the sequence of food price and financial shocks in 2007 and 2008, between 0.75 and 1.0 billion people in low- and middle-income countries were recipients of cash support (DFID, 2011).

With relatively minor changes in labor supply and private transfers documented in most programs, the impact on the total consumption of recipients is largely determined by the targeting efficiency and the generosity of the transfer program. The public value of any increase in aggregate consumption by low income households, however, is difficult to measure for the basic reason that while the welfare benefit from improved equity is real, it is hard to quantify. On the other hand, there is an extensive range of studies quantifying changes in specific investments and behaviors attributable to eligibility in transfer programs. Prominent among the outcomes studied is the impact of transfers on nutrition. Still, despite reasonable expectations – indeed, despite design features included in some programs to increase the nutritional impact – there is far less evidence from low and middle income settings that transfers influence the nutritional status of young children than there is evidence that specific health seeking behaviors have increased (Ruel and Alderman, 2013; Manley, Gitter, and Slavchevska, 2013).

This essay explores the interplay of transfer programs and child nutrition. As the potential for transfer programs to influence nutrition begins with the role of income in the production of nutrition, the paper begins with this topic. Moreover, as transfer programs may be designed as a response to specific shocks or as predictable contributions to household resources, this discussion distinguishes the goal of raising consumption over an extended period from the objective of enhancing resilience during times of crisis. But many transfer programs – particularly, but not only, conditional cash transfers – aim to influence the price of human capital investments as well as shift a family’s resource envelope. Thus, the paper then looks at the services that accompany transfer programs. Whether conditional or not, increasingly such transfers provide cash rather than food to households. Yet, there are circumstances in which in-kind transfers are still preferred. Therefore, the following section of the essay reviews recent evidence on this mode of delivery. The concluding section offers suggestions for enhancing the nutritional impacts of transfers programs.

2. The Relationship of Income and Malnutrition. As incomes increase – either through earnings or transfers - low income consumers increase both the quantity and quality of the food they purchase. Moreover, they are usually able to obtain more health services as their income increases. Moreover, at the national level as overall resources increase, governments are able to increase both the services provided as well as fund the transfer programs studied here. What, then, is the empirical record linking GDP growth or household income and malnutrition?

Using country level data from the 1970s, 1980s and 1990s, Haddad et al. (2003) found that the Millennium Development Goal indicator of rates of underweight children less than 5 years old declined at half the rate that GDP grew. An overall pattern of similar magnitude was observed using data from 12 household surveys, all of which were collected in the 1990s,

although there was appreciable heterogeneity in country specific results. More recent analysis of current cross country data found a somewhat larger response to income change, with underweight declining 7 percent for every 10% increase of GDP and stunting declining at 6% (Ruel and Alderman, 2013).¹ See table 1. This contrasts with the rate of decline for income poverty, which is at the same rate as GNP per capita increases based on cross country data. From one perspective such results, as well as a similar study indicating that anemia declines at a rate half as fast as does stunting (Alderman and Linnemayr, 2009), indicate the likely time frame for reducing malnutrition in the absence of specific interventions. Even with equitable growth the time frame for, say, halving undernutrition is measured more in terms of a generation rather than in a few years.

From another perspective, however, the results also imply that transfer programs might have a measurable impact on the nutritional status of beneficiaries. While the magnitude of transfers vary appreciably across countries - ranging from transfers that increase total income marginally to those that boost income by as much as one-third for the poorest recipients – it is not uncommon for a program to augment consumption in low income households by 20%. The expected decline in stunting from a transfer of this size – around 12% using the relationship of income and stunting reported above - should be measurable among recipients in comparison to similar households in a well-designed household survey. Whether this improvement is observable on a national scale is a different issue. Evidence on program impacts often come from pilot phases or donor funded projects, not all of which go to scale. On the other hand, some current transfer programs have a wide coverage; transfers in Brazil and Mexico reach 25% of the population and a program in Ecuador assisted 40% of their population (Fiszbein and Schady,

¹ While largely outside of the theme of this paper, this recent study also observed that maternal obesity increased at 7% for a 10% increase of GDP.

2009). Ethiopia's productive safety net – with the exception of South Africa, the largest transfer program in sub-Saharan Africa - covers 10% of the population (World Bank, 2012). Using an average income elasticity of stunting decline of -0.6, the increment to household resources attributable to programs at this scale may reduce the national stunting rate by 1 – 5% from the period prior to implementation to the time the program is rolled out to full nation-wide coverage. This is appreciable and appreciated, but possibly overshadowed by other trends and thus not easily identified.

Is transfer income used differently than other income? Based on studies of household decisions in regards to food expenditure, it is plausible that this would be the case. Evidence from cash transfers in Colombia, Ecuador, Mexico, and Nicaragua reported in Attanasio, Battistin, and Mesnard (2012) as well as the food stamp program in the United States (Breunig and Dasgupta, 2005) indicate that households commonly spend more on food and health out of transfer income than from general sources of income even when the transfers are only indirectly linked to nutrition and health. One possible explanation for this is labeling (Koorman, 1970) by which participation in a program influences a household's spending patterns.² Labeling is also raised as a possible reason that take home rations in a food for education program in Burkina Faso had a substantially larger impact on weight for age of younger siblings of girls eligible for these rations and who were 6 to 60 months old compared to the estimated impact of an income transfer of similar value (Kazianga, de Walque and Alderman, 2013).³

Other studies attribute changes in expenditure patterns to a combination of gender control – many transfer programs earmark women as recipients – and social marketing. That women generally spend differently than men has been shown in a variety of settings with the

² Labeling may affect education choices as well (Benhassine et al., 2013).

³ This result was not observed for school meals of the same value in this randomized control trial.

identification often coming from exogenous differences in earnings and assets or inheritance and alimony legislation (see the recent review by Doss, 2013). Moreover, an analysis of differences in expenditure patterns following an increase in child benefits financed from wage taxes in the United Kingdom (Lundberg, Pollak and Wales, 1997) provides evidence closer to the current theme of transfer programs. Similarly, studies of food expenditures in Mexico's conditional cash transfer program, PROGRESA, find that expenditures on food increase more than would be expected due to income effects alone (Attanasio and Lechene, 2002; Bobonis, 2009; Hoddinott and Skoufias, 2004). The first two cited examples attribute the increased food expenditures to female control of income, a hypothesis which is explicitly tested in the studies, while the third paper listed finds that the increased food expenditures reflect increased diet quality rather than increased calorie consumption and infers that this is due to the nutrition education that was provided to program participants. These two interpretations are not mutually exclusive. While these analyses are based on a random assignment into the transfer program, I am not aware of any studies that have studied nutritional outcomes (as opposed to education) using a random assignment to male and female recipients within the same intervention.

The majority of studies that use exogenously assigned eligibility for a transfer program to avoid biases that stem from the possibility that female control of resources reflects household preferences and labor choices look at expenditures as the outcome to be studied. Duflo (2003), however, directly measures differences in the anthropometry of the grandchildren of recipients of South Africa's relatively generous pension program. This study found that pensions received by women had a significant impact on the nutritional status of their grandchildren, an outcome that was not found for relatives of male pensioners. While this result clearly supports the view that women and men have different patterns of investment, it does not imply that a pension transfer is necessarily a good vehicle for improving child nutrition. In fact, only 46% of pensioners – either

male or female - lived with their grandchildren and the positive nutritional impact was only observed if the woman's grandchild was a girl.

Abstracting from any targeting errors in transfer programs, their impact on nutrition depends, in part, on the proportion of the beneficiary population that is in the nutritional vulnerable population. This core group consists of pregnant women and children less than two years of age, often referred to as children in the first 1000 days from conception. As transfer programs often have equity motives as well as explicit nutrition goals – many poor households do not contain individuals who are in the vulnerable 1000 days – there are clear tradeoffs that need to be considered in allocating any transfer budget. Ruel and Alderman (2013) surmise that one reason for the limited observed impact of transfer programs on nutrition is that the measurement of nutritional impact is often over a broader group of children included in transfer programs rather than those in the most responsive age group. With heterogeneity of nutritional outcomes, this would likely dilute and possibly mask overall changes on the treated population that can be attributable to a transfer program.

Still, even when transfers are used to augment diet quality for the most vulnerable household members, they are unlikely to have a major impact on other inputs into improved nutrition such as the supply and quality of health and sanitation which are largely public goods.⁴ Similarly, while an increase of purchasing power similar to what is provided in a transfer program may encourage health seeking behavior, larger investments and behavioral changes are needed to reduce the exposure to pathogens in the community in which a child plays (Ngure et al., 2013; Spears, 2013).

⁴ Estimates of the impact of GNP on nutrition are larger in absolute value when infrastructure is allowed to vary compared to holding it constant (Haddad et al., 2003).

3. Transfers and Resilience. There is almost a cottage industry producing studies that show the vulnerability of children to short term crises. For example, Alderman, Hoddinott, Kinsey (2006) show that drought and civil unrest contributed to increased stunting in Zimbabwe (independently as well as jointly) and subsequently this stunting led to reduced schooling. Akresh, Verwimp and Bundervoet (2011) also show that both drought and conflict contributed to persistent stunting – tested separately but not jointly – in Rwanda.⁵ In extreme cases, such as the massive policy induced famine in China between 1957 and 1961, observed stunting may be an underestimate of the nutritional insult since extremely high mortality may selectively remove stunted children from subsequent measurement (Gørgens, Meng, and Vaithianathan, 2012). However, Maccini and Yang (2009) show that a rain shortfall does not have to be substantial to result in reduced linear growth and schooling. Nor are these human capital crises confined to conflict and drought affected economies; Cruces, Glüzmann, and López Calva (2012) find that the incidence of low birth weight increased with the economic contraction in Argentina in 2001-2002 with both GDP contraction and reduced health expenditures per capita independently explaining this outcome.

To drill down into mechanisms, it is useful to draw upon more general models of human capital, covering education and mortality as well as nutritional status. Ferreira and Schady (2009) point out that economic downturns influence relative prices as well as overall resources and, thus, induce substitution effects as well as income effects. In developed countries substitution effects (as well as changing fertility patterns) may paradoxically result in improved human capital outcomes during economic downturns, especially in regards to schooling as the opportunity cost of education declines when employment contracts. Baird, Friedman and

⁵ That conflict affects health outcomes is not surprising and is regularly reported. See, for one example, Minoiu and Shemyakina (2012). It is not clear, however, that the mechanisms of impact or the policy responses of the transfer programs discussed in this paper are widely applicable to conflict situations.

Schady, however, document that in low income countries mortality is counter-cyclical; that is, infant mortality increases when GNP declines.

One notable exception to this pattern is a study by Miller and Urdinola (2010) in which a pro-cyclical pattern with coffee prices in Colombia was reported. The authors attribute this result to the cost of labor and, thus, of child care which declines when coffee prices fall and rises during a price spike.⁶ This outcome contrasts with estimates for India in which counter-cyclical mortality is explained, in part, by the need for additional income sources when rainfall is inadequate; Bhalotra (2010) observes increased female labor supply and decreased time for child care in times of stress.

The issue of child care may be part of the answer to the puzzle why negative economic shocks seem to have a larger impact than does an increase of income as shown in the cross country results in Baird, Freidman and Schady, a result that is echoed in the relative point estimates in Cruces, Glüzmann, and López Calva (2012). The issue of child care may also be behind the fact that many studies including Baird, Friedman, and Schady as well as Akresh, Verwimp and Bundervoet (2011) and Maccini and Yang (2009) find that girls are affected more in time of stress than are boys. This differs from the results from most cross sectional regressions which show that the nutritional status of girls is generally the same or better than boys in the same environment; recent analysis of 20 DHS data sets undertaken at IFPRI found that in all of the surveys the odds ratio for the probability of stunting was less than one for girls and significantly so for all but two of the countries. This pattern, which implies a lower risk for girls, includes analysis of surveys from countries such as India and Bangladesh which on the basis of other forms of gender bias (including mortality in Bhalotra's study) are occasionally

⁶ Ferreira and Schady claim that this result is so large as to be implausible.

incorrectly assumed to have a nation-wide pattern of gender discrimination in regards to nutrition.

An additional reason that shocks may have a negative influence on health and nutrition greater in absolute value than the improvement in health from increases in income may have to do with stock-out of assets; a household cannot draw down financial assets (including credit and social exchanges) indefinitely while it can increase them to the degree desired given its income. Thus, in the wake of a shock poor household may be forced to trade off current consumption against assets, reducing the former in order to protect the household's long term productive capacity while households with more assets are able to smooth consumption (Carter and Lybbert, 2012; Kazianga and Udry, 2006).⁷ Reducing food consumption, however, is not merely a welfare loss, it also may influence current productivity and, as documented, future earning capacity of the next generation. Thus, the absence of liquidity not only constrains consumption smoothing, it forces households to forego potential earnings in order to protect current assets as Hoddinott (2006) argues occurred in Zimbabwe in 1994-5. Hoddinott's underlying behavioral model is similar to that elaborated by Carter and Lybbert, with the major difference in that he disaggregates the impact of shocks over individuals within the household.

As mentioned, Cruces, Glüzmann, and López Calva (2012) found that the incidence of low birth weight increased when provincial public health expenditures declined and this increase was at a greater rate when the economy was also in decline. However, this incidence was not associated with changes in *total* public expenditures - that is, government outlays in all sectors. Paxson and Schady (2005) have a similar explanation in terms of public expenditures in their study of changes in mortality in Peru during a severe economic contraction. Moreover, Ferreira

⁷ This model of poverty traps and differences in inter-temporal choices has not, to my knowledge, been applied to leisure or to time allocation for child care. However, it may offer insights relevant to Bhalotra (2010).

and Schady (2009) contrast the increased mortality in Peru with the absence of severe health consequences in the wake of the 1997-8 economic crisis in Indonesia and use this example to bolster the suggestion that one strategy to protect children during economic downturns is to protect public expenditures.

But for this reasonable proposition to be valid these expenditures must be on services that can be shown to protect health; where the public health system is sparsely present or ineffective, protecting the system is unlikely to contribute to resiliency. Alternatively – or additionally – a government can protect private expenditures by introducing new safety net programs or by expanding the coverage or increasing the level of support in existing programs, the latter being administratively the easier option in the short run if such a program is available. For example, Ethiopia increased wages in its public works program in 2008 in the wake of rapidly rising food prices and in the same year Brazil increased the cash grant in the Bolsa Familia conditional cash transfer program as well as increased minimum wages. Ferreira et al. (2013) note that the combination of these measures in Brazil as well as general equilibrium effects on producer incomes and rural wage earners attributed to higher food prices mitigated the effects of the price increases on purchasing power. This protection was largely confined to the poorest 2 deciles of rural residents and the poorest decile in urban areas while middle income consumers had the largest proportional losses in welfare.

Ferreira et al., however, do not have the data to take the analysis one step further to measure the impact of transfers on nutrition or other dimensions of child health. There are particular research obstacles to such an investigation. For example, randomized trials among shock affected populations are largely incompatible with research ethics while comparisons between recipients and non-recipients need to consider the endogeneity of the heightened requirements for assistance. Yamano, Alderman and Christiaensen (2005) address the problem

of endogeneity by first modeling program placement as a function of rainfall shortages and then measuring the impact of food aid conditional on the allocation to the community (not the household itself). The study replicates the common finding that drought leads to a reduction in the rate of linear growth for children but also finds that the food aid allocation offsets this risk, largely mitigating the effects of the drought where the aid was provided.

Giles and Satriawan (2010) also address program placement as well as its duration in their study of supplementary feeding provided to children 6 to 60 months by the government of Indonesia as a specific response measure in the wake of the 1998 economic crisis in that country. They noted benefits for children 12-24 month old but no impact on stunting for either younger children or older ones reflecting both age specific health risks as well as difference in daily food allocation. The overall effect was a reduction in the likelihood of stunting by 15%. The examples in Ethiopia and Indonesia, both in response to relatively slow onset disasters (relative to, say, a typhoon), are examples of in-kind transfers, an issue that is explored further below.

Also relevant to the role of transfer programs in protecting health in the wake of a financial shock in Uruguay is a study by Amarante et al. (2012). This research finds a 15-17% reduction in low birth weight attributable to an unconditional transfer program implemented between April 2005 and December 2007 on an emergency basis in response to a contraction in GNP of 10%. The study used administrative micro-data matched to longitudinal vital statistics on the universe of births. As they also indicate that the transfer increased household income by at least 25%, this implies an income elasticity for low birth weight in the neighborhood of -0.6. This is nearly three times the magnitude of the elasticity for the reduction in low birth weight (-0.228) reported in table 1. Amarante et al. do not report the attendant changes in purchases financed by this transfer or the health services demanded, although they rule out the possibility that the improvement was due to significant changes in health seeking behavior. Reduced stress

and reduced labor supply are both flagged as possible contributors to the outcomes measured. This would imply a role of the transfer beyond that of earned income.

An important policy issue related to transfers and shocks is the potential for catch up growth. While, in general, stunting at age 2 has consequences that persist over a lifetime – with some risk of increase obesity with programs attempting to increase growth on a small frame after that age there is some debate as whether this generality holds when conditions that contributed to the stunting are removed. Singh, Park and Dercon (2014), for example, find that school feeding in India apparently reversed the impact on stunting of a severe drought. Few studies, however, have similar results that point to safety net programs that can offset the impact of undernutrition on physical growth although targeted stimulation programs may offset the consequences for cognitive development (Ruel and Alderman, 2013).

4. Linking Transfers and Health Services. Transfer programs are often aimed at increasing investments in human capital. This goal is fostered by adding a requirement that the beneficiary household participate in schooling or designated health care activities (Fiszbein and Schady, 2009). In effect, such requirements change the relative price of investments as well as increase the budget envelope. This is motivated, in part, by the assumption that poor households underinvest relative to a social optimum (Das, Do, Özler, 2005). The evidence from careful studies of conditional cash transfer programs (CCTs) indicates that these programs virtually always augment household food consumption and dietary diversity as well as increase participation in preventive health care. Some trials of CCTs also find improved anthropometry (Maluccio and Flores, 2005; Behrman and Hoddinott 2005). However, on average the impact of CCTs on anthropometric measures of nutritional status is small (Ruel and Alderman, 2013; Manley,

Gitter, Slavchevska, 2013)⁸. Similarly, a significant improvement in anemia was found in only one of the three country programs in which that outcome was studied (Leroy, Ruel, and Verhofstadt 2009).

This pattern of limited observed impact on nutritional outcomes is partially explained by the nature of the studies, some of which include in their focus individuals outside the first 1000 days and who, therefore, are not expected to be as responsive to nutrition interventions as younger individuals. Additionally, nutritional impacts are cumulative and some studies risk a bias towards limited impact if they cover too short a time frame (King and Behrman, 2009). Moreover, with the exception of recent preliminary results from the Philippines - which have not yet been included in any meta-analysis – all studies of the impact of CCT programs on nutritional outcomes have explored interventions in Latin America rather than Africa or Asia⁹ where malnutrition rates are in general much higher. The recent evidence from the Philippines comes from two related studies of the *Pantawid Pamilya* program which covered over 3 million people by 2012. These studies used both a randomized trial as well as regression discontinuity design to assess the impact on health and education and found 10-16 percentage point reductions in stunting in the two samples (Chaudhury, Friedman, and Onishi, 2012; Onishi et al. 2013).

Yet another reason hypothesized for the observed increase in health service participation with limited corresponding increase in outcomes is the quality of services received (Gaarder, Glassman and Todd 2010). Conversely, one study which found an improvement in birth weight of children born to women eligible for a successor to PROGRESA, Oportunidades, yet which did not find an increase in attendance claimed this stemmed entirely from an improvement in the quality of services (Barber and Gertler, 2010). This change, however, was not an outcome of

⁸ Manley, Gitter, Slavchevska (2013) include unconditional transfers in their meta-analysis, so their conclusions are not restricted to CCTs.

⁹ There are, however, a range of studies of CCT programs from Africa and Asia show that these influence health care decisions as well as schooling.

additional financial resources provided to the clinics but rather was attributable to the empowerment of women who demanded better services.

The insignificant pooled results of the impact of CCT programs in Latin America on nutrition also masks program heterogeneity. For example, Fernald, Gertler and Neufeld (2009) saw larger impact of PROGRESA on children who were in the program 18 months longer than a comparison group. In another study of PROGRESA, Berhman and Hoddinott (2005) found no overall impact when looking at the intention to treat in, but did observe that, after controlling for unobserved heterogeneity that was correlated with access to supplementary food, there was a significant positive and fairly substantial reduction in stunting among children 12-36 months who received the supplements. The reduction was greatest among the poorest families with functionally literate women present. An analysis of the improvement in anemia from PROGRESA¹⁰ that aimed to uncover the impact pathway attributed the improvement to increased dietary intake from the food supplements rather than other aspects of improved home diets of the young children within the household (Ramirez-Silva, Rivera, Leroy, and Neufeld, 2013). This analysis was not confined to iron intakes; the group that received supplements also consumed more retinol and zinc. The study, however, did not analyze the reasons that one group of participants consumed the supplements and another did not.

Ultimately, it may be argued that, similar to the various studies that attempt to unpack the causal chain to better nutrition, increased weight and heights themselves are part of an expanded pathway towards reduced mortality and better cognitive abilities of the survivors. In this regards, two recent studies showing that CCTs reduced mortality in Latin America are important. In one, Rasella et al. (2013) linked CCT coverage in Brazil with municipal mortality data using fixed

¹⁰ The study was funded by Oportunidades, but the data used for the study was collected under the earlier PROGRESA program.

effects regression analysis and observed that as coverage increased under five mortality declined. Similarly, a drop in deaths attributed to malnutrition was associated with the program availability. The analysis also accounted for the roll out of a program to provide free community based health care and found that the reduction in overall mortality was greatest where both programs had widespread coverage. In a similar study using municipal data, Barham (2011) found that PROGRESA reduced infant mortality as program coverage increased; mortality declined 17% in rural areas with full coverage and 8% overall. Moreover, the subset of deaths attributed to nutritional deficiencies was found to decline significantly even though this trend contributed less to overall reductions in infant mortality than did the changes in intestinal infections or respiratory diseases. The study, however, did not find a statically significant reduction in neonatal mortality.¹¹

The most detailed study of indicators of cognitive development in a CCT program - albeit one in which the actual monitoring of health seeking behaviors as a condition of participation was minimal - showed that young Nicaraguan children eligible for the emergency program *Atención a Crisis* had improved measures of child development two years after the program ended (Macours, Schady, and Vakis, 2012). The authors present evidence supporting the view that this was not merely due to the income effect although the outcome cannot be linked to any specific program element. Fernald and Hidrobo (2011) also show improved cognitive development in a transfer program in Ecuador. Both the Ecuador and the Nicaragua programs, however, did not find improvements in height for age. Thus, the transfer programs may have an

¹¹ This was tentatively attributed to underreporting although plausibly it could reflect the fact that CCTs have a smaller effect on behaviors that influence neonatal mortality than they do for subsequent health risks.

impact on the subsequent economic outcomes for the children of families currently receiving benefits even if this is not apparently mediated via a nutritional pathway.¹²

Turning the causal pathway around, there may be a link from cognitive states to improved nutrition mediated through transfer programs. There is new evidence that poverty raises stress levels in a manner that reduces an individual's cognitive function and, in effect, leads to a negative feedback loop (Mani et al., 2012). This may be due to a tying up of mental resources or attention (Shah, Mullainathan and Shafir, 2012) or to increased cortisol levels associated with stress (Chemin, de Laat and Haushofer, 2013). In either case, chronically poor individuals would be more susceptible to the effects of a crisis. This dimension of cognitive capacity and poverty has just begun to be studied in detail. A few studies have indicated that transfer programs can reduce symptoms of stress. For example, Fernald and Gunner (2009) observed lower cortisol in women with high depressive symptoms after participating in Oportunidades and Baird et al. (2013) found that cash transfers in Malawi reduced psychological stress and accounted for a sizable portion of the overall program impact on schooling and consumption.¹³ While this nascent field has not yet traced this psychological link as part of the causal pathway from transfer programs to evidence on nutritional outcomes, there is an association between depression and stunting (Surkan et al., 2009) and, thus, it is plausible that transfers may prevent malnutrition in economically stressful environments by reducing attendant psychological stress. Inter-disciplinary research on depression and health may find this a profitable area for investigation.

¹² A cost effectiveness analysis in terms of nutritional outcomes, then, might lead to different conclusions than a multidimensional benefit cost assessment.

¹³ They also noted increase in stress among non-participants, possibly reflecting increased inequality

5. In-Kind Transfers. Until relatively recently governments were more likely to support consumption by low income households through price supports and in-kind transfers than through cash assistance. Despite the well-known economic arguments favoring income transfers as less distortive of preferences than price subsidies or in-kind assistance, price supports were favored in many circumstances due to logistical advantages. Moreover, food assistance was advocated, in part, due to a distrust of markets as well as an explicit goal of shifting consumption patterns (Pinstrup-Andersen, 1998). Political concerns and the availability of food aid (itself a dimension of political concerns) also contributed to the predominance of in-kind support programs. As mentioned in the introduction, however, cash transfers have recently taken center stage. Where, if at all, might there be exceptions to the advantages of cash support?

One domain in which in-kind assistance still predominates is disaster relief, particularly in response to sudden onset emergencies such as earthquakes and hurricanes since these emergencies often disrupt normal market channels. Such situations may render the logistical advantages of cash transfers less advantageous, although cash vouchers were a component of the post-tsunami response in 2004 (Harvey 2007). Although food aid deliveries overall have declined from 15 million MT in 1999 to 5.4 million MT in 2009, emergency deliveries remained more or less constant, so that they now comprise more than two-thirds of total food aid (Barrett, Steets and Binder, 2012). Two related trends are apparent: the World Food Program now provides 70% of global food aid flow and local and regional purchases have also risen, close to half the total flow.

The response to disasters is usually in terms of general assistance to the family. As indicated in the discussion of Yamano, Alderman and Christiaensen (2005) above, emergency support to the household may be sufficient to prevent deterioration of nutritional status in crises. However, the impact may be diluted not only because the food is often shared among all

household members but also because assistance is not designed to meet the dietary needs of the most vulnerable children. Thus, nutritional impacts of emergency deliveries can be enhanced by including lipid-based nutrient supplements (LNS) in the package of assistance to families; these products have ample shelf life and can be specially formulated for nutritionally at-risk children (Chaparro and Dewey, 2010). One recent trial that added LNS to general food distribution in an emergency situation in the DRC found an improvement in linear growth and hemoglobin but not in wasting (Huybregts et al., 2012). Another trial in Niger with a similar formulation and also in the presence of a general household rations found reduced wasting but no impact on linear growth (Grellety et al., 2012). More crucial, however, may be the reduction in mortality that was observed as well as the fact that many of the observed deaths were of children who had not exhibited signs of wasting. While many of the current issues in regards to LNS for emergency or for other contexts are biological (Dewey and Arimond, 2012) – such as the potential stimulation to growth from milk powders – other topics highlighted in these recent studies have to do with program administration and targeting procedures and, thus, are themes that closely overlap with economics.

One advantage of in-kind programs is that they retain their real value in the face of price fluctuations and inflation. To be sure, cash transfers can be adjusted administratively, as Brazil did in 2008. However, this depends on an executive decision – one which is awkward to reverse if food prices retreat - while in-kind transfers are intrinsically protected from devaluation. Sabates-Wheeler and Devereux (2010) indicate the extensive temporal and spatial differences in the value of cash and in-kind public work wages in Ethiopia between 2006 and 2008, a period of extensive food price volatility. While they do not track these differences to their impact on nutrition, they do show that participants who received their wages wholly or partially as food

reduced their food deficits more than those who received wages in cash, despite an increase in nominal cash wages in 2008.

In infusion of cash into a remote community may also put pressure on local food prices. In a randomized trial in Mexico Cunha, De Giorgi, and Jayachandran (2011) found that cash transfers led to higher prices and thus a purchasing power loss for program participants amounting to 11% relative to those who received a similar valued transfer in-kind. It is not clear, however, how generalizable these results are since the study was conducted in remote villages. Indeed, their inaccessibility was the main reason these communities were not included in PROGRESA. Moreover, the commodities offered were largely processed food items and, perhaps, less competitively marketed in these communities than basic grains.¹⁴ Other randomized trials such as Aker et al. (2011) have not found cash transfers to inflate food prices. More generally, the impact of an infusion of cash on local prices is expected to be modest where markets function well. Similarly, whether food aid depresses producer prices depends critically on the degree of market integration.

Cunha (2012) notes that the in-kind distribution program in Mexico was largely infra-marginal. The commodities received in-kind substituted for others that would otherwise have been purchased. Nevertheless, the in-kind distribution increased micronutrient consumption. This is likely a general result in any program in which a fortified commodity is provided if the alternative foods obtained from the market are not similarly enriched. Cunha, however, also notes that the distribution of these foods costs substantially more than the distribution of a cash transfers and questions whether the benefits in terms of micronutrient intake justifies these costs.

A series of randomized experiments designed to assist the World Food Program in understanding modalities of assistance sheds further light on the relative impacts of cash and in-

¹⁴ Moreover, the value (in local terms) and the frequency of delivery differed between the two program modes.

kind programs as well as verifies that the administration of cash transfers can be substantially less expensive than food assistance. For example, Hidrobo et al. (2012) compared cash, vouchers, and in-kind food assistance in Ecuador. Each program arm delivered \$40 of assistance per household monthly with all participants also receiving nutrition education. As expected, each program increased food expenditures relative to the control group with no statistical difference between arms. Food transfers, however, had a larger impact on calories than did cash and the voucher had a larger impact on diet diversity than either of the other treatments.¹⁵ On the other hand, a related trial in Niger, comparing cash and food, found that the latter increased diet diversity more than did cash, possibly because cash was used for large seasonal purchases of grain (Hoddinott, Sandström, and Upton. 2013). While the Niger experiment included pulses and oil as well as grain, a similar program in Yemen (Schwab, 2013) provided only flour and oil and found that the cash arm of the trial led to greater diet diversity while the in-kind program increased calories more than the cash assistance.

These three studies tracked changes in consumption but did not document impacts on health or child development. A RCT in Uganda, however, did compare the provision of cash and food (valued at \$12 over a six week period) to families with children in preschool programs. The children aged 3 to 5 years in the group that received cash improved performance on a set of measures of cognitive development relative to the control group while those receiving food did not. This was attributed to a combination of improved diet quality (mainly meat and dairy) and a substantial increase in attendance in preschool as well as higher payments to the staff of these centers which likely improved motivation. There was also a reduction in anemia in the group that received cash. This was not observed in the food treatment arm even though the corn soy blend that this group received was fortified with 99% of iron requirements for young children.

¹⁵ In each arm, the majority of households indicated a preference for the modality in which they were participating.

These studies were not designed to assess whether nutrition education enhances the impact of in-kind or cash distribution. In contrast, one of the earliest RCTs exploring the joint impact of food pricing and education on nutrition (Garcia and Pinstrup-Andersen, 1987) found that the positive and significant impact of a subsidy on rice and cooking oil on household food expenditures and preschool weight gain in the Philippines was enhanced when nutrition education was also included.¹⁶

In-kind distribution of food or food subsidies do not always lead to marked improvements in dietary intake. One randomized experiment with subsidized rations in China found no increase in nutrient intakes (Jensen and Miller, 2011). In this case, the rations were capped at 750 grams of grain per individuals and were valued between \$0.02 and \$0.06 a day per person depending on the random assignment. With typical household consumption in this poor urban population reported as lying between \$0.41 and \$0.82 the ration was worth, at most, 15% of consumption and generally far less. The participants in this particular experiment exhibited a unique reduction in grain consumption with lower prices. However, even with a more commonly observed increase of consumption with lower prices the impact of a price subsidy is often modest. This may be because the value of the transfer is small due to the limitations imposed by the ration quotas. Moreover, the price response will be limited when the ration is infra-marginal. Additionally, when one considers a full range of cross price effects the net increase of nutrients consumed with a subsidy on a single commodity is often less than the change in intake of the subsidized good alone (Pinstrup-Andersen, Ruiz de Londoño, and Hoover, 1976; Pitt 1983; Alderman and del Ninno, 1999). Thus, unlike situations in which global or localized shocks lead to broad spikes in a number of food commodities, a subsidy on a

¹⁶ In a different context, Ruel (2001) also argued that increases the availability of nutritious foods – including through increase home production - has limited impact on nutrition without concurrent nutritional messaging.

single commodity is unlikely to translate into observable changes in nutritional outcomes. Clearly, a full subsidy – that is, free distribution – would have a greater impact as might a subsidy accompanied by nutrition education.

6. Conclusion

Many of the world's poor benefit from direct cash transfer programs. These clearly increase overall consumption and welfare. Moreover, the bulk of evidence shows that both conditional and unconditional transfers increase utilization of health care service (with mixed results as to the added value of conditions). Nevertheless, meta-analysis shows little impact of such programs on stunting or on anemia. This may reflect the fact that many evaluations have covered children outside of the most vulnerable – and most responsive – age brackets. Additionally, since impacts on stunting are cumulative over a period of years, some studies have been too short to assess the full impact of a sustained program. Moreover, to date, the majority of impact evaluations for transfer programs have been in Latin America; these results may not be fully valid for programs in Africa or Asia where malnutrition rates are higher and where the underlying conditions of malnutrition reflect more extreme poverty. This not only suggests obvious research gaps, it also suggests a potential for improved nutrition should programs be more finely tuned to focus resources on the population most at risk of malnutrition.

Still, the main challenge for enhanced impact of transfer programs that are formally or informally linked to health care services or to nutritional education remains the same challenge as it is for improving the quality of health services delivered in other contexts, including issues of worker training and incentives. But from the standpoint of the demand for these services the role of cash provision interacts with the time constraints of the care giver, an issue which is widely acknowledged but, nevertheless, difficult to address. The need to more fully

acknowledge these time costs when designing programs is underscored when one considers that programs aimed at improving nutrition are potentially synergistic with programs to improve care giving for child stimulation (Ruel and Alderman, 2013).

As the ability to deliver cash in an accountable manner has improved, the role of in-kind transfers has diminished. Still, there are settings where cash is less effective, either because markets are not functioning adequately or programs are not sufficiently flexible to accommodate major swings in food prices. It is not clear, however, if reported examples of isolated markets are widely representative and the food versus cash debate remains nuanced; as is often the case, context matters. Moreover, there are examples of enhanced nutritional impacts of cash transfer programs and of emergency relief programs that are attributed to the inclusion of child specific rations, particularly lipid based supplements. Thus, there remains a research agenda focused on when to include in-kind transfers, which ones, and at what cost. Moreover, if these programs are to address the acute crisis that particularly harm young children, they need to be designed to scale up rapidly and, given the need to hold resources available for long term investments, also scale back when appropriate.

Appendix: A Caveat in Regards to Obesity

The programs reviewed in this paper are designed to transfer income to low income families. They are intended to address both equity and poverty traps including under-investment in health as well as education. But, in fact, the poor are also at risk of over-nutrition, in part because low birth weight and stunting are associated with increased Body Mass Indices (BMI) and chronic illness (Alderman, 2012). In fact, in the short run, transfer programs can exacerbate overnutrition while aiming to reduce undernutrition.

For example, Fernald, Gertler, and Hou (2008) found that Oportunidades led to higher BMI as well as higher blood pressure and Forde et al. (2012) found a similar risk for BMI in Colombia's transfer program. Following up from the results of Fernald, Gertler and Hou, Leroy et al. (2013) compared the impact of cash and food distribution on the obesity of women in the same Mexican program studied by Cunha, de Giorgi, and Jayachandran (2011). Both forms of support led to increased weight gain relative to the control group. The point estimate of the transfer was larger for recipients of food relative to those who received cash. The difference, however, was not statistically significant. The study also found that women with higher body mass at the start of the two year program had the largest increase in weight. Indeed, those with a body mass index less than 25 showed no gain during the study. Thus, while this program has been able to increase diet diversity and, thus, the consumption of micronutrients (Leroy et al, 2010), there are both gains and risks associated with the intervention. Leroy et al. (2013) also report that a nutrition education component was included with the food distribution. However, the implementation was flawed and no impact was noted.

References

- Aker, Jenny, Rachid Boumnijel, Amanda McClelland, and Niall Tierney 2011. Zap It to Me: The Short-Term Impacts of a Mobile Cash Transfer Program. Center for Global Development. Working Paper #268.
- Akresh, Richard, Philip Verwimp and Tom Bundervoet. 2011. Civil War, Crop Failure, and Child Stunting in Rwanda. Economic Development and Cultural Change. 59(4): 779-810.
- Alderman, Harold. 2012. The Response of Child Nutrition to Changes in Income: Linking Biology with Economics. CESifo Economic Studies. 58(2):256-273.
- Alderman Harold and Sebastian Linnemayr. 2009. Anemia In Low Income Countries Is Unlikely To Be Addressed By Economic Development Without Additional Programs. Food and Nutrition Bulletin. 30 (3): 265-270.
- Alderman, Harold and Ruslan Yemtsov. 2013. How Can Safety Nets Contribute to Economic Growth? World Bank Economic Review. Forthcoming.
- Alderman, Harold, John Hoddinott, and William Kinsey. 2006. Long Term Consequences of Early Childhood Malnutrition. Oxford Economic Papers. 58(3):450-474.
- Alderman, Harold and Carlo del Ninno. Poverty Issues for Zero Rating VAT in South Africa. Journal of African Economies 8(2): 182-208. 1999.
- Amarante, Verónica, Marco Manacorda, Edward Miguel and Andrea Vigorito. 2012. Do Cash Transfers Improve Birth Outcomes? Evidence from Matched Vital Statistics, Program and Social Security Data. CEGA Working Papers WPS-004. Center for Effective Global Action, UC Berkeley.
- Attanasio Orazio and Valerie Lechene. 2002. Test of Income Pooling in Household Decisions. Review of Economic Dynamics. 5(4):720-48.
- Attanasio, Orazio, Erich Battistin and Alice Mesnard. 2012. Food and Cash Transfers: Evidence from Colombia. The Economic Journal. 122(559): 92–124.
- Baird Sarah, Jed Friedman, Norbert Schady. 2011. Aggregate Income Shocks and Infant Mortality in the Developing World. Review of Economics and Statistics. 93 (3): 847–856.
- Baird, Sarah, Jacobus de Hoop, Berk Ozler. 2013. Income Shocks and Adolescent Mental Health. Journal of Human Resources. 48(2): 370-403.
- Barber, Sarah and Paul Gertler. 2010. Empowering women: how Mexico’s conditional cash transfer programme raised prenatal care quality and birth weight. Journal of Development Effectiveness. 2(1): 51–73.

- Barham, Tania. 2011. A healthier start: The effect of conditional cash transfers on neonatal and infant mortality in rural Mexico. Journal Development Economics. 94: 74–85.
- Barrett, Christopher, Andrea Binder, Julia Steets, (Eds.). 2012. *Uniting on Food Assistance: The Case for Transatlantic Cooperation*. Routledge.
- Benhassine, Najy, Florencia Devoto, Esther Duflo, Pascaline Dupas and Victor Pouliquen. 2013. Turning a Shove into a Nudge? A “Labeled Cash Transfer” for Education. NBER Working Paper No. 19227. National Bureau of Economic Research.
- Behrman, Jere and John Hoddinott. 2005. Programme Evaluation with Unobserved Heterogeneity and Selective Implementation: The Mexican *PROGRESA* Impact on Child Nutrition. Oxford Bulletin of Economics and Statistics. 67(4): 547–569,
- Bhalotra, Sonia. 2010. Fatal Fluctuations? Cyclicity in Infant Mortality in India. Journal of Development Economics. 93:7-19.
- Bobonis, Gustavo . 2009. Allocation of Resources within the Household Efficient? New Evidence from a Randomized Experiment. *The Journal of Political Economy*. 117(3): 453-503.
- Breunig, Robert and Indraneel Dasgupta. 2005. Do Intra-household Effects Generate the Food Stamp Cash-Out Puzzle? American Journal of Agricultural Economics. 87(3): 552-68.
- Cater, Michael and Travis Lybbert. 2012. Consumption versus asset smoothing: testing the implications of poverty trap theory in Burkina Faso. Journal of Development Economics. 99(2): 255-264.
- Chaparro Camila and Kathryn Dewey. 2010. Use of lipid-based nutrient supplements (LNS) to improve the nutrient adequacy of general food distribution rations for vulnerable sub-groups in emergency settings. Maternal and Child Nutrition. 6: 1–69.
- Chaudhury, N., Friedman, J., & Onishi, J. (2012). Philippines Conditional Cash Transfer Program Impact Evaluation 2012. World Bank. Processed.
- Chemin, Matthieu, Joost de Laat and Johannes Haushofer. 2013. Negative Rainfall Shocks Increase Levels of the Stress Hormone Cortisol Among Poor Farmers in Kenya. MIT. Processed.
- Cruces, Guillermo, Pablo Glüzmann, and Luis Felipe López Calva. 2012. Economic Crises, Maternal and Infant Mortality, Low Birth Weight and Enrollment Rates: Evidence from Argentina’s Downturns. World Development. 40 (2): 303-314.
- Cunha, Jesse. 2012. Testing Paternalism: Cash Versus In-kind Transfers. Naval Postgraduate School. Processed.

- Cunha, Jesse, Giacomo De Giorgi and Seema Jayachandran. 2011. The Price Effects of Cash Versus In-Kind Transfers: NBER Working Paper 17456. National Bureau of Economic Research.
- Das, Jishnu, Q. Do and B. Özler. 2005. Reassessing Conditional Cash Transfer Programs, World Bank Research Observer, 20(1): 57-80.
- Dewey, Kathryn and Mary Arimond. 2012. Lipid-Based Nutrient Supplements: How Can they Combat Malnutrition? PLOS Medicine. 9. e1001314.
- DFID. 2011. Cash transfer evidence paper. London, Department for International Development (DFID) Policy Division.
- Doss, Cheryl. 2013. Intrahousehold Bargaining and Resource Allocation in Developing Countries. World Bank Research Observer 28 (1): 52-78.
- Duflo, E. 2003. Grandmothers and Granddaughters: Old-Age Pensions and Intra-household Allocation in South Africa, World Bank Economic Review, 17(1): 1-25.
- Fernald, Lia and Megan Gunnar 2009. Poverty-alleviation program participation and salivary cortisol in very low-income children. Social Science and Medicine, 68(12): 2180–2189.
- Fernald, Lia and Melissa Hidrobo. 2011. Effect of Ecuador’s cash transfer program (*Bono de Desarrollo Humano*) on child development in infants and toddlers: A randomized effectiveness trial. Social Science and Medicine. 72 (9): 1437–1446.
- Fernald, Lia Paul Gertler, Lynnette Neufeld. 2009. 10-year effect of Oportunidades, Mexico's conditional cash transfer programme, on child growth, cognition, language, and behaviour: a longitudinal follow-up study. The Lancet. 374 (9706): 1997-2005.
- Fernald, Lia, Paul Gertler and Xiaohui Hou. 2008. Cash Component of Conditional Cash Transfer Program Is Associated with Higher Body Mass Index and Blood Pressure in Adults. Journal of Nutrition. 138(11): 2250-2257.
- Ferreira Francisco and Norbert Schady. 2009. Aggregate Economic Shocks, Child Schooling, and Child Health. World Bank Research Observer. 24: 147-181.
- Ferreira Francisco, Anna Fruttero, Phillippe Leite and Leonardo Lucchetti. 2013. Rising food prices and household welfare: evidence from Brazil in 2008. Journal of Agricultural Economics 64(1):151-176.
- Forde, Ian, Tarani Chandola, Sandra Garcia, Michael Marmot and Orazio Attanasio. 2012. The impact of cash transfers to poor women in Colombia on BMI and obesity: prospective cohort study. International Journal of Obesity. 36(9): 1209–1214.

- Fiszbein, Ariel, and Norbert Schady. 2009. Conditional Cash Transfers for Attacking Present and Future Poverty. The World Bank. Policy Research Report.
- Gaarder, Marie, Amanda Glassman and Jessica Todd. 2010. Conditional cash transfers and health: unpacking the causal chain. Journal of Development Effectiveness. 2(1): 6–50.
- Garcia, Marito and Per Pinstrup-Andersen. 1987. The pilot food price subsidy scheme in the Philippines: its impact on income, food consumption and nutritional status. IFPRI Research Report #61.
- Giles, John and Elan Satriawan. 2014. Protecting child nutritional status in the aftermath of a financial crisis: evidence from Indonesia. World Bank Policy Research Working Paper #5471.
- Gilligan, Daniel and Shalini Roy. 2013. Resources, stimulation, and cognition: How transfer programs and preschool shape cognitive development in Uganda. International Food Policy Research Institute. Processed.
- Gørgens, Tue, Xin Meng and Rhema Vaithianathan. 2012. Stunting and selection effects of famine: A case study of the Great Chinese Famine. Journal of Development Economics 97(1): 99-111.
- Grellety, Emmanuel, Susan Shepherd, Thomas Roederer, Mahamane Manzo, Stephane Doyon, Eric-Alain Ategbo and Rebecca Grais. 2012. Effect of mass supplementation with ready-to-use supplementary food during an anticipated nutritional emergency. PloS one. 7: e44549.
- Haddad, Lawrence, Harold Alderman, Simon Appleton, Lina Song, and Yisehac Yohannes. 2003. Reducing Child Malnutrition: How Far Does Income Growth Take Us?. World Bank Economic Review. 17(1): 107-131.
- Harvey, Paul. 2007. Cash-Based Response in Emergencies. Overseas Development Group. Humanitarian Policy Group Report #24.
- Hidrobo, Melissa, John Hoddinott, Amber Peterman, Amy Margolies, and Vanessa Moreira. 2013. Cash, Food, or Vouchers? Evidence from a randomized experiment in Northern Ecuador. IFPRI. Processed.
- Hoddinott, John. 2006. Shocks and their Consequences Across and Within Households in Rural Zimbabwe. Journal of Development Studies. 42(2): 301-321.
- Hoddinott, John and Emmanuel Skoufias. 2004. The Impact of PROGRESA on Food Consumption. Economic Development and Cultural Change. 53(1):37-61.
- Hoddinott John, Susanna Sandström and Joanna Upton. 2013. The impact of cash and food transfers: Evidence from a randomized intervention in Niger. Paper presented at the

Agricultural & Applied Economics Association's 2013 AAEA & CAES Joint Annual Meeting, Washington, DC, August 4-6, 2013.

- Huybregts, Lieven, Freddy Houngré, Cecile Salpéteur, Rebecca Brown, Dominique Roberfroid, Miriam Ait-Aissa and Patrick Kolsteren. 2012. The effect of adding ready-to-use supplementary food to a general food distribution on child nutritional status and morbidity: a cluster-randomized controlled trial. PLoS Medicine; 9: e1001313.
- Jensen, Robert and Nolan Miller. 2011. Do Consumer Price Subsidies Really Improve Nutrition? Review of Economics and Statistics. 93(4): 1205-1223.
- Kazianga, Harounan, Damien de Walque and Harold Alderman. 2013. School Feeding Programs, Intrahousehold Allocation and the Nutrition of Siblings: Evidence from a Randomized Trial in Rural Burkina Faso. Journal of Development Economics. Forthcoming
- Kazianga, Harounan and Christopher Udry. 2006. Consumption smoothing? Livestock, Insurance and Drought in Rural Burkina Faso. Journal of Development Economics. 79(2): 413-446.
- King, Elizabeth and Jere Behrman. 2009. Timing and Duration of Exposure in Evaluations of Social Programs. World Bank Research Observer 24(1); 55-82.
- Kooreman, Peter. 2000. The Labeling Effect of a Child Benefit System. American Economic Review 90(3): 571-583.
- Leroy Jef, Paola Gadsden, Sonia Rodríguez-Ramírez and Teresa González de Cossío. 2010. Cash and in-kind transfers in poor rural communities in Mexico increase household fruit, vegetable, and micronutrient consumption but also lead to excess energy consumption. Journal of Nutrition. 140: 612-7.
- Leroy Jef, Paola Gadsden, Teresa De Cossío and Paul Gertler. 2013. Cash and in-kind transfers lead to excess weight gain in a population of women with a high prevalence of overweight in rural Mexico. Journal of Nutrition 143(3): 378-383.
- Leroy Jef, Marie Ruel and Ellen Verhofstadt. 2009. The impact of conditional cash transfer programmes on child nutrition: a review of evidence using a programme theory framework. Journal of Development Effectiveness. 1(2): 103-29.
- Lundberg, Shelly, Robert Pollak and Terence Wales. 1997. Husbands and Wives Pool Their Resources? Evidence from the United Kingdom Child Benefit. Journal of Human Resources. 32(3): 463-480.
- Maccini, Sharon and Dean Yang. 2009. Under the Weather: Health, Schooling, and Economic Consequences of Early-Life Rainfall. American Economic Review. June 99 (3), 1006-26.

- Macours, Karen, Norbert Schady and Renos Vakis. 2012. Cash Transfers, Behavioral Changes, and Cognitive Development in Early Childhood: Evidence from a Randomized Experiment. American Economic Journal: Applied Economics, 49(2): 247-73.
- Maluccio, John and Rafael Flores. 2005. Impact evaluation of a conditional cash transfer program: the Nicaraguan Red de Proteccion Social. IFPRI Research Report 141. Washington, DC.
- Mani, Anandi Sendhil Mullainathan, Eldar Shafir, Jiaying Zhao. 2103. Poverty Impedes Cognitive Function. Science 34: 976-980.
- Manley J, Gitter S, Slavchevska V. 2013. How effective are cash transfer programmes at improving nutritional status? World Development 46: 133-155.
- Miller, Grant and Piedad Urdinola. 2010. Cyclicity, Mortality, and the Value of Time: The Case of Coffee Price Fluctuations and Child Survival in Colombia. Journal of Political Economy 118(1): 113-55.
- Minoiu, Camelia, and Olga Shemyakina. 2012. Child Health and Conflict in Côte d'Ivoire. American Economic Review, 102(3): 294-99.
- Ngure, Francis, Brie Reid, Jean Humphrey, Mduduzi Mbuya, Gretel Pelto and Rebecca Stoltzfus. 2013. Water, Sanitation and Hygiene (WASH), Environmental Enteropathy, Nutrition, and Early Child Development: Making the Links. Paper prepared for the Annals of the New York Academy of Sciences special issue entitled “Integrated Interventions in Child Development and Nutrition.”
- Onishi, Junko, Eeshani Kandpal, Nazmul Chaudhury, Deon Filmer, Jed Friedman. 2013. Evaluating *Pantawid Pamilya* Using Regression Discontinuity Design: Key Results and Lessons. World Bank. Processed.
- Paxson, Christina, and Norbert Schady. 2005. “Child Health and Economic Crisis in Peru.” World Bank Economic Review 19(2):203–23.
- Pinstrup-Andersen, Per (ed.). 1988. Consumer-Oriented Food Subsidies: Costs, Benefits, and Policy Options for Developing Countries, Baltimore, Johns Hopkins University Press.
- Pinstrup-Andersen, Per Norha Ruiz de Londoño, and Edward Hoover. 1976. The Impact of Increasing Food Supply on Human Nutrition: Implications for Commodity Priorities in Agricultural Research and Policy. American Journal of Agricultural Economics. 58 (2): 133-142.
- Pitt, Mark. 1983. Food Preferences and Nutrition in Rural Bangladesh. Review of Economics and Statistics 65(1):105-114.

- Ramírez-Silva Ivonne, Juan Rivera, Jef Leroy and Lynette Neufeld. 2013. The Oportunidades program's fortified food supplement, but not improvements in the home diet, increased the intake of key micronutrients in rural Mexican children aged 12-59 months. Journal of Nutrition. 143(5):656-63.
- Rasella, Davide, Rosana Aquino, Carlos Santos, Romulo Paes-Sousa and Maurico Barreto. 2013. Effect of a conditional cash transfer programme on childhood mortality: a nationwide analysis of Brazilian municipalities. The Lancet. 382(9886):57-64.
- Ruel Marie. 2001. Can food-based strategies help reduce vitamin A and iron deficiencies? A review of recent evidence. Food Policy Review #5. Washington, DC, International Food Policy Research Institute.
- Ruel, Marie and Harold Alderman. 2013. Nutrition-Sensitive Interventions and Programs: How Can They Help Accelerate Progress in Improving Maternal and Child Nutrition? The Lancet. 382(9891): 536-551.
- Sabates-Wheeler, Rachel and Stephen Devereux. 2010. Cash transfers and high food prices: Explaining outcomes in Ethiopia's Saefty Net Programme. Food Policy. 25(3): 274-285.
- Schwab, Benjamin. 2013. In the form of bread? A randomized comparison of cash and food transfers in Yemen. International Food Policy Research Institute. Processed.
- Shah, Anuj, Sendhil Mullainathan, Eldar Shafir. 2012. Some Consequences of Having Too Little. Science 338: 682-685.
- Singh, Abhijeet, Albert Park and Stefan Dercon. 2014. School Meals as a Safety Net: An Evaluation of the Midday Meal Scheme in India. Economic Development and Cultural Change. Forthcoming.
- Spears, Dean. How much international variation in child height can sanitation explain? World Bank Policy Research Working Paper #6351.
- Surkan, Pamela, Caitlin Kennedy, Kristen Hurley and Maureen Black. 2011. Maternal depression and early childhood growth in developing countries: systematic review and meta-analysis. Bulletin of the World Health Organization. 89: 608–15.
- World Bank. 2012. Managing risk, promoting growth: developing systems for social protection in Africa. The World Bank's Africa Social Protection Strategy 2012-2022. Washington, DC, World Bank.
- Yamano, Takashi, Harold Alderman, and Luc Christiaensen. Child Growth, Shocks, and Food Aid in Rural Ethiopia. American Journal of Agricultural Economics. 87(2):273-288. 2005.

Table 1: Estimated elasticity of nutrition indicators relative to economic growth

Dependent variable	Poverty (<\$1.25/day)	Child Stunting (HAZ<-2)	Child Underweight (WAZ<-2)	Low birth weight (< 2.5 kg)	Maternal Low BMI (< 18.5 kg/m²)	Maternal High BMI (>=25 kg/m²)
GDP per capita (β)	-1.102***	-0.587***	-0.703***	-0.228***	-0.403**	0.7***
Standard error	0.12	0.09	0.09	0.07	-0.17	0.15
Constant	11.369***	7.901***	8.132***	4.137***	5.256***	1.18
Standard error	1.0	0.68	0.69	0.58	1.26	0.37
Number of observations	438	233	317	575	110	182
R-square	0.57	0.48	0.49	0.23	0.48	0.62

Adapted from the web annex to (Ruel and Alderman, 2013). The models used country fixed effects regressions, except the maternal low BMI regression, which estimates regional fixed effects because of the smaller sample size. Dependent variables are all specified in logarithms. Thus, the parameters can be interpreted as elasticities. All regressions are run on a sample of countries with GDP per capita of less than \$12,500 international 2005 dollars. The inclusion of higher income countries substantially reduces all elasticity estimates. GDP per capita is measured in an international currency (2005 purchasing power parity dollars) to better account for international price differences. Poverty is defined according to the World Bank's \$1.25 household poverty headcount, measured in 2005 international dollars. Anthropometric data for stunting, underweight and maternal BMI Data are drawn from the WHO Global Database on Body Mass Index and the Demographic and Health Surveys (DHS) by Macro International. Low birth weight data are drawn from UNICEF, State of the World's Children, Childinfo, and DHS.

* p<0.10, ** p<0.05, *** p<0.01.