The economics and nutritional impacts of food assistance policies and programs

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Highlights

- Ill health and malnutrition are strongly correlated with poverty, and especially with persistent poverty. Food assistance policies and programs can be a valuable means of addressing malnutrition.
- Not all food assistance programs (FAPs) are equally valuable or successful at alleviating malnutrition. We develop a typology of access-based FAP interventions. Class I interventions focus on the first thousand days (from conception to age two). Recent evidence points to the first thousand days (from conception to age two) as a critical window for nutritional interventions. Class II interventions are school feeding programs. Class III FAPs are general feeding programs and Class IV FAPs target the vulnerable and disabled.
- Our review of FAP evaluation and nutritional efficacy studies indicates that returns to FAPs vary by targeted population. Returns also vary by cost structures, food quality and role of complementary activities as well as by political economy considerations.
- As best as the limited available evidence presently indicates, Class I FAPs have the highest average returns in economic, health, and nutrition terms. Nonetheless, Class I FAPs are less well funded than other FAPs, in part because of the difficulty in reaching small children and pregnant women.

Abstract

Recent evidence on malnutrition and poverty raise important questions on the role of food assistance policies and programs. In this review article, we examine evidence on the economic and nutritional impacts of international food assistance programs (FAPs) and policies. The returns on investments in FAPs are, on average, high but depend considerably on the targeting and cost structures as well as on food quality and role of complementary activities. We disaggregate findings into four classes of recipients. Returns to FAPs are highest for children under two. But, FAPs oriented towards early childhood interventions are less well funded than are interventions aimed at school-age children or at the broader, largely adult population even though available evidence indicates that these latter classes of interventions offer considerably lower average returns in economic, health, and nutrition terms. Nonetheless, FAP effectiveness in achieving any of several objectives varies with a range of key factors, including targeting, additionality, seasonality, timeliness, incentive effects, social acceptability and political economy considerations.

Keywords: international food assistance, food aid, food insecurity

1. **Introduction**

The past several years have witnessed an explosion of evidence on the long-term health and economic benefits of improved nutrition. At the same time, food assistance programs and policies (FAPs) have been rapidly changing. FAPs encompass any publicly financed direct food, cash, or voucher transfers, or food subsidies that serve as de facto transfers for the purpose of increasing the quality or quantity of food consumed, with the broader objective to improve recipients' health and nutritional status. Carefully designed FAPs, and related nutritional interventions, have been identified by the Copenhagen Consensus (2008) as among the highest return investments available worldwide. But, as Barrett (2002, p. 2105) writes "[t]he impulse to action is strong but does not guarantee success. Most nations have implemented food assistance programs of some sort, but many of these have proved expensive, ineffective, or both." Despite the enormous sums spent on FAPs over the years, there exists relatively little rigorous evidence comparing among interventions so as to establish what approaches best meet which objectives and, therefore, what should be the highest priority interventions given scarce resources. The combination of new evidence on nutrition and increased flexibility of FAPs creates an opportunity to review recent findings in order to identify pathways to improve the nutritional outcomes of FAPs.

Ill health and malnutrition are strongly correlated with poverty, measured in any of several ways, and especially with persistent poverty and poverty traps. Illness and injury, commonly associated with undernutrition, can lead to chronic poverty (Krishna, 2007). A seminal review paper established clearly that undernutrition (measured at two years of age) is associated with several outcomes indicative of diminished human capital accumulation, including fewer years of schooling, poor cognitive development, shorter adult stature, and reduced economic productivity (Victora et al., 2008). Each of those outcomes is itself strongly associated with lower adult earnings and higher propensity to live in poverty. For example, using longitudinal data from Brazil, Thomas and Strauss (1997) estimate that each one percent increase in height is associated with a 2.4 percent increase in earnings. Bhutta et al. (2008, p. 340) write "damage suffered in early life leads to permanent impairment." These findings and other studies have led to an increased focus on nutrition in the first thousand days of a child's life – from conception to age two – when vulnerability to nutritional insults is greatest and thus so is the opportunity for carefully targeted interventions to have significant impacts.

Undernutrition in the early years may impact future generations as well. Children born to mothers who were themselves undernourished as children are more likely to suffer low birthweight (Victora et al., 2008; Berhman et al., 2009). The fetal origins hypothesis[1] posits that the in utero environment has lasting effects that can remain latent for many years. Adverse shocks experienced in utero, such as maternal undernutrition, illness, or smoking or drinking habits, can result in long-term health effects, disability, and lower educational attainment and adult wages for unborn children (Almond and Currie, 2011).

This intergenerational transmission of undernutrition, wherein the irreversible outcomes of initial nutritional insults launch a vicious cycle of low earnings that reinforces the increased likelihood of malnutrition, closely parallels the economic concept of nutritional poverty traps. A nutritional poverty trap occurs when individuals' physical work capacity declines more rapidly than wages once earnings (and the nutrients they can buy) fall below a critical level. Thus, in equilibrium there will be some critical asset holding such that those with at least that level obtain employment and thereby reach and maintain a non-poor standard of living, while those below that critical level will remain mired in poverty and malnutrition (Dasgupta and Ray, 1986, 1987; Dasgupta, 1993, 1997).

Given the strong, bidirectionally causal relationship between poverty and malnutrition, FAPs are commonly viewed as an important element of holistic poverty reduction strategies. Food assistance policies and programs can fill in the gaps left by the private (for-profit) food system and informal (not-for-profit) social safety nets so as to ensure the food security of vulnerable individuals, households and communities. A growing literature underscores the importance of social protection measures for economic growth and poverty reduction (Carter and Barrett, 2006, 2007; Alderman et al., 2006; Barrett et al., 2011). The social protection provided by food assistance and other social protection programs reduces individuals' and households' catastrophic risk exposure and encourages savings, investment and adoption of improved technologies, all of which contribute to increased incomes and enhanced food availability and access. Of course, increasing income is not enough to guarantee nutritional improvements. Household preferences, intrahousehold dynamics, and reliability of that income mediate the nutrition-poverty link. FAPs, education and improved access to health, water and sanitation therefore complement poverty reduction strategies that focus on income generation.

[1] This is also known as the Barker hypothesis for Barker's work linking undernutrition of pregnant women with the later health of their adult children. See, for example, Barker (1992).

As the bodies of evidence linking early malnutrition and later-life poverty have grown, FAPs have also undergone a series of changes. First, food assistance has rapidly shifted toward more market-oriented, cash-based assistance in the past several decades. This is apparent in national programs worldwide, but is easiest to document in international FAPs. Since 1996, and especially since the successful large-scale use of non-food transfers following the 2004 Indian Ocean tsunami, the European Community, Canada and all major food aid donors other than the United States (US) have steadily untied food aid donations, providing cash for cash or voucher transfers, or for local and regional procurement (LRP) of rations in developing countries.

Second, this shift away from tied, in-kind food aid toward greater flexibility parallels a growing use of food assistance to respond to emergencies. In 2008-9, 75 percent of global food aid was used in emergency response whereas in the 1980s, food aid for emergencies was less than 20 percent (Barrett et al., 2012). Importantly, the volume of total food aid deliveries has fallen during this time (Figure 1). From a high of 15 million metric tons delivered in 1999, the volume of food aid delivered fell to only 5.4 million metric tons in 2009. Barrett et al. (2012, p.3) argue that some of this focus on food aid for emergencies reflects findings from research and practice that "in-kind food transfers are rarely the best tool for addressing chronic poverty and food insecurity, but commodities can be essential in humanitarian response."

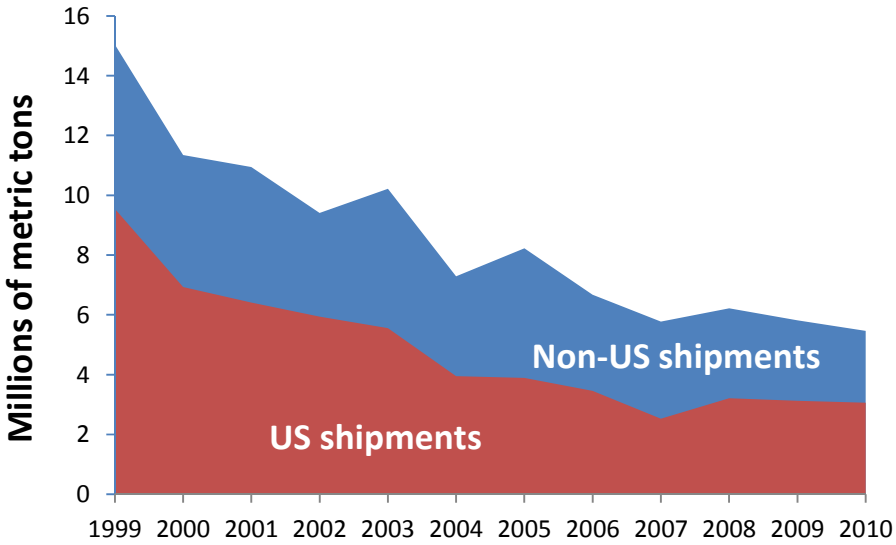

Figure 1: Global food aid deliveries, 1999-2010 (data source: WFP, *Food Aid Flows* reports)

Third, there is now a greater emphasis on targeting and away from generalized feeding programs and untargeted food deliveries (e.g., monetized and program food aid, meaning food aid sold by recipient NGOs or sold or distributed by recipient governments, respectively). This increased emphasis on targeting is partially in response to declining food aid volumes and partially in response to research from the late 1990s and early 2000s demonstrating that many FAPs failed to reach a sizable portion of the population who needed the transfers most (Coady et al., 2004).

Fourth, donors, local governments, practitioners, and recipient communities increasingly recognize - and emphasize - food quality to address nutritional concerns and improve utilization in FAPs. The movement away from delivering dietary energy toward commodity baskets offering a better balance of minerals and vitamins (i.e., micronutrients) in addition to calories, fat and protein (i.e., macronutrients) reflects the development and refinement of processed, micronutrient-fortified commodities, such as corn-soy blend (CSB) and more advanced products, CSB+ and CSB++. FAPs are also experimenting with delivery of fortified, nutrient dense foods such as ready to use supplementary foods (RUSF) (e.g., Plumpy'Doz and Plumpy Sup) and lipid based nutritional supplements (LNS). Nonetheless, there remains considerable scope to better deploy higher quality food aid to achieve better nutritional outcomes (Webb et al., 2011; United States Government Accountability Office (USGAO), 2011).

The remainder of paper is organized as follows. First, we define key nutritional concepts. Second, we typologize food assistance policy and program recipients into four classes. We then use this typology to evaluate available evidence on the nutritional impacts and costliness of various food assistance approaches. Third, we examine factors contributing to – or hindering - the ability of FAPs to meet their objectives. Finally, from our review of the economics and nutritional impacts of food assistance policies and programs, we extract key lessons useful to national and international policymakers, finding that the targeting and timing of deliveries, food quality, and complementary activities all impact the ability of a FAP to improve nutritional outcomes.

One challenge we face in assessing the evidence on impacts is that nutritional goals often vary across FAPs and as a result, direct comparisons among FAP approaches to achieving a single specific nutritional goal are rare. Further, the type of nutritional objective can influence costs, limiting cost comparability. For example, reducing (moderate or severe) acute malnutrition may be more expensive than addressing specific micronutrient deficiencies or protein-calorie malnutrition. Other factors also influence the effectiveness of different FAPs, including targeting, additionality, timeliness, seasonality, incentive effects, and social acceptability considerations. Thus, without clear counterfactuals and solid

methods for controlling for non-random placement and selection effects, assessing FAP performance rigorously is difficult.

Given this difficulty, we supplement the direct research on FAPs with key findings from controlled nutritional efficacy studies, which are especially informative with regard to the differential effects of food quality on achieving nutritional objectives. However, because these studies are often undertaken in carefully controlled environments, it should not be assumed that the same success will be achieved if the same approach is incorporated into a FAP. This caveat, however, is true for all FAPs as well. What works well in one context does not necessarily smoothly translate to another program (Upton and Lentz, 2012). Thus, we discuss broad findings that seem salient for moving FAPs closer toward meeting nutritional and cost objectives while highlighting specific program attributes that could contribute the positive impacts. Where possible, we report disability adjusted life years (DALYs) as the key outcome variable of interest, which allows for some comparability across findings.

2. Key concepts

The objective of food assistance policies and programs is to reduce hunger, undernutrition and/or food insecurity. It is important, therefore, to understand the key distinctions among those (and related) concepts.[2] Hunger reflects the physical discomfort caused by a lack of food (National Research Council, 2005). Undernourishment occurs when people regularly consume less food than their minimum caloric (energy) requirements. Undernutrition more generally refers to insufficient dietary energy and protein intake although it can also include deficiencies in vitamins and minerals, or micronutrients (United Nations Food and Agriculture Organization (FAO), 2012; UNICEF, 2012). Undernutrition is the result of prolonged insufficient food intake or absorption. Undernutrition is generally identified when anthropometric measures, such as underweight (weight-for-age) z-scores, wasting (weight-for-height) z-scores, stunting (height-for-age) z-scores or mid upper-arm circumference are at least two standard deviations below global reference values. 'Severe' undernutrition is commonly identified by measures three or more standard deviations below global reference values. Biomarkers or functional outcomes may be used to capture micronutrient undernutrition. Malnutrition refers to undernutrition, obesity and micronutrient deficiencies, thereby reflecting the full "triple burden" of nutritional problems. Nutritional status is influenced not only by adequate intake of appropriate foods but also by water and sanitation health, disease, and caring practices.

[2] We thank an anonymous reviewer for valuable contributions to this section. What follows in the next few paragraphs draws heavily on Barrett (2010) and Barrett and Lentz (2010).

Food insecurity is intrinsically unobservable and is typically defined as the complement to food security. Food security is commonly conceptualized as resting on three pillars: availability, access, and utilization. Some agencies, such as FAO, include stability as a fourth dimension of food security. The pillars of food security are nested, that is, food must be available for individuals to access it, and without access to food, individuals cannot utilize food or rely on food as a stable resource (Webb et al., 2006; Barrett, 2010). The causes of food insecurity are many and can result in availability, access, or utilization failures (Barrett, 2002).

The most common cause of food insecurity is chronic or regular[3] poverty, not catastrophic events, such as earthquakes, floods or war that disrupt food production and distribution at scale, although these events can result in episodes of severe food insecurity (Barrett, 2010). Further, many individuals experience transitory or regular food insecurity (Krishna, 2004; Wilde and Nord, 2005; Devereux et al., 2008).

3. Food assistance policy instruments

Through publicly financed direct transfers intended to increase food consumption, FAPs are best understood as trying to address one or more of the food security pillars. But FAPs rarely attempt to address the underlying structural causes of food insecurity, focusing instead on proximate causes associated with food intake. Most FAPs address access (e.g., through the provision of transfers or food subsidies) and stability failures, but some incorporate utilization interventions such as health care, nutrition education or other complementary inputs to the production of good nutrition and health. Availability interventions through broad-based food aid deliveries are on the decline, although fortification remains an important availability intervention (Barrett et al., 2011). In the remainder of this article, we restrict attention to food assistance policies and focus on the nutrition outcomes and cost evidence from FAPs that are "nutrition-sensitive" (Nabarro, 2010). Nutrition-sensitive FAPs include programs such as school feeding, which may not have a specific or primarily nutritional objective but which may nonetheless improve nutritional outcomes.

Other important interventions we exclude in our review of FAPS are social protection (SP) programs, therapeutic feeding programs, and private initiatives. SP programs are broader than FAPs, often trying to ensure an adequate standard of living more generally, not just in nutritional or food

[3] Regular poverty includes both periodic (e.g., seasonal) episodes due to seasonality in incomes and prices as well as aperiodic spells associated with temporary unemployment, episodes of ill health, or other recurring adverse events specific to individuals or households.

security terms. Although most SPs' primary objective is to reduce poverty and vulnerability, they often result in related improvements to food security, health, and educational attainment. In contrast to the broad mandates of SP programs, therapeutic feeding programs tightly focus on alleviating moderate to severe acute malnutrition (i.e., wasting and edema) through delivery of therapeutic foods (e.g., ready to use therapeutic foods – RUTFs – such as PlumpyNut) at community-based therapeutic centers and in-patient feeding centers. Therapeutic foods and approaches necessary to treat acute malnutrition are medical interventions, and thus fall outside of FAPs, which do not include medicines. However, as noted above, RUSFs and LNS products are increasingly being used in FAPs for prevention of malnutrition. Finally, private initiatives, such as in-kind payments for informal labor, transfers through charitable organizations, and private, interpersonal gifts undoubtedly play important roles especially for individuals and households who need but do not receive formal, public food assistance (Bhattamishra and Barrett, 2010).

Availability interventions

The primary availability interventions are deliveries of commodities or nutrients to communities with demonstrable shortfalls. Addressing broad availability shortfalls once was important, as many countries could not produce nor commercially import sufficient food to meet their population's needs. But the role of availability-oriented FAPs has shrunk, especially for delivery of macronutrients (energy, fat, protein) now increasingly readily available through commercial food markets.

Despite the reduced need for or use of broad-scale food delivery programs to augment nutrient availability, FAPs aimed at improving the availability of specific micronutrients have expanded. Most such programs operate through commercial markets. Mineral and vitamin fortification programs, including regulations on or incentives to food processing (e.g., mandatory iodization of salt, vitamin A fortification of sugar, iron fortified flours) are relatively cost effective interventions. Firms can typically pass some (or all) of the fortification costs on to consumers and achieve low per unit cost by fortifying products at scale. Fortifying products often purchased on the market rather than distributing products through parallel non-commercial channels that compete with locally produced products can increase the reach of the fortified goods. The provision of mineral and vitamin supplements also aims to address a lack of availability of particular micronutrients, although the distribution of supplements is commonly both more expensive and less effective than fortification due to limited consumer uptake.

Horton et al. (2010), using the 2008 *Lancet* series on Maternal and Child Undernutrition as a starting point to identify which micronutrients ought to be used in fortification processes, cost out universal coverage of salt iodization and universal iron fortification of staple foods for the 36 countries with the highest burden of undernutrition for the Scaling Up Nutrition (SUN) framework. They estimate that iron fortification of staple foods will cost approximately $0.20 per year per person while salt iodization will cost approximately $0.05 per year per person. The estimated annual financing needs to cover the target population in the 36 priority countries are about $600 million for iron fortification and $80 million for salt iodization, although one-time investments in production technologies totaling $500 million would also be required. Under their costing estimates, 1.2 billion more people would have access to iodized salt and 2.8 billion more people would have access to iron fortified foods. Horton et al. (2008) also cost out vitamin A supplementation for children between 6 and 59 months. They estimate a cost of $1.20 per child per year, or an additional annual cost of about $130 million. Horton et al. (2008) also note that early evidence has linked zinc with better growth and lower mortality and morbidity rates. Although measuring zinc status is difficult and thus the amount of and frequency with which individuals need zinc is not well understood, zinc can nonetheless be valuable in treating diarrhea. They report the cost of zinc supplementation is $0.47 per course of treatment.

Meenakshi et al. (2010) summarize cost estimates for iron and vitamin A fortification and supplementation. The authors write, "vitamin A fortification and supplementation cost between $20 and $55 per [disability adjusted life year] DALY averted in Asia and Africa, assuming a 50% coverage rate. Iron interventions cost $40–70 per DALY averted in Asia; costs in Latin America are much higher. Costs for higher coverage rates (such as 80% or 95%) are typically higher" (pp. 71-72). Furthermore, these costs vary depending on whether fortification or supplementation is pursued.

As availability-oriented FAPs have concentrated increasingly on augmenting the supply of specific micronutrients, their role in food assistance policy has shrunk markedly and they have become increasingly the domain of nutrition-sector interventions, public health services and commercial food production and distribution. The evidence available, however, clearly points to high payoffs from micronutrient fortification. For example, the 2008 Copenhagen Consensus Expert Panel ranked micronutrient fortification among the top three international development priorities, emphasizing in particular fortification with iron and iodine, on the basis of benefit-cost analysis (Horton et al., 2008).

Utilization interventions

Utilization interventions include several different approaches, including nutritional education programs, water and sanitary health interventions, and health interventions. Few could be properly classified as FAPs in the sense that they do not deliver transfers for direct consumption. Combining utilization interventions, such as education, access to clean drinking water or healthcare, with food distribution often improves the effectiveness of direct-transfer FAPs, however, underscoring the complementarity of food and water, sanitation, and health interventions (Dewey and Adu-Afarwuah, 2008; Horton et al., 2010; Webb et al., 2011).

Yet, the precise roles for education and behavior change in addressing undernutrition and food insecurity, particularly among non-poor households, remain debated. Evidence indicates that poverty, while a primary factor of undernutrition and food insecurity, is not the only cause, suggesting a valuable role for utilization interventions. For example, Horton et al. (2010) report findings by Gwatkin et al. (2003) that over 25 percent of Indian children living in households with the highest quintile of income had weight-for-age lower than two standard deviations below the mean.

One well-known program focusing exclusively on improving utilization of food is the Honduran Integrated Attention to Childhood in the Community (AIN-C) program (Horton et al., 2010). Under the program, families with children under age two receive information about childcare practices but do not receive food assistance transfers. Compared to families not participating in AIN-C, exclusive breastfeeding rates, iron and vitamin A supplementation rates, and immunization rates were all higher for AIN-C participants (Schaetzel et al., 2008). Further, AIN-C participants, especially those from poorer households, had higher weight-for-height Z-scores. Adding up costs associated with specific activities (i.e., an ingredients-based costing approach), Fiedler et al. (2008) find that the cost per child per year of an AIN-C monitoring and counseling program was $6.43 in 2005 dollars.

The success of AIN-C demonstrates that utilization-only interventions can be valuable for improving nutrition. However, not all populations seem to benefit from utilization-only interventions. A review of 42 studies on complementary feeding interventions for children ages 6 through 23 months old found little impact of education-only programs for programs in South Asia. The authors hypothesize that in areas with a high degree of food insecurity such as South Asia and sub-Saharan Africa, complementary food delivery may be a valuable addition to education-based interventions (Dewey and Adu-Afarwuah, 2008).

Access and stability interventions

In keeping with the entitlements-based understanding of hunger and food insecurity advanced by Sen (1981), most FAPs over the past generation emphasize improving and stabilizing individual or household-level access to food. The range of such interventions is large and evidence is mixed, so we categorize them into four broad classes grouped by who is targeted and ranked by their economic efficiency and nutritional impacts.

Class I interventions are FAPs that select and deliver supplemental foods to pregnant women and children under the age of two. A large body of evidence indicates that nutritional deficiencies in the first thousand days (from conception to age two) can lead to irreversible losses in human capital (Bhutta et al., 2008; Horton et al., 2008; Bezanson and Isenman, 2010; Horton et al., 2010). The 6 through 23 month age window is the peak incidence of faltering growth as children transition toward a diet that does not include breastmilk or formula (Dewey and Abu-Afarwuah, 2008). As a result, Class I interventions typically have the largest impacts, as measured in any of several ways, and are therefore increasingly the focus of food assistance policies. Class II interventions are school feeding programs, which reach school-aged children and which often seek to improve school enrollment with the secondary objectives of improving nutritional and cognitive status. Class III interventions are FAPs that reach the adult population and their families due to either emergency or nonemergency food insecurity. Class IV FAPs reach adults and others who need specific nutritional interventions.

Class I: Prenatal and early childhood interventions

The first one thousand days are critical for lifetime nutritional status, health, cognitive abilities, earnings and other outcomes (Shrimpton et al., 2001; Bhutta et al., 2008; Bezanson and Isenman, 2010). Maternal, prenatal, and early childhood FAPs tend to have specific nutritional objectives rather than addressing broad-based food insecurity. These Class I FAPs are widely regarded as the most impactful and cost-effective food-based interventions available to governments, donors and social services agencies. There are several approaches to addressing specific micronutrient needs of children under 24 months and their mothers including the distribution of targeted vouchers, micronutrient supplements, and targeted supplementary foods (RUSF and LNS). Yet, some of the evidence from nutrition efficacy studies have not yet been translated into practice. Traditionally, FAPs have targeted children under age five, although many are now tightening their focus to pregnant and lactating women and their children up to 24 months old. A study comparing preventative and recuperative programs in Haiti found that blanket targeting of children aged 6-23 months was more effective at reducing malnutrition than a recuperative model that targeted underweight children under five years old (Ruel et al., 2008). This

finding highlights the importance of early preventative interventions for young children (Ruel et al., 2008). [4]

Nutritional impacts

One of the best-studied prenatal and early childhood food assistance interventions is the US Supplemental Nutrition Program for Women Infants and Children (WIC), established in 1972 to improve the health status of women, infants and children. WIC vouchers are limited to a list of foods with specific nutrients (protein, calcium, iron, vitamins A, B-6, C and D and folate). A review examining evidence across several different evaluation methods reports that participation in WIC increases birthweight (Abrams, 1993). Given that low birthweight infants are 40 times more likely to die than normal birthweight (greater than 2500 grams) infants, increasing birthweight is seen as an important pathway to reducing infant mortality. WIC participation has also been associated with other positive nutritional impacts, including improved diets, greater use of health care services, and improved child growth (Devaney, 2007).

Just as part of the effectiveness of WIC comes through its coupling of food assistance with child growth monitoring and health consultations, for children aged 6 through 23 months, a combination of complementary foods (i.e., foods for children that complement breastmilk or milk substitutes during the first two years, also known as weaning foods) and education may be more successful when paired together, although those who are relatively better-off may not need the access intervention of complementary foods as much as the utilization intervention of education. Dewey and Adu-Afarwuah (2008), in a review of evaluations of complementary feeding interventions, find that participants in Indian and Bangladeshi projects that include both distribution of complementary foods and nutrition education achieve better growth outcomes than participants in an education-only project. Horton et al. (2010), reviewing complementary feeding interventions, argue that to treat and prevent moderate malnutrition in children ages 6 through 23 months counseling and education on behavior change for caregivers is generally needed, although behavior change programs alone will be less successful in situations where food access or availability is limited.[5] Webb et al. (2011) argue for providing guidance

[4] We thank an anonymous reviewer for raising this important point.

[5] "Complementary" feeding interventions are considered more suitable for treating and preventing moderate malnutrition while "therapeutic" feeding interventions are suitable for treating severe malnutrition and are generally considered medical interventions (Horton et al., 2010).

and education (e.g., through test-kitchens) for recipients on how to prepare distributed foods to meet specific nutritional goals.

Further, distributing appropriate types of complementary foods is important. Webb et al. (2011) make a series of recommendations to improve food aid quality especially for pregnant and lactating women, children 6 through 23 months of age, wasted children, and others. They recommend that fortified blended foods, such as CSB, have upgraded macronutrient contents (i.e., include a dairy source of protein), and be upgraded to improve micronutrient content, that blended cereals and milled grains have upgraded fortificant mixes of vitamins and minerals, and that lipid-based products, such as vegetable oil, have improved micronutrient content.

Lung'aho and Oman (2009), members of the Dadaab, Kenya refugee camps interagency collaboration team on infant and young child feeding, support providing children 6 through 23 months old with complementary foods, as the general rations in refugee camps do not provide the complementary foods, especially animal proteins, important for the health of this age group. A fresh food voucher project implemented by Action Against Hunger in the Dadaab camps demonstrated that nutrition of children under five and their caregivers improved through access to a more diverse diet (Trenouth et al., 2009). Vouchers were redeemed for items complementary to the dry rations, including eggs, milk, fresh vegetables and fruits available from vendors within the camps. Because mothers brought their children to nutrition program offices to collect the vouchers, nutrition program coverage rates increased and less time was spent on case management (Dunn, 2009).

In some instances, an alternative to high quality foods may be micronutrient powders (e.g., sprinkles). In its 2012 nutrition policy, the United Nations World Food Programme (WFP) advocates for the distribution of micronutrient powders, which can be sprinkled onto or mixed into foods, for children 6 through 23 months suffering micronutrient deficiencies. WFP (2012, p.15) differentiates micronutrient powder distribution from "[complementary] medical approaches such as high-dose vitamin A capsules or iron/folic acid tablets" because micronutrient powders distribute a blend of micronutrients while medical approaches often address single or few micronutrient deficiencies. De-Regil et al. (2011) review results from eight trials from developing countries on the effects of multiple micronutrient powders on anemia, iron deficiency, and growth of children under two relative to no intervention and to iron supplementation. The authors find that home use of multiple micronutrient powders containing at least iron, vitamin A, and zinc reduced anemia and iron deficiency among children aged 6 through 23 months, although growth was not affected.

Yet, micronutrient rich foods food may be preferred to the use of multiple micronutrient powders. Neumann et al. (2003) argue that compared to pharmaceutical approaches, such as micronutrient powders, micronutrient rich foods offer more protection because food is more locally available, because protein-energy malnutrition often coexists with micronutrient deficiencies and because food includes multiple micronutrients and thus may be more able to address deficiencies than single micronutrients or combinations of micronutrients. Meenakshi et al. (2010, p. 65) argue, "ensuring access to a diversified diet is the most sustainable solution for micronutrient deficiency, [but] it is not an immediately achievable solution in many developing countries as poor people lack the purchasing power to afford a diversified diet." Biofortification, an emergent food-based approach that is more an agricultural intervention than a FAP, has the potential to address common micronutrient deficiencies (Meenakshi et al., 2010). Miller and Welch (this issue) discuss biofortification in some detail.

While the age range used is longer than the first thousand days, one longer-term study finds important relationships among FAP receipt, nutrition and income for those who were young children during the intervention. Men in Guatemala who, when they were between zero and three years old received a supplementary food rich in micronutrients, earned statistically significantly higher hourly wages (46 percent higher) compared to men who received a less nutritious supplementary food (Hoddinott et al., 2008).

Cost

Abrams (1993) reports that WIC saves more than it costs, citing, among others, a US Government Accountability Office study that found for each WIC dollar, $2.89 was saved in Medicaid costs in an infant's first year and a total of $3.50 saved in Medicaid costs from birth to 18 years. Bitler et al. (2005) find that while WIC reaches food insecure households, about one-third of households receiving food stamps are eligible for WIC but do not receive it (Bitler et al., 2005). The much smaller size of WIC transfers (about $30/month/ household in 1996 dollars) relative to Food Stamp transfers ($276/month/household) may explain why some food stamp households did not apply for WIC even though they were eligible.

Complementary foods include macronutrients in addition to micronutrients and thus are valuable for treating not just micronutrient deficiencies but also undernutrition. Making a series of assumptions about coverage rates, duration of treatment, appropriate energy requirements, etc. for the SUN framework, Horton et al. (2010) estimate that the cost of complementary feeding to prevent and

treat moderate malnutrition for children under two to be $40 to $80 per child per year in 13 priority countries. Treatment of severe malnutrition is estimated to cost much more per child, at $200 per episode. This striking cost differential is one reason why Horton et al. (2010) advocate for prevention. Micronutrient powders tend to be less expensive but do not address protein-energy undernutrition. Horton et al. (2010) estimate the distribution of micronutrient powders cost about $3.60 per child for a 60-day course of micronutrients. The authors suggest that targeted children should receive three courses of micronutrient powder between the ages of 6 and 23 months, for a cost of less than $11 per child (Horton et al., 2010).

Class II: School feeding programs

A scientific consensus has clearly emerged that the first thousand days from conception represent the best opportunity to favorably affect child growth and health and thereby adult health and well-being.[6] Yet, relative to prenatal and early childhood interventions, school feeding is quite generously funded worldwide although the evidence of nutritional impacts remains quite limited. Much of the favorable evidence of school feeding impacts is on educational enrollment rates, participation and cognitive impacts rather than on child nutrition (Afridi, 2011; Alderman and Bundy, 2012). Inasmuch as school feeding provides additional, needed micronutrients, it could be a valuable support to adolescent growth and health and an important complement to early childhood nutritional interventions. This is not, however, how school feeding programs have typically been designed or motivated. Nonetheless, there is, strong political appeal of school feeding and reaching children in school is often logistically easier than reaching younger children. Hence the enduring appeal of school feeding programs and their relatively more generous funding, as compared to Class I interventions to benefit pre-school age children and infants and their mothers.

Nutritional impacts

WFP (2012, p.16) recognizes that in school feeding programs, nutrition is not an "immediate or primary objective but [such programs] represent an opportunity for improving nutrition outcomes." Much of the interest in school feeding FAPs has focused on whether take home rations or in-school

[6] A recent study on adult height attained by Nigerian children who lived through the Biafrian civil war found that adult height was more adversely affected for children who were adolescents during the war compared to children at younger ages, as older children were less able to catch-up following the war (Akresh et al., 2012). This study is, however, an outlier inconsistent with studies arguing that the most critical window for nutrition is the first thousand days (see Bhutta et al., 2008; Victora et al., 2008; Almond and Currie, 2011).

feeding are more effective at increasing school attendance or at improving nutritional outcomes. The evidence on the effectiveness of the two types of school feeding is mixed (Margolies and Hoddinott, 2012). However, school feeding programs seem to have the greatest impact where school attendance rates are low and undernourishment is common although longer term nutritional outcomes are less clear (Margolies and Hoddinott, 2012). A review of several studies of school feeding's impacts on food consumption and nutritional status notes that multiple studies have found significant impacts on school children participants; indeed, spillover nutritional impacts on recipients' siblings not yet of school age have been found in both Burkina Faso and Uganda (Alderman and Bundy, 2012).

The effectiveness of delivery of higher quality foods in a programmatic school feeding setting is limited, although distribution of iron fortified products has been linked to lower anemia levels in girls (Adelman et al. 2008). Evaluations from school feeding efficacy studies confirm that the type of food provided impacts nutritional outcomes. Higher quality foods, such as animal products, fruits and vegetables or micronutrient powders can better address these deficiencies than staple grains (Murphy et al., 2003; Neumann et al., 2003). Incorporating biofortified orange-fleshed sweet potato, which is high in beta-carotene, in a South African school feeding program has been shown to improve vitamin A levels (van Jaarsveld et al., 2005). In a controlled school feeding study in Kenya, primary schools received one of four supplementary mid-morning snacks, which differed by whether the snacks included meat, milk, vegetable oil, or nothing additional to the snack itself (Neumann et al., 2003). The children receiving the milk and meat supplements had higher intakes of several nutrients, include vitamin A, calcium, and vitamin B-12 (Murphy et al., 2003). Furthermore, the meat-supplement group had higher levels of iron and zinc, and also experienced higher dietary total energy. Nonetheless, supplemental feeding at school can lead to declines of consumption at home potentially resulting in an increase in dietary quality but not in dietary quantity (Murphy et al., 2003).

Findings of the importance of food quality in the US concur with findings from South Africa and Kenya. A review of the US National School Lunch Program (NSLP) and the School Breakfast Program (SBP), find that much of the impact studies of US school breakfast and school lunch programs focus on overnutrition measured as obesity rather than on other health or nutrition impacts, such as alleviating micronutrient deficiencies (Meyerhoefer and Yang, 2011). NSLP has been associated with increases in obesity while SBP participation is not associated with increases in obesity. This conflicting finding may be due to different nutritional profiles of foods served at breakfast and lunch; NSLP participants receive

high quantities of food while SPB participants receive nutrient-rich foods that are not higher in calories compared to non-participation (Meyerhoefer and Yang, 2011).

School lunches may be important vehicles for addressing micronutrient deficiencies. Fortifying rice in school lunches in India led to statistically significant declines in iron deficiency anemia from 30 percent to 15 percent for the treatment group while anemia remained essentially unchanged for the control (Moretti et al., 2006). School feeding that delivers iron to anemic populations can be especially valuable for girls and you woman as they enter reproductive periods of their lives (Case and Paxson, 2008). While not a school feeding FAP, a study examining outcomes for Guatemalan women who as girls between the ages of 0-12 years received either a nutritious supplementary food or received a less nutritious food found those receiving the more nutritious supplementary food had offspring with higher birthweights, were taller, and achieved better height-for-age and weight-for-age scores compared to the offspring of women who received a less nutritious supplementary food. (Berhman et al., 2009).

Cost

A review of the school feeding literature finds few cost effectiveness studies on school feeding programs (Margolies and Hoddinott, 2012). Coady and Parker (2004) estimate the relative cost effectiveness of promoting school enrollment through conditional cash transfers in Mexico compared to building more schools. They find that demand-side subsidies, such as Progresa, are much more cost effective means to increasing enrollment than supply side interventions. Under Progresa, which started in 1997 as a government-run conditional cash transfer program, mothers receive cash payments based on the school attendance of their children, visits to health clinics and receipt of nutritional supplements for some eligible children. Improved education is just one objective of Progresa (the other two are improved nutrition and health) and therefore, by Coady and Parker's (2004) estimates, any nutritional benefits are surplus (and cost neutral). Peterson and Le Grand (2011) find that in-kind food funding of the US NSLP is much less efficient than cash funding due, in part, to complex funding processes in the in-kind program. For each one dollar increase in available in-kind funding received, Minnesota school districts obtained $0.60 in food value. Alderman and Bundy (2012, p. 205) conclude that "the strongest direct consequence of school feeding is best viewed as a form of an income transfer to assist low income households", not as a food or nutritional intervention per se.

Class III: FAPs to address food insecurity by providing safety nets

The class of FAPs that seek to reduce food insecurity for adults (and their children) by providing a safety net is large.[7] In Class III FAPs, the target population is those who need assistance in order to exit poverty or to avoid becoming (further) impoverished. There are numerous types of FAPs that either deliver food directly to recipients or that improve recipients' ability to access food, such as through voucher programs or cash transfers. The FAPs considered in this class differ by the reliability and duration of the transfer, whether transfers are conditional, the form of transfer, and by objective. The sheer variety of FAPs makes comparisons among them exceedingly difficult. It is also challenging to identify which factor or factors result in differences in nutritional or cost effectiveness outcomes in FAPs.

Nutritional impacts

Nutritional impacts of FAPs vary by form of transfer. In general, the percentage of the transfer consumed as food is highest with food transfers, and lowest when FAPs come as cash transfers, with vouchers in the middle (del Ninno and Dorosh, 2003; Ahmed et al., 2010). The vast majority of studies report that the bulk of all food assistance transfers are consumed as food. However, not all distributed food assistance is consumed as food. Researchers have found that households or individuals may sell food aid, not because they do not need the food, but because the need for other household items (e.g., soap or matches) is more pressing (Reed and Habicht, 1998). Estimates from Burkina Faso, Malawi, and Zambia of the total amount of food assistance transfers consumed as food vary between 60 and 90 percent (Devereux et al., 2006; Harvey and Marongwe, 2006; Harvey and Savage, 2006; Catholic Relief Services - Burkina Faso, 2010).

Increasing caloric consumption may not be the most effective means of improving nutrition, especially when micronutrient deficiencies cannot be addressed with certain foods. Cash transfers tend to result in more diverse diets, allowing households to incorporate nutritionally rich foods, such as animal-sourced foods and fruit and vegetables into their diets. As discussed above, animal-sourced foods have been found in efficacy studies to not only improve nutritional outcomes but also to improve cognitive development (Neumann et al., 2003). Compared to in-kind food distributions, vouchers have also been linked to increased dietary diversity (Meyer, 2007). In-kind food and commodity-denominated vouchers allow for agencies to target for specific nutrition interventions, such as distribution of vitamin-fortified vegetable oil or micronutrient powders. Studies comparing how households use US food stamp

[7] The section on Class III FAPs draws on Upton and Lentz (2012).

vouchers and cash distributions of similar value have found that vouchers, which are redeemable only for food, result in two to ten times more nutrient availability for households compared to cash (see Barrett, 2002 for a review). Barrett (2002) points out that one would expect that for poor households in poor countries, who spend proportionally much more of their income on food than U.S. residents, the ratios are likely lower.

The vast majority of available studies examine the short-term effects of nutritional and consumption-based interventions on nutrition outcomes. Several studies of FAPs report that households receiving cash transfers consumed foods with higher kilocaloric values compared to those receiving in-kind assistance (del Ninno and Dorosh, 2003; Adams and Winahyu, 2006; Sharma, 2006). FAPs have been documented to lead to increased child weight-for-height in Ethiopia and height-for-age in Ethiopia and Malawi (Quisumbing, 2003; Yamano et al., 2005; Sharma, 2005 as cited by Gentilini, 2007). In one of the few studies of the short-term impacts of food aid on adult nutrition, Broussard (2012) finds that men in households receiving free distributions of food aid in rural Ethiopia have higher body mass indices (BMIs). However, adult women in low asset households receiving free distributions of food aid did not have higher BMIs, possibly reflecting lower bargaining power. Reviewing the outcomes of the US program, Supplemental Nutrition Assistance Program (SNAP), on health, Meyerhoefer and Yang (2011) report that SNAP recipients consistently spend more on food than do non-participants with equivalent post-transfer incomes but whether SNAP participation impacts nutrient intake remains inconclusive. SNAP participation is positively associated with obesity for women, although not for men and evidence is mixed for children (Meyerhoefer and Yang, 2011; See also Landers, 2007).

Cost

Available evidence indicates that cash tends to be less expensive than vouchers, which are less expensive than in-kind transfers (Gentilini, 2007; Meyer, 2007; Upton and Lentz, 2012). Unfortunately, this generalization is based on few side-by-side comparisons. In one study of different government transfer programs in Bangladesh, Ahmed et al. (2009) found that the cost of delivering food was 20 percent of the value of the food while the cost of delivering the same value in cash was less than two percent. In Ethiopia, cash transfers were found to be 39 to 46 percent less costly than equivalent transoceanic shipments and were 6 to 7 percent less costly than local procurement (Adams and Kebede, 2005). However, inflation can undercut cost savings in cash programs (Harvey and Marongwe, 2006). Vouchers generally have slightly higher administrative costs than cash, but may have lower monitoring and evaluation costs because it is possible to interview vendors about voucher use rather than

interviewing many households receiving cash (Meyer, 2007; Lor-Mehdiabadi and Adams, 2008). Nonetheless, two important caveats are that administration costs and delivery costs are highly variable, especially for cash and vouchers (Harvey, 2005; Gentilini, 2007) and that the above cost findings by transfer type should not be considered universally true because in certain contexts certain transfers may be more or less appropriate (Barrett et al., 2009).

The cost efficiency of transoceanic deliveries of in-kind transfers compared to locally and regionally procured in-kind transfers appears to differ based on the commodity type and the local context. Disaggregating food aid by commodity type (grains, pulses, and higher value products), Lentz et al. (forthcoming) find that grains and most pulses tend to be substantially cheaper to procure locally than grains and pulses delivered as US food aid. The cost differential likely reflects that bulkier products cost more to ship relative to underlying commodity value, especially from the US, where US Cargo Preference law requires the use of the generally more expensive US-flagged shippers (Bageant et al., 2010). However, for higher value products, such as vegetable oil and CSB, shipping from the U.S. can be more cost efficient, although this varies (Lentz et al., forthcoming). In countries with relatively well-developed production facilities, such as Kenya, procuring vegetable oil and CSB locally can be more cost efficient than US food aid shipments.

Finally, improving the quality of in-kind food aid comes with additional costs, although the costs are likely outweighed by the expected nutritional gains. Webb et al. (2011) estimate the cost of improving the quality of food aid rations for a mixture of nine emergency and development food aid projects at 6.6 percent of current costs, on average. The specific improvements to food aid quality included fortification and milling of grains rather than delivery of whole grains, improvements to CSB and wheat soy blend, and delivery of appropriate levels of vegetable oil (to be blended with fortified blended foods). However, where programs delivered CSB as payment or incentives, the authors replaced CSB with a lower cost fortified product, which contributed to the relatively low cost increase (Webb et al., 2011).

Class IV: Adults with special nutritional needs

Carter and Barrett (2006) differentiate between intrinsically poor individuals and unnecessarily poor individuals. The latter category includes individuals and households who need safety nets or SP programs to assist them to escape poverty or to recover from a shock (we designate this category as Class III). Intrinsically poor individuals, in contrast, need external support in order to meet their basic

needs and are unlikely to gain economic independence. Elderly individuals, households with HIV positive members, disabled individuals and others facing chronic illnesses are less likely to be able to work for income and therefore are at higher risk of being intrinsically poor. The ability of intrinsically poor individuals to rely on FAPs and to access long-term external assistance has been described as "positive dependency" (Lentz et al., 2005).

Nutritional impacts

Ivers et al. (2009) write "food insecurity … undernutrition … and HIV/AIDS overlap and have additive effects" (p. 1096). Failing to address malnutrition as an HIV infection progresses can lead to worsening malnutrition; HIV disrupts metabolic functioning, compromising an individual's ability to utilize micronutrients. In turn, food improves the absorption and effectiveness of drugs. Therefore undernutrition can undermine antiretroviral therapeutic (ART) treatment for HIV. HIV-positive individuals also have different nutritional needs than the noninfected population (Ivers et al. 2009). Food assistance can provide an important support to the health of HIV-positive individuals and may delay or prevent the progression of HIV. However, there is no consensus yet on what foods can best support the health and nutrition of HIV-infected individuals, although RUTFs are increasingly used in HIV programs (Ivers et al., 2009). Similarly, Webb et al. (2011) note that "advances in programming of nutritional support to ART activities remain limited" (p. 30) and they recommend that the US government should develop guidance on nutritional support for people affected by HIV/AIDS.

Cost

There is little evidence on the costs of FAPs targeting adults with special needs. Most such interventions are motivated on humanitarian grounds, which may help explain the paucity of evidence.

4. Factors contributing to FAP nutrition and cost outcomes

The performance of FAPs depends on a host of factors related to context, the objectives of the FAP and program design (Bryce et al., 2008; Barrett and Lentz, 2010). Often, tradeoffs exist among objectives. For example, a successful approach to decreasing anemia in one context may not succeed in another context. Which intervention is likely most appropriate will depend on the primary objective and the environmental, market, and political context (Barrett, 2010; Upton and Lentz, 2012). Upton and Lentz (2012, p.77) write, "The crucial question is not which tool is always optimal, but which tool or sequence of tools is appropriate to a given set of objectives, context, place, and time." An implication is

that analysts should seek the food assistance intervention that can best meet the primary objective(s) rather than seeking an (elusive) intervention to achieve all objectives equally well. Further, implementing agencies' capabilities and capacities shape outcomes. In this section we review how FAP effectiveness in achieving any of several objectives varies with a range of key factors.

Targeting

Better targeting may be the most cost effective improvement to FAPs for food insecure recipients (Lentz and Barrett, 2007). Rivera et al. (2004), comparing outcomes for children (ages 0-12 months) eligible for the Mexican social protection program, Oportunidades, for two years to children eligible for Oportunidades for one year, find that among children eligible for two years, only those children living in below-median socioeconomic status households grew significantly more (1.1 centimeters) than children eligible for one year. The finding from Oportunidades suggests that for cash constrained households (those with lower socioeconomic status), receiving cash translated into improved nutritional status. Similarly, in a review of conditional cash transfers' impacts on child nutrition, Leroy et al. (2009) find that there is a threshold beyond which additional cash does not result in improved nutrition. These two findings indicate that targeting poorer households with transfers may improve nutritional outcomes of CCTs. The findings also highlight the complementary role that nutrition education can play (Bryce et al., 2008).

Hence the considerable effort most programs undertake to target the needy. There are numerous approaches to targeting households and individuals including means testing, geographic targeting, community-based targeting, demographic targeting, self-targeting, and proxy means testing. A combination of approaches is often most effective. Coady et al. (2004) report that the median program in their review of targeting practices provided roughly 25 percent more resources to poor individuals than would random allocations. Yet, targeting is difficult; both exclusion and inclusion errors are commonplace in all FAPs. However, improved targeting accuracy often results in increased costs (Basu, 1996). Thus, there is a tradeoff between accuracy of targeting and cost of identifying the subpopulation of interest.

Much of the interest in targeting has focused on whether female recipients will use transfers differently from male recipients and thus whether gender should be a targeting criterion. Attanasio et al.'s (2009) findings from Colombia suggest that CCTs targeted to women may crowd in food consumption, particularly if CCTs improve bargaining power of those in charge of food consumption

decisions. Barber and Gertler (2010) argue that a benefit of Oportunidades is that women receiving the transfers felt more entitled to health care services and accessed more care for their children.

Yet, food aid receipt (or receipt of other transfers) alone may not be enough to "empower" women or increase their household bargaining power, particularly among extremely poor households. Findings from Bangladesh indicate that whether a woman is a household head or not appears relevant for determining whether a woman prefers cash or food transfers. Walsh (1998) concludes that women who are household heads may be more able to spend cash on items they need compared to women who are not household heads and may not be able to control how a cash transfer is used. Therefore, while targeting tends to focus on whether to provide transfers to males or females, providing transfers to women does not necessarily guarantee that women will decide how to use them.

Nutrition-sensitive programming may lend itself to specific targeting approaches, for example, cohort targeting to women of child-bearing age. Almond and Currie (2011, p. 168) argue that if the fetal origins hypothesis stands, "one can best help children (throughout their life course) by helping their mothers. That is, we should be focusing on pregnant women or perhaps even women of child-bearing age … That said, the existing evidence is not sufficient to allow us to rank the cost-effectiveness of interventions targeted at women against more traditional interventions targeted at children, adolescents or adults." Nonetheless, targeting specific members of a household does not mean that the assistance is entirely additional for that member or that incentives within the household are aligned with program objectives.

Additionality

One concern about food assistance projects is whether they have adverse effects on local informal support networks by "crowding out" community-based assistance (Dercon and Krishnan, 2003; Bhattamishra and Barrett, 2010). As a result, FAPs may not be fully additional to resources that would otherwise have been available to recipients. However, crowding out may not indicate an erosion of private transfers. Rather, FAPs may protect private transfers by keeping them in reserve for when broader assistance programs are unavailable. Moreover, findings of crowding out appear to be context-dependent. Lentz and Barrett (2005) do not find any significant effect of food aid on remittances received in northern Kenya and southern Ethiopia. Gilligan et al. (2009) likewise find that private transfers to participants in Ethiopia's Productive Safety Nets Programme (PSNP) are not affected by PSNP transfers. In contrast, providing conditional cash transfers to women in the Colombian program

Familias en Acccion appears to crowd in household food consumption by 13 to 15 percent, perhaps by changing intrahousehold bargaining power (Attanasio et al., 2009).

Timeliness

Delayed interventions can result in lost lives, health, and assets and can cause other adverse side effects. Delayed interventions are also much more costly compared to intervening before conditions deteriorate to devastating levels. Individuals may choose to forgo food in order to protect productive assets (Hoddinott, 2006). This can be particularly devastating for small children, who may not catch up after a period of undernourishment. That prevention is nutritionally more impactful than a recuperative model highlights the important of early interventions for young children (Ruel et al., 2008).

Further, beyond a critical threshold, households without other options may engage in adverse coping strategies, such as eating seed or selling livestock, in order to meet basic needs. This renders them more at-risk for future food insecurity. Finally, delaying responses costs agencies and governments more. Barrett (2010, p. 826) points out "In Niger, quite apart from the still unclear human health toll and lives lost to delays, the cost per beneficiary for World Food Programme deliveries more than tripled from February to August 2005, from $7 to $23, due to far greater need for supplemental and therapeutic foods instead of cheaper, bulk commodities, and the need for airlift and other quicker, but more expensive, logistical support." Lastly, mis-timed deliveries of food assistance, when households do not need or need it less are less effective and can adversely impact local markets (Barrett et al., 2009).

The transfer form of a FAP can dramatically affect the timeliness of response. On average, cash and voucher-based FAPs reach recipients faster than does local procurement, which is faster than transoceanic food aid (Upton and Lentz, 2012). Lentz et al. (forthcoming) find that procuring food aid locally saved an average of fourteen weeks relative to transoceanic food aid matched by country and time period.

The duration of the intervention can also increase nutritional gains through both increased exposure to the intervention and also through learning effects (Galasso et al., 2011). Galasso et al. (2011) find that an additional year of exposure to a Malagasy community nutrition program resulted in a statistically significant decrease in malnutrition for 0-6 month olds and 7-12 month olds. Further improvements were seen for programs implemented for two years. Secondary benefits of longer duration projects and programs include that they provide agencies an opportunity to learn how to more effectively administer the program and recipients and communities can internalize new practices.

Seasonality

Those facing periodic or seasonal food insecurity are not only rural populations in developing countries but include other populations, such as impoverished, school aged children in western countries during summer breaks. Seasonal hunger is particularly a problem for rural populations in the period leading up to harvest season and for seasonal workers (Devereux et al., 2008). FAPs that reliably reach people during periodic hunger can keep people from undertaking adverse coping strategies that can lead to worsening nutrition and further impoverishment. Nord and Romig (2007) find that within the US, food insecurity for families with children eligible for school lunches under the NSLP worsens in summer in states with smaller numbers of Summer Food Service Program (SFSP) meals and summer school lunches than students in states providing more SFSP meals.

Incentive effects

USGAO (2011) reports that while targeting higher-nutrient foods to desired populations, such as small children, may be cost effective, "targeting can be undermined at the recipient level by the cultural practice of sharing in local communities" (p. 26). In a survey of 30 programs, they found 26 programs reported some sharing. Thus, targeting specialized nutritional products can be difficult and may not be as cost effective as some estimates indicate. Webb et al. (2011) argue that smaller packaging of high-nutrient content foods may discourage sharing. Blanket supplementary feeding or distribution of family rations allows for some sharing while reaching the individuals most at need.

One common concern is that FAP transfers, by acting as income sources, will discourage people from working or pursuing livelihoods. There is relatively little evidence of this (Lentz et al., 2005). Examining US assistance programs, Moffitt (2002) reports that the US Food Stamp Program had little effect on labor supply although Hoynes and Schazenbach (2012) find that during the later 1960s and early 1970s, among female single-headed households food stamp participation reduced employment by 25 percent. Abdulai et al. (2005) found that food aid distributions in Ethiopia are not associated with any decline in food production. Based on these findings, the authors argue, "observers should be cautious about uncritical acceptance of claims that food aid has disincentive and dependency effects" (Abdulai et al., 2005, p. 1701).

A second common concern is that FAP eligibility requirements based on anthropomorphic measures may encourage caregivers to deny food to a child, in order to increase the likelihood of their eligibility. In an evaluation of a fresh food voucher program in the Dadaab refugee camps in Kenya, Dunn

(2009) reports that while there were rumors of caregivers withholding food from children, the rumors were unfounded. While such anecdotes abound, hard evidence of strategic withholding of food from targeted individuals remains rare.

Social acceptability

Under some programs, many eligible individuals do not receive benefits. Landers (2007) reports that in the US in 2005, 35 percent of all eligible individuals did not receive food stamps. Common reasons given for not participating included people not knowing they could were eligible, not feeling they needed the benefit, not satisfied with the amount they would receive, feeling that the application process was complex and feeling that receiving food stamps would be stigmatizing (Landers, 2007). Particular delivery mechanisms can decrease stigma associated with receiving FAPs, such as cash or distinctively labeled debit cards, compared to vouchers. However, some agencies that use self-targeting to identify food insecure individuals may use long waiting lines, distribution of less-desirable foods, or other potentially stigmatizing actions in order to "encourage" only food insecure individuals who truly need assistance to use the program.

Nonetheless, self-targeting may not achieve the desired results. Food-for-work, for example, was commonly believed to be an effective form of self-targeting. When the FFW payment rate was below market wages it was expected that only the most needy households would supply workers. However, in a study of food-for-work projects in Ethiopia, Clay et al. (1999) found that households with a surplus of labor participated in FFW schemes, and that the most-needy households often did not have spare labor to participate while wealthier households did. Barrett and Clay (2003) demonstrate that adjustments to FFW wages lead to as much self-selection into or out of the program among the poor as among the better-off in rural Ethiopia. And even when an employment based self-targeting scheme does induce greater willingness to participate among the poor, relative to the non-poor, administrative rationing commonly negates the self-targeting benefits of such programs (Liu and Barrett, 2012).

In an evaluation of comparable populations receiving in-kind transoceanic food aid and receiving locally procured food aid, Violette et al. (forthcoming) find that recipients receiving local food were more satisfied, even in instances when preparing local food required more effort. This seems to reflect familiarity and comfort with local food varieties over imported foods, underscoring yet again the importance of local and national food systems, even within FAPs.

Political economy considerations

While the Copenhagen Consensus, Millennium Development Goals, and other activities have highlighted both the importance of improved nutrition and the costs associated with achieving nutritional goals, chronic and seasonal hunger has tended to be relatively low on the list of international priorities (Vaitla et al., 2009). For this, and other reasons, country-led strategies may be the most effective avenues to pursuing improved nutrition and food security. The SUN framework (2009), now endorsed by over 100 partners, argues for country-owned nutrition programs and strategies, as does USAID's Feed the Future Initiative. Ideally, countries' ministries are best-suited to design contextually appropriate nutritionally sensitive food assistance programming rather than international strategies. However, country-led programs face political economy challenges.

When designing FAPs, policymakers and analysts have to trade off targeting accuracy for political support (Pinstrup-Andersen, 1993). Errors of inclusion, such as expensive bread subsidies that mainly support the middle class rather than the poor, may be the political price of ensuring support for any sort of program that will cover economically and politically marginalized populations most in need. These considerations are perhaps especially salient in democratic states where governments rely on the support of voters, who are more likely to be urban and middle class than the rural poor.

Furthermore, path dependency can limit the benefits of FAPs. FAPs designed for a particular context and moment in time can be difficult to change or end when circumstances evolve substantially. For example, the United States' international food aid program, the world's largest, was created in its modern form in 1954, in part as a means to dispose of government-held cereals and nonfat dried milk powder surpluses generated by federal farm price support programs. Those surpluses were shipped beyond the international marketshed into which American producers of the 1950s exported product. A government bureaucracy and political coalitions emerged around these programs. But when the United States government ended farm price support programs in the latter 1990s, thereby drying up government-held surpluses in need of disposal, the country's international food aid programs retained largely the structure into which they were cast almost half a century earlier (Barrett and Maxwell, 2005). Bureaucratic and political inertia can make policy change difficult to effect, even when the evidence of inefficiency (or worse) under prevailing arrangements and the logic of change is compelling.

5. Conclusions: Some key principles

Several key principles stand out from the foregoing review. FAPs are necessarily small relative to the broader food system on which people rely for daily nourishment. Thus, the first key principle is that

any public food assistance policy or program must be designed to integrate effectively with the private food production and distribution system. Globally, 85-90 percent of global cereals production is consumed in the country in which it is grown in any given year; only 11-12 percent of global food production is internationally traded in any given year even though trade has been growing faster than output over the past 40 years (Figure 2). International food aid is far smaller still, amounting to less than one-quarter of one percent of total food production and only 1.9 percent of commercial international food trade. Moreover, most international food aid is now purchased primarily in developing countries under LRP programs, not in donor countries, with much of it bought in surplus regions of the recipient country under "local purchase" programs. And many international donors rely increasingly and effectively on commercial food marketing systems by using electronic benefit transfers, mobile phone-based transfers, cash or vouchers, rather than establishing parallel delivery channels. As cash-based transfers become more common, the line blurs between FAPs and social protection programs more broadly.

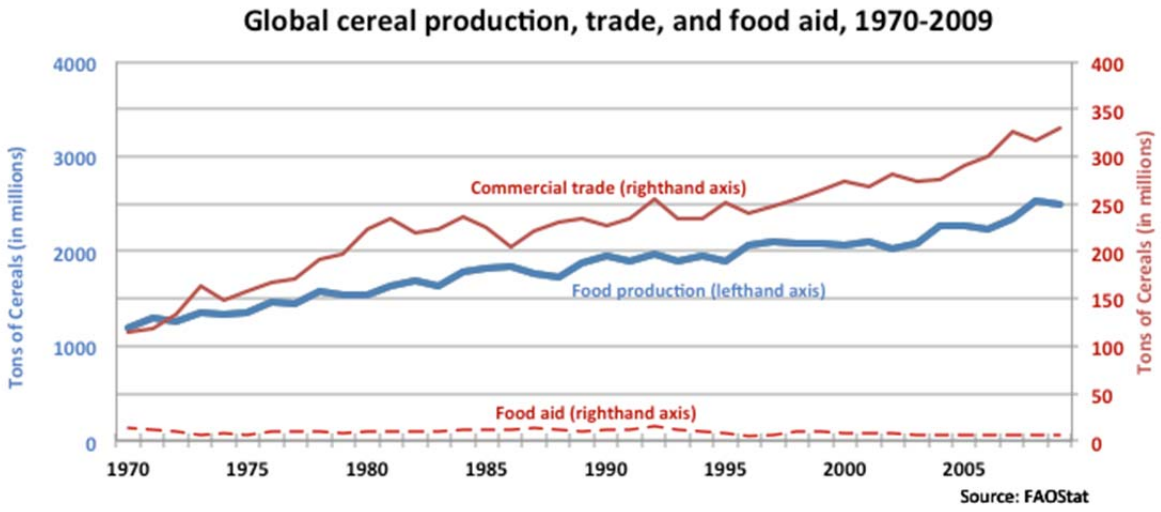

Figure 2: Cereals production versus commercial trade and food aid

Furthermore, international food assistance is dwarfed by national programs. Global food aid amounts to less than $5 billion annually today, as compared to, for example, nearly $90 billion spent by the United States government each year on public FAPs (school breakfast and lunch programs, SNAP, etc.). And even in the countries with the largest FAPs, these are small compared to the broader food economy. For example, India's targeted public distribution system (TPDS) comprised only about 16 percent of total foodgrains produced in 2009-2010 (Government of India, 2011) while the United States'

domestic FAPs account for less than ten percent of a food economy of more than $1 trillion annually. In terms of reach, India's TPDS is even smaller. Khera (2011) in a study of the TPDS in Rajasthan, India reports that 67 percent of TPDS wheat and 18 percent of TPDS rice failed to reach consumers. Thus, the second key principle is that the performance of the domestic private food production and distribution systems matter more to food security than do national public food assistance policies and programs, which in turn matter more than international FAPs. Thus, policymakers should focus on getting domestic programs right first and only attend international programs as a secondary matter.

A third key principle is that poverty reduction is the most effective food assistance program. Food security is typically advanced more durably and effectively by policy and program interventions that address more fundamental underlying issues of poverty and the functioning of the broader food system – local agricultural productivity, the efficiency of local commercial food distribution systems, etc. Nonetheless, FAPs are a necessary and valuable last resort for poor and vulnerable individuals, households, and communities.

Fourth, the returns on investments in FAPs are, on average, high but depend considerably on the timing, targeting and cost structures as well as on food quality and role of complementary activities. Nutritional benefits are highest for the youngest recipients and especially for pregnant women and young children for the simple biological reason that this is the developmental window within which physiological and cognitive response to nutritional interventions is greatest. Likewise, FAPs have the greatest impact when independent food access is interrupted and before the adverse effects of malnutrition have materialized. This puts a premium on permanent, continuing programs that expand and contract with fluctuations in demand and that aim to prevent malnutrition, rather than on programs that come and go episodically and aim at recuperative care. But, FAPs oriented towards prenatal and early childhood interventions – Class I interventions in our typology – are universally less well funded and less popular than are interventions aimed at school-age children (Class II) or at the broader, largely adult population (Class III) even though these latter classes of interventions offer considerably lower average returns in economic, health, and nutrition terms as best as anyone can tell presently.

The fifth key principle is that the political economy of food assistance policy tends to favor older, better off, urban populations. Policymakers, advocates, and donors may need to recognize that certain FAPs are likely to garner more political support than others. If it is otherwise impossible to establish programs for poor subpopulations at significant nutritional risk, it may be necessary to expand the program to include others at less nutritional risk.

Lastly, it bears repeating that it is difficult to do benefit-cost analysis effectively in the absence of clear counterfactuals and solid methods for controlling for non-random placement and selection effects. Carefully controlled nutritional efficacy studies provide valuable impact information otherwise not currently available that could benefit FAP design. Whether findings from efficacy studies will translate into "real-world" FAPs is less clear. Moreover, there are relatively few studies that offer long-term results so as to establish long-run payoffs as well as those during a short period of program evaluation (exceptions include Hoddinott et al., 2008; Behrman et al., 2009). All of these serious caveats point to a need for further research on how FAPs can more successfully improve nutrition and at what cost.

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