Do agricultural support and cash transfer programmes improve nutritional status?

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Abstract

Cash transfer and agricultural support programmes are both used to improve nutrition outcomes in developing countries. Previous reviews of these programmes have examined their ability to improve both food consumption and anthropometric outcomes, but none has compared the evidence between the two. We update previous reviews, more than doubling the number of studies on each programme type based on an additional literature search of over 13,000 articles in eight databases. We find: (i) although there are about the same number of programmes of each type, many more papers have been written about the cash transfer programmes than the agricultural programmes; (ii) both programme types improved the quality of food consumption though evidence on quantity is more mixed; and (iii) both programme types show weak evidence of improvements in anthropometric outcomes.
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Introduction

Achieving the second Sustainable Development Goal (SDG2) to end hunger, achieve food security and improved nutrition, and promote sustainable agriculture, and particularly the second target to end all forms of malnutrition by 2030, will require a range of policies, including broad-based policies to facilitate economic growth, policies to enhance agricultural productivity, health care policies and nutrition education. Along with these general policies, there is a need to target particularly vulnerable populations in an effort to improve their nutritional outcomes. Improving nutritional outcomes can reduce mortality, increase educational attainment and improve productivity, yet typically studies of the benefit-to-cost ratio of nutrition programming suggest that there is underinvestment in nutrition (Alderman et al., 2017). Among the policies targeting the chronically poor and food-insecure, particularly in rural areas, are the social protection programmes, predominantly cash transfer programmes, and productive programmes. Cash transfers and direct agricultural support programmes both have the potential to help achieve SDG2. But this raises the question asked by Banerjee et al. (2015): "Is it better to deliver physical assets and support, rather than pure cash transfers?"

Today, these two broad types of targeted programmes dominate the landscape of development assistance. Cash transfer programmes are of two types: one group, such as Give Directly, provides only an unconditional cash transfer, while the other type, such as Brazil’s Bolsa Familia programme, provides cash conditional on recipients carrying out tasks like getting health check-ups or keeping children in school. Alternatively, agricultural programmes provide assets, livestock, agricultural inputs, technical support or other support to enhance production with the hypotheses that this will, among other things, lead to improve nutrition. One example is Helen Keller International’s Enhanced Homestead Food Production, which seeks to improve nutrition through the production of nutritious foods in home gardens. Another is the attempt that the International Fund for Agricultural Development (IFAD) is making to improve nutrition through broader production pathways.

Of course, there is a third option that combines the two. The programme Targeting the Ultra Poor (TUP) provides a cash or food transfer, along with an asset transfer and technical assistance (often agricultural in nature), access to savings accounts, and health and life-skills training. Agricultural support programmes are generally not as holistic as the TUP, although they often include a gender component and sometimes include nutrition education, while some cash transfer programmes also provide additional nutrition education or have conditions that might improve nutrition.

Cash transfers clearly play an important role in achieving the SDG goals, as they now cover 750 million to 1 billion people across the globe (Arnold et al., 2011). Income from transfers has the potential to improve access to food and therefore nutrition. Agricultural support
programmes enhance income and food access through increasing agricultural production. Recent estimates by Hoddinott et al. (2013) suggest that an additional US$8 billion per year investment could improve world crop yields and reduce the number of hungry people by 200 million by 2050. Targeted investments in agricultural production, particularly home gardens or dairy production with direct links to nutrition, may further improve the nutritional value of a household’s food basket. Agricultural interventions that increase the production of cash crops may do so via increasing a household’s food budget. In considering how to allocate scarce resources to support SDG2, the question remains: do targeted investments in agricultural production improve nutritional status as much as cash transfers?

This review takes a first step at comparing nutritional outcomes for these types of programmes by synthesizing the nutritional impacts shown in over 200 studies of about 100 different agricultural support and cash transfer programmes. In particular, we focus on two sets of nutrition outcomes.

The first set of outcomes are the programme effects on the quantity and quality of the food consumed by programme recipients. While an increase in the quantity of food consumed may seem obvious, we will see that it is not so simple. As Banerjee (2016) notes, increasing spending on food does not necessarily mean nutrition improves. Further, increases in food consumption may not be sufficient to improve child nutrition; as Arimond and Ruel (2004) show, dietary diversity is key to child nutrition, so we track quality as well as quantity of consumption.

The second set of outcomes are nutrition indicators, including anthropometric measures (e.g. height-for-age and weight-for-age and the prevalence of stunting and wasting) and micronutrient indicators (e.g. serum retinol concentrations and rates of anaemia), which are related to food consumption as well as the body’s ability to utilize nutrients based on physical health.

Cash transfers have been particularly well studied and are the subject of several comprehensive reviews in terms of their impacts on nutrition. These reviews suggest that cash transfers can increase total food consumption and dietary diversity (Bastagli et al., 2016); however, the impacts on anthropometric outcomes are modest and often not statistically significantly different from zero (Bastagli et al., 2016; Manley et al., 2013). Reviews of the impacts of agricultural programmes on dietary diversity and quality of food mirror those of cash transfer programmes. In general, these programmes improve dietary diversity and the quality of food (Masset et al., 2012; Webb and Kennedy, 2014), though few study the changes in total food consumption or calories. Like cash transfers, there is weak evidence that these programmes affect micronutrient status or anthropometric outcomes (Masset et al., 2012; Webb and Kennedy, 2014).

This paper makes its main contributions by expanding the evidence base and contrasting the two types of studies. First, we provide an updated summary of the growing evidence base from evaluations of agricultural programmes and cash transfers. For agriculture, as Webb and Kennedy (2014) predicted, the number of studies has grown in recent years. Furthermore, compared to previous cash transfer reviews, our search yielded roughly two to four times the number of total studies, depending on the outcome, and it increases the geographical reach of the evidence base as well. Second, by combining reviews of both cash transfer and agricultural programmes, we can compare the evidence for each programme type’s ability to improve factors that influence nutritional status.
Three key takeaways emerge from our literature search. First, cash transfers have a broader evidence base in terms of their impact on food consumption and nutrition outcomes than agricultural programmes. We find over twice as many studies on cash transfer programmes as agricultural programmes, and for almost all variables of interest there were more analyses for cash transfer programmes than agricultural programmes. This is a reflection of multiple studies on the same programmes, as there are only 20 per cent more cash transfer programmes evaluated than agricultural programmes in our dataset. Second, the evaluations often, though not always, show that cash transfers and agricultural programmes have the ability to improve dietary diversity and consumption of food in key categories (e.g. protein, fruits and vegetables). A substantially larger number of cash transfer studies evaluate the effect on the value of total food consumption compared to studies of agricultural programmes. Cash transfer programmes only increased food consumption in roughly two thirds of the cases; we discuss the reasons (small transfers, irregular payments and educational requirements) that were responsible for the null findings. Unfortunately, our third takeaway is that these evaluations have not found conclusive evidence regarding either cash transfer or agricultural programmes’ ability to improve anthropometric or micronutrient outcomes reliably. This non-finding is not proof of their inability to influence these outcomes, but it is in line with other reviews of the subject, such as Headey et al. (2017) who emphasize “the need for multidimensional nutritional strategies involving a broad range of nutrition-sensitive sectors”.

The remainder of this paper is organized as follows. In section 2, we discuss the potential pathways for both cash transfers and agricultural support programmes to influence nutrition in terms of food consumption, anthropometric and micronutrient indicators. This section also summarizes the findings of the previous reviews discussed above. Section 3 discusses our search, which included a snowball of previous reviews and a search of eight major databases using a combination of keywords yielding 13,596 results. Section 4 discusses the methods and types of evaluations included in this review, and highlights our first takeaway that the evidence base linking cash transfers to nutrition is stronger than the evidence base for agricultural programmes’ links to nutrition. Section 5 summarizes the evidence of both types of programmes on food consumption, in terms of quantity and quality, in order to demonstrate that both improve the quality of food consumed, though cash transfers seem to do better. Section 6 highlights our third takeaway on the lack of evidence on anthropometric or micronutrient outcomes. Finally, section 7 offers some areas for further analysis and section 8 the conclusions.
Causal pathways and previous reviews

While it would make analysis much easier if the link between income and nutritional status were simple and direct, things are somewhat more complicated. Several prior works have diagrammed this complex link between income and nutrition status (UNICEF, 1990; Black et al., 2008; Smith and Haddad, 2015). We have created our own diagram (Figure 1) based on these prior works and adapt it to highlight the relationships of interest to this paper. Figure 1 illustrates the relationship between poverty, consumption and nutritional status and can be used to contrast how cash transfers and agricultural support programmes may work through different pathways.

Figure 1: Factors affecting nutritional status

Discussing the determinants of child nutritional status, Smith and Haddad (2015) describe the immediate importance of dietary intake and health status, which interact to produce healthy development. Bhargava (2014) points to four factors that influence nutrition: food intake, health and environmental services, dietary diversity, and food availability. These factors combine with behavioural influences, including care for children such as feeding, health-seeking behaviours and cognitive stimulation, and care behaviours for women such as adequate food, health care, rest and support for mental health including protection from abuse. When pregnant women are not healthy, effects are sure to be transmitted to the child they carry, and after birth the mother’s health affects children dependent on her as caretaker.
Given this model for the production of good nutrition, how do cash transfers and agricultural interventions hope to achieve their aims? First, and most obviously, both interventions ought to increase access to food and to an increased variety of food through either increased income or food production. This is necessary, but not sufficient: for increases in consumption to translate into improved child health, they must be accompanied by security, safety and wisdom of the child’s caretaker. Further, they must occur in a safe environment. Thus, programmes that ensure the provision of these other goods are most likely to see improved health among beneficiaries.

Leroy et al. (2009) list mechanisms by which cash transfers can affect nutrition, while Carletto et al. (2015) link agriculture to nutrition status. We adapt both into three pathways by which either mechanism might be effective. First, interventions should improve household food consumption and diet quality by enabling households to produce and/or purchase more and better food. (Some programmes also improve the diet quality of children, in particular by providing nutritional supplements.) Again, Figure 1 shows that increased income is not a sufficient condition for improved nutrition, but it is certainly helpful. Second, programme targeting may educate and empower women. Providing women with income is directly useful and may also improve their standing for intrahousehold bargaining over household resources. Programmes with educational components may further increase awareness and knowledge of child-feeding and caretaking practices. On the down side, programmes may also cost time to comply with programme requirements. Third, programmes may improve the home environment and/or the child’s access to health care. Increased income from transfers or from better agricultural productivity can be used in some cases to improve shelter, sanitation and access to water. In cases when parental and community support is also part of the programme, the benefits can extend to improved parental skills and a safer and more stimulating environment in which to develop (Britto et al., 2017). On the other hand, an increase in agricultural activity may increase exposure to pathogens associated with animal waste, which has been linked to undernutrition (Headey et al., 2016).

The specifics of how the various agricultural programmes affect nutrition vary, though most increase food availability by targeting nutritious food production. Home gardens can mean more and a greater diversity of food is produced, and that food may be more likely to be under women’s control. Biofortification can mean that the same level of food production increases household consumption of micro- or macronutrients. Livestock programmes also can improve the quality of household consumption or lead to increases in income from the sales of animal products (Carletto et al., 2015).

Previous reviews show that both cash transfer and agricultural programmes tend to improve food consumption and dietary diversity, but have limited evidence in their ability to improve anthropometric outcomes. The most recent comprehensive review of cash transfer programmes, Bastagli et al. (2016), covers programmes across 19 countries. In terms of food consumption, the evidence suggests that cash transfers improved both the quantity and the quality of food. There were 25 of 31 studies that directly tested the changes in food expenditures and found statistically significant impacts, with 23 finding positive results and only two finding negative impacts, perhaps due to a reduction in labour supply. There is more limited evidence for dietary diversity, with 7 of 12 studies finding statistically significant and positive impacts and the rest not finding statistically significant results.

Despite two thirds of cash transfer studies finding that the total value of food consumption increased, the evidence linking these programmes to anthropometric outcomes is weak. Transfers seem to have “very little impact on micronutrient status”, according to Leroy et
al. (2009). As Banerjee (2016) suggests, this could be related to findings that suggest poor households use additional income to purchase higher quality, though not necessarily more nutritious, food. Also, other factors besides diet are necessary to improve nutrition outcomes, as suggested by Bhutta et al. (2008): “Nutritional status results from a complex interaction between food intake, access to safe water and sanitation, nutritional knowledge of caretakers, and access to care and medical services. Higher income and the ability to finance food expenditures are therefore only two of many determinants of nutritional status.” Bastagli et al. (2016) find that “just five out of 13 studies for stunting, one of five for wasting and one out of eight for underweight show statistically significant impacts.” Manley et al. (2013), in a review focused on cash transfers and height-for-age, specifically that covered 17 cash transfer programmes, found results consistent with Bastagli et al. (2016). Using a meta-analysis, they find that on average cash transfers increase height-for-age z-scores by 0.02 and this change is not statistically significant from zero.

The results for the links between agricultural programmes and nutrition mirror those of the cash transfer programmes, though with a more limited evidence base. In a meta-analysis of the effects of agricultural programmes on nutrition, Masset et al. (2012) found most studies (19 of 23) show positive and statistically significant effects on dietary diversity or consumption of food in key categories (e.g. protein, vegetables). The authors point out, though, that this may not necessarily represent an improvement in diet if there are substitution effects. This may be particularly an issue for programmes such as vegetable gardens, dairy or fisheries, which focus on consumption of a specific category of food. Interestingly, no studies measured changes in total food consumption and only one tested changes in income. Ruel et al. (2013) discuss similar findings for home-gardening programmes, although they find more promising results in newer biofortification projects. Webb and Kennedy’s (2014) review of 10 previous literature reviews on the subject is also consistent with Masset’s findings. Furthermore, Webb and Kennedy (2014) point to a lack of current completed research at the time to address these questions, but remain optimistic based on the large amount of research being conducted at the time they wrote the article.

Masset et al. (2012) summarize the 13 studies where anthropometric data were collected for agricultural interventions, with only one reporting z-scores. Of the eight studies on anthropometric outcomes, only one showed a statistically significant reduction in stunting, three in underweight and two in wasting. They find “little support” for the ability of these interventions to improve anthropometric outcomes. However, they caution this could be due to the limited sample size since these outcomes are typically measured in children under 5 years old, which would mean only a subset of households would have observations. In terms of micronutrients there are even fewer studies, identified by Masset et al. (2012), with two covering iron intake of children and finding no statistically significant impact, four covering vitamin A, which all had positive impacts, and a meta-analysis showing a positive impact on average.

This paper takes Bastagli et al. (2016) and Masset et al. (2012) as jumping-off points. Our search, described in the next section, increases the number of studies by a factor of two to four relative to those included in these previous reviews in terms of the questions of interest. It is worth noting that Bastagli et al. (2016) was not necessarily meant to be systematic for all issues because it covers a wide range of issues (poverty, savings, employment and empowerment). We also believe it is important to follow up on Masset’s work, as that search was performed in 2010. As Webb and Kennedy (2014) note at that time, there was a large pipeline of over 150 planned research studies on the link between agriculture and nutrition.
Before beginning the literature search, we established the cut-off date for publication and chose to include only papers published in 1997 or after to coincide with the creation of PROGRESA, Mexico’s well-known cash transfer programme. We also established the criteria for which types of programmes to include. We only include studies published in English and utilizing a clearly defined comparison group (control). For cash transfer programmes, we elected to include both conditional and unconditional cash transfers, and excluded programmes that provided cash on the condition of work. Provision of opportunities for wage labour might simply reduce regular, market wage labour, making impacts on nutrition unlikely. For agricultural programmes, we targeted multiple types based on previous reviews. We included six types of programmes: (i) support for inputs such as fertilizer; (ii) free provision or help with livestock or other productive assets; (iii) irrigation; (iv) aquaculture; (v) home gardens; and (vi) biofortification. We excluded other types of programmes such as credit or land tenure, as the impacts to food production are not as direct. It is important to note that we only examined articles where an actual agricultural intervention took place. Therefore, a study that used a natural experiment of, for example, fertilizer prices on outcomes of interest would be excluded.

To be included in the analysis, the cash transfer or agricultural programme had to examine at least one of the variables of interest for either food consumption or anthropometrics. In terms of food consumption, we examined four variables: total food value, calories, food categories and diversity. Total food value was any measurement of either total consumption or expenditures on all foods in the household. Calories include any measure of total calories consumed by the household, typically based on food intake recall. The make-up of the diet is also important, so we included an indicator of whether the programme increased consumption of any specific food category (e.g. milk, meat or vegetables) and another for whether programme impacts were noted on “food diversity”, usually measured by the number of unique foods consumed or dietary diversity scores. We also included standard measures of anthropometrics (weight-for-age, height-for-age, height-for-weight, stunting and wasting). Finally, we included micronutrient changes, both when measured by medical tests (e.g. hemoglobin) and when measured by food intake.

Note that an individual paper may include multiple studies if the analysis includes multiple programmes (e.g. Baird et al., 2013), which includes a comparison of conditional and unconditional cash transfers. Further, some programmes such as PROGRESA have multiple papers studying the same data. In order to address this, we summarize some results by using the mean of all studies of the programme for the variable of interest. Finally, some programmes such as Targeting the Ultra Poor have been evaluated in multiple countries. We consider each programme and country combination a unique programme reflective of differences in the context of running a programme in different countries.
To begin the search, we examined the citations in all the reviews mentioned above for potentially relevant studies (Bastagli et al., 2016; Manley et al., 2013; Masset et al., 2012; Ruel et al., 2013). This also included a sub-search of eight of the reviews included in Webb and Kennedy, 2014: Arimond et al., 2011; Berti et al., 2004; Bhutta et al., 2008; Kawarazuka, 2010; Leroy and Frongillo, 2007; Ruel, 2001; World Bank, 2007; and Masset et al., 2011, which is an earlier version of the Masset et al. (2012) review. We reviewed the references in each of the studies listed in this paragraph, and based on the title reviewed any potentially relevant studies for possible inclusion.

The next step was to search literature databases with key words. There are always trade-offs in terms of time and exhaustiveness of these searches. Given these trade-offs, we selected a total of eight terms for programmes and two terms for outcomes. Each search was a combination of one programme term and one outcome term, yielding 16 total searches per database (see Table 1 for the terms). We planned to search all of the same databases that Masset et al. (2012) used for their search; however, we were only able to search 8 of the 10 potential databases (Agris, Econlit, Eldis, International Bibliography of Social Sciences [IBSS], IDEAS, International Food Policy Research Institute [IFPRI], PubMed and World Bank). Therefore, we searched 128 combinations of terms. To make the searches manageable, we followed a simple four-step process. We first entered only the programme term, and if the result was less than 100 articles we searched all articles; if it was more, we used the combination of the programme term and each of the two outcome terms (nutrition and food consumption). Finally, in nine cases where there were more than 500 results, we added the words “women or children” to the search since, like most relevant studies of nutrition, we chose to discuss impacts on one of these subgroups. So, for example, articles showing the effects of programme participation on adult body mass index were not included.

Overall, the search yielded 13,596 titles and abstracts to review, which is almost double the number in Masset et al. (2012). Of these, 133 papers that had not been found in the snowball of previous reviews were identified as possibly relevant for inclusion, and 36 were ultimately included (27 evaluations of agricultural programmes and 9 of cash transfers) based on our established criteria. The fact that we found more agricultural papers is likely a reflection of the existence of more recent and numerous reviews of cash transfers, which meant that most papers were caught in the initial snowball.

Table 1: Search terms

<table>
<thead>
<tr>
<th>Term 1: Programme types</th>
<th>Term 2: Outcomes</th>
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<tbody>
<tr>
<td>Fertilizer</td>
<td>Nutrition</td>
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<tr>
<td>Livestock</td>
<td>Food consumption</td>
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<td>Irrigation</td>
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<tr>
<td>Aquaculture</td>
<td></td>
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<tr>
<td>Home garden</td>
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<tr>
<td>Biofortification</td>
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<tr>
<td>“Asset transfer”</td>
<td></td>
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<tr>
<td>“Cash transfer”</td>
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1. We were unable to access Scopus. Jolis was not used due to the overwhelming number of results for the programme terms combined with food consumption alone (10,000).
In total, we found 142 cash transfer and 63 agricultural programme studies, which covered 52 cash transfer and 44 agricultural programmes. In other words, there were 2.8 studies per programme for cash transfers, which is double the 1.4 studies per agricultural programme. Even eliminating PROGRESA with its 25 studies, there are still on average almost 2.4 studies per cash transfer programme.

Once the papers were identified, one of the authors of this paper coded the results based on the food and nutrition indicators of interest (e.g. total food consumption, height-for-age or total calories consumed). The indicator was coded as 1 if a positive statistically significant result at the 5 per cent level was found for any analysis. An independent research assistant then coded the articles without knowledge of how they had been previously coded. The codes were compared and any non-matching results were reconciled by the authors.

Programme types are shown in Table 2 as the total number of studies and unique programmes. Seventeen studies (13 programmes) involved improving plant production, 10 studies (7 programmes) involved livestock or aquaculture, 16 studies (14 programmes) had multiple components, and 5 studies (3 programmes) were focused on nutrition, (i.e. primarily educational). We found 15 studies (7 programmes) analysing Targeting the Ultra Poor, a programme type that involves a variety of support given to recipients. Among the studies of cash transfer programmes, 78 were studies of 21 programmes that gave cash conditionally, while the remaining 64 studies of 31 programmes gave unconditional grants.

As in any study, there are some potential biases to our approach. First, we are only able to document programmes that were evaluated. If the presence of an evaluation is linked to the quality of the programme, then our results may be biased toward finding positive results. Furthermore, individual evaluations will likely omit either measuring or reporting some outcomes. This may be because of the costs associated with the survey, particularly for anthropometrics or nutrient measures. Studies may also omit outcomes that show no impact. For example, the Manley and Slavchevska (2016) review of 12 African cash transfer programmes shows that eight omit anthropometric analysis. Our decision to code any paper by its most positive and significant result may bias the results upwards, as we do not correct for multiple hypothesis testing.

Table 2: Programme types

<table>
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<tr>
<th>Programme type</th>
<th>No. of studies</th>
<th>No. of programmes</th>
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<tr>
<td>Horticulture</td>
<td>17</td>
<td>13</td>
</tr>
<tr>
<td>Livestock</td>
<td>10</td>
<td>7</td>
</tr>
<tr>
<td>Mixed</td>
<td>16</td>
<td>14</td>
</tr>
<tr>
<td>Nutrition</td>
<td>5</td>
<td>3</td>
</tr>
<tr>
<td>Targeting the Ultra Poor</td>
<td>15</td>
<td>7</td>
</tr>
<tr>
<td>Conditional cash</td>
<td>78</td>
<td>21</td>
</tr>
<tr>
<td>Unconditional cash</td>
<td>64</td>
<td>31</td>
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</table>
In our searches (snowball and database search), we found over twice as many studies of cash transfers and nutrition (142) as we did studies of agricultural programmes and nutrition (63), though, as mentioned above, this is reflective of more studies per cash transfer programme. The full list of studies included in the analysis and their citations is available in Appendix 1 (Agricultural Programmes) and Appendix 2 (Cash Transfer Programmes). Trends suggest that the gap between the number of studies in agriculture and cash programmes is widening: see Figure 2. In the period 2008-2016, cash transfers averaged 16 studies per year compared to slightly under five per year for agricultural programmes. Additionally, the spike in 2015 in agricultural programmes is reflective of the Banerjee et al. (2015) paper that has the studies of the Targeting the Ultra Poor programme in six countries, which we categorize as six unique studies.

The number of programmes evaluated is much closer when comparing the total number of cash and agricultural programmes, 52 and 44, respectively. We plot the cumulative number of programmes observed by the two programme types to compare trends in the quantity of programmes (Figure 3). For programmes with multiple studies, the programme year is based on the year of the oldest paper. The trends for the number of programmes are similar over the last four years.

**Figure 2: Studies by year**

![Chart showing studies by year]
There are roughly the same number of countries represented in cash transfer (30) and agricultural programmes (24), as shown in Table 3. Bangladesh has the most combinations of studies and unique agricultural programmes with 11 different programmes. Malawi is also well studied, with four cash transfer programmes and six agricultural programmes. No other country has more than four programmes represented in either programme type. There is also regional variation, shown in Table 2, which may reflect the influence of regional development banks or that countries may look to their neighbours when creating new programmes. Latin America includes nearly all cash transfer programmes with the exception of the TUP studies in Honduras and Peru. On the other hand, Asia has nearly twice as many agricultural programmes as cash transfer programmes, while the number of each programme is roughly equivalent in Africa.

Studies of cash transfer programmes have sample sizes that are two to three times those of agricultural programmes, as seen in Table 4, with the exception of Targeting the Ultra Poor studies. We do not find substantial differences between unconditional and conditional cash transfer programmes in terms of sample sizes. Sample sizes are even smaller for horticultural or biofortification programmes. The larger sample sizes for cash transfer programmes increase the chances of finding statistically significant results.
Table 3: Number of programmes by country, region and programme type

<table>
<thead>
<tr>
<th>Country</th>
<th>Ag</th>
<th>Cash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Benin</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Burkina Faso</td>
<td>3</td>
<td>1</td>
</tr>
<tr>
<td>Ethiopia</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Ghana</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Kenya</td>
<td>1</td>
<td>3</td>
</tr>
<tr>
<td>Lesotho</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Malawi</td>
<td>6</td>
<td>4</td>
</tr>
<tr>
<td>Mali</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Mozambique</td>
<td>2</td>
<td>1</td>
</tr>
<tr>
<td>Niger</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Rwanda</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>South Africa</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Tanzania</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>Uganda</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Zambia</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Zimbabwe</td>
<td>1</td>
<td></td>
</tr>
<tr>
<td><strong>Africa</strong></td>
<td>21</td>
<td>24</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Region</th>
<th>Ag</th>
<th>Cash</th>
</tr>
</thead>
<tbody>
<tr>
<td>Asia</td>
<td>21</td>
<td>11</td>
</tr>
<tr>
<td>Latin America</td>
<td>2</td>
<td>17</td>
</tr>
</tbody>
</table>

| Number of programmes | 44 | 52 |
| Number of countries  | 24 | 30 |

Note: Ag = agricultural programme; Cash = cash transfer programme.

Table 4: Sample sizes by programme type

<table>
<thead>
<tr>
<th>Programme type</th>
<th>No. of studies</th>
<th>Median</th>
<th>25th percentile</th>
<th>75th percentile</th>
</tr>
</thead>
<tbody>
<tr>
<td>Horticulture</td>
<td>18</td>
<td>422</td>
<td>331</td>
<td>827</td>
</tr>
<tr>
<td>Livestock</td>
<td>9</td>
<td>1 000</td>
<td>369</td>
<td>1 102</td>
</tr>
<tr>
<td>Mixed</td>
<td>15</td>
<td>720</td>
<td>639</td>
<td>2 160</td>
</tr>
<tr>
<td>Nutrition</td>
<td>4</td>
<td>214</td>
<td>112.5</td>
<td>281</td>
</tr>
<tr>
<td>Targeting the Ultra Poor</td>
<td>15</td>
<td>1 600</td>
<td>925</td>
<td>4 000</td>
</tr>
<tr>
<td>Conditional cash</td>
<td>70</td>
<td>2 100</td>
<td>1 000</td>
<td>6 519</td>
</tr>
<tr>
<td>Unconditional cash</td>
<td>61</td>
<td>2 000</td>
<td>1 200</td>
<td>2 900</td>
</tr>
</tbody>
</table>

Note: sample size was missing for some studies.
Early cash transfer programmes such as Mexico’s PROGRESA and Brazil’s *Bolsa Familia* used clustered randomized control trials (RCTs) as part of their evaluations. Table 5 also documents the trends in methodical approaches where we separate studies by propensity score matching, RCTs/double difference and other methods. Four out of the five cash transfer studies used RCT and double differences compared to around two thirds of agricultural studies included in our set of studies. For cash transfers, 6 of the 13 studies with other methods are regression discontinuity design. Agricultural studies are more likely to rely on other methods, with eight using single differencing and three employing instrumental variables. This has been a consistent trend, as the breakdown by methods is similar for the periods 2000-2007 and 2008-2016.

**Table 5: Study methods**

<table>
<thead>
<tr>
<th>Programme type</th>
<th>Matching (%)</th>
<th>Double difference (%)</th>
<th>Other (Instrumental variable, single difference) (%)</th>
<th>Total no. of studies</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural</td>
<td>17</td>
<td>60</td>
<td>23</td>
<td>48</td>
</tr>
<tr>
<td>Targeting the Ultra Poor</td>
<td>13</td>
<td>80</td>
<td>7</td>
<td>15</td>
</tr>
<tr>
<td>Cash</td>
<td>13</td>
<td>78</td>
<td>9</td>
<td>142</td>
</tr>
</tbody>
</table>
Impact on food consumption

One key part of the causal pathway between cash transfer or agricultural programmes and nutrition is to improve both the quantity and the quality of food that is consumed. We see that, when measured, cash transfers and agricultural programmes have the ability to improve dietary diversity and consumption of food in key categories (e.g. protein, fruits and vegetables). The results are less clear for total food consumption or calories. Only two thirds of cash transfer programmes increased total food consumption, and most agricultural programmes did not measure changes in the total value of food consumption.

In Table 6, we break down the per programme average of our measure of changes in food consumption. The studies we surveyed looked at food consumption in different ways: some considered impacts on the value of food consumed, while others used calories rather than dollar values as their metric of choice. There was also heterogeneity in ways of considering changes in the quality of food: some used a measure of variety of foods consumed (“dietary diversity”), while others tracked increased consumption of categories of food such as dairy or orange-fleshed sweet potatoes. The measures reflect the percentage of studies with any positive and statistically significant result at the 5 per cent level. The per programme average is calculated by taking the mean of the outcomes of all studies of a programme. It is worth noting we do not observe these outcomes in all studies and, in many cases, in the entire programme.

The change in the measure of the value of food is a good example of the relationship between the programme type and what is measured. Only 9 of the 37 studies of the agricultural programmes (excluding TUP) measured changes in the value of total food consumption, compared with all seven TUP programmes, and 43 of the 52 cash transfer programmes. For non-TUP agricultural programmes, less than half showed increases in the value of food consumption compared to almost all of the TUP studies and two thirds of the cash transfer programmes.

For agricultural programmes, increased production of one nutritious good may decrease the production of another less nutritious good, thereby improving the diet but not changing total consumption. The null result for one third of cash transfer programmes was more surprising, since cash transfers typically target households where relaxing the budget constraint increases food purchases, though one programme – “Bota” in Kazakhstan – targeted households seeming already to have sufficient food supply. We examined each of the 13 cash transfer programmes that had null results for changes in food consumption and a few common reasons occurred. In 6 of the 13 cases, the authors discussed that the transfer was potentially too small, with the extreme example of Nepal’s Child Grant Programme making a monthly payment insufficient to purchase one pound of chicken meat. Three programmes

2. These programmes are Programa de Asignacion Familiar (PRAF), Honduras; Bono de Desarrollo Humano (BDH), Ecuador; Child Grants Programme, Nepal; Education Sector Support Project, Cambodia; Pantawid Pamilyang, Philippines; and Primary Education Stipend, Bangladesh.
(Livelihood Empowerment Against Poverty, or LEAP, in Ghana, Child Grants Programme in Lesotho, and Monze in Zambia) pointed to problems with the disbursement of payments. The third reason, seen in three programmes, was that households spent money on other important things. For example, recipients of Tanzania’s Social Action Fund spent money on health services.

Total calories was the least likely food indicator to be measured, probably due to the difficulty of measuring caloric intake in a survey. Calories were roughly as likely to be measured in agricultural and cash transfer programmes, with around 30 per cent of programmes measuring calories compared to just one of the seven in the TUP.

Not only does the total food matter, but also the types of food. Over half of the agricultural and cash transfer programmes measured changes in at least one specific food category. The percentage of average positive programme effects was quite high in cash transfers (80 per cent). This result was 100 per cent in non-TUP agricultural programmes, which is a reflection of many programmes measuring a food category related to the intervention (e.g. fish consumption for aquaculture or sweet potato consumption for biofortified sweet potato programmes). Under 60 per cent of cash programmes that measured diversity showed improvements. Finally, it is worth noting that, although all of the TUP programmes measured changes in the value of food consumption, only one programme looked at each total calories and specific food categories and only two measured diversity.

Table 6: Changes in consumption

<table>
<thead>
<tr>
<th>Programme type</th>
<th>Variable</th>
<th>Value of food</th>
<th>Total calories</th>
<th>Food categories</th>
<th>Dietary diversity</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>% showing positive effect</td>
<td>44.4</td>
<td>90.9</td>
<td>100</td>
<td>84.6</td>
</tr>
<tr>
<td></td>
<td>programmes (no. out of 37)</td>
<td>9</td>
<td>11</td>
<td>20</td>
<td>13</td>
</tr>
<tr>
<td>Targeting the Ultra Poor</td>
<td>% showing positive effect</td>
<td>95.2</td>
<td>100</td>
<td>100</td>
<td>50.0</td>
</tr>
<tr>
<td></td>
<td>programmes (no. out of 7)</td>
<td>7</td>
<td>1</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Cash transfers</td>
<td>% showing positive effect</td>
<td>66.0</td>
<td>70.4</td>
<td>80.4</td>
<td>58.0</td>
</tr>
<tr>
<td></td>
<td>programmes (no. out of 52)</td>
<td>43</td>
<td>14</td>
<td>34</td>
<td>25</td>
</tr>
</tbody>
</table>

Note: Percentages are the share of studies showing a positive effect among those that considered the outcome in question.
Impact on anthropometrics and micronutrients

The reviews of cash transfers and agricultural programmes discussed in Section 2 have suggested that there is not strong evidence that either type of programme can improve anthropometric outcomes (e.g. height-for-age, stunting, wasting). Our collection of studies is consistent with these previous reviews (see Table 7). Overall, we find that, when measured, the majority of studies do not find statistically significant impacts of cash transfer or agricultural programmes on anthropometric outcomes. For example, only a little over one third of cash transfer and agricultural programmes that measured height found a statistically significant impact. Furthermore, the height-for-age z-score, the most common anthropometric variable, is measured only 40 per cent of the time for cash transfers and 30 per cent for agricultural programmes. This highlights another major contrast between the two types of programmes: cash transfer programmes have almost twice as many programme studies on height-for-age (HAZ) compared to agricultural programmes and similar differences exist for weight and height-for-weight measurements.

Micronutrient measures such as measures of iron and vitamin A, like anthropometrics, can reflect the nutrition level of an individual. As with the results on the consumption of specific categories of food, agricultural evaluations are less likely to test for changes in specific micronutrients, but when they do they are more likely to find positive effects. There were 20 total studies of micronutrients for agricultural programmes. Of those, 10 specifically found a positive impact on vitamin A measures. Nine of these were programmes that promoted vitamin-enhanced sweet potatoes. Among the cash transfer studies, 26 considered micronutrient outcomes with 16 (roughly 60 per cent) showing a positive impact. Most of the impacts were on iron, hemoglobin and anaemia.

Table 7: Programme impacts on anthropometrics

<table>
<thead>
<tr>
<th>Programme type</th>
<th>Variables</th>
<th>HAZ</th>
<th>Stunting</th>
<th>WAZ</th>
<th>WHZ</th>
<th>Wasting</th>
<th>BMIZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agriculture</td>
<td>% showing positive effect</td>
<td>35.7</td>
<td>27.3</td>
<td>44.4</td>
<td>25</td>
<td>36.4</td>
<td>0</td>
</tr>
<tr>
<td>programmes (no. out of 44)</td>
<td>14</td>
<td>11</td>
<td>9</td>
<td>4</td>
<td>11</td>
<td>2</td>
<td></td>
</tr>
<tr>
<td>Cash transfers</td>
<td>% showing positive effect</td>
<td>37.0</td>
<td>15.0</td>
<td>22.2</td>
<td>12.5</td>
<td>33.3</td>
<td>34.6</td>
</tr>
<tr>
<td>programmes (no. out of 52)</td>
<td>25</td>
<td>20</td>
<td>18</td>
<td>16</td>
<td>18</td>
<td>13</td>
<td></td>
</tr>
</tbody>
</table>

Note: TUP included with other agricultural programmes, as only one TUP programme was examined. Effects were found on HAZ, stunting and wasting.
HAZ = height-for-age; BMIZ = body mass index; WAZ = weight-for-age; WHZ = weight-for-height.
Further analysis: Nutrition information and publication bias

In a previous meta-analysis of cash transfers, Manley et al. (2013) found that studies published in peer-reviewed journals were more likely to find statistically significant results. This finding suggested the potential for publication bias where programmes or variables with statistically significant results were more likely to be published. We examine in Table 8 the potential for publication bias by examining the variables in Table 6 and Table 7 for published and unpublished studies for both cash transfers and agricultural programmes. We find that among cash transfer studies, published results are more likely to show an impact on most anthropometric outcomes. Among agricultural studies, there are insufficient data to make a strong conclusion.

Table 8: Investigating publication bias

<table>
<thead>
<tr>
<th>Programme type</th>
<th>Published or not</th>
<th>Consumption</th>
<th>Diet diversity</th>
<th>HAZ</th>
<th>Stunting</th>
<th>Wasting</th>
<th>WAZ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Agricultural</td>
<td>Published</td>
<td>81.3%*</td>
<td>100%</td>
<td>36.4%</td>
<td>27.3%</td>
<td>20%</td>
<td>40%</td>
</tr>
<tr>
<td></td>
<td>(16)</td>
<td>(13)</td>
<td>(11)</td>
<td>(11)</td>
<td>(10)</td>
<td>(10)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not published</td>
<td>63.6%</td>
<td>60%</td>
<td>33.3%</td>
<td>100%</td>
<td>100%</td>
<td>0</td>
</tr>
<tr>
<td></td>
<td>(11)</td>
<td>(5)</td>
<td>(3)</td>
<td>(1)</td>
<td>(1)</td>
<td>(0)</td>
<td></td>
</tr>
<tr>
<td>Cash</td>
<td>Published</td>
<td>85.7%</td>
<td>88.9%</td>
<td>57.9%</td>
<td>33.3%</td>
<td>33.3%</td>
<td>50%</td>
</tr>
<tr>
<td></td>
<td>(28)</td>
<td>(9)</td>
<td>(19)</td>
<td>(9)</td>
<td>(3)</td>
<td>(6)</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Not published</td>
<td>70.7%</td>
<td>62.5%</td>
<td>16.7%</td>
<td>8.33%</td>
<td>37.5%</td>
<td>10%</td>
</tr>
<tr>
<td></td>
<td>(41)</td>
<td>(16)</td>
<td>(24)</td>
<td>(12)</td>
<td>(8)</td>
<td>(10)</td>
<td></td>
</tr>
</tbody>
</table>

*Percentage of studies with positive results 81.3 per cent in a total of (16) studies may contain multiple studies on a single programme.

Note: HAZ = height-for-age; WAZ = weight-for-age.
Conclusions

Making the decision of how to target scarce resources to achieve SGD2 among particularly vulnerable populations should be based on the evidence on what works. The synthesis of the literature in this paper provides a starting point to answering the particular question of whether it is better to deliver physical assets and support for agriculture rather than pure cash transfers. We draw three main conclusions. First, the evidence base on cash transfers is substantially larger with almost three times as many articles examining nutrition, although this is mostly due to multiple studies on the cash transfer programme. There were only slightly more cash transfer programmes than agricultural programmes, with 52 and 44 programmes, respectively. The multiple studies do present one advantage in that they result in a great number of variables being covered for any one programme. It is not clear why there are more studies per programme for cash transfers than agricultural programmes. One possible explanation is that cash programmes have lower implementation and overhead cost than agricultural programmes, which could free up costs for longer surveys that include more detailed nutrition-related questions. It could also be that cash transfers require paying more attention to political acceptability and therefore must take greater care to make data publically available for researchers leading towards multiple papers.

Second, we show that both agricultural programmes and cash transfers can improve consumption of specific food categories and dietary diversity. The evidence is mixed in terms of the ability of cash transfers to improve the total value of food consumption with only two thirds of programmes showing positive and statistically significant impacts, although null results may be explained by small transfers or irregular payments. For agricultural programmes, a vast majority do not measure the value of food consumption, and when they do they are often unsuccessful. TUP shows strong impacts on total value of food consumption, but little in the way of improving dietary diversity or consumption of specific food categories. Third, we find weak evidence in terms of the ability of these programmes to improve anthropometric outcomes. This is not to say that there is no effect; it could be that the effects are small or studies are underpowered.

One limitation of the analysis of the agricultural programmes is the larger heterogeneity among programmes than of cash transfers. Agricultural support programmes range from seeds for home gardens to large asset transfers, which likely have different effects in terms of both pathways that influence nutrition and expected outcomes. One clear advantage of cash transfers is that, other than transfer size and conditionality, the programmes generally function similarly. In that sense, the cash transfer programme results may be more comparable with each other.
This analysis has the limitation of only being able to report on the outcomes and studies that we find. Outcomes with no impact may not be reported, and programmes that fail may not produce studies. In this case, we may be overestimating the extent to which these programmes are able to improve nutrition. A second limitation of this study is that we do not provide cost-benefit estimates of these programmes in terms of nutrition outcomes. Sulaiman et al. (2016) compare lump-sum transfers, livelihood programmes and graduation programmes (TUP) and find that lump-sum transfers provide the highest benefit to cost, although the authors caution that the number of lump-sum transfers is small and evidence of long-term impacts in all programmes is scant. However, to our knowledge, there is not a cost-benefit comparison of the programmes discussed in Sulaiman and traditional cash transfer programmes that pay regular small benefits. Banerjee et al. (2015) attempts to compare their cost-benefit analysis of the Targeting the Ultra Poor programme to the well-known cash transfer programme Give Directly; however, they note the difficulty in making a direct comparison due to the different evaluation lengths and the potential for impacts to vary by time. That said, a future review could potentially create cost-benefit measures using these evaluations and matching it to cost data, which is often not provided within evaluations.

From a policy perspective, it appears that both cash transfer and targeted agricultural support programmes can improve diet; however, the impacts on anthropometrics are not large enough to regularly yield statistically significant results. Returning to Figure 1, this suggests that either the improvement in food consumption is not sufficient to result in dramatic changes in anthropometric outcomes or that food may not be sufficient to result in these changes and that other factors such as sanitation might be considered.

The evidence on which approach might be better overall to achieve SDG2 cannot be clearly determined until more evidence is generated. The evidence is insufficient and quite mixed. It may be the case that under certain conditions one approach may be superior to another and more evidence is needed on the conditions under which programmes tend to be successful in achieving nutritional outcomes. As these programmes are scaled up nationally, representative groups can be analysed to measure programme impacts over the long term; for example, see the Andersen et al. (2015) study of the Peruvian cash transfer programme using the Young Lives Survey. Furthermore, in countries with both agricultural and cash transfer programmes there is the potential for comparison of different programme types.

Future research should also look to programmes such as Targeting the Ultra Poor to see if a combination of interventions (agriculture, cash and sanitation) is the final piece to improving anthropometric outcomes. There is great potential to grow the evidence base, as these programmes have been expanded to 50 locations in over 40 countries and are approaching the global reach of cash transfers (Fahey and Loiseau, 2016). Finally, the limitations to good nutrition vary from place to place, thus conducting a preliminary analysis or diagnosis of the factors that affect nutritional status can help to illuminate which programme elements are required in each environment.
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Appendix 1: Agricultural programme studies


Appendix 2: Cash transfer programme evaluations


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Leroy, J. L., Gadsden, P., Rodríguez-Ramírez, S. and De Cossío, T. G. (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. *The Journal of Nutrition*, 140(3), 612-617.


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