Effective Public Investments to Improve Food Security

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Introduction

The world has made considerable progress in reducing hunger over the last three decades. Since 1990, the proportion of undernourished people fell from 23.3 per cent to 12.9 per cent, almost achieving Millennium Development Goal 1 (MDG1) to halve the proportion of people suffering from hunger (United Nations, 2015). But hunger remains a major challenge for many countries, particularly in sub-Saharan Africa. In 2017, the Food and Agriculture Organization of the United Nations (FAO) reported that hunger levels rose from 777 million people in 2015 to 815 million people in 2016 (FAO et al., 2017).

In 2015, the international community made a commitment to end hunger as part of the 2030 Agenda for Sustainable Development, including the Sustainable Development Goals (SDGs). SDG 2 aims to "end hunger, achieve food security and improved nutrition and promote sustainable agriculture." Specifically, this commitment includes a target to "end hunger and ensure access to food by all" (Target 2.1).

The International Institute for Sustainable Development (IISD) and the International Food Policy Research Institute (IFPRI) recently published a report that found that it would cost on average an extra USD 11 billion per year on top of current public spending between 2015 and 2030 to achieve SDG 2. Donors need to provide USD 4 billion of the additional spending, and the remaining USD 7 billion needs to come from poor countries themselves (see Figure 1) (Laborde et al., 2016).

But what is the most effective and efficient way to spend the additional public money? And what does the evidence say about what works and what doesn't? These are the questions addressed in this policy brief. It is derived from a longer peer-reviewed article titled: *Can interventions in the agricultural sector improve food security? A Review of available evidence* (Bizikova et. al, under review).

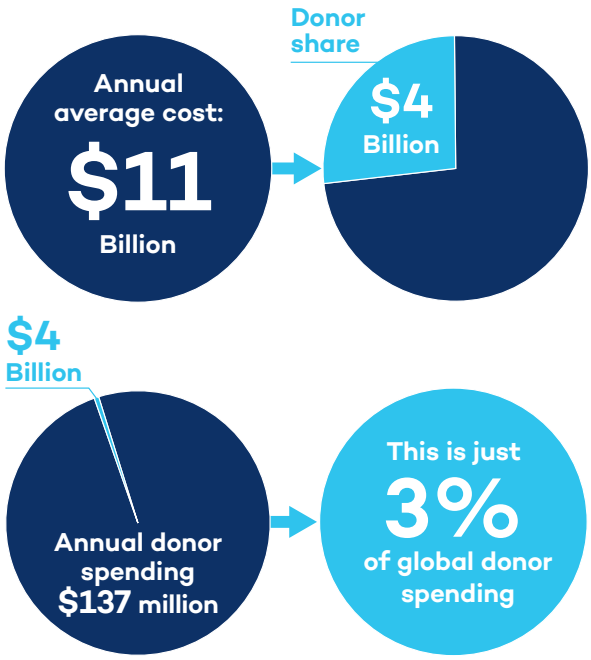

Figure 1. Ending hunger: what would it cost?
Source: Laborde et al., 2016.

What Are the Public Investments for Improving Food Security?

Public investments to improve food security can be placed into five broad categories: (1) social safety nets, such as food stamps and cash transfers, (2) support to farmers, through fertilizers and seeds, research & development, and extensions services, (3) rural development, such as electricity, education, and storage, (4) enabling policies, and (5) nutrition (see Figure 2).

This paper focuses on Category 2 and 3 interventions because 70 per cent of donor spending is allocated in these two categories (See Figure 3). Considerable research has been done on the impact of social safety nets (Category 1), such as cash transfers and food stamps, on poverty reduction and food security. Less has been done to assess the effectiveness of interventions to support farmers (Category 2) and invest in rural development (Category 3). As such, this policy brief contributes to the literature on the impact of public investments in Categories 2 and 3. It assesses the contribution of these agricultural interventions to food security and while doing so identifies the factors and situations that determine whether and under what conditions specific interventions have been successful.

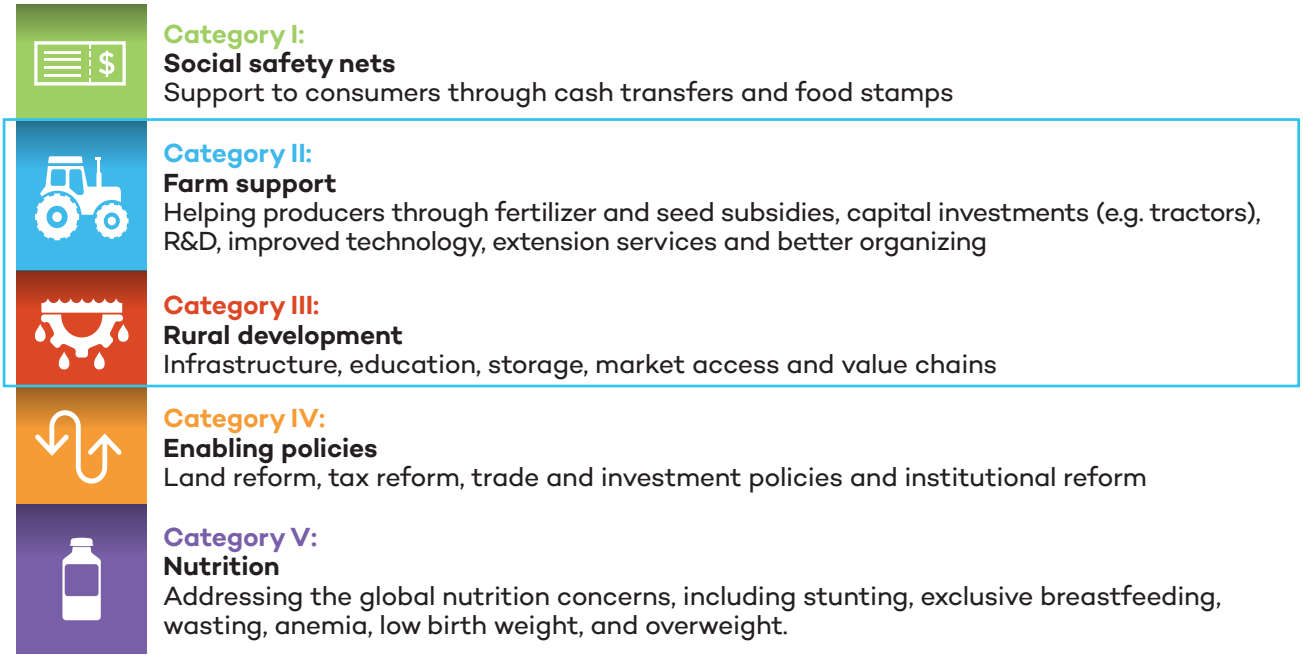

Figure 2. Five categories of spending & categories selected for study
Source: Laborde et al., 2016.

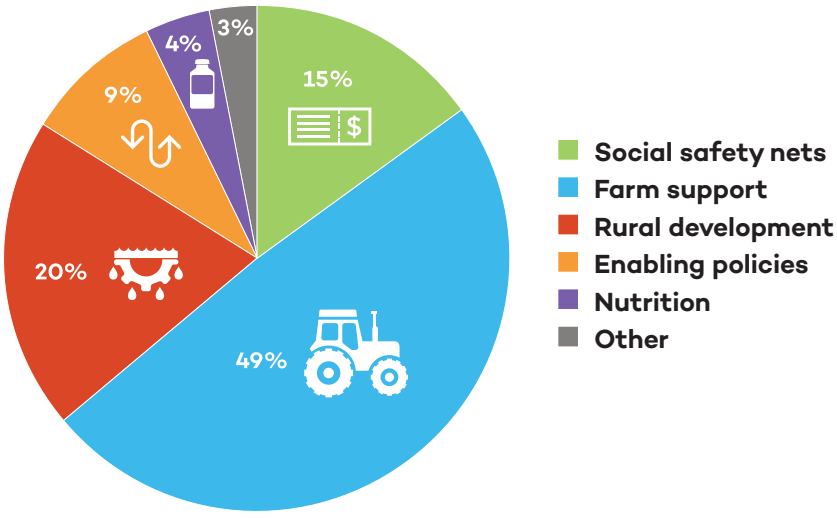

Figure 3. Donor allocations across the five categories of interventions to address food security and nutrition
Source: Laborde et al., 2016

The Approach

We conducted a systematic review of studies of the impact of Category 2 and 3 interventions in low-income and lower-middle-income countries in Africa and Asia published after 1990. We included only empirical studies that explicitly assessed impacts of interventions on food security. Building on recommendations of previous studies that have focused on cost effectiveness (Mogues et al., 2012; Bodnar, 2011) or specific target groups such as smallholders (Ton et al., 2013) or impacts such as improved nutrition (Masset et al., 2012), we focus on the direct and indirect impact of agricultural interventions on food security.

Table 1. Criteria for inclusion of the literature in the paper

Publishing year	**Publishing year 1990 or after (up to June 2017)**
Interventions focus	Studies focused on the following interventions from Categories 2 and 3 were included: input subsidies, food and cash transfers, extension services, credit access, value chains, market development and infrastructure. Food and cash transfers (Category 1) were also included in cases where they were linked to Categories 2 and 3 interventions.
Specific reference to food security	Only studies that used either a specific indicator or explicit assessment of food security benefits of the studied interventions were included.
Using empirical data to indicate impacts of interventions	Studies that collected empirical data on the impacts of the implemented interventions in the communities/villages/areas of implementations; or studies that assessed empirical data from other research (meta-studies).
Geography	Only studies focused on low-income and lower-middle income countries.

Characteristics of the Sample

The initial literature search yielded almost 200 papers (see Annex online). After a second screening for evidence of the impact of interventions on food security 69 publications were retained for in-depth analysis. Several studies evaluated multiple interventions, so our final sample contained 87 cases of agricultural interventions. The majority of the evaluations focused on Africa and Asia (see Figure 4), with a large number of cases focusing on a few countries. For example, Malawi accounts for one third of research conducted in Africa (17 of 48 cases), and India, Indonesia and Bangladesh account for two thirds of all cases in Asia (10 of 15).

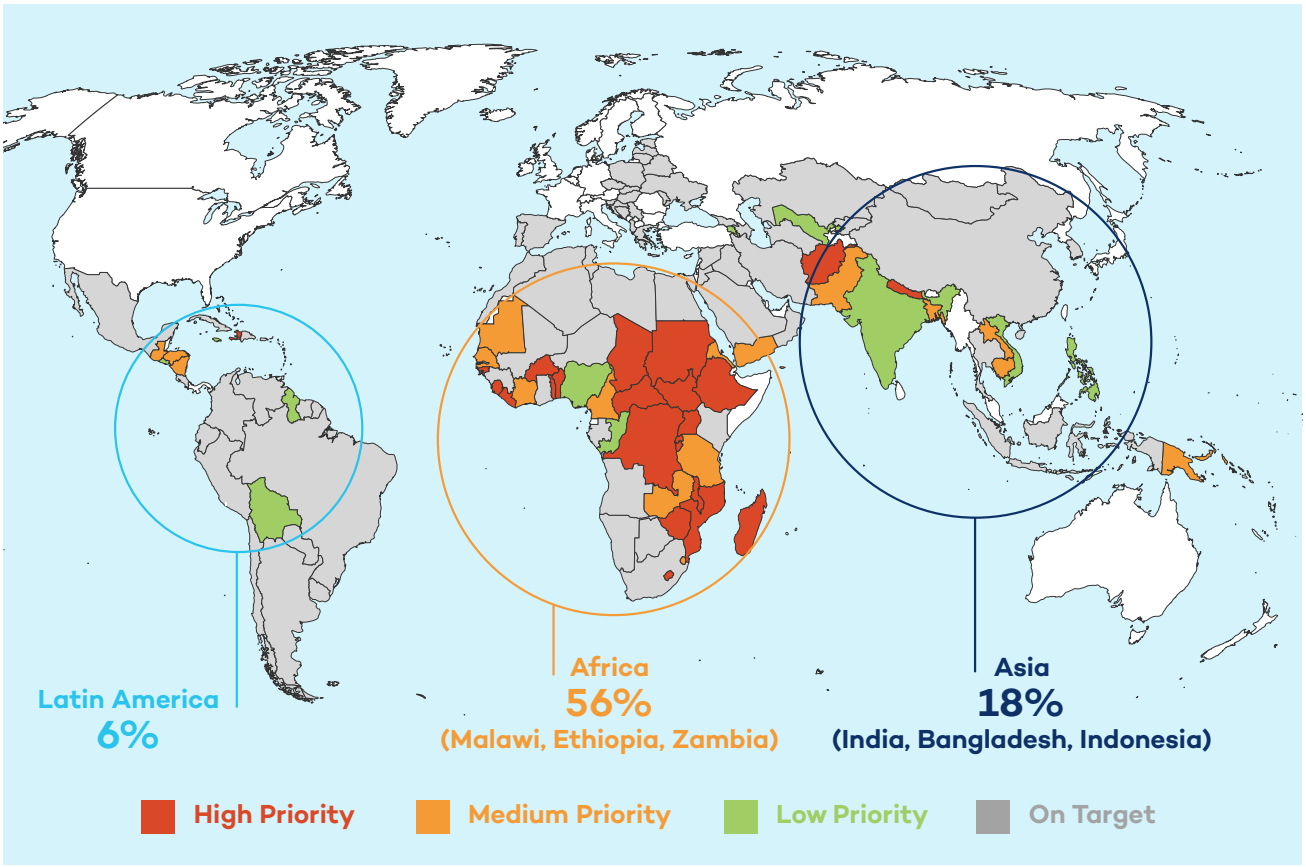

Figure 4. Geographical distribution of publications compared with priority countries for *Ending Hunger: What Would It Cost?*

A third of the cases studied used a direct food security indicator. These mostly covered food availability, such as caloric intake, food balance sheet or the number of days in a year during which a household had insufficient food. The remaining cases used a proxy indicator covering food access, such as grain output or household income. The low number of cases using direct food security indicators is due to the difficulty associated with collecting household-level data on food consumption.

The Findings

Almost 70 per cent of the 87 interventions studied were found to have a positive impact on food security. Only 7 per cent of the interventions were found to have a negative impact, while 24 per cent were found to have no measurable impacts (see Figure 5). A number of different types of interventions were studied ranging from access to credit, infrastructure projects, and fertiliser subsidies (see Table 2). Interventions that had a positive impact on food security were closely tied to the specific context and the implementation of the intervention MORE than the type of intervention. It is also important to note that our sample may be subject to "publication bias," because studies reporting positive results are published more often than those that have no impact or a negative impact.

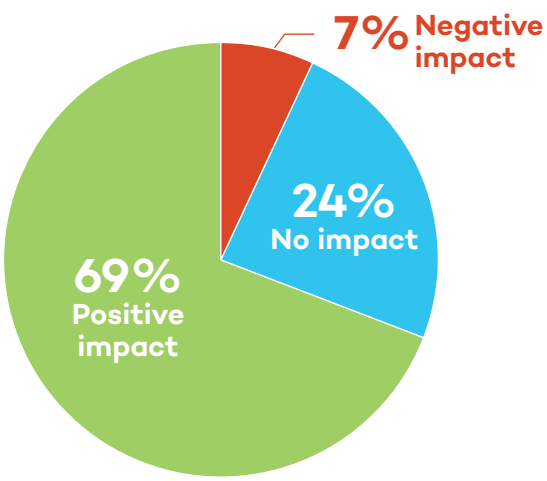

Figure 5. Overall impact of interventions

Table 2. Overview of the contributions to food security of intervention types in the studied cases

Intervention type	Cases	Impact		
		Positive	None	Negative
Input subsidy	27	19	5	3
Value chain development & market access	13	10	3	0
Extension services	12	8	3	0
Technology	8	6	2	0
Multiple agricultural interventions	7	6	1	0
Infrastructure	7	4	1	2
Direct transfer (Cash or Food)	7	5	1	1
Insurance	2	1	1	0
Education	2	1	1	0
Credit	3	0	3	0
Total	**87**	**60**	**21**	**6**

What Are the Most Effective Interventions to Improve Food Security?

The sample size for many of the interventions was too small to allow for in-depth analysis and conclusions on effectiveness. But, for three interventions—input subsidies, value chains and extension services—the samples were large enough for a closer look at the factors for success.

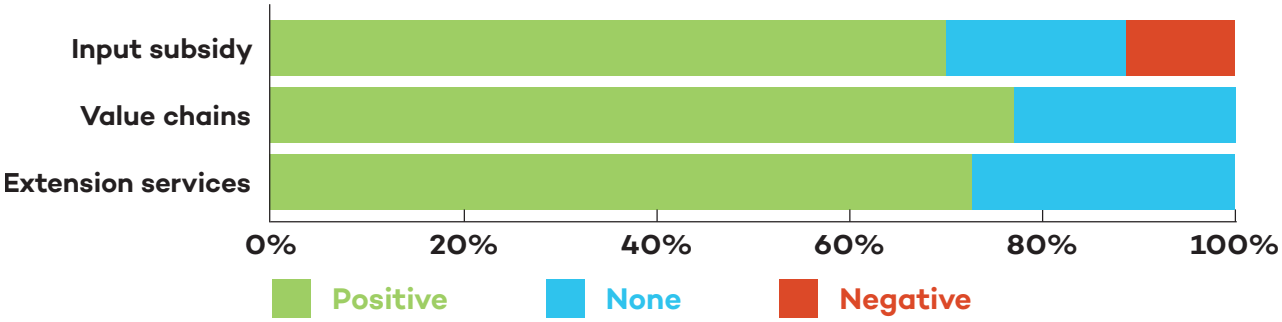

Figure 6. Effectiveness of the most researched interventions

1. Input Subsidies

Input subsidies seek to remove bottlenecks in production by making inputs such as seeds and fertilizers accessible to farmers who would otherwise not be able to afford them. To be effective, input subsidies require that farmers have access to productive assets such as land, machinery, irrigation and complementary inputs. Research has shown that households with more assets can benefit more easily from subsidized inputs than the poorest households (Ellis & Maliro 2013).

Successful cases generally report a positive impact on yields, productivity or household incomes, but show mixed impacts on food security. For example, a fertilizer subsidy program in Malawi successfully increased yields in poorer households, but the households were unable to store the additional grain, which in turn reduced the food security benefits (Javdani, 2012). A case from Zambia highlighted the importance of other factors, such as market infrastructure or the timing of fertilizer or coupon distribution, for the success of the subsidy program (Mason & Smale, 2013).

The cases that had no or negative impacts on food security underline the importance of equity effects. For several African countries and individual cases from Zambia and Indonesia, studies suggest that negative effects on equity more than offset the positive effect of overall yield increases on food security (Goyal & Nash, 2017; Mason, Jayne & Mofya-Mukuka, 2013; Gomez Osorio et al., 2011).

One strategy that improves the outcomes of input subsidies is combining them with other interventions. Two cases from Malawi showed that providing cash transfers to the poorest households overcame barriers to the uptake of subsidized fertilizer, leading to more effective outcomes (Ellis & Maliro, 2013; Kaplan et al., 2016). Another study evaluated a program that provided extension services alongside subsidized fertilizer, finding that extension enhanced the benefits of the subsidy. Surprisingly, the study also found that farmers who received only extension services achieved higher yields in the long run than farmers who received only subsidized fertilizer. The authors explained that these farmers were trained in strategies that do not depend on purchasing external inputs, such as manure management and organic farming techniques. When the fertilizer subsidy ended, those who only received fertilizers could not afford to purchase them, while the farmers trained in alternative farming methods could continue using their skills to improve yields (Leuveld et al., 2016).

2. Value Chains

Value chain interventions are diverse and complex addressing multiple stages of the path that food products take from the field to consumers, and intervening in the interplay of different activities of diverse actor groups far beyond the farm (Kaplan et al., 2016; Page et al., 2009; Chitundu, Droppelmann & Haggblade, 2009; Dias Pereira et al., 2016). Value chain promotion therefore often concerns a set of interventions that overlap with other categories, such as education or extension services. Core interventions included in this category focus on private sector development, market access, organization and institutions.

Value chain interventions often increased the availability and quality of food, if they focused on a diversity of locally consumed crops, and thus contributed to increased food production and reduced prices (Kaplan et al., 2016; Baker & Jewitt, 2007; Rutherford et al., 2016; Cleaver, 2013). However, as with input subsidies, participation in value chain interventions was easiest for those with access to productive assets. As a result, the poorest households were less likely to see improved food security (Kaplan et al., 2016; Dias Pereira et al., 2016).

Even when interventions did not significantly contribute to food security, they still provided some benefits in terms of price stabilization during shocks, increased small-scale investments and coordination between famers and processors (Quisumbing et al. 2014; World Bank 2012; World Bank 2010).

3. Extension Services

Extension services use diverse approaches to provide information and capacity building regarding cultivation, seed choice and storage, novel technologies, as well as support for addressing community and food security challenges. In the sample, there were no cases with negative impacts on food security.

In terms of positive contributions to food security, the following cases stand out: a combination of training for the effective use of high-yield seeds and the free distribution of such seeds in pilot projects in Uganda, (Pan, Smith & Sulaiman, 2015); peer-to-peer learning to acquire new agricultural management techniques in Kenya (Duveskog, Friis-Hansen & Taylor, 2011) and creating farmers' field schools in Tanzania (Larsen & Lilleør, 2014).

Extension services were most successful when using collaborative approaches with the target community, directly addressing food security as part of the services provided, and taking into account other community challenges such as access to credit and participation in decision-making (Pan, Smith & Sulaiman 2015; Duveskog, Friis-Hansen & Taylor 2011; Leuveld et al., 2016; Larsen & Lilleør, 2014). Extension services that focused on production, planting choices or market access without a broader concern for the community context were less likely to produce a positive impact on food security (Jaim & Akter, 2016).

Conclusions and Recommendations

Public investment in agriculture has a positive impact on food security. Almost 70 per cent of the 87 agricultural interventions studied for this paper were found to have a positive impact on food security. Only 7 per cent of the interventions were found to have a negative impact, while 24 per cent were found to have no measurable impacts. The most robust evidence comes from research on the effectiveness of input subsidies, value chain development and extension services.

Input subsidies, for example, were effective where farmers had access to productive assets such as land, machinery and irrigation. In these cases, the subsidies led to improvements in yields, productivity and household incomes. Improvements in market access and value chains increased the availability and quality of food, especially when they focused on a diversity of locally consumed crops. And investment in extension services were most successful when there was collaboration with the target community, directly addressing food security as part of the services provided, and taking into account other community challenges such as access to credit and participation in decision-making.

A key message is that improved food security is often the result of multiple, well-designed interventions. The success of the studied agricultural interventions depended more on the context in which they were implemented rather than the type of intervention. For example, the cases in which interventions had no or negative impacts on food security, the reason for failure was often the lack of consideration of broader community challenges, gender inequality and wealth inequity. Successful interventions, on the other hand, stressed the importance of prior analysis or baseline assessment. Therefore, the focus should be less about finding the right intervention and more about ensuring that interventions are designed and implemented with the particular context in mind.

Four recommendations from the research can help future planning for public investment in food security:

1. Include direct food security indicators into the design, testing, implementation and evaluation of interventions to enable better tracking of food security outcomes and their attribution to specific interventions.
2. Conduct rigorous baseline assessments to understand the local context and uncover specific conditions that could have a significant impact on the success or failure of the planned interventions. This includes considering the potential impacts of combined interventions such as input subsidies and cash transfers to build on complementarity.
3. Improve the methodological approaches for evaluating impacts of interventions to ensure effective communication of lessons learned to enable continuous improvement by the donor community, local and international implementation organizations and governments.
4. Where feasible, evaluations should include cost-benefit comparisons of interventions or other methods to assess efficiency.

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