



The effects of food systems interventions on food security and nutrition outcomes in low- and middle- income countries

The devastating impacts of malnutrition and food insecurity are well documented. In low- and middle-income countries (L&MICs), constraints and complexities within food systems are significant drivers of these conditions. As a result, there has been a significant global focus on improving food systems to facilitate better food security and nutrition outcomes. The evidence base regarding the impact of interventions within food systems in achieving these aims is massive, but complicated and disorganised, making it difficult for donors, policymakers and practitioners to navigate.

To address this challenge, the International Initiative for Impact Evaluation (3ie), with support from Innovative Methods and Metrics for Agriculture and Nutrition Actions, was commissioned by Deutsche Gesellschaft für Internationale Zusammenarbeit to develop an evidence gap map (EGM) providing an overview of the literature relating food systems interventions to food security and nutrition outcomes in L&MICs. 3ie adopted an interdisciplinary approach to organise this siloed body of literature, with the goal of facilitating future discussion. This work can serve as a starting point for evidence-informed decision-making, investing in further synthesis and knowledge translation, and the efficient use of resources.

Highlights

- This is 3ie's largest EGM, including over 2,000 studies. It represents a rich body of evidence in an accessible format.
- Several widely implemented interventions are not well researched, allowing for the potential for negative consequences and the inefficient use of funds.
- Women are traditionally major actors within food systems; however, we identified relatively few studies that examined interventions supporting women's decision-making or measured outcomes regarding women's empowerment.
- Larger interventions, which impact more people, are less commonly studied. The vast majority of evaluations took place at the local and subnational level, resulting in less evidence on national and transnational interventions.
- There is a strong focus on randomised trials. Mixed-methods approaches and those considering cost evidence are severely underrepresented in the literature.



Main findings

A total of 2,035 studies were identified for inclusion: 178 systematic reviews and 1,838 impact evaluations. There has been a rapid increase in the number of studies published since 2000, with the largest increase in interventions aiming to improve the food supply chain or consumer behaviour within food systems. Impact evaluations were primarily located in Sub-Saharan Africa (33%), South Asia (20%), and East Asia and the Pacific (17%). Over half were conducted in rural areas.

Most interventions were examined by at least one impact evaluation. The most common interventions, with over 100 impact evaluations each and at least 20 systematic reviews, focused on the provision of supplements, fortification, classes, peer support and counselling targeting consumer behaviour, and direct provision of food. Future research in these areas could assess effects on different populations, examine the intermediate steps in a theory of change (either quantitatively or as part of an impact evaluation), or test assumptions that underpin theories of change as part of an impact evaluation or systematic review.

Several interventions, including some that have been widely implemented, have weak evidence bases.

We did not identify any impact evaluations related to advertising regulations, food waste education programmes or packaging of food. In addition, some intervention categories had fewer than five studies, including: food safety regulations, cold chain initiatives, composting education, labelling regulations, private food donation, door-to-door behaviour change campaigns, provision of goods or services to support food processing, on-farm and post-harvest processing, and access to pesticides. We also identified relatively few studies that examined interventions supporting women's decision-making or measured outcomes regarding women's empowerment, despite women traditionally being significant actors within the food system.

Interventions relating to agricultural extension, agricultural information provision, government manipulations of price, and agricultural insurance had many impact evaluations but only one or no systematic reviews, allowing for evidence synthesis opportunities. Several widely

implemented interventions, such as those related to labelling and advertising regulations and governmental price manipulations, have relatively weak evidence bases. Due to their reach, evaluations of these programmes are needed.

Few studies evaluate national and transnational interventions.

Most impact evaluations were conducted at a local and subnational level. Consequently, there is less evidence on national and transnational interventions. Local programmes, whilst important, do not require the resources of national and transnational programmes, nor do they affect as many people. As both resources and reach increase, the ethical imperative for evaluations also increases because the potential harm is larger. The gap in the evaluation of national and transnational interventions is likely driven by a tendency to rely on randomised controlled trials within this literature. Roughly three quarters of impact evaluations implemented randomised designs. Although evaluations of these large-scale interventions can be difficult because randomisation is not practical, quasi-experimental designs can be employed.

Few studies report cost-effectiveness evidence and implement mixed methods.

A minority of studies contextualised effect sizes using qualitative analysis or conducted a cost analysis. Cost and qualitative analysis evidence is necessary to understand how limited resources can be best allocated and the mechanisms through which changes may occur, respectively. Qualitative information can also help to determine whether impacts might vary by population or setting and improve our understanding of the theory of change.

Few studies consider outcomes along the theory of change.

The most common final outcome categories were anthropometric, micronutrient status, and diet quality and adequacy outcomes. The most common intermediate outcome categories, which fall along the

causal chain between interventions and nutrition or food security, were economic, agricultural and intrinsic motivational outcomes. However, outcomes related to the location of foods in stores; climate impact; non-food waste produced; import/export; agricultural cooperative performance; women's self-esteem; food spoilage or loss; and economic, social and political stability were evaluated in fewer than five studies.

Studies that only evaluated final outcomes accounted for just over half the evidence base, while just over one quarter of studies considered intermediate outcomes only. One fifth of studies investigated both intermediate and final outcomes. Conducting more studies that consider multiple steps along the causal chain could result in a deeper understanding of the theory of change and the development of more efficient programmes.

The quality of available systematic reviews is increasing.

Unfortunately, 54% of completed reviews scored a low confidence rating, 26% scored a medium confidence rating and just 19% were rated as high confidence. However, the latter reviews were primarily published after 2014, indicating recent improvement. These reviews commonly focused on synthesising the effects of supplementation and fortification interventions. Meta-analysis was the most common synthesis method, and most systematic reviews sought to understand how effects might vary between different groups. Stakeholders are encouraged to reference high-quality systematic reviews before implementing interventions. If no such relevant reviews are available, it may be necessary for such a review to be conducted to ensure the responsible use of resources.



Promising areas for future research

Although this EGM is a reference tool to help stakeholders identify relevant literature, it also serves as a starting point in the discussion of how to build the evidence base. There is significant opportunity for future systematic reviews and impact evaluations based on the gaps identified here. We suggest several key areas where future work could be useful; however, stakeholders are encouraged to consider their own priorities and interests when considering this tool.

Interventions

- Government manipulations of price
- Advertising and labelling regulations

- On-farm, post-harvest processing
- Interventions to support food packaging
- Efforts to support women's empowerment within the food system
- Innovative store design
- Cold chain storage

Outcome

- Women's empowerment
- Economic, social and political stability
- Food loss
- Environmental impacts of the food system
- Measures of diet insufficiency

Synthesis opportunities

- Agricultural extension and information-sharing activities within the food value chain
- Provision of free or reduced-cost farm inputs to crop production
- Educational approaches within the food value chain
- Agricultural insurance products
- Outcomes related to other diet quality and adequacy measures

Using the evidence gap map

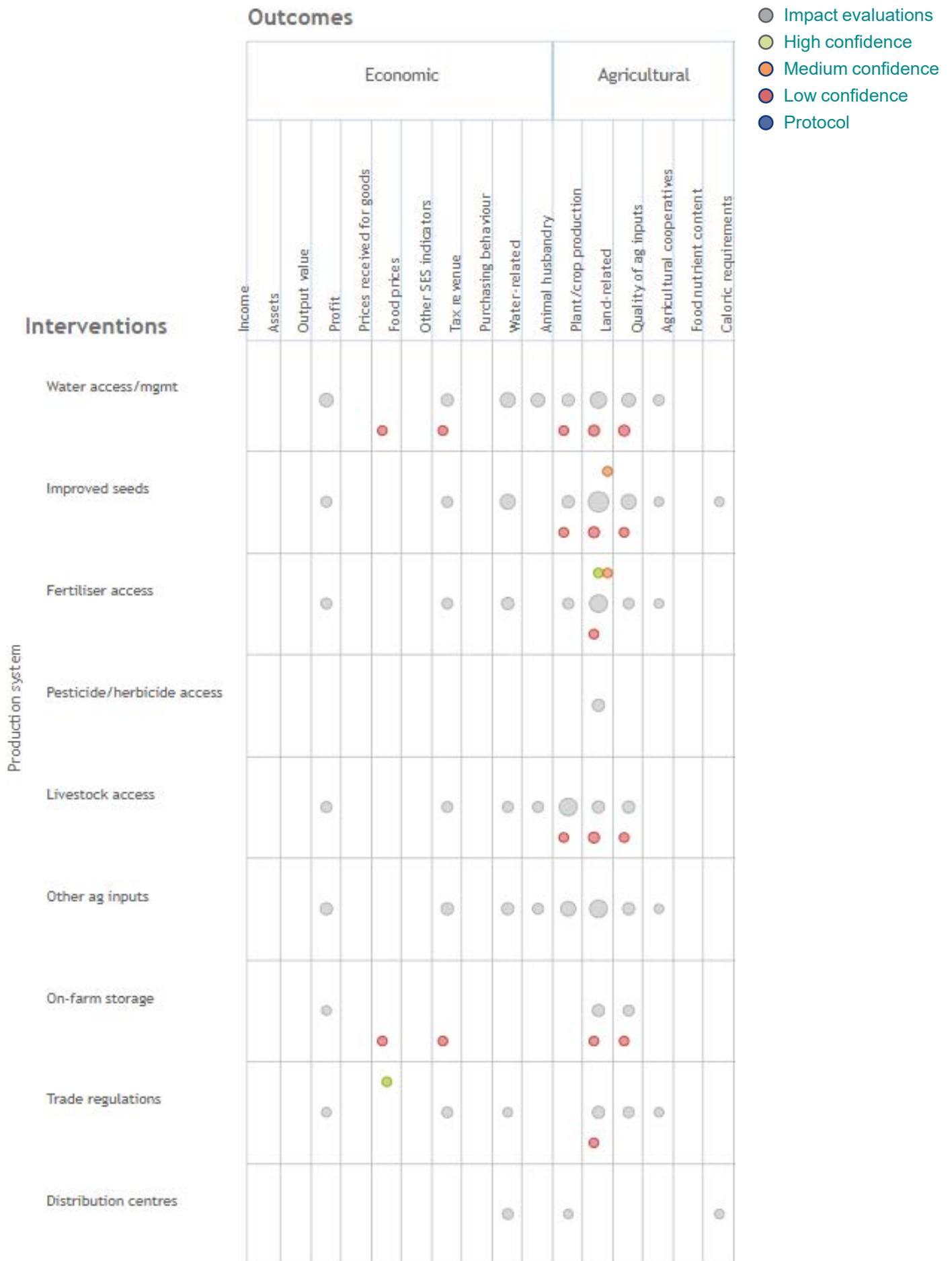
We present the results graphically on an interactive online platform.¹ The main framework is a matrix of interventions and outcomes, with grey and coloured circles representing impact evaluations and systematic reviews. The systematic reviews follow a traffic-light system to indicate confidence in their findings: green for high, orange for medium, red for low. The colour blue indicates that the study is ongoing. The size of the bubble indicates the relative size of the evidence base for that intersection of intervention and outcome. The interactive aspect of the EGM allows users to filter the results based on key variables, thereby facilitating efficient, user-friendly identification of relevant evidence. The evidence can be filtered by region, country, sex, age, setting, study design, mixed methods and cost evidence.

What is a 3ie evidence gap map?

3ie evidence gap maps are collections of evidence from impact evaluations and systematic reviews for a given sector or policy issue, organised according to the types of programmes evaluated and the outcomes measured. They include an interactive online visualisation of the evidence base, displayed in a framework of relevant interventions and outcomes. They highlight where there are sufficient impact evaluations to support systematic reviews and where more studies are needed. These maps help decision makers target their resources to fill these important evidence gaps and avoid duplication. They also facilitate evidence-informed decision-making by making existing research more accessible.



Food Systems and Nutrition Evidence Gap Map



* This image shows only a part of the Food Systems and Nutrition EGM. For the full map, please visit the [website](#).



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About this map

This brief is based on the report *The effects of food systems interventions on food security and nutrition outcomes in low- and middle-income countries*, by Nick Moore, Charlotte Lane, Ingunn Storhaug, Amber Franich, Heike Rolker, Josh Furgeson, Thalia Sparling and Birte Snilstveit. The

authors systematically searched for published and unpublished studies and reviews that took place between 2000 and mid-2020, and then identified, mapped and described the evidence base on food system interventions evaluating the effect on food security and nutrition outcomes in

L&MICs. The map contains 1,738 completed and 100 ongoing impact evaluations, and 175 completed and 3 ongoing systematic reviews. The characteristics of the evidence are described and mapped according to a framework of 49 interventions, 48 intermediate outcomes and 26 final outcomes.

Endnotes

¹Available at: <https://www.3ieimpact.org/evidence-hub/evidence-gap-maps> [Accessed 28 October 2020].



The International Initiative for Impact Evaluation (3ie) promotes evidence-informed, equitable, inclusive and sustainable development. We support the generation and effective use of high-quality evidence to inform decision-making and improve the lives of people living in poverty in low- and middle-income countries. We provide guidance and support to produce, synthesise and quality-assure evidence of what works, for whom, how, why and at what cost.

For more information on 3ie's evidence gap maps, contact info@3ieimpact.org or visit our website.

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