

## Food Systems and Nutrition Evidence Gap Map

### Update #4 (April 2022 – December 2022)

#### Highlights

- We added 72 studies to the EGM (70 impact evaluations and two systematic reviews), taking the total to 2267.
- Most new studies focused on the food supply chain (n = 50), specifically the production system (n = 46). There were 12 new food environment studies and 11 consumer behaviour.
- There has been a shift in most common outcomes to agricultural (n = 26), economic (n = 22), and anthropometric (n = 13). In the original EGM the most common outcomes were anthropometric and in the last three updates diet quality and adequacy have been the most common.
- More studies are considering national and transnational programs, with an increase from 9 per cent in the original map to 24 per cent in the current update.
- Four studies address previously identified gaps, three studies on women's empowerment intervention and/or outcomes, and one study on climate impact outcome.
- There was a large increase in quasi-experimental designs from 20 per cent in original to 64 per cent in this update.

**Table 1: Studies added to the EGM**

Interventions	Studies and protocols added (studies previously included)
Total studies	72(2195)
Food supply	50(949)
Food environment	12(767)
Consumer behaviour	11(631)
Common multi-component	1(105)
<b>Previously identified gaps</b>	
<i>Illustrative list of interventions to priorities for evaluation</i>	
Government manipulations of price	0(25)
Advertising and labelling regulations	0(3)
On-farm, post-harvest processing	0(4)
Interventions to support food packaging	0(0)
Efforts to support women's empowerment within the food system	2(21)
Innovative store design	0(5)

Interventions	Studies and protocols added (studies previously included)
<i>Illustrative list of outcomes to priorities for evaluation</i>	
Women's empowerment	3(50)
Economic, social, and political stability	0(4)
Food loss	0(3)
Environmental impacts of the food system	1(3)
Measures of diet insufficiency	0(30)
<i>Illustrative list of evidence synthesis priorities</i>	
Provision of free or reduced-cost farm inputs to crop production	0(9)
Educational approaches within the food value chain	0(8)
Agricultural insurance products	0(1)
Outcome related to other diet quality and adequacy measures	0(24)

## Background

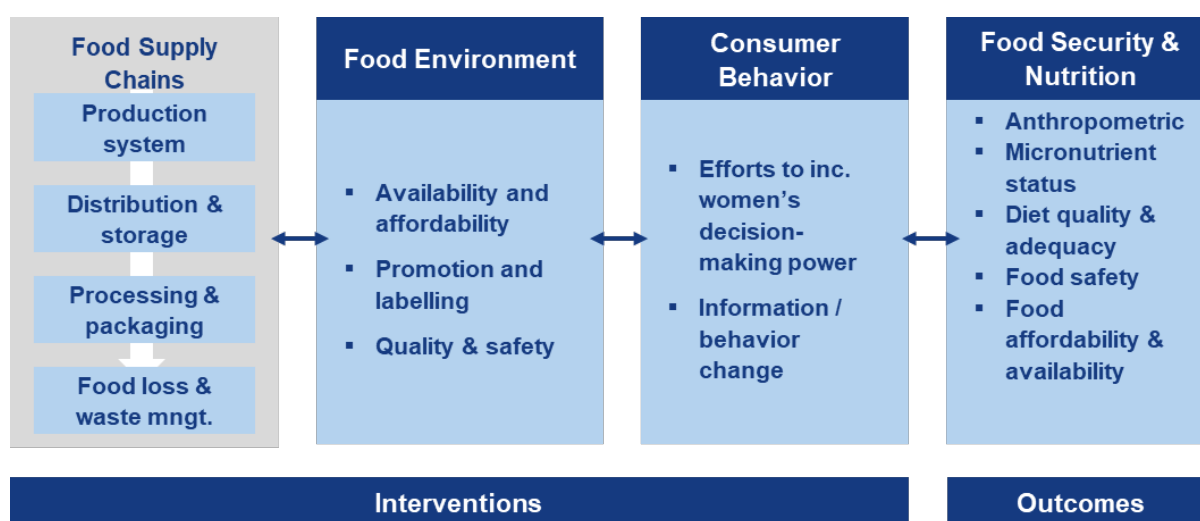
Although the discussion of the effect of the “three Cs” (COVID, climate, and conflict) began at the UN Food Systems Summit, the [Russia-Ukraine conflict in February 2022](#) brought these into sharp focus. The three Cs interact with the “five Fs” (food, fodder, fertilizer, finance, and fuel) to produce potentially devastating effects. To mitigate the effects of, and eventually recover from, these shocks, we need to know what interventions are effective at improving food security and nutrition, who they work for, and what they cost. This has been a longstanding need and one that 3ie has been working to address. With support from BMZ through GIZ’s “Knowledge for Nutrition” programme, 3ie completed an [Evidence Gap Map \(EGM\)](#) on Food Systems and Nutrition in January 2021. The EGM presents all impact evaluations and systematic reviews of interventions in low- and middle-income countries (LMIC) that function within food systems and measure outcomes related to food security and nutrition.

The map has the dual purpose of serving as a collection of the available evidence and a presentation of knowledge gaps. The EGM acts as a global public good to inform the efficient allocation of resources. It makes existing evidence more easily available to decision-makers, funders, and researchers. To fill knowledge gaps identified through the EGM, we used these maps to produce a rapid evidence assessment on [women’s empowerment interventions in food systems](#) and a systematic review on [fiscal policies for healthy diets](#).

The EGM uses an adapted version of the framework from the High-Level Panel of Experts on Food Security and Nutrition ([HLPE](#)) from 2017 to conceptualise the food system, separating it into the three dimensions: (i) food supply chain, (ii) food environment, and (iii) consumer behaviour (Figure 1). With over 1,800 impact evaluations and 170 systematic reviews included, the original EGM was 3ie’s largest to date.

The evidence base is rapidly expanding. To ensure that the EGM remains a useful and current tool, we developed it into a living EGM. What this means in practice is that we continuously monitor newly published studies, adding them to the EGM as they are identified. In doing so it ensures that the most recent research remains available to stakeholders and keeps them up to date on the latest evidence. This report presents our analysis of the studies published from April to October and discusses changes in the evidence base over this period.

**Figure 1: Conceptual framework and theory of change for the Food Systems and Nutrition Evidence Gap Map**



Source: 3ie (2020). Adapted from HLPE (2017).

## Methods

### Search strategy

To populate this EGM, we drew from three sets of searches. First, we re-ran the searches in the [original EGM](#). The search strings used and the databases searched were identical to those in the original EGM, with the exception of correcting a syntax error in the strings for one database (Scopus). Second, we also re-searched grey literature sources included in the original EGM. Third, we screened items retrieved in the searches for 3ie's [Development Evidence Portal](#)—a database of impact evaluations and systematic reviews across sectors in international development—for relevance to this EGM. Monthly “evidence surveillance” searches are used to populate the Development Evidence Portal. As there is considerable overlap in the inclusion criteria for the Portal and this EGM, pooling these search strategies reduces overall workload and allows more articles to be screened. However, no studies returned from the Portal search and not the EGM search were included in the first update. Therefore, we do not expect that this pooling of the search results affected the number of studies identified.

The most recent Development Evidence Portal and EGM-specific searches were run in October, covering the period since the previous searches. The search for grey literature was last completed in January 2022. Relevant studies from these searches are included in the present update.

### Screening

The same process for screening was employed in this update as in the original EGM. Records retrieved through the searches were uploaded into the EPPI-Reviewer 4 software. An automated process within the software was applied to remove duplicates. We applied a machine learning classifier, developed during the original EGM, to these search results, and screened abstracts with a priority score of 30% or above. We also applied a second classifier developed with Development Evidence Portal screening data to the EGM search results and screened those scoring 30% or above.

Title and abstracts of all imported, deduplicated, and prioritized studies were screened by a single consultant against inclusion/exclusion criteria. If screeners were uncertain about inclusion, the study was screened by a senior reviewer.

The full texts of studies that met title and abstract criteria were screened by a single consultant, with the same option to request a second opinion by a senior reviewer in case of uncertainty. All consultants conducting full text screening had conducted screening for the original EGM.

We conducted some data checks and re-screening in November 2022 to ensure the quality and consistency of the map. During this process, 27 studies previously included were identified as excludes and removed from the dataset. Generally, this decision was made because the studies evaluated the adoption of agricultural techniques rather than interventions themselves. For example, studies which quantified the impacts of using improved seeds without the context of an intervention to support the adoption of improved seeds would be excluded. In addition, 19 additional studies were found during these checks. Three of these were first identified through the search for the original map and are not considered to be part of the update. However, the remaining 16 would have been identified during the update period and are reflected in this update note.

### Data extraction, analysis, and presentation of results

Data extraction and analysis procedures were identical to those of the original EGM. Results are presented graphically on the 3ie interactive [online](#) platform. This report presents updated figures, illustrating the evolution of the evidence base.

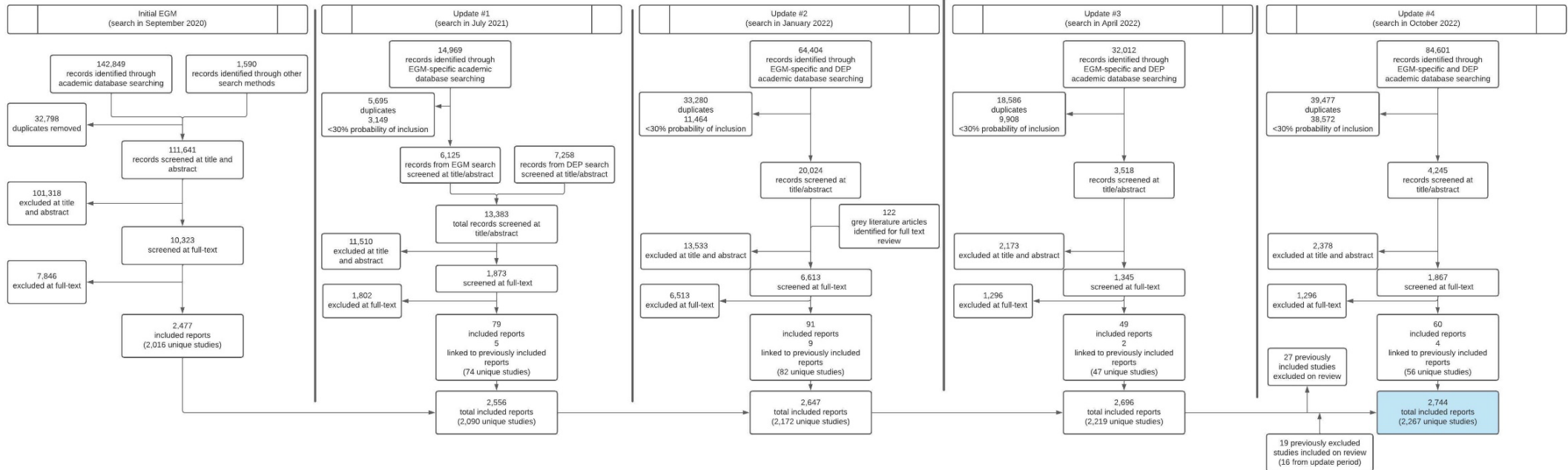
### Results

Our search retrieved 84,601 records (Figure 2). We removed 39,477 duplicates. We also removed 38,572 which were identified as having low probability based on the classifier in EPPI-Reviewer 4. Therefore, 4,245 abstracts were screened. During title and abstract screening, 2,378 articles were excluded, leaving 1,867 to be screened at full text. Finally, 60 relevant articles were eligible for inclusion, four of which were linked to other articles and did not represent unique studies. Therefore, we added 56 unique studies from this search and the additional 16 from previous updates: 70 impact evaluations and two completed systematic review. Of included studies, 9 reports were published before 2022 but added to the databases searched in a delayed manner. The remainder of the newly included studies were published in 2022.

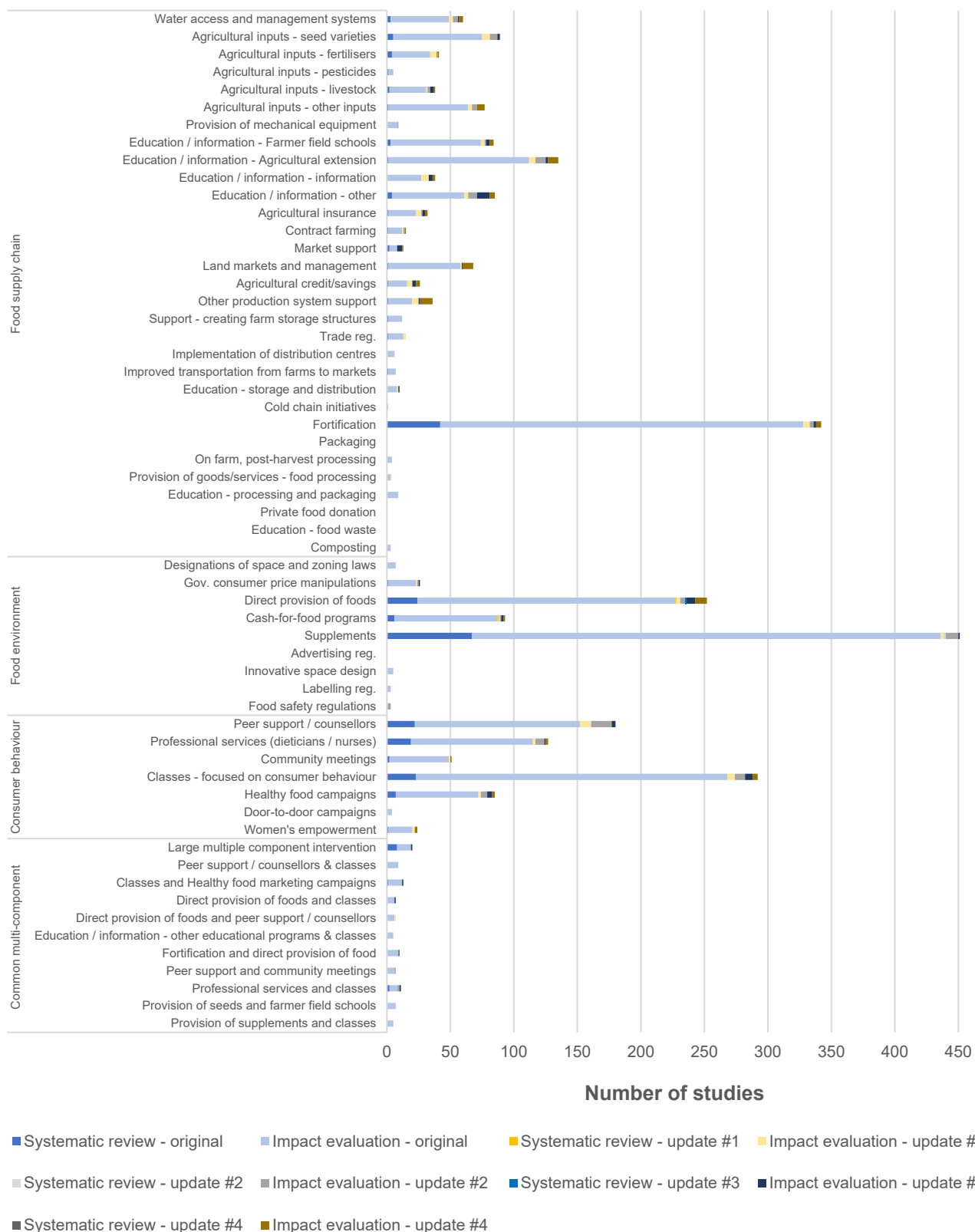
The food supply chain is still the most common intervention domain considered in impact evaluations (Figure 3,  $n = 49$ ). The most common intervention considered in impact evaluations is “other” improvements of the production system ( $n = 9$ ) with a diverse set of programmes from vaccinations to farmland development projects. This was followed by impact evaluations of agricultural extension programs and land markets and management ( $n = 8$  each). Six of the eight evaluations of land markets and management considered the impacts of China’s switch from village-level land ownership to households property rights. Fortification studies have consistently been some of the most common, and we added four new impact evaluations to the map.

Impact evaluations of interventions within the food environment ( $n = 12$ ) and consumer behaviour ( $n = 11$ ) are less prevalent. Within the food environment there is a focus on direct provision of food ( $n = 9$ ). There is only two new evaluations of the provision or use of supplements, representing a large decrease in the focus on this intervention since we first published this EGM. The consumer behaviour studies are spread roughly evenly between four common interventions, nutrition classes ( $n = 4$ ), community meetings ( $n = 1$ ), healthy good social marketing ( $n = 2$ ), and professional services ( $n = 2$ ). Two studies evaluated a women’s empowerment intervention, filling a gap previously identified.

**Figure 2: PRISMA**

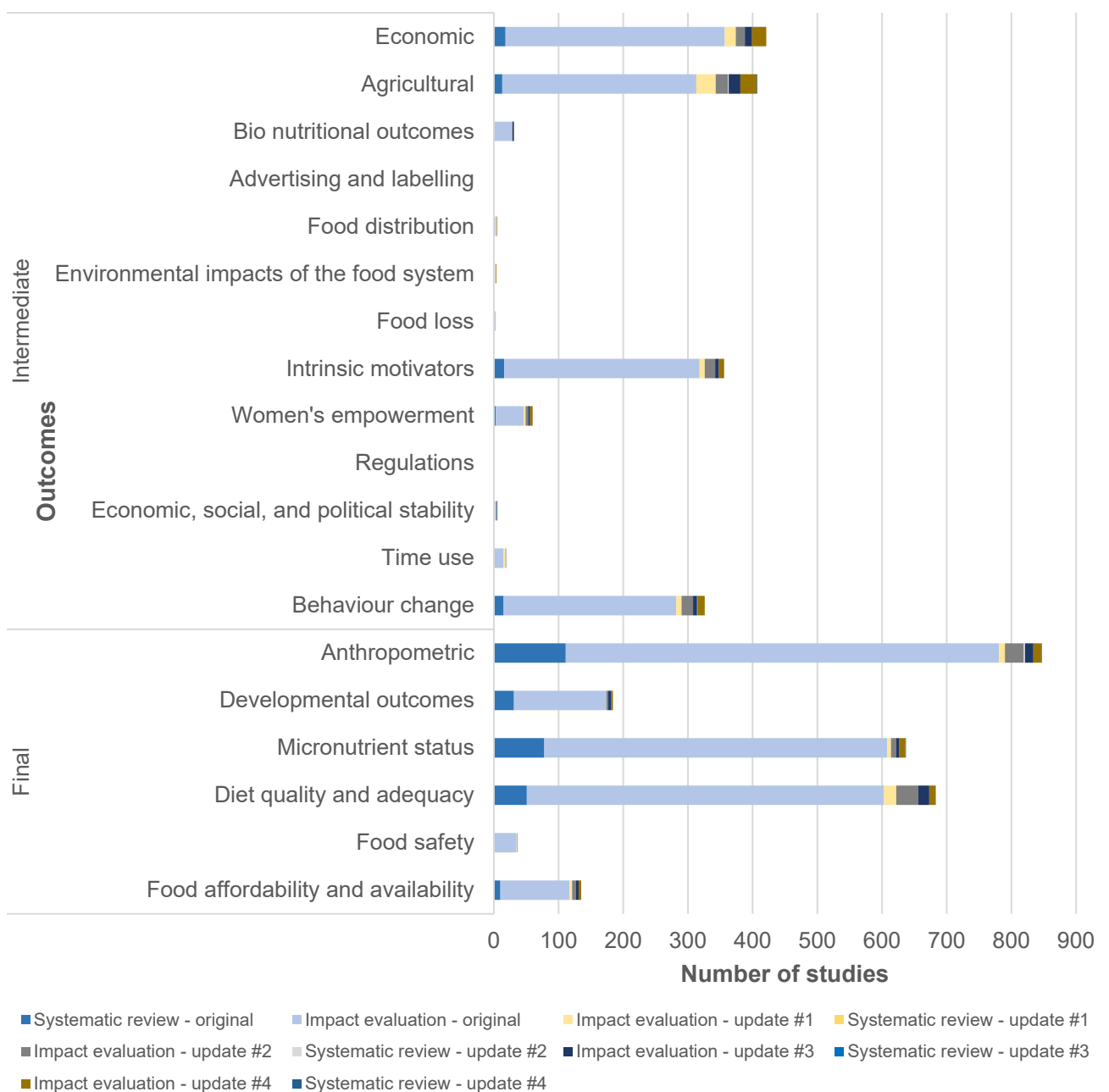


**Figure 3: Distribution of included studies by intervention domain and subdomain**



Most impact evaluations considered agricultural (Figure 4; n = 25), economic (n = 22) or anthropometric outcomes (n = 12). In particular, the main agricultural outcomes were plant/crop production (n = 14) and quality of agricultural input (n = 10). Income was the most common economic outcome (n = 13). Previous updates identified diet quality and adequacy as the most common outcome group while in the original EGM the largest outcome group was anthropometric measures. Four studies filled gaps related to outcome measurement: three measured women empowerment outcomes and one environmental impacts of the food systems.

**Figure 4: Distribution of included studies by outcome domain**



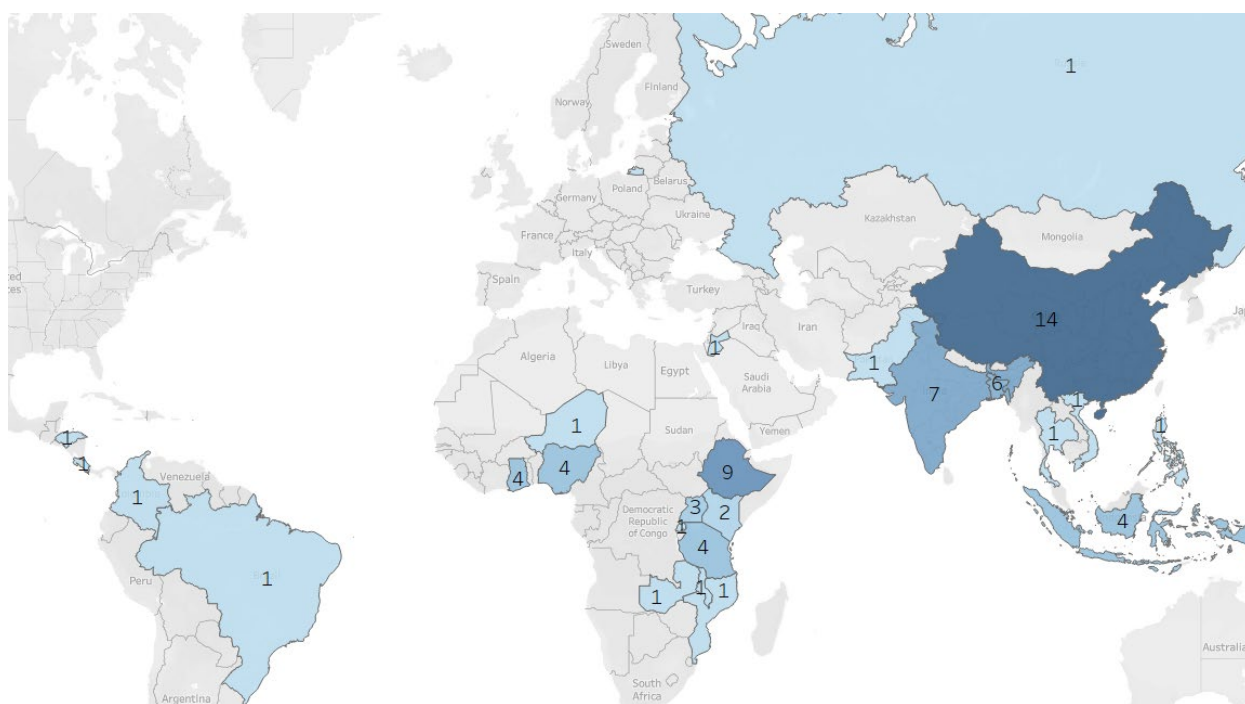


The proportion of impact evaluations adopting experimental designs has decreased considerably since the original EGM: 80 per cent in original, 63 per cent in update three and 36 per cent in this update. Most studies for this update have used quasi-experimental designs (n = 45), mainly fixed effects (n = 20) and statistical matching (n = 20) as main method. China was the country with most impact evaluations (Figure 5; n = 14), followed by Ethiopia (n = 9), India (n = 7), and Bangladesh (n=6). No other country had more than four impact evaluations carried out.

More studies are considering national and transnational programs, with an increase from 9 per cent in the original map to 24 per cent in the current update. We find 14 new impact evaluations on national interventions and three on trans-national programs. Four of the national evaluations considered changes in land rights in China and one considered inheritance rights in India. Three were other forms of agricultural production programs: support for rice intensification in Vietnam, a farm subsidy in Malawi, and an illegal crop substitution program in Colombia. Three were transfer programs: school meals in Thailand and Nigeria and cash transfers in Bangladesh. One study considered national fortification initiatives globally, and another trade regulations in Russia. One of the transnational programs involved the exchange of seeds between seed banks in east Africa. The second one looked at the effect of irrigation program in Ethiopia and Tanzania. The third was a program coaching couples in farming in East Africa.

The systematic reviews are related to veterinary interventions for livestock and micronutrient fortified complementary foods. These are rated as being of low and medium confidence respectively.

**Figure 5: Distribution of included impact evaluations by country**



### Discussion

Through our first living EGM we continue to provide researchers and decision-makers with the most up to date evidence on food systems and nutrition. We monitor if gaps in the evidence base have been filled or the research focus is changing. New studies are made available through the interactive version of the EGM. The map is now being leveraged to provide other analytical outputs and facilitate evidence uptake. We used these maps to produce a rapid evidence assessment on [women's empowerment interventions](#) in food systems and a systematic review on [fiscal policies for healthy diets](#). We have an ongoing rapid evidence assessment examining the impacts of agricultural interventions 10 years or more after the projects began.

In past updates we have started to see a reduction in the focus on experimental designs. The included studies in this update demonstrate a shift to majority quasi-experimental designs. This reflects an ongoing shift towards matching the methods to the research question rather than allowing the methods to drive the research questions that are asked. The evaluation of national and transnational policies through quasi-experimental work was noticeably more common in this update relative to past updates, increasing from 9 per cent in the original map to 24 per cent in this update. However, the geographic focus is the same as most of the previous updates with China, Ethiopia and India being the countries with the most interventions evaluated.

Four new studies evaluate interventions and/or outcomes identified as gaps in the original EGM. We added one new study measuring environmental outcomes. This study evaluated the effect of a farmer field school on sustainable agriculture (Bhuiyan and Maharjan, 2022). They found that the intervention both increased farmer income and protected the environment by reducing pesticide use.

One national study considered the effects of women's empowerment through laws allowing Indian women to inherit their parents' ancestral property (Ajefu et al, 2022). The evaluation showed positive effects on child health nutrition outcomes and found some positive effect on women's decision making.

The studies considering the effect's of China's land certification program generally found positive effects on agricultural labour allocation and agricultural efficiency (Sun et al., 2022; Zhao & Guo, 2022; Cong, 2022). The program also improved the welfare of farmers potentially through increased income, stable land management, and improved relationships with neighbours (Guan et al., 2022). The manner in which the program was implemented seems to moderate its effect. The largest, but still small, reductions in poverty were observed when land rights were combined with relocation support, rural tourism initiatives, and an employment scheme (Liu et al., 2022). A related national program in China supported the construction of dedicated basic farmland and was found to reduce poverty (Peng et al., 2022). Four of these studies received funding from the National Natural Science Foundation of China, two received funding from the National Social Science

Foundation of China, and one did not report funding (some studies had more than one funding source).

The two national school meal programs evaluated were in Nigeria and Thailand. These two countries have meaningfully different nutritional contexts. The program in Nigeria improved education, nutrition, and health among rural school children while reducing child labour (Okolo-Obasi & Uduji, 2022). In Thailand, the program slightly reduced the prevalence of overweight and obese status among students (Kanchanachitra & Angeles, 2022). The program had larger effects in schools that were exposed for longer periods of time.

The online map can be accessed [here](#). The original EGM report is available [here](#). Notes from the [first](#), [second](#), and [third](#) updates are posted online.

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## Appendix 1: Studies added to EGM April 2022 – October 2022

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### About this note

This note presents information and results from the first update to the Food Systems and Nutrition Evidence Gap Map. We discuss the distribution of the evidence base and the current state of the evidence.

This brief was authored by Charlotte Lane, Ingunn Storhaug, Diana Cordova-Arauz, and Mark Engelbert. They are solely responsible for all content, errors, and omissions. It was designed and produced by Akarsh Gupta and Tanvi Lal.

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