

Food Systems and Nutrition Evidence and Gap Map

Update #5 (January 2023 – April 2023)

Highlights

- In the last four months, we added 90 studies, 23 of which were evaluations of women's empowerment and gender transformative interventions added due to the expansion in inclusion criteria.
- Half of the new studies focused on the food supply chain (n = 46).
- The most common outcomes were diet quality/adequacy (Figure 4; IE n = 28), economic (IE n = 27), anthropometric (IE n = 24) and agricultural outcomes (IE n=21).
- Although we still find a shift towards more studies considering national and transnational programs, increasing from nine per cent in the original map to 14 per cent in the current update, this represents a decrease from the last update, in which 24 per cent considered these programs.
- 31 studies address previously identified gaps.
- There was an increase in quasi-experimental designs from 20 per cent in original to 38 per cent in this update; however, this is a decrease from the previous update with 64 per cent.
- There was a significant increase in the number of systematic reviews identified from seven in all the previous updates combined to 13 in this update alone. However, 12 were rated as low-confidence.
- Many interventions have been evaluated five times or less throughout the living period, including advertising and labelling regulations, cold chain initiatives and food safety regulations.
- Food loss and economic, social, and political stability remain the least measured outcomes.
- Priorities for future evidence include reporting cost data, mixed methods research, more high-confidence systematic reviews and national/trans-national evaluations.

Table 1: Studies added to the E&GM

Interventions	Studies and protocols added (studies previously included)
Total studies	90(2216)
Food supply	46(952)
Food environment	25(791)
Consumer behaviour	46(629)
Common multi-component	2(104)
Previously identified gaps	
<i>Illustrative list of interventions to priorities for evaluation</i>	
Government manipulations of price	0(25)
Advertising and labelling regulations	0(1)
On-farm, post-harvest processing	0(5)
Interventions to support food packaging	0(0)
Efforts to support women's empowerment	19(26)
Gender transformative interventions	5(7)
Innovative store design	0(5)
Cold chain initiatives*	0(1)
Improved farm to market transport*	0(5)
Food safety regulations*	0(3)
<i>Illustrative list of outcomes to priorities for evaluation</i>	
Women's empowerment	24(57)
Economic, social, and political stability	0(4)
Food loss	0(2)
Environmental impacts of the food system	0(14)
Measures of diet insufficiency	0(29)
<i>Illustrative list of evidence synthesis priorities</i>	
Provision of free or reduced-cost farm inputs to crop production	0(13)
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)
<i>Illustrative list of methods and scale priorities</i>	
Cost evidence	3(181)
Mixed methods research	12(194)
High-confidence systematic reviews	0 (42)
National and trans-national evaluations	10(211)

* These represent new priority areas identified through our mid-term report

Background

Since May 2020, 3ie has been undertaking its ambitious, *living* Food Systems and Nutrition Evidence and Gap Map (E&GM) project with support from BMZ through GIZ's "Knowledge for Nutrition" programme. The E&GM presents all impact evaluations and systematic reviews of impact evaluations considering interventions in low- and middle-income countries (LMIC) that function within food systems and measure outcomes related to food security and nutrition. Newly published studies are continuously monitored and added to the E&GM. This ensures that the E&GM remains a useful and current tool as the evidence base rapidly expands. The map has the dual purpose of serving as a collection of the available evidence and a presentation of knowledge gaps. The E&GM 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.

This represents the fifth update to the E&GM and comes shortly after the publication of a detailed mid-term report (Lane et al., 2023). Through the mid-term report, we added 260 impact evaluations and seven systematic reviews of impact evaluations to the map in the last two years. However, only one systematic review was rated as medium-confidence, and none as high-confidence, meaning this evidence base is rapidly becoming out of date. In addition, the rate of expansion in the evidence base has slowed since 2019. After reviewing the studies added to the map and current development priorities, we determined that none of the previously identified evidence gaps have been filled. We added three additional evidence gaps based on our understanding of the evidence base and shifts in implementation priorities: cold chain initiatives, farm to market transport, and food safety regulation (Table 1). We have also decided to regularly report on changes in the evidence base regarding the use of specific methods in these notes.

Map extension

The current updating process for the map has been extended and the project will be continued through March 2024. As a result of the reflections from the mid-term report, we are extending the E&GM in three dimensions. For this update a year filter has been added to the map, allowing users to search for evidence from specific years.

In addition, in this update, the inclusion criteria for women's empowerment interventions has been expanded to include any women's empowerment intervention. This intervention is no longer limited to those that take place within the context of the food systems. To identify these, we drew in studies from the Nutrition-Sensitive Agriculture EGM, which has the same inclusion criteria as this E&GM on population, outcomes, and study design, but includes all women's empowerment interventions. Gender transformative interventions are now uniquely identified their own row within the map. These were identified by re-screening the women's empowerment studies and breaking them into two separate interventions. Gender transformative interventions aim to influence the gender norms and inequities at the

population level, targeting both men and women. Women’s empowerment interventions are conceptualized as targeting the behaviour of individuals.

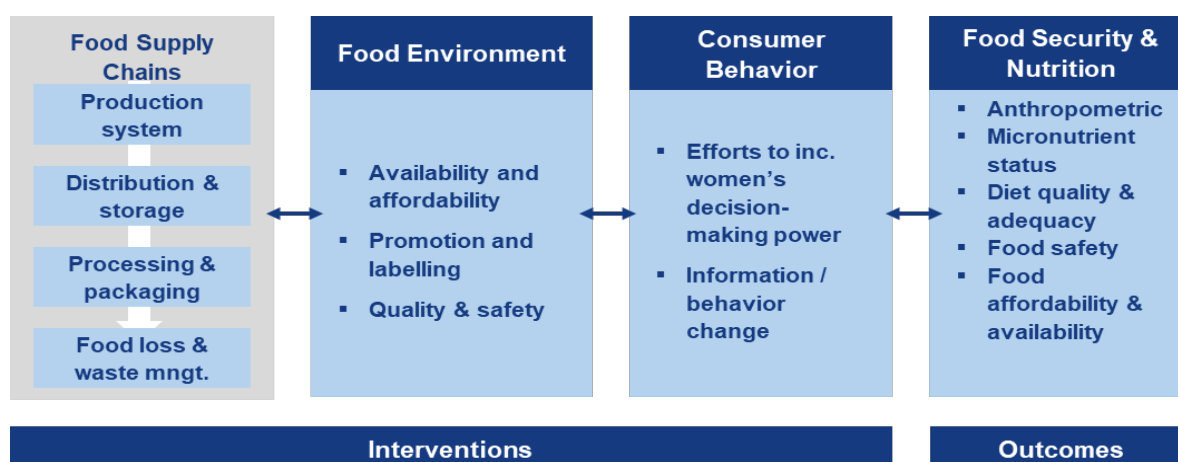
For the next update, women’s empowerment outcomes will also be expanded to include gender transformative outcomes as a separate category. Although most gender transformative outcomes would have been included under our current definition of women’s empowerment outcomes, studies which *only* considered gender norms regarding men would have been excluded. Therefore, to identify studies considering gender transformative outcomes, we will re-screening of studies which were previously excluded on outcomes to check for gender transformative outcomes. We will also re-screen studies which are included as having women’s empowerment outcomes to consider if these should be coded as gender transformative outcomes.

In addition, in coming updates, we will also add a new set of interventions relating to social protection, cash transfers, social assistance, and social insurance programmes. These will be identified through a novel search and screening process.

Framework

The E&GM 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 E&GM was 3ie’s largest to date. This report presents our analysis of the studies published from January 2023 to April 2023 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 and Gap Map



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

Methods

Search strategy

To populate this E&GM, we drew from three sets of searches. First, we re-ran the searches in the [original E&GM](#). The search strings used and the databases searched were identical to those in the original E&GM, 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 E&GM. 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 E&GM, pooling these search strategies reduces overall workload and allows more articles to be screened. A small number of studies identified through the search for the Development Evidence Portal and not the E&GM-specific search have been included in the map.

The most recent Development Evidence Portal and E&GM-specific searches were run in April 2023, covering the period since the previous searches. The search for grey literature was last completed in January 2022. Relevant studies from the January and April 2023 searches are included in this update.

Screening

The same process for screening was employed in this update as in the original E&GM. 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 E&GM, 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 E&GM 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 E&GM.

Studies from the Development Evidence Portal search between October 2022 and April 2023 have been identified, but not yet screened for inclusion in this E&GM.

Data extraction, analysis, and presentation of results

Data extraction and analysis procedures were identical to those of the original E&GM. 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 93,179 records (Figure 2). We removed 48,099 duplicates. We also removed 37,707 which were identified as having low probability based on the classifier in EPPI-Reviewer 4. In total, 4,947 studies from the DEP search were added to a screening pipeline and will be screened at a later point. Therefore, 2,426 abstracts included in the E&GM specific search were screened. During title and abstract screening, 2,103 articles were excluded, leaving 323 to be screened at full text. Finally, 79 relevant articles were eligible for inclusion, 12 of which were linked to other articles and did not represent unique studies. Therefore, we added 67 unique studies from this search and the additional 23 from Nutrition-Sensitive Agriculture EGM: 77 impact evaluations and 13 completed systematic review. Of included studies, 14 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 or 2023, except the additional empowerment evaluations added.

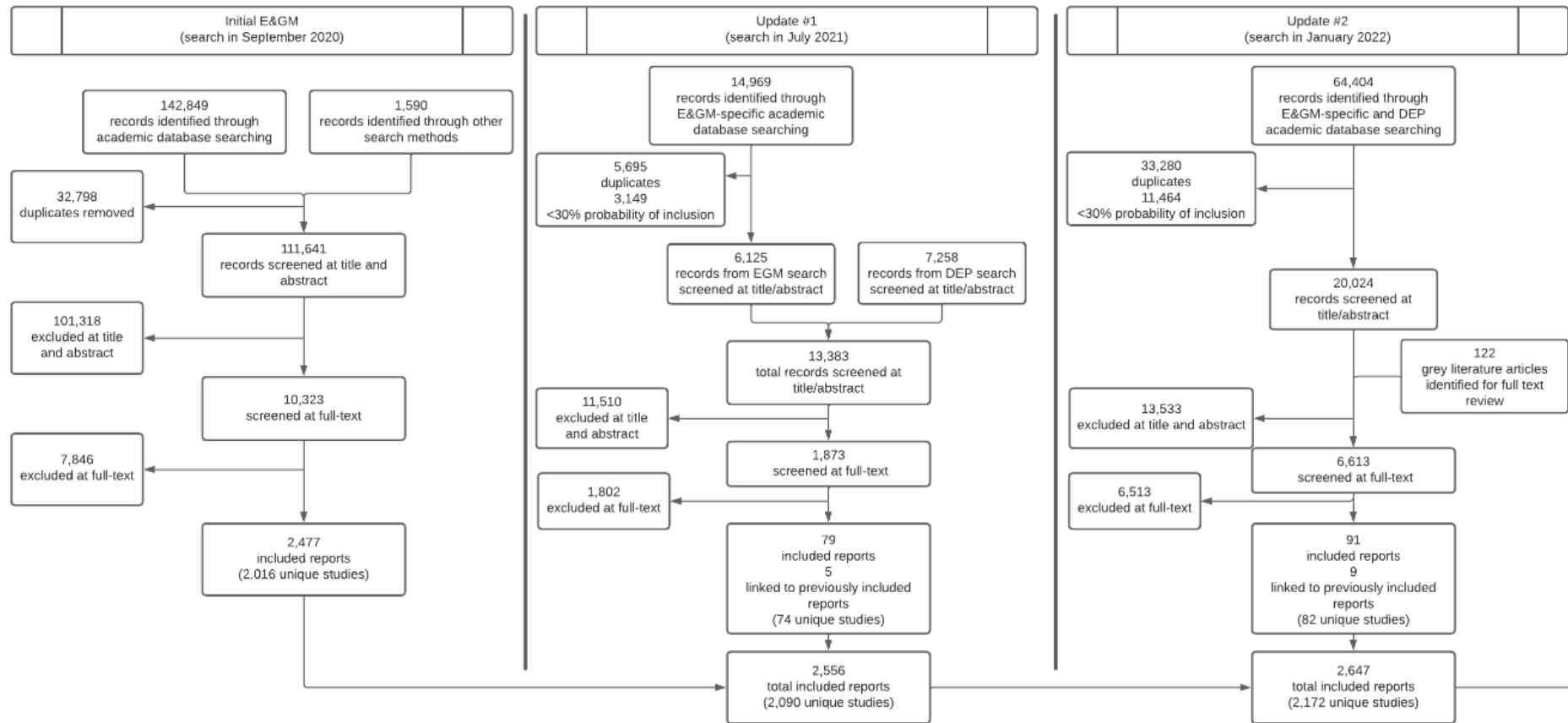
The food supply chain is still the most common intervention domain (Figure 3, IE n = 40, SR n = 6). We continue to see many impact evaluations (IE n = 21), but no systematic reviews, focusing on agricultural education interventions, mainly 'other' educational programs (IE n = 11) and agricultural extension programs (IE n = 7). Other common interventions within the food supply chain include fortification (IE n = 9, SR n = 5), free or reduced cost fertiliser (IE n = 6, SR n = 0) and seeds (IE n = 6, SR n = 0).

Although we also added 38 impact evaluations and eight systematic reviews in the consumer behaviour interventions, half of these are the new women's empowerment/gender transformative interventions added through the increase in scope of the E&GM (IE n = 20, SR n = 3). Seven studies that were previously included were also found to evaluate gender transformative interventions. Following these interventions, professional services within the consumer behaviour domain was the commonly evaluated interventions in this update (IE n = 11, SR n = 3).

Food environment interventions are less common (IE n = 17, SR n = 8). Provision of supplements (IE n = 8, SR n = 5) and food (IE n = 5, SR n = 5) were most commonly evaluated within this domain.

Ten interventions have previously been listed as interventions prioritised for evaluation (Table 1). These are a mix of interventions from each intervention domain. The women's empowerment intervention expansion has resulted in a large increase, in total 46 studies. The other ones have remained low also throughout the living period. Many interventions have been evaluated five times or less in total, including advertising and labelling regulations, cold chain initiatives and food safety regulations.

Figure 2: PRISMA



Food Systems and Nutrition Evidence Gap Map: Update #5

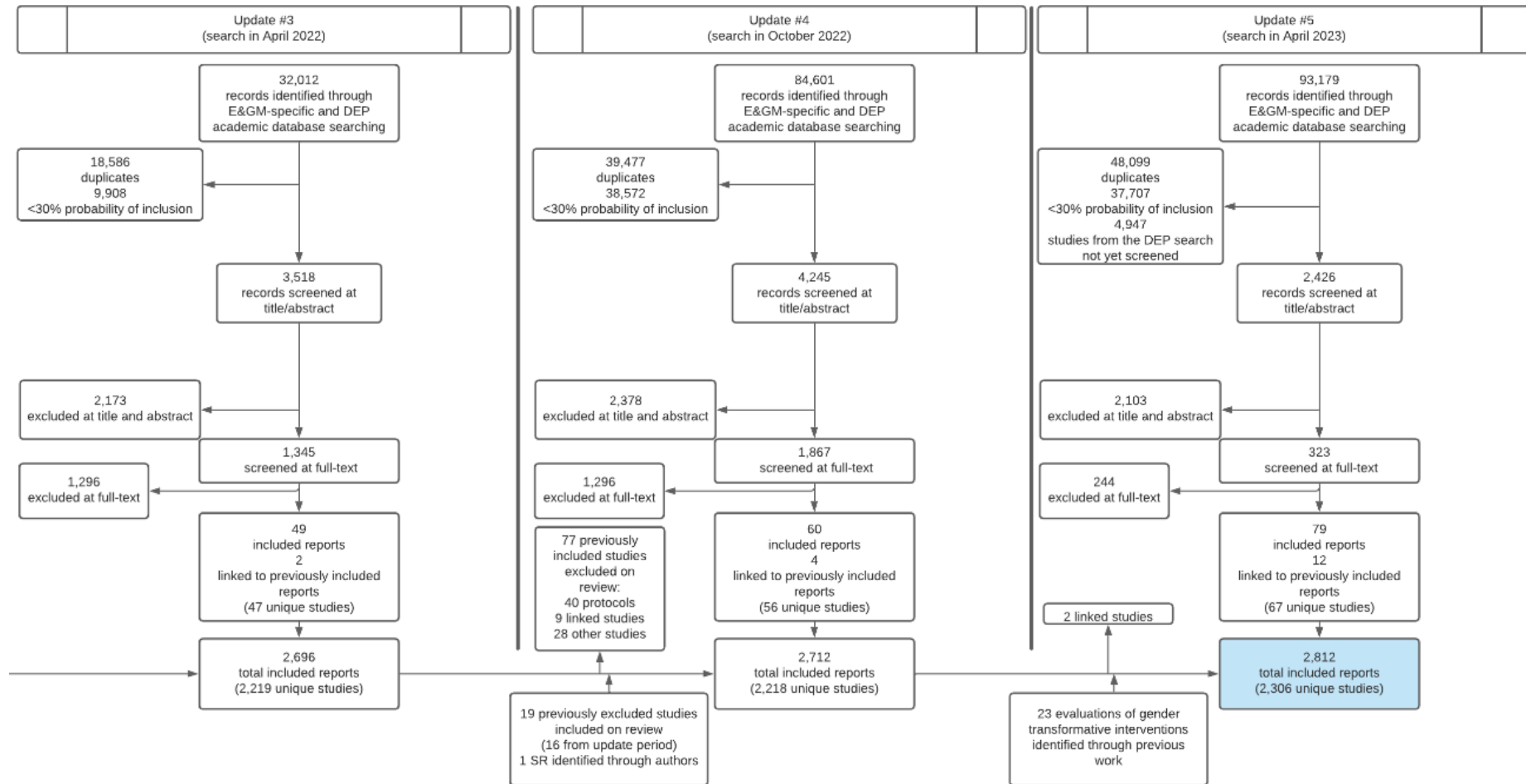
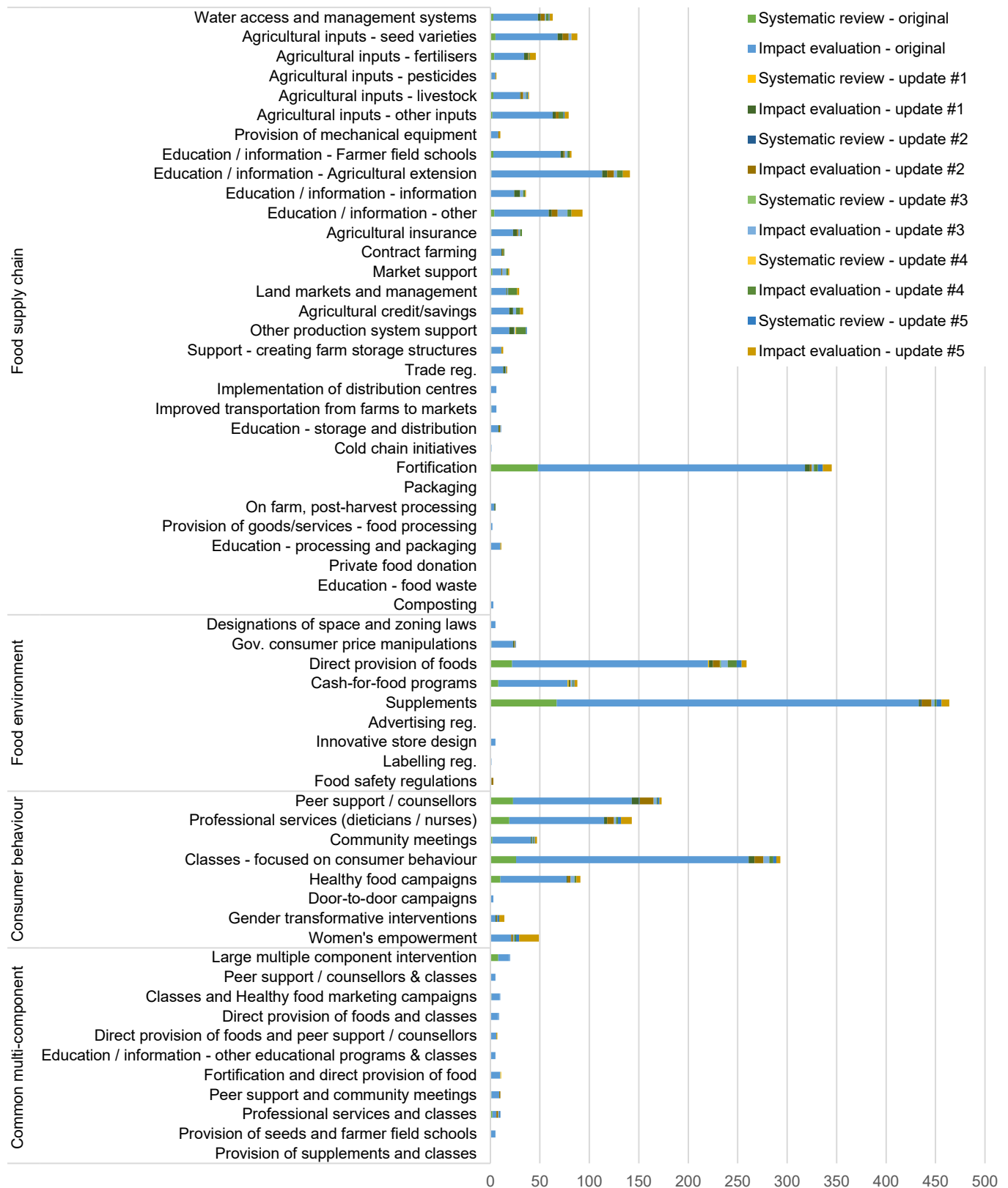


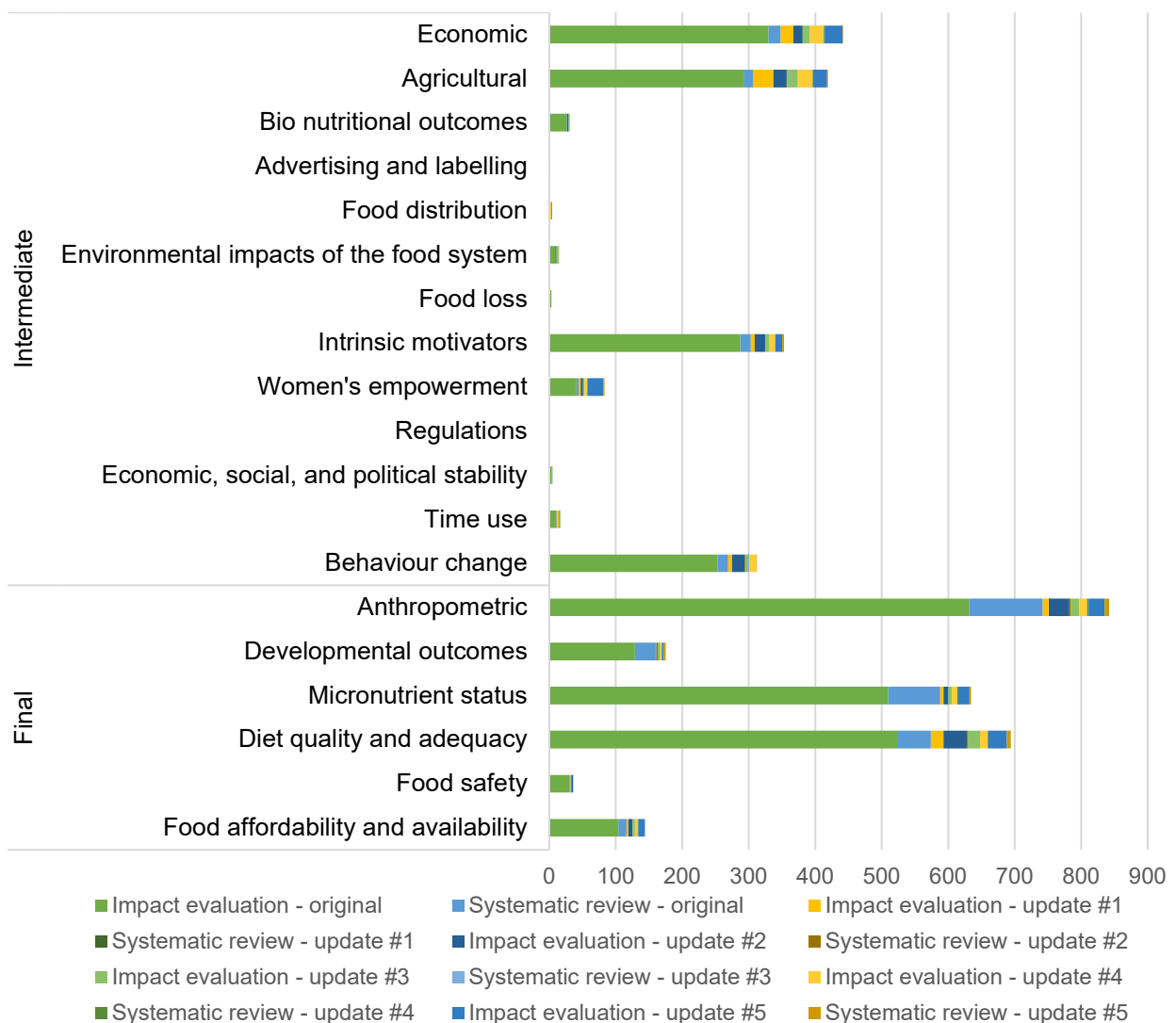
Figure 3: Distribution of included studies by intervention domain and subdomain



Most studies considered diet quality/adequacy (Figure 4; IE n = 28, SR n = 6), economic (IE n = 27, SR n = 1), anthropometric (IE n = 24, SR n = 7) or agricultural outcomes (IE n = 21, SR n = 1). The most frequently measured specific outcomes were anthropometric: linear growth (IE n = 18, SR n = 6), relative weight (IE n = 17, SR n = 7), and weight (IE n = 12, SR n = 7). This continues the focus on diet quality/adequacy and anthropometrics noted throughout this evidence mapping project, but also highlights that the clustering on these outcomes is reducing, as noted in the mid-term report.

Five outcomes have been considered evidence gaps for evaluation prioritisation (Table 1). Women’s empowerment outcomes have increased significantly for this update due to expanded intervention definition, in total 81 studies. Some of the outcomes have not had any new studies identified during the living period, although most updates have identified some new women’s empowerment outcomes. Food loss and economic, social, and political stability are the least measured outcomes.

Figure 4: Distribution of included studies by outcome domain

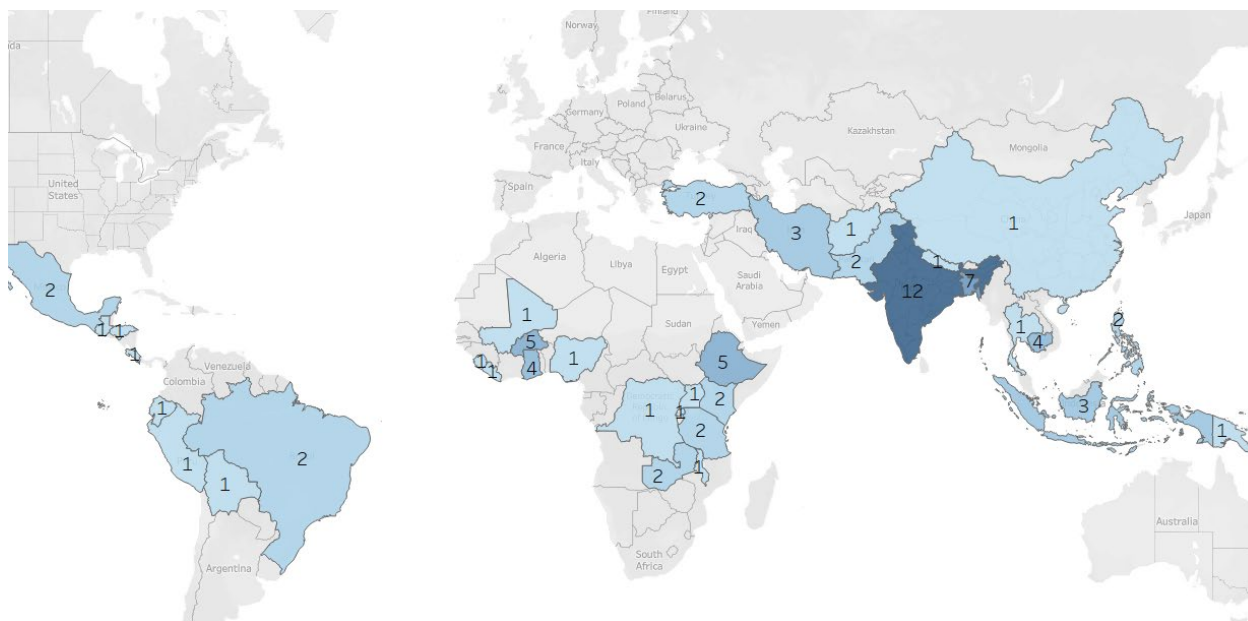


Although the proportion of studies using experimental designs (62%) remains considerably lower than in the original map (80%), it increased considerably relative to the last update (36%). The most common quasi-experimental method was fixed effects (n = 38). The other quasi-experimental designs were not very common, e.g., statistical matching (n = 13) and instrumental variable (n = 6). India (Figure 5; n = 12), Bangladesh (n = 7), Burkina Faso (n = 5) and Ethiopia (n = 5) were the countries with most impact evaluations. There were nine impact evaluations evaluating national interventions, while one evaluated transnational interventions.

We have also identified methods and scale priorities for future evidence (Table 1). This includes reporting cost evidence, mixed methods research, more high-confidence systematic reviews and national/trans-national evaluations. Usually, a few studies identified for each update seem to implement the methods/scales identified as priorities, but most studies do not.

Only one of the 13 new systematic reviews were medium confidence, and none were rated as high confidence. Three of the systematic reviews were protocols. In terms of synthesis gaps, four interventions/outcomes have previously been identified as gaps (Table 1). Only one systematic review focused on agricultural insurance products despite 31 evaluations of the intervention. Other diet quality and adequacy related outcomes have been considered a synthesis gap despite being measured in 24 studies due to the large variability of the category resulting in many different outcome measures within the same outcome category.

Figure 5: Distribution of included impact evaluations by country



Discussion

Through our first living E&GM 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 E&GM. Based on our recent stock-taking through the publication of our mid-term report, we are expanding on the E&GM to make it more useful to the current priorities of policy makers. This includes the addition of a filter for year of publication, the inclusion of gender transformative approaches, and the addition of social protection programs.

Although, we saw a large increase in systematic reviews included, only one was rated as medium-confidence and none were high-confidence. The systematic review rated as medium-confidence evaluated the effectiveness of breastfeeding interventions in L&MICs. The interventions were found to be effective in improving exclusive breastfeeding and early initiation, but no effect of interventions using mobile phones to send educational messages was identified (Khatib et al., 2023).

With the exception of the women's empowerment and gender transformative interventions, no new studies evaluate interventions and/or outcomes identified as gaps in the original E&GM. Most of interventions taking gender transformative approaches were multi-component interventions. For example, an integrated poverty graduation program for women in Burkina Faso, provided technical skills training, cash transfers and a campaign addressing normative gender beliefs including family violence and the role of wives in family decision-making. The program was successful in improving the economic well-being of women and their households, including significant effects on return from farm market activities and assets owned by women (Karimli, Bose and Kagotho, 2019). A Sustainable Agriculture intervention in Zambia supported food production. It also provided training on gender issues, such as recognising the roles of women in households / communities, and emphasising the need for women to be involved in the leadership of the community. The effects of this intervention on agricultural, economic, and women's empowerment outcomes were mixed (Bishop, 2011).

Women empowerment interventions which were evaluated often linked to agriculture or economic interventions such as savings groups or poverty alleviation programs. For example, one intervention aimed to empower women in Rwanda by training them on improved agricultural planting-material techniques and business development. The intervention showed **significant positive effect overall on** women's empowerment index outcome (Caeyers and Fuller, 2015). A Land Tenure Assistance program in Tanzania, which also educated people on respecting the land-rights of women, increased women's formalized documentation of rights to their resident and women's perceived tenure security. However, it also increased male-decision making in the household (Persha and Patterson-Stein, 2021). The Savings for Change program in Mali allowed women to organise self-managed savings and credit groups. The program had small positive effects, mainly on savings. However, it did not increase women's decision-making power within the households, their ownership of assets or livestock (Innovations for Poverty Action, 2013).

Sometimes women's empowerment interventions are single-component, for example teaching both parents about infant and young child feeding instead of only addressing mothers and conveying messages on gender roles. An intervention which took this approach in Myanmar was found to increase fathers' knowledge significantly compared to if only mothers got the education (Han, et al. 2019).

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

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Appendix 1: Studies added to EGM January 2023 – April 2023

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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 Ingunn Storhaug, Charlotte Lane, 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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