Food Systems and Nutrition Evidence and Gap Map
Update #7 (August 2023 – October 2023)

Highlights

- This update focuses on social protection interventions. The overall intervention trends are still similar to the original although the updates show a reduction in the rate of publication of studies on supplementation and fortification, and an increase in studies on agricultural education and training interventions.
- This update adds 431 new impact evaluations and 31 new systematic reviews for a total of 2,914 included studies.
- 83 new studies address previously identified intervention and outcome gaps (Table 1).
- Nine high- and medium-confidence systematic reviews were added for this update. Overall, during the update period 14 high- and medium-confidence reviews have been identified.
- We added several new interventions: food taxes, food subsidies, social insurance, food vouchers, and cash transfers (conditional and unconditional). In total 344 new studies in the map evaluate these interventions.
- This update shows a large increase in national and transnational programs evaluated: 55 per cent in the current update compared with 9 per cent in the original map and 18 per cent overall.
- We continue to see greater use of quasi-experimental methods, currently 59 per cent of studies in the update and 35 per cent overall in the E&GM.

Figure 1: E&GM timeline
Table 1: Studies added to the E&GM (August-October 2023)

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Studies and protocols added (studies previously included)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Total studies</td>
<td>462 (2452)</td>
</tr>
<tr>
<td>Food supply</td>
<td>123 (1076)</td>
</tr>
<tr>
<td>Food environment</td>
<td>374 (848)</td>
</tr>
<tr>
<td>Consumer behaviour</td>
<td>66 (720)</td>
</tr>
<tr>
<td>Common multi-component</td>
<td>7 (115)</td>
</tr>
</tbody>
</table>

**Previously identified gaps**

*Illustrative list of interventions to priorities for evaluation*

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Studies and protocols added (studies previously included)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Food taxes</td>
<td>0(10)</td>
</tr>
<tr>
<td>Food subsidies</td>
<td>12 (17)</td>
</tr>
<tr>
<td>Advertising and labelling regulations</td>
<td>0(1)</td>
</tr>
<tr>
<td>On-farm, post-harvest processing</td>
<td>0(5)</td>
</tr>
<tr>
<td>Interventions to support food packaging</td>
<td>0(0)</td>
</tr>
<tr>
<td>Efforts to support women's empowerment</td>
<td>3(47)</td>
</tr>
<tr>
<td>Gender transformative interventions</td>
<td>3(12)</td>
</tr>
<tr>
<td>Innovative store design</td>
<td>0(5)</td>
</tr>
<tr>
<td>Cold chain initiatives*</td>
<td>0(1)</td>
</tr>
<tr>
<td>Improved farm to market transport*</td>
<td>0(5)</td>
</tr>
<tr>
<td>Food safety regulations*</td>
<td>0(3)</td>
</tr>
</tbody>
</table>

*Illustrative list of outcomes to priorities for evaluation*

<table>
<thead>
<tr>
<th>Outcomes</th>
<th>Studies and protocols added (studies previously included)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Women's empowerment</td>
<td>45(85)</td>
</tr>
<tr>
<td>Gender transformative outcomes</td>
<td>5(19)</td>
</tr>
<tr>
<td>Economic, social, and political stability</td>
<td>0(4)</td>
</tr>
<tr>
<td>Food loss</td>
<td>1(3)</td>
</tr>
<tr>
<td>Environmental impacts of the food system</td>
<td>0 (17)</td>
</tr>
<tr>
<td>Measures of diet insufficiency</td>
<td>11(29)</td>
</tr>
</tbody>
</table>

*Illustrative list of evidence synthesis priorities*

<table>
<thead>
<tr>
<th>Interventions</th>
<th>Studies and protocols added (studies previously included)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Provision of free or reduced-cost farm inputs to crop production</td>
<td>0(13)</td>
</tr>
<tr>
<td>Educational approaches within the food value chain</td>
<td>0(8)</td>
</tr>
<tr>
<td>Agricultural insurance products</td>
<td>1(1)</td>
</tr>
<tr>
<td>Outcome related to other diet quality and adequacy measures</td>
<td>3(24)</td>
</tr>
</tbody>
</table>

*Illustrative list of methods and scale priorities*

<table>
<thead>
<tr>
<th>Methods and scale priorities</th>
<th>Studies and protocols added (studies previously included)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Cost evidence</td>
<td>39 (188)</td>
</tr>
<tr>
<td>Mixed methods research</td>
<td>65 (216)</td>
</tr>
<tr>
<td>High-confidence systematic reviews</td>
<td>5 (43)</td>
</tr>
<tr>
<td>National and trans-national evaluations</td>
<td>236 (245)</td>
</tr>
</tbody>
</table>

* These represent new priority areas identified through our mid-term report
Currently, we are over the halfway mark to the 2030 Sustainable Development Goals (SDGs). Only about 15 per cent of countries are on track to meet these targets (UNFSS+2, 2023). In July 2023, during a ‘UN Food Systems Stocktaking Moment’, the UN Secretary-General called for accelerated action to transform the food systems, focusing on six objectives. These included incorporating food systems strategies in national policies, food systems governance with a whole of society approach, and investing in research, data and technology capacities (UN food systems coordination hub, 2023). 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. Through our E&GM we are working to provide up to date evidence on interventions in low- and middle-income countries (L&MICs) that function within food systems and measure outcomes related to food security and nutrition. We ensure it remains a useful and current tool by continuously monitoring the literature and periodically adding newly published studies to the E&GM. 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. 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 August 2023 to October 2023 as well as studies evaluating social assistance and social insurance interventions from 2000 to 2023. We discuss additions and overall changes in the evidence base.

Map extension

We are extending the E&GM and for this update, we have added a new set of interventions relating to social protection, cash transfers, social assistance, and social insurance programmes. These have been identified through a supplemental search and screening process. In addition, government price manipulation interventions have been re-coded to food taxes or food subsidies. Cash-for-food programmes have been re-coded to conditional cash transfers, unconditional cash transfers and food vouchers.

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).
Figure 2: Conceptual framework and theory of change for the Food Systems and Nutrition Evidence and Gap Map


Methods

Search

This update includes records identified in the most recent Development Evidence Portal (3ie’s database of impact evaluations and systematic reviews across sectors in international development) and E&GM-specific searches from October 2023, covering the period since the previous searches. An additional search was carried out for social protection interventions all the way back to year 2000. For more details on search strategy see Appendix B.

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 (Thomas et al. 2020).

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 20% 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.

Single screening against inclusion/exclusion criteria was carried out for both title and abstract screening and full text screening, with a senior reviewer checking any marked as unsure and included studies.
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 113,841 records (Figure 2). We removed 60,324 duplicates. We also removed 44,643 which were identified as having low probability based on the classifier in EPPI-Reviewer 4. Therefore, 8,874 abstracts included in the E&GM specific search and social protection search were screened. During title and abstract screening, 7,089 articles were excluded, leaving 1,785 to be screened at full text. Finally, 225 relevant articles were eligible for inclusion, 4 of which were linked to other articles and did not represent unique studies. Therefore, we added 221 unique studies from this search: 210 impact evaluations and 11 systematic reviews. In addition, 241 social protection studies were identified through previous work and added to the E&GM. In total, 431 impact evaluations and 31 systematic reviews were added in this update.

This time the majority of the studies added were ones in the food environment domain (n=374). This is due to expanding the framework and adding all the studies that met the inclusion criteria back to year 2000. In total we added 123 to the food supply chain domain, and 66 to the consumer behaviour domain. Based on the studies from October the majority of interventions were food supply chain (n=23), followed by food environment (n=17) and consumer behaviour (n=12). Due to the addition of new interventions the most common domain overall in the E&GM is no longer the food supply chain (n=1193), but instead the food environment (n= 1218).

The studies identified in this update most commonly focus on conditional cash transfers (IE n=181, SR n=18), and unconditional cash transfers (IE n=139, SR n=13). Provision of food was the third most commonly evaluated intervention (IE n=52, SR n= 6). Ten per cent of the cash transfers also provided participants with food. Only 13 studies were identified for the new social insurance category. Overall, conditional cash transfers (IE n=226, SR n=25) are the fourth most common intervention category in the E&GM after provision of supplements (IE n=425, SR n=79), consumer behaviour classes (IE n=331, SR n=34) and fortification (IE n=302, SR n=59).

In terms of the gaps identified in the original E&GM, this update has identified 18 studies focusing on these intervention gaps (Table 1). Twelve of these studies are evaluating food subsidies and ten of them were identified through the new social protection search. Three studies also evaluated a gender transformative intervention and three women’s empowerment interventions. In total there are 29 impact evaluations on food subsidies, 50 evaluating women’s empowerment interventions and 15 studies evaluating gender transformative interventions in the E&GM.
The diagram follows the Preferred Reporting Items for Systematic reviews and Meta-Analysis (PRISMA) guidelines (Page et al. 2020).
Figure 4: Distribution of included studies by intervention domain and subdomain
In terms of outcomes, most studies included in this update focus on economic outcomes (IE n=249, SR n=13), diet quality and adequacy (IE n=173, SR n=16), anthropometrics (IE n=106, SR n=25) and food affordability and availability (IE n=104, SR n=7). Overall, the E&GM anthropology (IE n=851, SR n=154), diet quality and adequacy (IE n=868, SR n=77), and economic outcomes (IE n=717, SR n=33) are the most commonly measured outcomes. Even though these are still the most common outcomes, the updates have shown a reduction in the clustering on these outcomes, as noted in the mid-term report.

Many studies measuring outcomes identified as gaps were identified in this update. Measures of diet insufficiency were identified in 11 impact evaluations, measures of food loss in one study, gender transformative outcomes in 5 studies, and women’s empowerment outcomes in 43 studies. The increase in women’s empowerment outcomes and insufficient diet measures are a result of cash transfer interventions focusing on these outcomes.

Figure 5: Distribution of included studies by outcome domain

![Distribution of included studies by outcome domain](image-url)
The use of experimental methods has decreased relative to our last update. In this update period, 41% of the impact evaluations used a randomized controlled trial as the main method, compared to 50% in the previous update. Overall, between the original map and this update, there is a decrease of experimental studies from 73 per cent to 41 per cent.

Mexico (n = 47), Ethiopia (n = 40) and Bangladesh (n = 33) added the highest number of impact evaluations for this update. The numbers for Mexico and Ethiopia have increased significantly since our last update (Mexico = 5; Ethiopia = 7) and doubled their representation since our original E&GM (Mexico: from 4% in the original E&GM to 11% in this update; Ethiopia:4% to 9%). We see a slight decrease in the number of studies for countries like China and India, which accounted for 7% and 9% of studies in the original map, while contributing with 4% and 6% for this update.

Figure 6: Distribution of all included impact evaluations by country (original and all updates)

Previous versions of the E&GM also identified a lack of evaluations of interventions at the national or trans-national levels (Table 1). In this update over 50 per cent of the interventions were national-scale (n=220) and 4 per cent transnational (n=16). This is very high compared to the overall E&GM (n=476, 18%). Mixed-methods research and cost evidence are other gaps previously identified. These are more common in this update than overall in the E&GM: 39 studies (9%) reported cost evidence and 65 studies (15%) used mixed methods, compared to 227 (9%) for cost evidence and 281 (11%) for mixed methods.

Out of the 31 systematic reviews added, five were high-confidence and four were medium-confidence. Two were protocols and the remainder were low-confidence. In total, 21 of these focused on cash transfers. The overall map has 53 high- and medium-confidence reviews. Four systematic reviews measured areas previously identified as gaps. These were three systematic reviews on outcome measures related to diet quality and adequacy and one on agricultural insurance (Table 1). These were two low-confidence reviews and one protocol.
Food Systems and Nutrition Evidence and Gap Map: Update #7

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 whether 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. Overall, the E&GM is rapidly growing with a total of 2,914 studies now included. Despite the addition of studies across multiple updates evaluating areas considered as gaps, these additions have been insufficient to provide robust evidence bases in these areas (Table 1). Decision makers can therefore continue investing in evaluation research in these areas.

One positive development of note is the emergence of a larger evidence base for women’s empowerment outcomes, which now stands at 128 impact evaluations. This update identified 12 impact evaluations on food subsidies, 3 on women’s empowerment interventions and 3 on gender transformative interventions. In terms of outcomes, we found 43 new studies measuring women’s empowerment, 5 measuring gender transformative outcomes, 1 food loss outcome and 11 measuring diet insufficiency outcomes. We also identified 3 systematic reviews measuring other diet quality and adequacy outcomes and one including agricultural insurance interventions.

Only two studies had previously been identified measuring food loss (Delgado et al. 2021). The study identified in this update provided bean farmers in Honduras and Guatemala with market-based incentives aiming to reduce food loss. The farmers were provided with information of the standards required. If they met these standards they would receive a price premium. The results showed food loss was reduced amongst farmers in both Honduras and Guatemala.

Five high-confidence systematic reviews were included in this update. Two of these reviews evaluated unconditional cash transfers in LMICs. One SR by Pega and colleagues assessed the effects of UCTs provided for assistance in humanitarian disasters. Three studies met their inclusion criteria: one study showed a significant effect on the incidence of acute severe malnutrition in children. Another study showed a small increase in behaviour change, specifically in the proportion of children receiving iron supplements or vitamins. No evidence indicating any impact on children's stunting was discovered. The second SR studied the effect of cash transfers on the use of sanitary services and health outcomes in children and adults. When compared to conditional cash transfers (n = 3) the evidence showed uncertain results on dietary diversity. However, when compared to no transfer authors found positive effects on dietary diversity, whether analysed through meta-analysis or narrative synthesis (n = 13).

The third review with high-confidence rating focused on conditional cash transfers (CCTs). Lagrde, Haines and Palmer (2009) evaluated a CCT on health outcomes and use of health services in LMICs. The results were overall positive, including outcomes on stunting, wasting and weight. The fourth review by Rana and colleagues (2020) found evidence on nutrition-
specific and nutrition-sensitive interventions on stunting, wasting, anaemia, low-birthweight and breastfeeding. Nutrition-specific interventions such as complementary feeding and dietary supplementation \((n = 3)\) showed positive effect on the evaluated outcomes. Nutrition-sensitive interventions were less common and only one study, which evaluated a WASH intervention revealed positive results. The fifth review synthesised evidence on the effect of iron fortification interventions on prevention of anaemia and health improvements. The authors found a lot of differences in results from the included studies and state they do not have high confidence in the evidence included in the review. Their findings indicate that these interventions could slightly improve iron levels and decrease iron deficiency, and adding other micronutrients as well as iron can reduce anaemia.

Only six systematic reviews identified in the update period from 2020-2023 have been rated as high-confidence and seven as medium-confidence. In 2019, we found 10 high-confidence and 10 medium-confidence systematic reviews. Therefore, more systematic reviews in these areas could be carried out or previous ones updated to avoid gaps in synthesis of the latest evidence, as the systematic reviews are becoming outdated.

The addition of new intervention categories on social protection and social insurance allowed us to identify new studies. The studies that evaluated conditional and unconditional cash transfer programs account for 70 per cent of the total studies included in this update. Cheng and colleagues (2016) evaluated the non-contributory arm of a nationwide pension program providing minimum income protection and saving incentives to elderly individuals. The evidence found beneficial impacts on income, behaviour, dietary adequacy, micronutrient intake and gender transformative outcomes. Chatterjee and Merfeld studied a social protection program that provided income-risk mitigation mechanisms, especially agricultural productivity shocks. They found that the program mitigates the impact of heavy rainfall loses on income on the sex selection of infants and the health outcomes of girls in the household.

Many new studies focus on national-scale governmental programs. For example, an evaluation of Brazil’s PROGRESA (Gertler 2004) shows how this conditional cash transfer program worth from 20-30% of household income, improved children’s stunting levels. Another study evaluated a monthly unconditional cash transfer in Malawi and found improvements on household expenditure levels and investment on productive assets (Miller, 2011).

The online map can be accessed here. The original E&GM report is available here. Notes from the first, second, third, fourth, fifth and sixth updates are posted online.
References


Appendix A: Studies added to EGM August 2023 – October 2023


Afkar, R., & Matz, J. (2015). *Cash transfer, in-kind, or both? Assessing the food and nutrition security impacts of social protection programs in Indonesia.*


Blattman, C., Green, E., Annan, J., & Jamison, J. (2013). *Building women’s economic and social empowerment through enterprise: An experimental assessment of the women’s income generating support program in Uganda*.


Brugh, K. N. (2016). Impacts of an unconditional cash transfer on household food and nutrition security and child health outcomes in Malawi. The University of North Carolina at Chapel Hill.


Del Ninno, C., & Dobosh, P. A. (2002). In-kind transfers and household food consumption: Implications for targeted food programs in Bangladesh.


https://doi.org/10.2499/p15738coll2.133601


International Centre for Diarrhoeal Disease Research, Bangladesh. (2021). *Effects of Adding Psychosocial Stimulation for Children of Lactating Mothers Enrolled to Receive Unconditional Cash Transfer (UCT) and Health Education Awareness Programme on Children’s Cognition and Behaviour in Rural Bangladesh* (Clinical Trial Registration NCT03281980). clinicaltrials.gov. https://clinicaltrials.gov/study/NCT03281980


https://doi.org/10.1093/ajcn/nqab341


Walton, C. G. (2012). *Sustainable livelihoods and food and nutrition security of Kenyan smallholder farm women*.


Appendix B: 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. This was last completed in January 2022. 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.

Websites searched

**Academic databases**

We conducted electronic searches of the following databases of published sources:

- MEDLINE
- EMBASE
- Cochrane Controlled Trials Register (CENTRAL)
- CINAHL
- CAB Global Health
- CAB Abstracts
- Agricola
- PsychINFO
- Africa-Wide Information
- Academic Search Complete
- Scopus
- Campbell Library

**Grey literature sites searched**

To identify relevant grey literature, we searched the following databases (some of which contain a mixture of published and grey literature):

- Google Scholar
- EconLit
- ENN-Network
- IDEAS/RePEc
- Innovative Methods and Metrics for Agriculture and Nutrition Actions grantee database
- WHO Global Index Medicus
- Grey Literature Report
- Social Science Research Network (SSRN)
Below is a list of organisational websites we manually searched for additional related studies.

- AgEcon Search (University of Minnesota)
- Innovations for Poverty Action
- Abdul Latif Jameel Poverty Action Lab
- Global Development Network
- World Bank Development Impact Evaluation (DIME) and Impact Evaluation Policy Papers
- Inter-American Development Bank
- Center for Global Development
- Center for Effective Global Action (CEGA)
- Research for Development (R4D)
- USAID
- International Food Policy Research Institute
- CIGAR
- Food and Agriculture Organization of the United Nations (FAO)
- High Level Panel of Experts on Food Security and Nutrition
- World Food Programme
- Action Against Hunger
- UNICEF
- United Nations Evaluation Group
- Asian Development Bank
- World Agroforestry Centre (ICRAF)
- International Livestock Research Institute (ILRI)
- Nutrition International

**Search terms**

Table B1 below presents the terms we used in the literature search to capture key concepts in the EGM framework. For each of the terms shown in the table, we used multiple variants to capture alternative spellings and word forms.
### Table B1: Search terms

<table>
<thead>
<tr>
<th>Concept</th>
<th>Terms</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Study type and geography</strong></td>
<td></td>
</tr>
<tr>
<td>Impact evaluations</td>
<td>• Random</td>
</tr>
<tr>
<td></td>
<td>• Experiment</td>
</tr>
<tr>
<td></td>
<td>• Propensity score matching</td>
</tr>
<tr>
<td></td>
<td>• Difference-in-differences</td>
</tr>
<tr>
<td></td>
<td>• Quasi-experiment</td>
</tr>
<tr>
<td></td>
<td>• Counterfactual evaluation</td>
</tr>
<tr>
<td></td>
<td>• Instrumental variables</td>
</tr>
<tr>
<td></td>
<td>• Regression discontinuity</td>
</tr>
<tr>
<td></td>
<td>• Time series regression</td>
</tr>
<tr>
<td>Systematic reviews</td>
<td>• Systematic review</td>
</tr>
<tr>
<td></td>
<td>• Literature review</td>
</tr>
<tr>
<td></td>
<td>• Meta-analysis</td>
</tr>
<tr>
<td>Low- and middle-income countries (LMICs)</td>
<td>• Developing</td>
</tr>
<tr>
<td></td>
<td>• Low/middle income</td>
</tr>
<tr>
<td></td>
<td>• Underserved</td>
</tr>
<tr>
<td></td>
<td>• Transitional/emerging economy</td>
</tr>
<tr>
<td></td>
<td>• Global south</td>
</tr>
<tr>
<td></td>
<td>• Deprived</td>
</tr>
<tr>
<td></td>
<td>• Poor</td>
</tr>
<tr>
<td></td>
<td>• Low GDP</td>
</tr>
<tr>
<td></td>
<td>• Terms associated with each LMIC (see full list below)</td>
</tr>
<tr>
<td><strong>Interventions</strong></td>
<td></td>
</tr>
<tr>
<td>Production systems</td>
<td>• Food systems/production</td>
</tr>
<tr>
<td></td>
<td>• Kitchen garden</td>
</tr>
<tr>
<td></td>
<td>• Agriculture/aquaculture inputs</td>
</tr>
<tr>
<td></td>
<td>• Livestock</td>
</tr>
<tr>
<td></td>
<td>• Improved seeds/varieties/crops</td>
</tr>
<tr>
<td></td>
<td>• Agriculture/crop subsidies</td>
</tr>
<tr>
<td></td>
<td>• Price purchase guarantee</td>
</tr>
<tr>
<td></td>
<td>• Crop/rain/weather/index insurance</td>
</tr>
<tr>
<td></td>
<td>• Drought/pest resistant</td>
</tr>
<tr>
<td></td>
<td>• GMOs</td>
</tr>
<tr>
<td></td>
<td>• Fertiliser/pesticide/insecticide</td>
</tr>
<tr>
<td></td>
<td>• Land management</td>
</tr>
<tr>
<td></td>
<td>• Water meter</td>
</tr>
<tr>
<td></td>
<td>• Rain-fed</td>
</tr>
<tr>
<td></td>
<td>• Trench and hill method</td>
</tr>
<tr>
<td></td>
<td>• Fixed distance planting</td>
</tr>
<tr>
<td></td>
<td>• Row planting</td>
</tr>
<tr>
<td></td>
<td>• Irrigation</td>
</tr>
<tr>
<td></td>
<td>• Water break</td>
</tr>
<tr>
<td></td>
<td>• Terracing</td>
</tr>
<tr>
<td></td>
<td>• Contour bunding</td>
</tr>
<tr>
<td></td>
<td>• Mechanisation</td>
</tr>
<tr>
<td></td>
<td>• Intercropping</td>
</tr>
<tr>
<td></td>
<td>• Companion plants/species</td>
</tr>
<tr>
<td></td>
<td>• Integrated soil fertility management</td>
</tr>
<tr>
<td></td>
<td>• Farmer training/field schools</td>
</tr>
<tr>
<td></td>
<td>• Demonstration plots</td>
</tr>
<tr>
<td></td>
<td>• Agricultural/rural extension</td>
</tr>
<tr>
<td></td>
<td>• Farmers’ organisations</td>
</tr>
<tr>
<td></td>
<td>• Social protection</td>
</tr>
<tr>
<td>Storage &amp; distribution</td>
<td>• Silo</td>
</tr>
<tr>
<td></td>
<td>• Storage/storehouse</td>
</tr>
<tr>
<td></td>
<td>• Shed</td>
</tr>
<tr>
<td></td>
<td>• Warehouse</td>
</tr>
<tr>
<td></td>
<td>• Collection/distribution centre</td>
</tr>
<tr>
<td></td>
<td>• Cold chain</td>
</tr>
<tr>
<td></td>
<td>• Refrigerated transport</td>
</tr>
<tr>
<td>Processing &amp; packaging</td>
<td>• Fortification</td>
</tr>
<tr>
<td></td>
<td>• (Non-)plastic packaging</td>
</tr>
<tr>
<td></td>
<td>• Post-harvest cleaning/winnowing/canning/milling/threshing/hulling</td>
</tr>
<tr>
<td></td>
<td>• Drying</td>
</tr>
<tr>
<td></td>
<td>• Food donation/transfer</td>
</tr>
<tr>
<td></td>
<td>• Food bank/pantry</td>
</tr>
<tr>
<td></td>
<td>• Soup kitchen</td>
</tr>
<tr>
<td>Concept</td>
<td>Terms</td>
</tr>
<tr>
<td>---------------------------------</td>
<td>--------------------------------------------</td>
</tr>
<tr>
<td>Food environment</td>
<td>• Food environment</td>
</tr>
<tr>
<td></td>
<td>• Zoning</td>
</tr>
<tr>
<td></td>
<td>• Farmers market</td>
</tr>
<tr>
<td></td>
<td>• Food desert</td>
</tr>
<tr>
<td></td>
<td>• School meals/feeding/lunches</td>
</tr>
<tr>
<td></td>
<td>• Cash transfers</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Consumer behaviour</td>
<td>• Sugar-sweetened beverage tax</td>
</tr>
<tr>
<td></td>
<td>• Consumer subsidies</td>
</tr>
<tr>
<td></td>
<td>• Nudge campaigns</td>
</tr>
<tr>
<td></td>
<td></td>
</tr>
<tr>
<td>Outcomes</td>
<td></td>
</tr>
<tr>
<td>Anthropometric</td>
<td>• Height, Height-for-age (Z-score)</td>
</tr>
<tr>
<td></td>
<td>• Weight, Weight-for-age (Z-score)</td>
</tr>
<tr>
<td></td>
<td>• Weight-for-length (Z-score)</td>
</tr>
<tr>
<td></td>
<td>• Short stature</td>
</tr>
<tr>
<td></td>
<td>• Stunting</td>
</tr>
<tr>
<td></td>
<td>• Elevated weight</td>
</tr>
<tr>
<td></td>
<td>• Low (birth) weight</td>
</tr>
<tr>
<td></td>
<td>• Small/large for gestational age</td>
</tr>
<tr>
<td></td>
<td>• Body mass index</td>
</tr>
<tr>
<td></td>
<td>• Head circumference</td>
</tr>
<tr>
<td>Micronutrients</td>
<td>• Iron/fe</td>
</tr>
<tr>
<td></td>
<td>• Vitamin A</td>
</tr>
<tr>
<td></td>
<td>• B12</td>
</tr>
<tr>
<td></td>
<td>• Cobalamin</td>
</tr>
<tr>
<td></td>
<td>• Calcium/ca</td>
</tr>
<tr>
<td></td>
<td>• Zinc/zn</td>
</tr>
<tr>
<td></td>
<td>• Folate/folic acid</td>
</tr>
<tr>
<td>Diet quality and adequacy</td>
<td>• Food consumption/variety score</td>
</tr>
<tr>
<td></td>
<td>• Dietary diversity</td>
</tr>
<tr>
<td></td>
<td>• Dietary adequacy/sufficiency</td>
</tr>
<tr>
<td></td>
<td>• Food groups consumed</td>
</tr>
<tr>
<td></td>
<td>• Meal frequency</td>
</tr>
<tr>
<td></td>
<td>• Minimal acceptable diet</td>
</tr>
<tr>
<td></td>
<td>• Estimated average requirement</td>
</tr>
<tr>
<td></td>
<td>• Reference daily intake</td>
</tr>
<tr>
<td>Infant and young child feeding</td>
<td>• Breastfeeding (exclusive, early, extended, initiation, frequency)</td>
</tr>
<tr>
<td></td>
<td>• Mixed feeding</td>
</tr>
<tr>
<td></td>
<td>• Introduction of complementary foods</td>
</tr>
</tbody>
</table>
### Concept Table

<table>
<thead>
<tr>
<th>Concept</th>
<th>Terms</th>
</tr>
</thead>
</table>
| Food security | • Food (in)security  
• Household food insecurity access scale  
• Poverty line/index  
• Income/wealth inequality  
• Market access  
• Food desert  
• Food basket  
• Consumer price index  
• Shannon measure/metric/score  
• Modified functional attribute diversity  
• Food stress  
• Hunger  
• Skipped/missed meals  
• Coping strategy index  
• Food affordability |

### Example full search strategy

Database: Ovid MEDLINE(R) and Epub Ahead of Print, In-Process & Other Non-Indexed Citations, Daily and Versions(R) <1946 to April 06, 2020>

Search Strategy:

---

1. (random* or experiment* or (match* adj2 (propensity or coarsened or covariate)) or "propensity score" or ("difference in difference" or "difference-in-difference" or "differences in difference" or "differences-in-difference" or "double difference") or ("quasi-experimental" or "quasi experimental" or "quasi experiment") or ((estimator or counterfactual) and evaluation*) or "instrumental variable" or (IV adj2 (estimation or approach)) or regression discontinuity or time series or segment* regression).ti,ab,kw. (3158100)

2. Randomized Controlled Trial/ or Random Allocation/ or Evaluation Studies/ or Propensity Score/ or Interrupted Time Series Analysis/ or Controlled Before-After Studies/ or Controlled Clinical Trial/ or Non-Randomized Controlled Trials as Topic/ (931395)

3. 1 or 2 (3600883)

4. (review or meta-analysis).pt. (2687667)

5. cochrane database of systematic reviews.jn. (14735)

6. (systematic review or literature review).ti. (154171)

7. 4 or 5 or 6 (2731803)

8. 3 or 7 (6034861)

9. developing countries.sh,kf. (85389)

10. (Africa or Asia or Caribbean or West Indies or South America or Latin America or Central America).ti,ab,kw. (216058)

11. Africa/ or Asia/ or Caribbean/ or West Indies/ or South America/ or Latin America/ or Central America/ (76022)

12. (Afghanistan or Albania or Algeria or Angola or Argentina or Armenia or Armenian or Azerbaijan or Bangladesh or Benin or Byelorussian or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Herzegovina or Botswana or Brazil or Bulgaria or Burkina Faso or Burkina Faso or Upper Volta or Burundi or Unrundi or Cambodia or Khmer Republic or Kampuchea or Cameroon or Cameroon or Cameroon or Central African Republic or Chad or China or Colombia or Comoros or Comoro Islands or Comores or Mayotte or Congo or Zaire or Costa Rica or Cote d'Ivoire or Ivory Coast or Cuba or Djibouti or French Somaliland or Dominica or Dominican Republic or East Timor or East Timur or Timor Leste or Ecuador or Egypt or United Arab Republic or El Salvador or Eritrea or Ethiopia or Fiji or Gabon or Gabonese Republic or Gambia or Gaza or Georgia Republic or Georgian Republic or Ghana or Grenada or Guatemala or Guinea or Guiana or Guyana or Haiti or Honduras or India or Maldives or
Indonesia or Iran or Iraq or Jamaica or Jordan or Kazakhstan or Kazakh or Kenya or Kiribati or Korea or Kosovo or Kyrgyzstan or Kirghizia or Kyrgyz Republic or Kirghiz or Kirgizstan or Lao PDR or Laos or Lebanon or Lesotho or Basutoland or Liberia or Libya or Macedonia or Madagascar or Malagsy Republic or Malaysia or Malaya or Malay or Sabah or Sarawak or Malawi or Mali or Marshall Islands or Mauritania or Mauritius or Agalega Islands or Mexico or Micronesia or Middle East or Moldova or Moldovia or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Burma or Namibia or Nepal or Netherlands Antilles or Nicaragua or Niger or Nigeria or Muscat or Pakistan or Palau or Palestine or Panama or Paraguay or Peru or Philippines or Phillipines or Philippines or Papua New Guinea or Romania or Rumania or Roumania or Rwanda or Ruanda or Saint Lucia or St Lucia or Saint Vincent or St Vincent or Grenadines or Samoa or Samoa or Island or Navigator Island or Navigator Islands or Sao Tome or Senegal or Serbia or Montenegro or Seychelles or Sierra Leone or Sheldon Islands or Somalia or Sudan or Suriname or Surinam or Swaziland or South Africa or Syria or Tajikistan or Tadzhikistan or Tadjikistan or Tadzhikistan or Tanzania or Thailand or Togo or Togolese Republic or Tonga or Tunisia or Turkey or Turkmenistan or Turkmen or Uganda or Ukraine or Uzbekistan or Uzbeck or Vanuatu or new Hebrides or Venezuela or Vietnam or Viet Nam or West Bank or Yemen or Zambia or Zimbabwe).

13     ((developing or less* developed or under developed or underdeveloped or middle income or low* income or underserved or under served or deprived or poor*) adj (countr* or nation? or population? or world or state*)),ti,ab,kw. (98986)

14     ((developing or less* developed or under developed or underdeveloped or middle income or low* income) adj (economy or economies)),ti,ab,kw. (535)

15     (low* adj (gdp or gnp or gross domestic or gross national)),ti,ab,kw. (243)

16     (low adj3 middle adj3 countr*),ti,ab,kw. (15731)

17     (lmic or lmic or third world or lami countr*),ti,ab,kw. (7551)

18     (transitional countr* or emerging econom* or global south),ti,ab,kw. (1010)

19     9 or 10 or 11 or 12 or 13 or 14 or 15 or 16 or 17 or 18 (1594007)

20     8 and 19 (255764)

21     exp Agriculture/ or Food Assistance/ or exp Food Packaging/ or Food Preservation/ or Food Storage/ or Food-Processing Industry/ or exp Meat-Packing Industry/ or exp Food Quality/ or exp Nutrition Policy/ or exp Nutrition Therapy/ (311574)

22     (((agricultur* or aquacultur*) adj3 input*) or (improv* adj3 (seed* or variet* crop*)) or (genetic* adj3 modif* adj3 (food* or organism*)) or GMO or fertili* or pesticid* or insecticid* or compost* or manure* or mulch* or ((drought* or pest* or insect*) adj3 (toleran* or resist*))) or (rotat* adj3 crop*) or (land adj3 manage*) or "fixed distance planting" or (plant* adj3 row?) or ((farm* or crop or agricultur* or aquacultur*) adj6 subsid*) or (price* adj6 purchas* adj6 guarantee*) or (crop* or rain* or weather or index) adj6 insurance) or (irrigat* adj6 (project* or program* or access* or improv*)) or "water meter" or (rain* adj3 (fed or feed*)) or (trench* adj3 hill*) or "water break" or terrac* or ((farm* or agricultur* or aquacultur*) adj3 (mechani#e* or mechani#ation*)) or intercrop* or (companio adj3 (plant* or variet* or species)),ti,ab,kw. (274307)

23     (((rain* or crop* or agricultur* or aquacultur* or farm* or produce) adj6 (silo* or stor* or shed* or warehouse*)) or ((agricultur* or aquacultur* or farm*) adj3 (collection or distribution) adj3 (centre* or center*)) or (farm* or produce or food* or agricultur* or aquacultur*) adj6 ("cold chain" or (refrigerat* or cold) adj3 (truck* or transport* or transit))))),ti,ab,kw. (4047)

24     (((food* or crop* or staple*) adj3 (fortif* or biofortif*)) or (recycl* or compost* or biodegrad* or plastic*) adj3 (pack* or sache*)) or (post-harvest adj6 (clean* or winnow* or cann* or mill* or thresh* or hull*)) or ((food* or crop* or grain*) adj3 dry*) or ((food* or grocer* or soup) adj6 (donat* or pantry* or bank* or kitchen or transfe*)) or (food* adj6 near* adj6 spoil*)),ti,ab,kw. (9156)
25  ("food environment"* or (zoning and (food* adj3 (security or access*)) or "farmers market" or "food desert" or (school adj6 (meal* or feed* or food* or lunch*)) or (food* adj6 (cash or "social assistance" or "social safety net")) or (food* adj6 ((advertist or label* or market*)) adj3 (ban* or restrict* or regulat* or polic* or law*)) or ((supermarket or ((food* or grocer* or convenience or corner) adj (store* or market*))) adj6 (design* or redesign* or re-design* or layout*)) or (front adj3 pack* adj3 label*)) or (food* adj3 (safe* or quality) adj3 (regulat* or restrict* or polic* or law* or inspect*)) or (food* adj3 certif*))).ti,ab,kw. (8820)

26  (((sugar* or SSB) adj3 tax*) or ((food* or consumer*) adj6 subsid*) or nudg* or ((food* or eat* or feed* or meal* or food* or lunch*) adj6 subsid*) or ((food* or eat* or feed* or meal* or diet*) adj6 (decie* or ((cultur* or social) adj3 (norm* or preferen*)))) or (womnan adj6 (food* or eat* or feed* or meal* or diet*)) adj6 (empower* or deci*)) or (((food* or eat* or feed* or meal* or diet*) adj3 (inform* or educat* or promot* or campaign* or media or initiative*)))).ti,ab,kw. (33515)

27  or/21-26 (608240)

28  Breast Feeding/ or Child Nutritional Physiological Phenomena/ or Adolescent Nutritional Physiological Phenomena/ or Infant Nutritional Physiological Phenomena/ or Weaning/ or Energy Intake/ or Diet, Healthy/ or Eating/ or Elder Nutritional Physiological Phenomena/ or Food Preferences/ or exp Maternal Nutritional Physiological Phenomena/ or exp Nutritional Requirements/ or Nutritional Status/ or exp Nutritive Value/ or exp Nutrition Disorders/ or Nutrition Assessment/ or exp Food Supply/ (548239)

29  (height? or length? or length-for-age or LAZ or "short stature" or stunt* or weight? or weight-for-age or WAZ or "elevated weight" or overweight or "low weight" or "body mass index"* or "weight-for-length" or WLZ or BMI or BMIz or wasted or wasting or obes* or overweight or "mid-upper arm circumference" or MUAC or "low birth weight" or LBW or ((small or large) adj3 "gestational age") or "head circumference"* or adiposity or (lean adj3 ("muscle mass" or "body mass")) or DEXA or "dual-energy x-ray" or absorptiometry or electroimpedence or "whole body air displacement" or plethysmography or "skin fold"* or "arm fat" or ((hip-to-waist or hip-to-shoulder) adj ratio*)).ti,ab,kw. (1939806)

30  (((iron or fe or iodine or "vitamin a" or b12 or cobalamin or calcium or ca or zinc or zn or folate or "folic acid") adj3 deficien*) or h?emoglobin or an?emia or ferritin or transferrin or "urinary iodine concentration"* or goitre* or goiter* or "serum thyroid stimulating hormone" or TSH or (serum adj (thyroglobulin or tg))).ti,ab,kw. (388485)

31  ((food adj (consumption or variety) adj score*) or (diet* adj6 divers*) or DDS or "food groups consumed" or (meal* or "food consumption" adj frequency) or "minimal acceptable diet"* or "estimated average requirement" or "reference daily intake" or RDI or "recommended daily allowance" or RDA or (diet* adj6 (adequa* or sufficient*)) or (fruit* or vegetable*) adj6 consum*) or (healthy eating index* or HEI or "nutrient rich food index" or "Mediterranean diet score" or "nova food groups" or "dietary pattern score"* or (probability adj3 adequa*)).ti,ab,kw. (38256)

32  ((breastfeed* adj3 (exclusive* or early or extend* or initiat* or frequen*)) or "mixed feeding" or weaning or ((food* or feed*) adj6 complement* adj6 introduc*) or (index adj3 feed* adj3 (infant or child)) or IYCF).ti,ab,kw. (388485)

33  ((food adj (security or insecurity)) or "household food insecurity access scale" or HFIAS or "poverty index" or "poverty line" or ((income or wealth) adj3 (inequality or relative)) or (access* adj3 market*) or "food desert"* or (food* adj3 basket*) or (index adj3 "food consumer price")* or FCPI or (Shannon adj (measure or metric or score)) or (modified adj3 functional adj3 attribute adj3 diversity) or (stress* adj3 food) or hunger or hungry or ((meal* or food* or feed*) adj3 (skip* or miss*)) or "coping strategy index" or (food* adj6 afford*)).ti,ab,kw. (25766)

34  or/28-33 (2804578)

35  exp Animals/ (23074750)

36  Humans/ (18388397)

37  35 not (35 and 36) (4686353)

38  34 not 37 (2088346)

39  20 and 27 and 38 (4339)
This note presents information and results from the sixth 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.

The International Initiative for Impact Evaluation (3ie) and Innovative Methods and Metrics for Agriculture and Nutrition Actions research group were funded by the German Federal Ministry for Economic Cooperation and Development (BMZ) through Deutsche Gesellschaft für Internationale Zusammenarbeit (GIZ) through its “Knowledge for Nutrition” programme in February 2020 to undertake an Evidence and Gap Map (E&GM) of the effects of food systems interventions on food security and nutrition outcomes. 3ie is solely responsible for the regular updates and maintenance of the map.