

Food Systems and Nutrition Evidence and Gap Map

Update #8 (November 2023 – January 2024)

Highlights

- This update adds 307 new impact evaluations and eight new systematic reviews for a total of 3,218 included studies.
- The update shows an increase in studies focusing on cash transfers, nutrition classes and professional services related to nutrition compared to the initial E&GM.
- 22 new studies address previously identified intervention and outcome gaps (Table 1).
- Three out of the eight systematic reviews added for this update were high-confidence. These all synthesised interventions within the food environment. Overall, during the update period 17 high- and medium-confidence reviews have been identified.
- This update shows an increase in national and transnational programs evaluated compared to the original map: 27 per cent in the current update compared with 9 per cent in the original map and 19 per cent overall.
- We continue to see greater use of quasi-experimental methods, with such methods being used in 40 per cent of studies in the update and 35 per cent of studies in the E&GM overall.

Figure 1: E&GM timeline

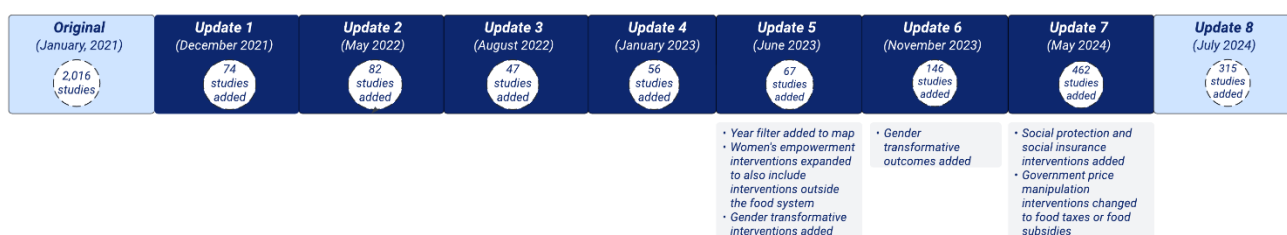


Table 1: Studies added to the E&GM (November 2023-January 2024)

Interventions	Studies and protocols added (studies previously included)
Total studies	315(2903)
Food supply	126 (1228)
Food environment	120 (1209)
Consumer behaviour	91 (814)
Common multi-component	28 (73)
Previously identified gaps	
<i>Illustrative list of interventions to priorities for evaluation</i>	
Food taxes	0(10)
Food subsidies	1(29)
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	3(47)
Gender transformative interventions	4(15)
Innovative store design	0(5)
Cold chain initiatives*	0(1)
Improved farm to market transport*	1(5)
Food safety regulations*	1(3)
<i>Illustrative list of outcomes to priorities for evaluation</i>	
Women's empowerment	19(132)
Gender transformative outcomes	8(23)
Economic, social, and political stability	0(4)
Food loss	2(4)
Environmental impacts of the food system	0(18)
Measures of diet insufficiency	2(40)
<i>Illustrative list of evidence synthesis priorities</i>	
Provision of free or reduced-cost farm inputs to crop production	0(7)
Educational approaches within the food value chain	0(9)
Agricultural insurance products	0(2)
Outcome related to other diet quality and adequacy measures	0(27)
<i>Illustrative list of methods and scale priorities</i>	
Cost evidence	11 (226)
Mixed methods research	23 (246)
High-confidence systematic reviews	3 (50)
National and trans-national evaluations	82 (474)

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

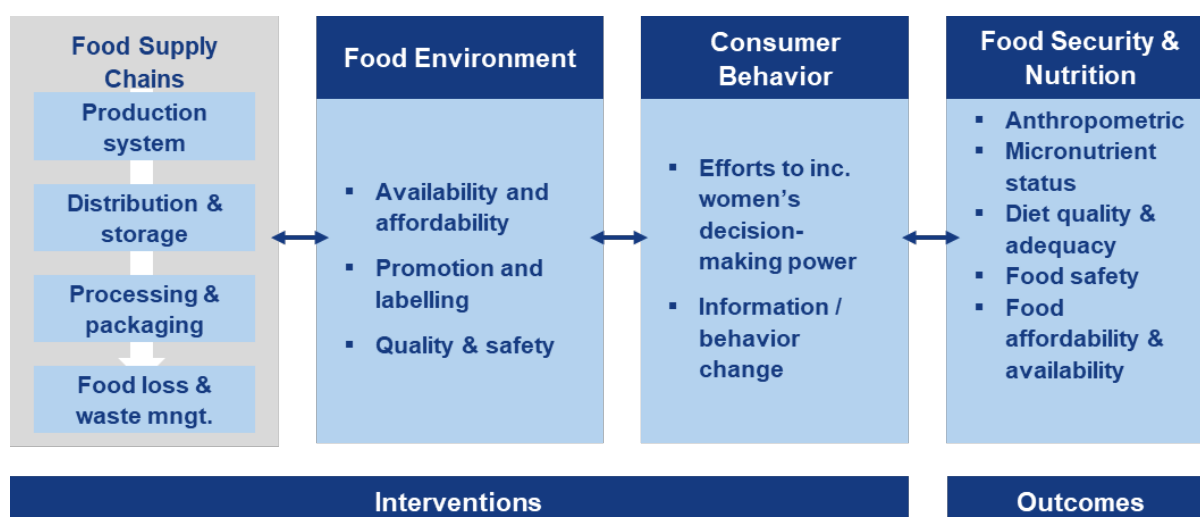
Background

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. This is the final update under our current partnership. 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. In total, 1,217 studies have been added to the E&GM during the update period. This report presents our analysis of the studies published from November 2023 to January 2024. We discuss additions and overall changes in the evidence base.

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



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

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 January 2024, covering the period since the previous searches. For more details on search strategy, see Appendix 2.

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 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 all included studies as well as any marked as 'unsure'.

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 73,484 records (Figure 2). We removed 39,909 duplicates. We also removed 28,532 which were identified as having low probability of inclusion based on the classifier in EPPI-Reviewer. Therefore, 5,256 abstracts included in the E&GM specific search and development evidence portal searches were screened. During title and abstract screening, 5,038 articles were excluded, leaving 218 to be screened at full text. Finally, 94 relevant articles were eligible for inclusion. In addition, 217 studies were identified from the backlog and 4 studies were identified by an advisory group member for our most recent food systems REA focusing on women's empowerment outcomes. Therefore, we added 315 unique studies from this search : 307 impact evaluations and 8 systematic reviews.

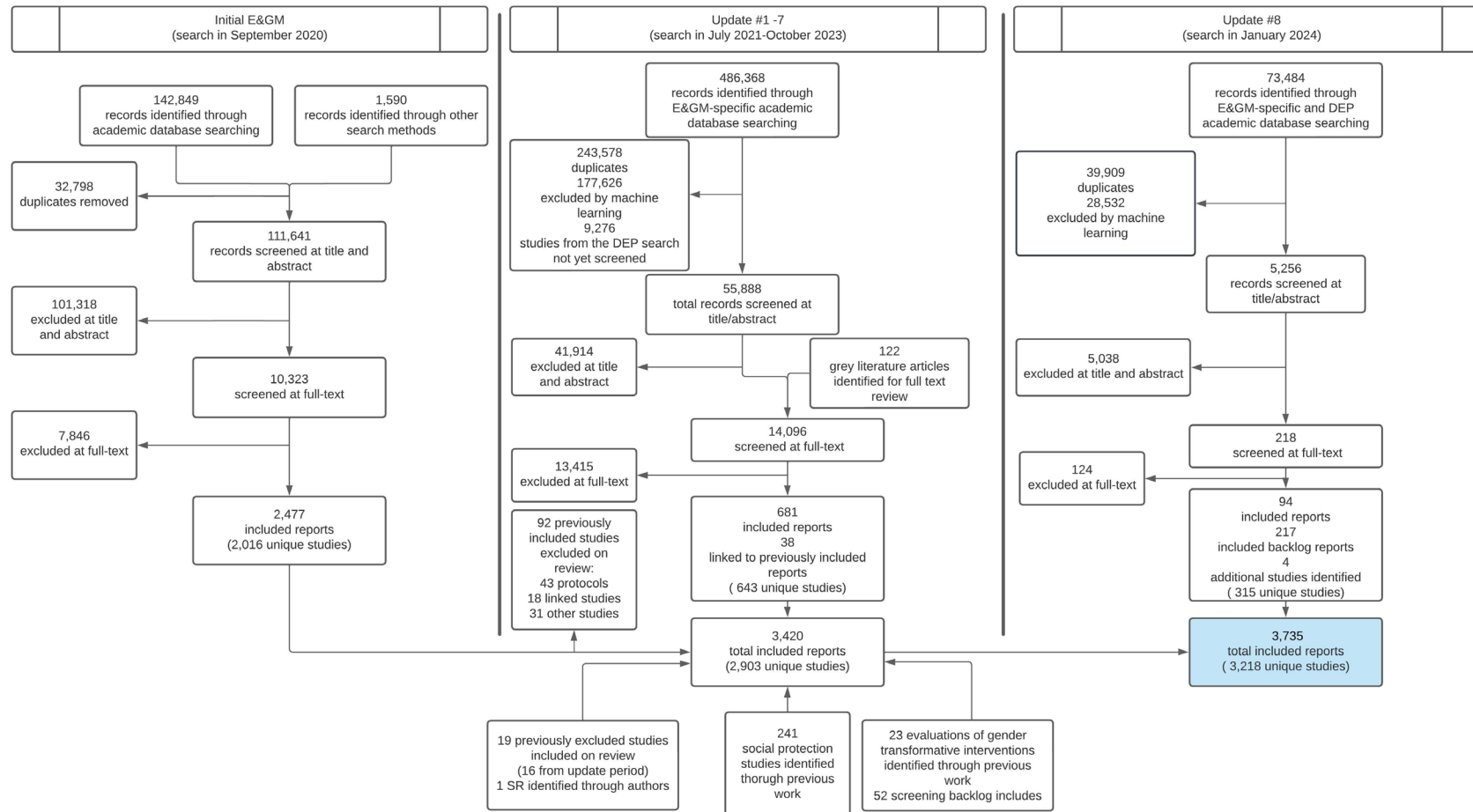
The food supply chain interventions were the most commonly evaluated interventions identified for this update (n=126). The food environment is second (n=120) and consumer

behaviour is third (n=91). After expanding the framework for food environment interventions included in the E&GM for the previous update, the evidence base for food environment interventions (n=1342) and food supply chain interventions (n=1325) are about the same size overall for the E&GM. The evidence base for consumer behaviour interventions is slightly smaller (n=877).

More specifically, the most common interventions identified for this update were professional services (IE n=32, SR n=2) and classes (IE n=30, SR n=2) from the consumer behaviour domain, conditional cash transfers (IE n=32, SR n=0) and unconditional cash transfers (IE n=30, SR n=0) from the food environment. These do not match the most evaluated interventions overall in the E&GM. Provision of supplements (IE n=449, SR n=84), classes (IE n=362, SR n=35), fortification (IE n=322, SR n=58), and direct provision of food (IE n=335, SR n=34) are the four most common interventions.

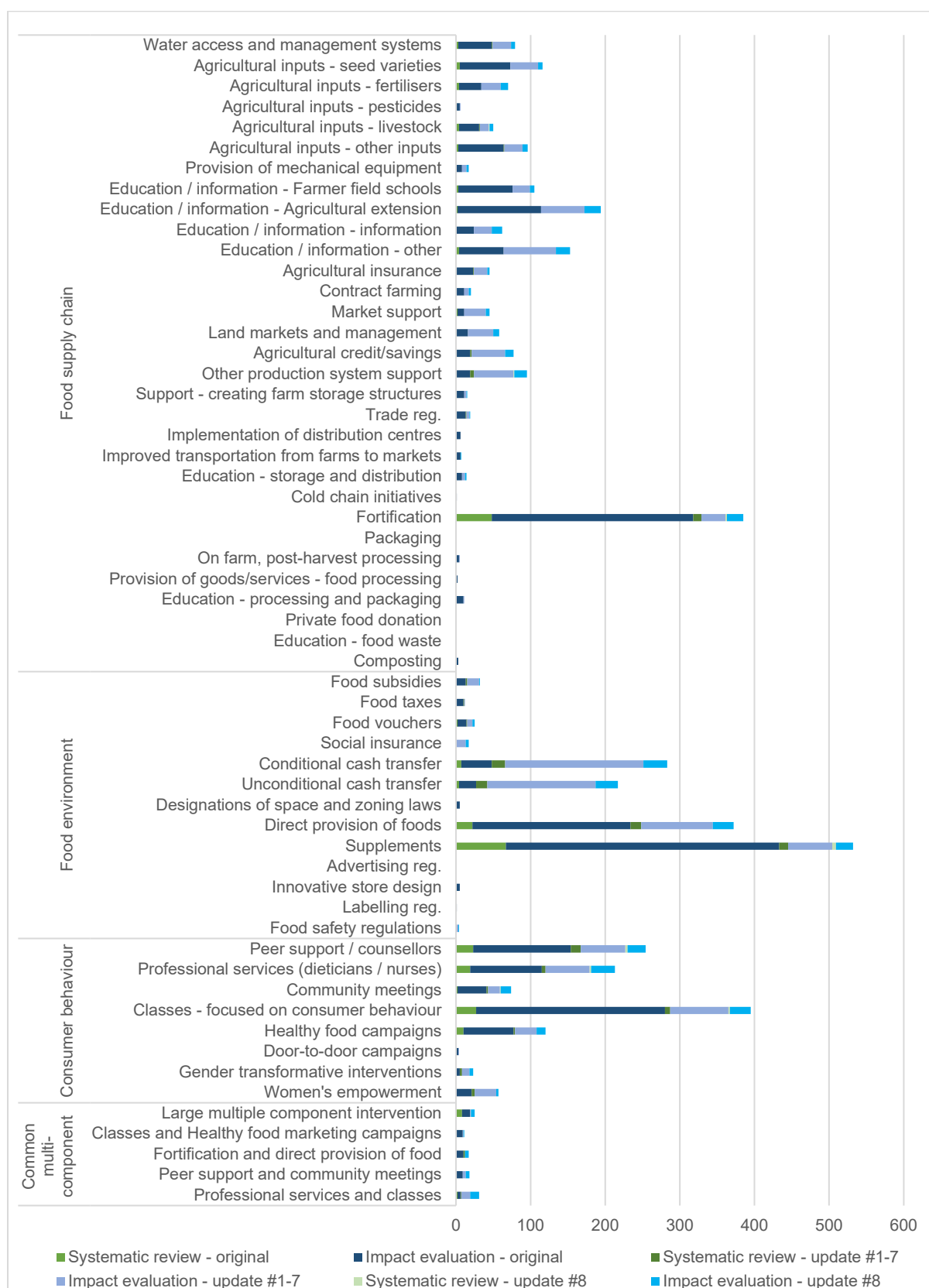
In total, ten IEs evaluate interventions identified as gaps identified in the original E&GM and the midline report (Table 1). Five of these are studies of gender-transformative interventions, three are studies of women's empowerment interventions, one of food subsidies, one on improved farm to market transport and one on food safety regulations.

Figure 3: PRISMA flow diagram¹



¹ The diagram follows the Preferred Reporting Items for Systematic reviews and Meta-Analysis (PRISMA) guidelines (Page et al. 2020).

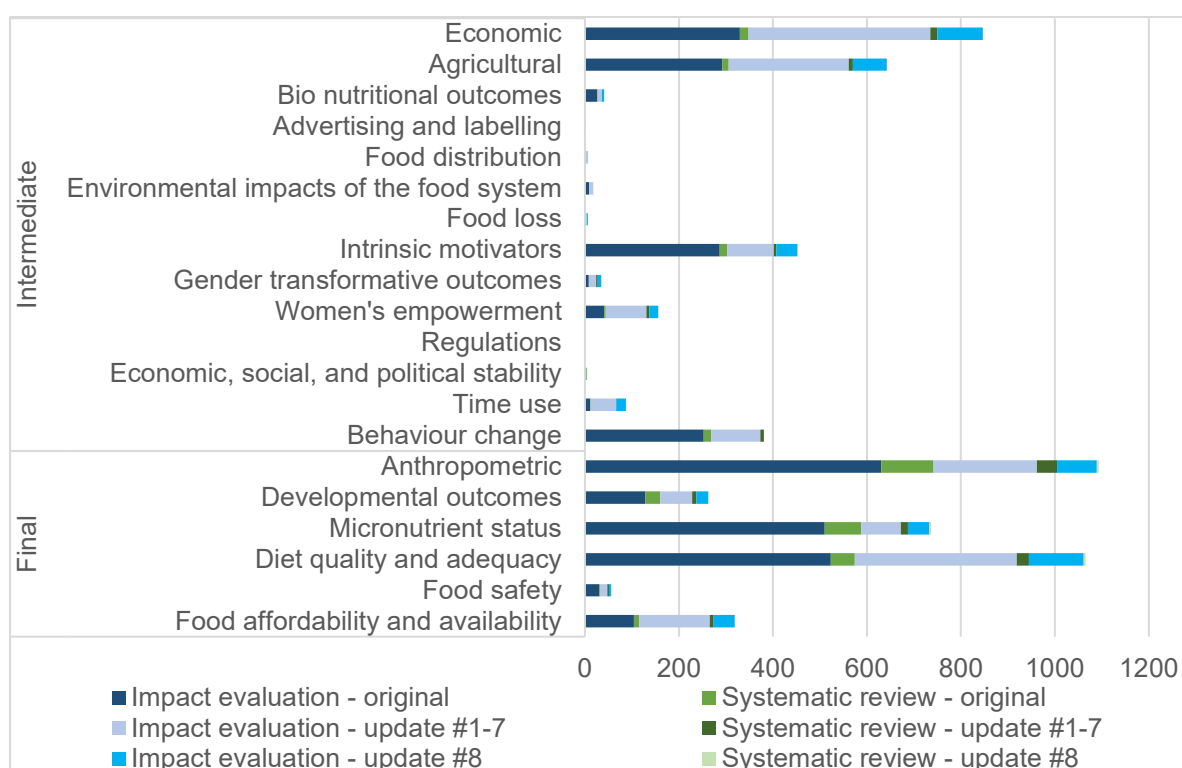
Figure 4: Distribution of included studies by intervention domain and subdomain



Diet quality and adequacy (IE n=117, SR n=4), economic (IE n=98, SR n=0), anthropometric (IE n=86, SR n=4), and agricultural outcomes (IE n=73, SR n=0) were the most commonly measured outcomes identified in this update. There has not been a change in the most common outcomes measured since the initial E&GM. The most common outcome categories remains anthropometric outcomes (IE n=936, SR n=154) followed by diet quality and adequacy outcomes (IE n=983, SR n=78).

Several studies were also identified covering the outcomes considered as gaps (Table 1). In total 12 studies were identified. Two studies measured food loss outcomes, two studies insufficient diet measures, and eight studies gender-transformative outcomes.

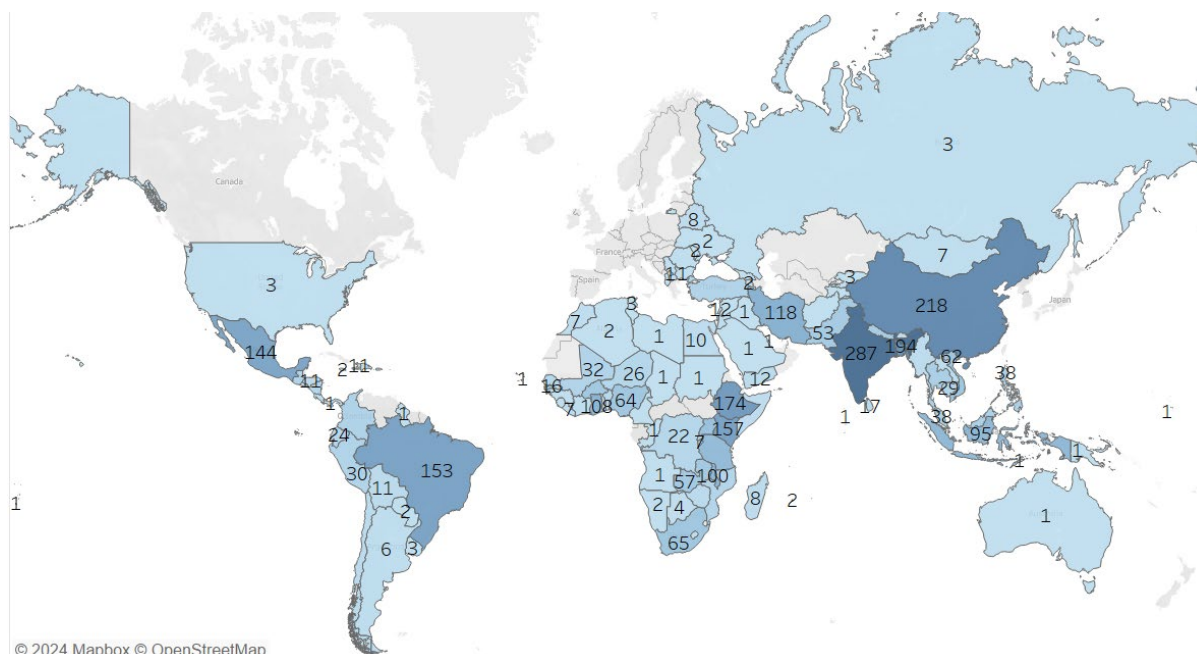
Figure 5: Distribution of included studies by outcome domain



Impact evaluations employing experimental methods constituted 60% of the total IEs included. This represents an increase from our previous update, where 41% of the studies used experimental methods. Nevertheless, it reflects a continued overall decline from the original map, in which 73% of studies used experimental methods.

India (n = 35, 11%), China (n = 31, 9%) and Ethiopia (n = 24, 7%) contributed the highest number of impact evaluations in this update. This is consistent with the overall trend observed up to this last update. Cumulatively, India (n = 287, 10%), China (n = 218, 7%) and Ethiopia (n = 174, 6%) remain the leading countries in terms of publication volume of impact evaluations. We found that the number of evaluations focused on Mexico and Bangladesh has decreased since the last update, with Mexico dropping from 11% to 2% and Bangladesh from 8% to 4% of included impact evaluations.

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



Other areas identified as priorities for evaluations include national or trans-national interventions, mixed methods research and cost evidence (Table 1). This update included 27% national and trans-national interventions, while the overall E&GM has included 19% of these evaluations. This update shows lower percentage of studies including cost evidence and same percentage mixed-methods as the overall E&GM: 4% (n=11) included cost evidence and 8% (n=23) mixed methods, compared to 7% (n=237) cost evidence and 8% (n=259) mixed methods.

Eight systematic reviews were added for this update. One was a protocol, four were low-confidence, and three were high-confidence. These mainly focused on supplementation/fortification interventions (n=7) or consumer behaviour interventions (n=3). None of the systematic reviews focused on areas previously identified as gaps.

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 3,218 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.

A total of six studies had previously been identified evaluating improved farm to market transportation interventions. In this update, one additional study has been identified. This study provides evidence from Mozambique where the government has aimed to modernise and commercialise the agricultural sector by implementing a variety of interventions including improving rural infrastructure such as the road network. The results showed that improving the connectivity resulted in increased agricultural production, although there was some variation across regions (limi, 2022).

Four new studies were identified evaluating gender-transformative interventions. One study evaluated an intervention aiming to empower women in rural Myanmar through gender and nutrition education. Two studies were conducted in India, one focusing on adolescent girls and one on women. One study focused on men in rural Ethiopia. This was a multicomponent intervention including cash transfers, gender dialogue, and a men's engagement group. This men's group focused on men's reflections on gender norms in their community. The evaluation found improvements in men's gender-equitable attitudes and their involvement in domestic tasks (Alderman et al., 2023).

In terms of outcome gaps, only four studies have previously been identified measuring food loss outcomes. One of these studies focused on improving storage technology in India. The intervention made hermetic bags for storage available for purchase to farmers. The results showed that grain loss was reduced by nearly 100%, and although it didn't show any change in dietary diversity, the food loss had economic benefits for the smallholder farmers (Shukla, Pullabhotla and Baylis, 2023).

Three out of eight systematic reviews were rated as high-quality in this update. Imdad and colleagues (2021) assessed the effects of neonatal nutrition interventions on neonatal mortality, child health and developmental outcomes, finding no significant impact of vitamin A supplementation on all-cause mortality in newborns. A systematic review on the use of fortified milk consumption showed significant effects on measures of growth and biochemistry in young children, particularly in studies longer than 6 months on vulnerable populations (Brooker et al. 2022). Sguassero and colleagues (2012) reviewed the effects of community-based supplementary feeding on the growth of children under five. It found that the impact on growth measures was not significant. The high levels of heterogeneity among studies and discussion of explanatory variables allowed to conclude that while these interventions did not significantly impact growth measures, the lack of sanitary facilities and safe drinking water limits their effectiveness, highlighting the need for contextualization of these results.

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

About this note

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.

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Appendix A: Studies added to EGM November 2023 – January

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Appendix B: Search strategy

2.1 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.

2.2 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 \(IMMANA\)](#) grantee database
- WHO Global Index Medicus
- Grey Literature Report
- Social Science Research Network (SSRN)
- Eldis
- Epistemonikos
- 3ie Development Evidence Portal
- Registry of International Development Impact Evaluations (RIDIE)
- Oxfam Policy & Practice

Below is a list of organisational websites we manually searched for additional related studies.

- [AgEcon Search \(University of Minnesota\)](#)
- [Innovations for Poverty Action \(IPA\)](#)
- [Abdul Latif Jameel Poverty Action Lab \(J-PAL\)](#)
- [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 \(CEGA\)](#)
- [Department for International Development \(DFID\) Research for Development \(R4D\)](#)
- [USAID](#)
- [International Food Policy Research Institute \(IFPRI\)](#)
- [CIGAR](#)
- [Food and Agriculture Organization of the United Nations \(FAO\)](#)
- [High Level Panel of Experts on Food Security and Nutrition \(HLPE\)](#)
- [World Food Programme \(WFP\)](#)
- [Action Against Hunger](#)
- [UNICEF](#)
- [United Nations Evaluation Group](#)
- [Asian Development Bank](#)
- [World Agroforestry Centre \(ICRAF\)](#)
- [International Livestock Research Institute \(ILRI\)](#)
- [Nutrition International](#)

2.3 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

Concept	Terms	
Study type and geography		
Impact evaluations	<ul style="list-style-type: none">▪ Random▪ Experiment▪ Propensity score matching▪ Difference-in-differences▪ Quasi-experiment	<ul style="list-style-type: none">▪ Counterfactual evaluation▪ Instrumental variables▪ Regression discontinuity▪ Time series regression
Systematic reviews	<ul style="list-style-type: none">▪ Systematic review▪ Literature review	<ul style="list-style-type: none">▪ Meta-analysis
Low- and middle income countries (LMICs)	<ul style="list-style-type: none">▪ Developing▪ Low/middle income▪ Underserved▪ Transitional/emerging economy▪ Global south	<ul style="list-style-type: none">▪ Deprived▪ Poor▪ Low GDP▪ Terms associated with each LMIC (see full list below)
Interventions		
Production systems	<ul style="list-style-type: none">▪ Food systems/production▪ Kitchen garden	<ul style="list-style-type: none">▪ Water break▪ Terracing

Concept	Terms	
	<ul style="list-style-type: none"> ▪ Agriculture/aquaculture inputs ▪ Livestock ▪ Improved seeds/varieties/crops ▪ Agriculture/crop subsidies ▪ Price purchase guarantee ▪ Crop/rain/weather/index insurance ▪ Drought/pest resistant ▪ GMOs ▪ Fertiliser/pesticide/insecticide ▪ Land management ▪ Water meter ▪ Rain-fed ▪ Trench and hill method ▪ Fixed distance planting ▪ Row planting ▪ Irrigation 	<ul style="list-style-type: none"> ▪ Contour bunding ▪ Mechanisation ▪ Intercropping ▪ Companion plants/species ▪ Integrated soil fertility management ▪ Farmer training/field schools ▪ Demonstration plots ▪ Agricultural/rural extension ▪ Farmers' organisations ▪ Social protection
Storage & distribution	<ul style="list-style-type: none"> ▪ Silo ▪ Storage/storehouse ▪ Shed ▪ Warehouse 	<ul style="list-style-type: none"> ▪ Collection/distribution centre ▪ Cold chain ▪ Refrigerated transport
Processing & packaging	<ul style="list-style-type: none"> ▪ Fortification ▪ (Non-)plastic packaging ▪ Post-harvest cleaning/ winnowing/canning/milling/threshing/hulling ▪ Drying 	<ul style="list-style-type: none"> ▪ Food donation/transfer ▪ Food bank/pantry ▪ Soup kitchen
Food environment	<ul style="list-style-type: none"> ▪ Food environment ▪ Zoning ▪ Farmers market ▪ Food desert ▪ School meals/feeding/lunches ▪ Cash transfers 	<ul style="list-style-type: none"> ▪ Social assistance/safety net ▪ Advertising bans/regulations ▪ Store re-design ▪ Front-of-package labelling ▪ Food safety/quality ▪ Food certification
Consumer behaviour	<ul style="list-style-type: none"> ▪ Sugar-sweetened beverage tax ▪ Consumer subsidies ▪ Nudge campaigns 	<ul style="list-style-type: none"> ▪ Social norms ▪ Women's empowerment/decision-making ▪ Information/education
Outcomes		
Anthropometric	<ul style="list-style-type: none"> ▪ Height, Height-for-age (Z-score) ▪ Weight, Weight-for-age (Z-score) ▪ Weight-for-length (Z-score) ▪ Short stature ▪ Stunting ▪ Elevated weight ▪ Low (birth) weight ▪ Small/large for gestational age ▪ Body mass index 	<ul style="list-style-type: none"> ▪ Adiposity ▪ Lean body/muscle mass ▪ Dual-energy X-ray ▪ Absorptiometry ▪ Electroimpedence ▪ Whole body air displacement ▪ Plethysmography ▪ Skin fold

Concept	Terms	
	<ul style="list-style-type: none"> Head circumference 	<ul style="list-style-type: none"> Arm fat Hit-to-waist/shoulder ratio
Micronutrients	<ul style="list-style-type: none"> Iron/fe Vitamin A B12 Cobalamin Calcium/ca Zinc/zn Folate/folic acid Haemoglobin 	<ul style="list-style-type: none"> Anaemia Ferritin Transferrin Urinary iodine concentration Goitre Serum thyroid stimulating hormone Serum thyroglobulin
Diet quality and adequacy	<ul style="list-style-type: none"> Food consumption/variety score Dietary diversity Dietary adequacy/sufficiency Food groups consumed Meal frequency Minimal acceptable diet Estimated average requirement Reference daily intake 	<ul style="list-style-type: none"> Recommended daily allowance Fruit/vegetable consumption Healthy eating index Nutrient-rich food index Mediterranean diet score Nova food groups Dietary pattern score
Infant and young child feeding	<ul style="list-style-type: none"> Breastfeeding (exclusive, early, extended, initiation, frequency) Mixed feeding Introduction of complementary foods 	<ul style="list-style-type: none"> Weaning Infant and Young Child Feeding Index
Food security	<ul style="list-style-type: none"> Food (in)security Household food insecurity access scale Poverty line/index Income/wealth inequality Market access Food desert Food basket Consumer price index 	<ul style="list-style-type: none"> Shannon measure/metric/score Modified functional attribute diversity Food stress Hunger Skipped/missed meals Coping strategy index Food affordability

2.3: 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 "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 Byelarus or Byelorussian or Belarus or Belorussian or Belorussia or Belize or Bhutan or Bolivia or Bosnia or Herzegovina or Hercegovina or Botswana or Brazil or Bulgaria or Burkina Faso or Burkina Fasso or Upper Volta or Burundi or Urundi or Cambodia or Khmer Republic or Kampuchea or Cameroon or Cameroons or Cameron or Camerons or Cape Verde 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 Malagasy 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 Moldavia or Moldovan or Mongolia or Montenegro or Morocco or Ifni or Mozambique or Myanmar or Myanma 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 Philipines or Phillipines or Phillippines 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 Samoan Islands or Navigator Island or Navigator Islands or Sao Tome or Senegal or Serbia or Montenegro or Seychelles or Sierra Leone or Sri Lanka or Solomon Islands or Somalia or Sudan or Suriname or Surinam or Swaziland or South Africa or Syria or Tajikistan or Tadjhikistan or Tadjikistan or Tadjhik 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 Uzbek or Vanuatu or New Hebrides or Venezuela or Vietnam or Viet Nam or West Bank or Yemen or Zambia or Zimbabwe).ti,ab,kw,sh. (1423829)
- 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 (Imic or Imics 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 hilling or "water break" or terrac* or ((farm* or agricultur* or aquacultur*) adj3 (mechani#e* or mechani#ation*)) or intercrop* or (companion adj3 (plant* or variet* or species))))).ti,ab,kw. (274307)
- 23 (((grain* or crop* or agricultur* or aquacultur* or farm* or produce) adj6 (silo* or stor* or shed* or warehous*)) 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 pantr* or bank* or kitchen or transfer*)) 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 ((advertis* 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 diet*) adj6 (deci* or ((cultur* or social) adj3 (norm* or preferen*))) or (wom#n 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 underweight 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 electroimpedance 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 deficient*) 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 sufficien*)) 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. (38042)

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 (2604578)

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)

About this note

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.

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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.

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