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Evidence Collection on Moderate and Severe Acute Malnutrition: a multi-organisation collaboration

Isla Kuhn
Medical Library, University of Cambridge, Cambridge, UK.
E-mail address: ilk21@cam.ac.uk

Claire Allen
Evidence Aid, Oxford, UK.
E-mail address: callen@evidenceaid.org

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Abstract:

Background: *Linked evidence collections on the Evidence Aid and Cochrane websites aim to increase the uptake of robust evidence in the humanitarian and disaster risk reduction sectors by providing a convenient overview of relevant synthesised evidence.* ***Methods:*** *Linked collections highlight the most relevant high quality synthesised evidence on a specific topic within the limits of an agreed scope. Identified resources were assessed on relevance and quality. All resources are made available through Evidence Aid with a link to the Cochrane collection. The multi-stakeholder collaboration ensures an inclusive process, crucial to safeguard the relevance, practical use, feasibility and quality of the collection. Together the collaborators formulated the topic and process for the collection.* ***Results:*** *4646 articles were identified after the search strategy was agreed. The Evidence Aid Collection was published in March 2018****;*** *the linked Cochrane Collection is scheduled for publication in June 2018.* ***Reflections:*** *The limitations of the evidence are important to consider, and changes in research methodology in the future might result in changes to both the EA process and the impact that these collections can have. The role of the information specialist is also considered.* ***Conclusion:*** *Evidence Aid has demonstrated that providing evidence in an easily accessible way can help people to summarise and distil the appropriate robust evidence, making it available to a wider audience with the aim to inform activities in the field. It shows the benefits of a single portal of the evidence freely available to all.*

Keywords: evidence summaries, malnutrition, collaboration

Background

History of evidence aid

The Austrian-American physicist Victor Frederick Weisskopf said, "Human existence is based upon two pillars: compassion and knowledge. Compassion without knowledge is ineffective; knowledge without compassion is inhuman." (Wikipedia, 2018)

The Evidence Aid website states: "When disaster strikes, the best interventions can save lives and help shattered communities rebuild. Knowing what works and what doesn't can be the difference between life and death, and yet that vital component - evidence - is often missing".

There is increasing recognition of the need to use research-based evidence in decision-making before, during and after the response to disasters and humanitarian emergencies (Active Learning Network for Accountability and Performance in Humanitarian Action, 2014)

Evidence Aid [www.evidenceaid.org] is a co-ordinated, international initiative to improve effective and timely access to the best available evidence from evidence synthesis of relevance to disasters and humanitarian crises and major healthcare emergencies. It was established after the Indian Ocean tsunami of 26 December 2004, with input from several members of Cochrane, Cochrane groups and other individuals and groups and has a global focal point in the Centre for Public Health at Queen's University Belfast in Northern Ireland, and a small staff team based in the UK.

Evidence Aid works with partners and contributors around the world to achieve its aim of providing people and organisations with the knowledge tools they need to make well informed decisions and choices in their efforts to improve health following disasters and other humanitarian emergencies. It uses knowledge from systematic reviews to provide reliable, up-to-date evidence on interventions that might be considered in the context of natural disasters and other major healthcare emergencies. Evidence Aid seeks to highlight which interventions work, which don't work, which need more research, and which, no matter how well meaning, might be harmful; and to provide this information to agencies and people planning for, or responding to, disasters.

By working with individuals and organisations from around the world to prioritise the needs for evidence, a list of 30 priority questions was produced in June 2013 and the top 10 topics for research and reviews relevant to interventions and actions in disaster were agreed upon, (Evidence Aid Priority Setting Group, 2013) with nutrition and food security high on that list.

Challenges around evidence surrounding acute malnutrition

In 2017, the United Nations Children's Emergency Fund (UNICEF), the World Food Programme (WFP), and other United Nations (UN) agencies estimated that more than 70 million people globally required food or other assistance because of natural disasters, conflict, population displacement, famine or high levels of acute malnutrition. (FAO, et al, 2017) After an initial decline in humanitarian emergencies following the end of the 20th century, there is now an alarming increase in the number of people requiring food and other assistance. In many situations, the crisis is socio-economic – food is available but unaffordable. (World Economic Forum, 2017)

The right to receive, and the obligations to provide, food, nutrition and medical care in an emergency are clearly enshrined in humanitarian law. (International Committee of the Red Cross, 2005) Providing appropriate interventions to support prevention and treatment for child and maternal nutrition and health can be life-saving. However, high caseloads of acute malnutrition occurring in the context of climatic extremes and military or civil conflict result in a pressing need for curative and preventive interventions that achieve high coverage, are effective and cost-effective, and underpinned by evidence. To achieve this, agencies increasingly need to base programmes and interventions on strong scientific evidence rather than customary practice. This is recognised by The Food and Agriculture Organization (FAO) of the UN, UNICEF, WFP and other UN agencies who recently

concluded that "Addressing food insecurity and malnutrition in conflict-affected situations cannot be business as usual." (FAO, et al, 2017**)**

Malnutrition Collection

Evidence Aid brought together a group of experts and volunteers including information specialists (IS) to develop a collection which provides an overview of relevant evidence that has been synthesised in systematic reviews. It aims to increase the uptake of robust evidence to improve prevention and treatment of acute malnutrition in emergencies, namely Severe Acute malnutrition (SAM) and Moderate Acute Malnutrition (MAM), and to inform decision-making on strategies and policies in the humanitarian and disaster risk reduction sectors. It will also guide funders in their quest to fund future research by identifying gaps in robust evidence and areas that are under-researched.

This paper will describe the methods used to plan and create the collection, and highlight, in particular, the role of the information specialist.

Methods

The Evidence Aid Collection is a curated list of systematic reviews related to the prevention and treatment of acute malnutrition, with summaries of each review published on the Evidence Aid website; linked to this is a Cochrane Special Collection, which will be published on the Cochrane Library and linked to from the Evidence Aid collection. The essence of the method was to carry out a review of reviews, up to the point that the data was compared and analysed.

This initiative was implemented by a collective collaboration involving a wide range of stakeholders. It was led by Evidence Aid, with input from experts from Action Against Hunger, Cochrane (Cochrane Nutrition, Cochrane Switzerland and the editorial unit in Cochrane), Emergency Nutrition Network, KEMRI/Wellcome Trust Research Programme, Médecins Sans Frontières, Save the Children, Scaling up Nutrition (SUN) Movement Secretariat, University of Oxford, and the World Food Programme. While the number of experts actively involved varied over time, as capacity and other commitments permitted, the total number of individuals who signed up to the collaboration was 27.

In addition, there was also a group of volunteers with a variety of backgrounds and expertise, and an information specialist with responsibility for many specific aspects of project management.

Process and milestones

It was agreed amongst the collaborators the steps that would guide the process (Fig 1).

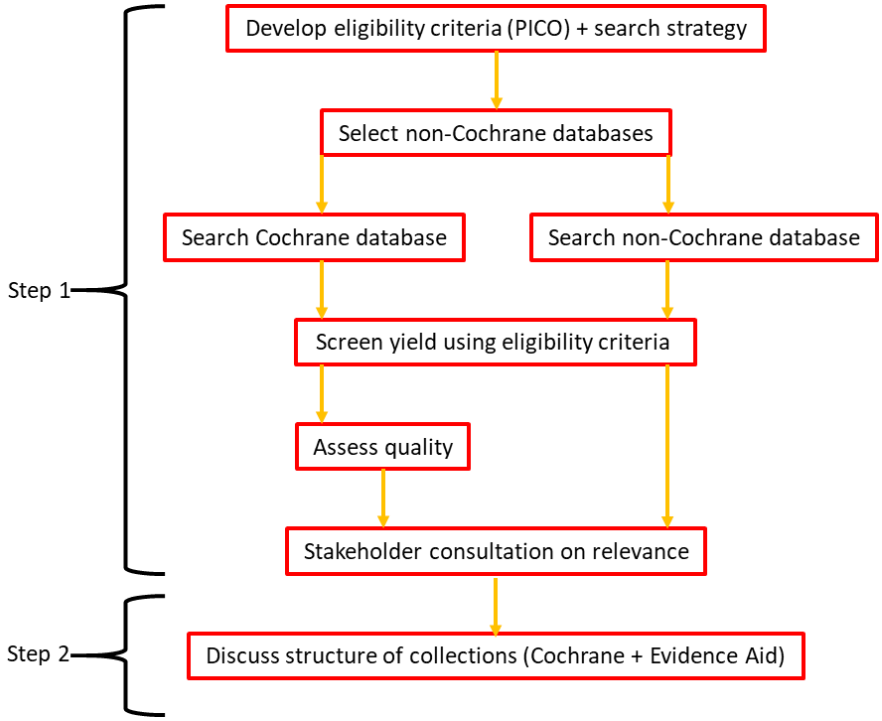

Fig 1 - Key steps in development of the collection

Steps

1. Identify eligible systematic reviews in Cochrane and non-Cochrane databases
    - 1.1 Develop eligibility criteria (PICO – Population, Intervention, Comparison and Outcomes).
    - 1.2 Decide which non-Cochrane databases to search.
    - 1.3 Develop search strategies.
    - 1.4 Run the searches in databases.
    - 1.5 Screen yields using the PICO, and select eligible systematic reviews.
    - 1.6 Stakeholder consultation on relevance of selected reviews and select final for inclusion in collection. (including determining the relevance to contexts, such as lower- and middle-income countries, or conflict and disaster affected countries).
2. Discuss the structure of the collections.
3. Prepare brief summaries of all included systematic reviews.
4. Write an introduction as to the purpose of the collections.
5. Publish both collections and ensure they are linked.
6. Promote both collections.

The information specialist (IK) joined the collaboration after the expert collaborators had developed a detailed protocol, including PICO criteria and took responsibility for developing the search strategy which was reviewed by subject experts.

Scoping the collection

The scope of malnutrition is very broad. The collaboration used an overview of key areas of intervention for the nutrition cluster in the Interagency Standing Committee (IASC) Nutrition toolkit (Global Nutrition Cluster, 2008), to identify the key elements:

1. Infant and young child feeding in emergencies.
2. Treatment of diarrhoea with ORT/Zinc.
3. Prevention and treatment of vitamin A deficiency.
4. Prevention and treatment of micronutrient deficiencies.
5. Management of Moderate Acute Malnutrition (MAM).
6. Management of Severe Acute Malnutrition (SAM).

7. Nutrition, HIV and AIDS.
8. The psychosocial components of nutrition.
9. Nutritional care for groups with special needs.
10. The use and role of food assistance.
11. Food handling, storage and preparation.
12. Household food security and livelihoods.

Overall there was a consensus in the group that some interventions were too limited in scope, such as 2 and 3 above, with the risk the collection would be too limited and not useful. Other topics were not directly related to the health outcomes or medical aspects, such as 11 and 12 above. The collaboration decided to focus on key element 5 and 6, resulting in the topic: "The prevention and treatment of moderate and severe acute malnutrition in humanitarian emergencies."

A highly detailed PICO (Appendix 1) was developed as part of the protocol which could be used to inform the search strategy, and also for use by multiple reviewers to inform their selections when screening titles and abstracts.

Results

Literature searches (see Appendix 2) were carried out in 12 databases (Appendix 3), in the week of 15 September 2017. These searches yielded a total of 4646 potentially eligible papers once they had been de-duplicated. Four hundred and sixty-three Cochrane reviews were then excluded since, once screened, they would be included in a separate collection of evidence on The Cochrane Library. This left a total of 4,183 eligible papers for the Evidence Aid collection of evidence.

Three individuals (CA, JJ and IK) then screened all titles for 4,183 potentially eligible papers to include or exclude based solely on title, removing any papers that were obviously not related to the collection. This left 1,475 papers that would be full text screened by the collaboration.

It had been previously agreed by the collaboration that all 1,475 papers would be full text screened by two reviewers independently and disagreements resolved by a further screen. If disagreements could not be resolved, another member of the collaboration would step in to mediate.

At the time of writing, 50 papers are eligible to be included and 20 papers have not yet been allocated for screening. The Evidence Aid Collection was published in March 2018 (Evidence Aid, 2018) and is divided into 5 categories: Treatment of acute malnutrition; Antenatal measures to improve birth outcomes (LBW); Breastfeeding promotion; Complementary feeding: Improving nutritional state; Disease: to promote nutrition state in illness. The linked Cochrane Collection is scheduled for publication in June 2018.

Reflections

Limitations of the evidence

Systematic reviews are the highest level of scientific evidence, combining results from all available trials on a topic and rigorously assessing their quality. The obvious limitation is that not all topics have undergone systematic review. Where well-designed trials have not been undertaken, a systematic review may be published as 'empty' or be missing altogether. (Yaffe et al. 2012) This may indicate areas where the priorities of decision-makers and practitioners, and those of researchers are not aligned. One important example is the specific treatment of kwashiorkor, a serious form of malnutrition caused by eating too little protein, mainly found in children in parts of tropical Africa. (Briend, 2014) Systematic reviews are also not possible where only descriptive studies have been conducted, as this is a type of study that cannot be used to assess true efficacy (effect under controlled conditions) or effectiveness (effect in natural settings) against a suitable comparator.

Some interventions are not amenable to randomisation, and a genuinely informative before/after comparison is challenging to achieve. Methods of integrating nutrition with other services (e.g. health,

water, sanitation & and hygiene, and food security), structured monitoring and evaluation of coverage and performance, for example, as well as qualitative research may provide evidence that could be reviewed; however, the indicators for how to synthesise and systematically measure potential biases and the quality of such research are yet to be developed. Therefore, some areas that are heavily debated, such as criteria to assess the nutritional status of communities or optimal food security assessment methods cannot be synthesised in systematic reviews and therefore are not considered in this collection.

The implementation of the research in these collections by the target audience (humanitarian aid organisations and workers) has not yet been measured, although the challenges have been explored (Banatvala, 2000; Altay, 2014) A blog post by Rick Bartoldus, Evidence to Action Officer, International Rescue Committee on the Evidence Aid website acknowledges that evidence based humanitarian aid can never follow exactly the same model as evidence based medicine/clinical care (Bartoldus, 2017)

Rather than systematic reviews, the content of future collections might include/focus on realist reviews, which aim to show what works, for whom, and under what circumstances (Pawson et al, 2005), but as yet there is not enough of this type of work available.

The role of the Information Specialist

This was the first Evidence Aid Collection to have an information specialist (IK) taking an active role in project managing aspects of the collection. Older collections were developed on more of an ad hoc basis - and only contained Cochrane reviews since EA sat within the Cochrane Collaboration at that time. Gradually, as more resource (financial and man-power) has become available the development of each collection is becoming more rigorous - for example, the Zika Collection was developed and project managed by a systematic reviewer who had searching skills, but no dedicated IS. The development of this malnutrition collection has been enhanced by having an IS on board, who not only took responsibility for the development of the search strategy, but also project managed the whole reviewing process and was available for each teleconference to discuss progress.

While Evidence Aid (CA and JJ) led the project as a whole, the IS role included the development of an initial search strategy to be approved by the collaboration; database selection; translation of this strategy to run in all the databases; deduplication of results; managing and facilitating the title/abstract screening and the full text screening. The summaries were written by another volunteer (BS) and the collection was organised, and categorised by experts (JB, SvdK)

As with all systematic reviews, the search strategy was developed very much in collaboration with the experts in the group. The PICO (Appendix 1) was the core basis of the strategy, and the range of keywords was built up in an iterative way through discussion and consultation (Appendix 2). The databases were selected according to their relevance and accessibility.

As with any systematic review, one of the most laborious aspects is the export of results from each database into the reference manager, in this case Endnote [https://endnote.com/] was used as a first preference, as opposed to other commonly used tools, such as Mendeley or Zotero. When using "standard" database interfaces, OVID, Ebsco, Web of Science, PubMed, this is repetitive but straightforward, depending on the number of articles per expert that is permitted. It is when using "non-standard" interfaces which do not have mass-export functionality that the process is made much more labour intensive. When faced with this, the IS would either use an export into Zotero [https://www.zotero.org/], using the browser bar functionality, and then export the Zotero file into Endnote, or manually copy/paste the relevant information straight into Endnote.

Endnote was used to collate all the results from the 12 databases, and to deduplicate the results. This was one of the challenges of the project, since the deduplication was not complete, despite a variety of combinations of field comparisons being used (Bramer et al, 2016). This inevitably created additional

workload and potential for confusion during the screening process; even during the manual screening, removal of duplicates could not be guaranteed since a number of people were involved.

Rayyan [https://rayyan.qcri.org/] a free web-tool designed to help researchers working on systematic reviews, was used to facilitate title/abstract screening, and the IS role was important here to administer the process. After an initial "rough screen" to remove any obviously irrelevant papers, a pair of experts were assigned a set of titles and abstracts, and were blind to each to others selections. The IS monitored progress, and papers with common agreement were automatically sent for full text review or excluded as appropriate, and any disagreements were re-shared with the pair for reconsideration. Any persistent disagreements were given to a third review for adjudication. Rayyan was a particularly valuable tool since it was accessible from anywhere, was even compatible with tablets or phones, and meant that large spreadsheet attachments sent by email could be avoided - something that was important to consider given the wide variety of circumstances of the collaborators. Exports from Rayyan were compatible with Endnote, which enabled a master list of papers to be built up.

The full text reviewing was also done in duplicate, using dropbox and google forms to facilitate the process. The form used had been developed from the protocol developed by the collaboration, and was refined with significant input from experts, and was tested and revised before roll out.

Two subject experts reviewed each paper, answering questions about the relevance of the full text using a google form [https://tinyurl.com/y8kx8lpy]. At any stage through the review the paper could be excluded if it met even a single exclusion criterion.

Working with multiple expert collaborators located around the world, with varying amounts of time to commit to the project, and sometimes limited internet connection speed, was both very rewarding and challenging. The expert input, with their knowledge of nutrition/malnutrition and of humanitarian aid, and the systematic review expertise from colleagues in Cochrane was what made the collection possible and valuable.

The fact that there were a range of pair combinations of reviewers screening titles/abstract and full text meant that there was no opportunity for any bias to be perpetuated. However, it is possible that this variation also introduced the possibility of variation of interpretation of inclusion/exclusion criteria; variations in levels of expertise in the topic also raised the possibility of inconsistencies. With the exception of CA and JJ, none of the collaborators were paid for their work, which became a lower priority and, therefore, other tasks would often take precedence, resulting in slower progress than might have been ideal.

The added challenge of the voluntary nature of this collaboration was the time required to complete the various tasks inherent in the development of the collection. Screening 400 titles and abstracts does take time, and full text reviewing of even 20 papers takes even longer. For future reviews it might have been useful if, during the development of this collection, we had asked all participants to note their time commitment - this could inform planning for future collections and discussions with prospective volunteers/collaborators. Given that this collection will require updating in September 2018, there is ample opportunity to implement this.

While the software made the work a great deal easier, the incompleteness of deduplication in Endnote did create problems with unnecessary double screening of papers. It also created confusion regarding which was the best version of a duplicated title to use. This was particularly the case with some Cochrane titles, which appeared in multiple editions of the database. Endnote also did automatic naming of PDFs, which was sometimes not accurate, and again creating some confusion and possible duplicate workload. The fact that the copies of a duplicated paper might be reviewed by four different individuals in total meant that the error might only be spotted when the paper was passed to be summarised. Highlighting these issues in this collection will help towards avoiding or minimising them for future collections.

In contrast, Rayyan was easy to use, and a major benefit to blind screening of titles and abstracts. For future collections, reviewers could be advised to tags indicating the reason for their inclusion or exclusion. This might help to resolve disputes faster, since the reasoning is apparent when the blinding functionality is turned off.

The value of the Evidence Aid collections is that they facilitate access to research through both academic and practitioner audiences. This is made possible through open access publishing. Where relevant articles are not available in open access form, the publisher is contacted with the aim of negotiating access. The gradual move towards greater OA publication as a trend (Archambault, E. et al, 2013) will greatly aid development of future collections, and so the potential impact they can have as a result of the easier access to research by humanitarian aid workers.

The opportunity for the IS to be involved to such a large extent in the whole process was a significant change for the creation of Evidence Aid collection. It was also a development opportunity for the IS: while developing search strategies for systematic reviews, and translating them for a range of databases was familiar, the role of project manager in allocating sets of papers for peer review, and managing progress of the group through the workload was new. Previous collaborations in systematic reviews had ended with handing over the deduplicated results to the research team. There were many learning opportunities for the IS, particularly around the quality of deduplication and file naming.

Conclusion

The creation of the Evidence Aid collection for "Prevention and treatment of acute malnutrition in emergencies and humanitarian crises" is a proud achievement in terms of multi-organisation collaboration, and should be of significant help to humanitarian aid workers and organisations in delivering more effective interventions underpinned by evidence. It has also been a significant learning curve for the IS involved, and demonstrates the opportunities for professional development that are available via volunteer work.

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Appendix 1 - PICO

Population: populations with and at risk[1] of moderate and severe acute malnutrition (no age limitations)[2] - We excluded systematic reviews in populations which underwent highly specialised tertiary-level treatments not likely to be available and/or scalable in humanitarian settings, for example, organ and stem cell transplants, most cancer treatments and surgeries, elective rehabilitation and rehabilitative surgeries (e.g. hip replacements) and specialised treatments for chronic liver disease. We also excluded reviews in populations not relevant to humanitarian settings, such as nursing homes, and rehabilitation and specialist treatment centres (e.g. for eating disorders or acute and sub-acute strokes).

Interventions for management: intervention activities with direct impact on relevant nutrition health outcomes e.g. TSFP, CMAM, IMAM, micronutrient supplementation, artificial feeding, ORT, IYCF interventions (counselling, messaging, promotion), and other vulnerable group nutrition counselling; infection treatment and management. Vitamin A supplementation in the treatment of children with SAM, and ARVs for the management of HIV+ children with SAM. Examples of specific products: Ready-to-Use Therapeutic Food (RUTF), F100, F75, food fortification, micronutrient powders (MNP), Ready-to-Use Supplementary Food (RUSF), Ready-to-Use Foods (RUF), Lipid-based Nutrient Supplements (LNS) - According to strict specifications, they are classified as large, medium or small quantity LNS (LQ-LNS, MQ-LNS, SQ-LNS) - for use in specific target groups/interventions. LQ-LNS are formulated for the management of MAM; MQ-LNS provide macro and micronutrient supplementation to children (6-23 months, 6-36 months) during food insecurity; SQ-LNS primarily provides essential (micro) nutrients intended to children aged 6-23 months). Standard outpatient treatment targeting children 6-59 months of age with low MUAC (management) or low WHZ (management) and with good appetite and no medical complications or with oedema + or oedema ++, and inpatient treatment for those with low MUAC (management) or low WHZ (management) and medical complications or poor appetite or with marasmic-kwashiorkor or oedema +++, children who are <4kg, management of children <6 months of age with SAM (management); use of routine antibiotics.

Interventions for prevention: activities addressing immediate causes of malnutrition, namely inadequate dietary intake and disease – Examples: micronutrient supplementation, point-of-use fortification, (IYCF) interventions (counselling, messaging, promotion), and other vulnerable group nutrition counselling; WASH interventions, vaccinations, specialized food transfers, general food distribution, food fortification, livelihood interventions, Cash Transfer Programmes (CTP), conditional cash transfers, unconditional cash transfers, vouchers, school feeding, anti-anaemia actions, protection of appropriate IYCF by restricting marketing of breastmilk substitutes, promotion of fruit and vegetable gardens for healthy diets, food safety measures. Examples of specific products: MQ-LNS, LQ-LNS (see above), MNP, RUSF, RUF, LNS.

Comparison: variable.

Outcomes: relevant nutrition health outcomes – Examples: recovery, relapse, mortality, morbidity, defaulter, SAM and MAM incidence, adverse events, time to recovery, mean rate of weight gain, anthropometry (e.g. weight gain (total), BMI, WAZ, WHZ, MUAC, BMI-for-age etc.), dietary intake, feeding practices (exclusive breastfeeding, continued breastfeeding, minimum acceptable diet –

standard WHO indicators exist), referral to hospitals, recovery from diarrhoea/duration of diarrhoea, cost of treatment per child.

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[1] The collection will not be limited by specific definitions of what high risk groups are (WHO Guideline: (<-2 WHZ, <125mm MUAC, including both oedema and no oedema, HIV/TB positive, diarrhoea for more than 2 weeks, etc.), but it will be kept into consideration at a later stage when the collection is collated.
[2] Although it was decided to not include age limitations, the WHO guideline age ranges (<6 months and 6-59 months) will be kept into consideration at a later stage when the collection is collated.

Appendix 2 - sample search strategy, using Medline via OVID

1 maternal welfare/ or public policy/ or social welfare/ or exp social security/ or exp food supply/ (62838)
2 ((social adj (assistance or polic$ or welfare or insurance$ or protection)) or public assistance).tw. (9253)
3 (family policy or ((financial or cash or pay$ or monetary or money) adj3 (transfer$ or measure$ or incentive$ or allowance$ or exclu$ or reform$ or gain$ or credit$1 or benefit$1)) or CTP or voucher*).tw. (19584)
4 ((food* adj3 (transfer* or distribut* or transport* or suppl* or security)) or (livelihood adj3 intervention*) or ("Water Sanitation" adj Hygiene adj (program* or intervention*)) or WASH).tw. (34666)
5 exp Dietary Supplements/ or foods, specialized/ or Food, Fortified/ or Food, Formulated/ or Nutrition Therapy/ or Micronutrients/ or REHYDRATION SOLUTIONS/ or FLUID THERAPY/ (99560)
6 (((food$ or diet* or nutrition* or nutrient*) adj3 (complement$ or formulat$ or therap$ or supplement$ or fortif$ or blended or weaning or enrich*)) or (TSFP or IMAM or IYCF) or (integrated adj management*) or (target* adj supplement* adj feed*) or (lipid based or (lipid adj3 supplement$) or LNS) or ((home adj3 supplement$) or (home adj3 fortif$) or (home adj3 process$)) or ("ready to use" or RUTF or RTUF or RUF or RUSF or "plumpy nut") or "point of use" or (multimicronutrient$ or multi-micronutrient$ or micronutrient$ or micro-nutrient$ or multinutrient$ or multi-nutrient$) or (MNP or MNPs or sprinkle$) or nutrition* counsel* or (hydrat* or rehydrate* or (fluid adj therap*) or ORT)).tw. (166559)
7 (cmam or (community* adj3 manage* adj3 acute adj malnutrition)).tw. (48)
8 exp nutritional support/ or exp enteral nutrition/ or exp intubation, gastrointestinal/ or ((Artificial* adj feed*) or (nutrition* adj3 support*) or (enteral adj (feed* or nutrition*)) or ((tube* or intubate*) adj2 (feed* or gastric* or gastro* or nasogastric*))).tw. (70569)
9 exp anti-bacterial agents/ or (antibiotic* or antibacterial* or bacteriocide*).tw. (808603)
10 (f75 or f100).tw. (190)
11 exp vaccination/ or exp immunization/ or (vaccin* or immuni*).tw. (521566)
12 Ration*.tw. (186342)
13 (School* adj3 (feed* or meal* or dinner* or lunch*)).tw. (2020)
14 exp anemia/ or (anaemi* or anemi*).tw. (215211)
15 exp breast feeding/ or exp milk, human/ or exp bottle feeding/ or exp infant formula/ or (breastfeed* or breastfed* or breastmilk* or breast milk or ((breast or bottle*) adj (feed* or fed*))).tw. (67516)
16 exp gardening/ or food garden*.tw. (781)
17 exp food safety/ or exp food contamination/ or (food* adj3 (safe* or contaminat* or adulterat*)).tw. (78702)
18 Seasonal.tw. (61972)
19 exp intestinal diseases, parasitic/ or (worm* or de-worm* or deworm* or intestinal parasite*).tw. (58105)
20 or/1-19 (2292230)

21 Malnutrition/ or nutrition disorders/ or Wasting Syndrome/ or exp protein-energy malnutrition/ or Emaciation/ or infant nutrition disorders/ or deficiency diseases/ or child nutrition disorders/ or childhood malnutrition/ (50914)
22 (malnutrition$ or malnourish$ or mal-nutrition$ or mal-nourish$ or (wasting or wasted or stunting or stunted or growth-falter$) or (undernutrition or undernourish$ or under-nutrition$ or under-nourish$) or (nutrition$ adj defic$) or (marasmus$ or kwashiorkor or emaciat$)).tw. (74108)
23 exp infant, low birth weight/ or exp infant, small for gestational age/ or exp fetal growth retardation/ or (low birth weight* or LBW or ELBW or SGA or (small adj2 gestation*)).tw. (60617)
24 ((fetal or foetal or intrauterine or intra-uterine) adj growth adj (retard* or restrict*)).tw. (15830)
25 or/21-24 (163704)
26 Meta-Analysis as Topic/ or Meta-Analysis/ or exp Review Literature as Topic/ or meta analy$.tw. or metaanaly$.tw. or (systematic adj (review$1 or overview$1)).tw. or cochrane.ab. or embase.ab. or (psychlit or psyclit).ab. or (psychinfo or psycinfo).ab. or (cinahl or cinhal).ab. or science citation index.ab. or bids.ab. or cancerlit.ab. or reference list$.ab. or bibliograph$.ab. or hand-search$.ab. or relevant journals.ab. or manual search$.ab. or ((selection criteria or data extraction).ab. and Review/) (266375)
27 Comment/ or Letter/ or Editorial/ (1626529)
28 Animal/ not (animal/ and human/) (4550475)
29 27 or 28 (6114392)
30 26 not 29 (252573)
31 20 and 25 and 30 (1173)

Appendix 3 - databases searched, and numbers of hits

Database	**Results**
Medline via OIVD	1173
Embase via OVID	2417
CINAHL via Ebsco	327
Global Health via Ebsco	167
LILACS	13
ScieLO	31
Pubmed	5598
TRIP	564
HealthEvidence.org	209
HealthSystemsEvidence.org	118
WHO Nutrition	201
Epistemonikos	190
Total	**11151**
Deduplicated	**8122**