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STUDY PROTOCOL

REVISED Impact of livestock interventions on maternal and child nutrition outcomes in Africa: A systematic review and meta-analysis protocol [version 2; peer review: 2 approved]

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Abstract

The challenge of undernutrition (stunting and wasting) still remains a major health concern in children below 5 years of age in Africa, with the continent accounting for more than one third of all stunted children and more than one quarter of all wasted children globally. Despite the growing evidence on the role of agriculture interventions in improving nutrition, empirical evidence on the impact of livestock intervention on nutrition in Africa is scant.

This review is aimed at determining whether livestock interventions are effective in reducing undernutrition in children below five years of age and in pregnant and lactating women in Africa. The review will be conducted according to PRISMA guidelines. Major electronic databases will be searched and complemented with grey and non-indexed literature from google and google scholar, and expert consultation for additional articles and reports. PICO criteria will be used while employing search strategies including MeSH, Boolean search operators and truncation/wildcard symbol to narrow or broaden the search. Articles on effect of livestock interventions on maternal and child nutrition conducted in Africa that meet the set inclusion criteria will be included in the review after critical appraisal by two independent reviewers. A standardized form will be used to extract data from included studies. The extracted data will be summarized and synthesized both qualitatively and quantitatively and

Open Peer Review

Reviewer Status ✓ ✓

	Invited Reviewers	
	1	**2**
version 2 (revision) 01 Oct 2021	✓ report	✓ report
	↑	↑
version 1 08 Jan 2021	? report	? report

1. **Nazia Binte Ali** (iD), International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b), Dhaka, Bangladesh

2. **Willy Kiboi** (iD), Chuka University, Chuka, Kenya

Any reports and responses or comments on the article can be found at the end of the article.

key outcomes presented. Evidence generated from the systematic review and meta-analysis will be important for guiding nutrition sensitive livestock interventions and policies on nutrition programming, specifically on how to leverage on livestock interventions to reduce the burden of undernutrition.

Keywords
Livestock interventions, Malnutrition, Under-five children, Systematic review, Africa

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REVISED **Amendments from Version 1**

In the abstract and introduction, we have included underweight as part of the nutrition outcomes to be considered and defined PRISMA and PICO in full. Our second objective has been clarified that the characteristics of interventions to be considered are design and implementation strategies. In the literature search and study selection, we have excluded grey literature and included MeSH terms as part of the search strategy. Under the inclusion and exclusion criteria, we have clarified that studies published any date up to the time of conducting the search will be eligible. Under the data management, we have indicated that duplicates will be removed using the Rayyan QCRI web and mobile application. Additionally for the screening process we have clarified that two independent reviewers will examine the studies and any disagreements among the reviewers on eligibility of any study will be decided through discussions with a third reviewer. For the study designs, we have clarified that experimental studies will include controlled trials while observational studies will include cohort studies, case control studies and cross-sectional studies. For consistency we have clarified our study population will be children under five years and pregnant and lactating women. For data analysis we have indicated that sub-group analysis will be performed to check for check for the sources of heterogeneity and if heterogeneity is observed even after sub-group analysis, then a meta-regression will be conducted.

Any further responses from the reviewers can be found at the end of the article

Introduction

Undernutrition (stunting, wasting and underweight) remains a serious public health concern in Africa[1]. Globally, the continent accounted for more than one third of stunted children (58.7 million, 39%) and more than one quarter of wasted children (13.8 million, 27%) in 2018[2,3]. To combat and address the challenge of undernutrition and contribute to the progress of attaining Sustainable Development Goal 2 of ending hunger and all forms of malnutrition, holistic, multifaceted strategies employing both nutrition specific and nutrition sensitive interventions are required[4,5]. Additionally, more efforts are needed in building more resilient, equitable and sustainable food systems for improved nutrition[6].

Agriculture including livestock plays a key role as a source of food and nutrition security and livelihoods for a majority of rural households in sub-Saharan Africa[7]. In the last two decades, several reviews have been conducted to assess the contribution/impact of general agriculture interventions (home gardening for fruits and vegetables, aquaculture, livestock production, cash crops and biofortified crops) on nutrition[8–18]. These reviews have documented the growing evidence on the role of agriculture interventions in improving nutrition and identified some of the pathways through which agriculture interventions can contribute to nutrition. Animal-source foods (ASF) are a rich source of bioavailable nutrients that play an important role in reducing risk of protein malnutrition[19,20]. In the context of arid and semi-arid areas with limited potential for crop agriculture, the role of livestock and ASF in supporting the livelihood and nutrition of pastoralist communities is especially critical.

The impact pathways through which livestock interventions may influence human nutrition include: (1) Increased production and consumption of animal source foods and hence dietary diversity at household and individual level (2) Increased household level income through sale of livestock products which in turn translates into increased access to dietary diversity[18,21]. Livestock interventions such as dairy programs, small livestock rearing, backyard poultry production, breed improvement, fisheries, livestock transfer programs, livestock feeds improvement and livestock value chains programs have a potential to positively influence improved dietary diversity at household level and possibly impacting the individual nutritional outcomes. However, empirical data on the net contribution of livestock intervention on nutrition in Africa is scant.

This review is aimed at collating, synthesizing and documenting all available evidence on the linkages between livestock interventions and nutrition outcomes in Africa. Evidence generated from the systematic review and meta-analysis will be important for guiding nutrition sensitive livestock interventions and policies on nutrition programming, specifically on how to leverage on livestock interventions to reduce the burden of undernutrition.

Review question

Are livestock interventions effective in reducing undernutrition in children below five years of age and in pregnant and lactating women in Africa?

Objectives of this review are to

1. Assess the available evidence on impact of livestock interventions on maternal and child nutrition outcomes in Africa and identify data gaps

2. Determine the characteristics (design and implementation strategies) of livestock interventions that improve nutrition outcomes

3. Estimate the pooled effect of livestock interventions to improve nutrition outcomes

4. Evaluate the type of livestock interventions more effective in improving nutrition outcomes

Methods

The systematic review will be conducted following the guidelines suggested in the PRISMA (Preferred Reporting Items for Systematic Reviews and Meta-Analysis) statement[22,23]. The review protocol has been registered in the international prospective register of systematic reviews (PROSPERO), protocol registration number CRD42020203843 on 14th September 2020.

Definitions

Livestock interventions – all livestock related interventions or programmes with an objective of increasing production diversity, access and consumption of animal source foods (ASFs) and income generation to the households. Such interventions include provision of livestock feed, provision of animal health care, provision of water, provision of shelter, and training/extension services

Livestock – all domesticated animals such as cattle, camels, goats, sheep, pigs, other small ruminants, poultry/chicken, fish and bees

Literature search and study selection

Major electronic databases including PubMed, Scopus and Web of Science will be searched by two independent reviewers to identify relevant peer-reviewed publications and reports. All the reference lists of all papers identified through the database searches and relevant papers and reports considered will be reviewed and "forward citation" tool in Google Scholar will be applied to find papers that cited these studies to complement the search. Reference lists of previous systematic reviews conducted on similar study themes will also be reviewed. Experts in this field and study investigators will also be consulted for any additional papers or reports which may not have been captured through the online search.

Search strategy will be based on key words formulated according to the population/patient/problem, intervention/indicator/ exposure, comparison/control, outcome (PICO) format. These key words will be generated through a preliminary general search in major electronic databases to identify most used key words in the publications. Medical Subject Headings (MeSH) terms will be used to identify potential key wards and choose appropriate terms. Boolean operators' terms "AND", "OR" and "NOT" will be used to connect the search terms to either narrow or broaden the search. Truncation/wildcard symbol (*) will also be used for words where variations may be possible (Table 1).

Inclusion and exclusion criteria

Studies will be screened against a set inclusion and exclusion criteria to determine and assess their relevance for inclusion in the systematic review (Table 2). Studies published in any date

up to the time of conducting the search and which meet the inclusion criteria will be eligible for inclusion.

Data management

The search results will be uploaded to Rayyan QCRI a web and mobile app for systematic reviews that facilitates collaboration among reviewers during the study selection process. All duplicates will be removed prior to screening using the Rayyan QCRI platform. Screening questions will be developed and tested based on the inclusion and exclusion criteria prior to the start of the screening process.

A two-stage screening process will be employed in all the retrieved articles from the database searches;

  i.   Titles/abstracts will be screened by two independent reviewers for relevance to the review question

  ii. Full texts of possible relevant articles will be reviewed by two independent reviewers to ascertain if the methods used in the studies selected at stage one adheres to the set methodological standards for the review and exclude those that do not meet the criteria. Any disagreement between the two reviewers over the eligibility of any study will be decided through discussion with a third reviewer and consensus reached.

Data abstraction and synthesis

For those articles found relevant after full text review, data will be extracted using a pre-prepared excel spreadsheet template (extended data[24]). Variables to be extracted are described in Table 3

The data extracted will be summarized and synthesized both qualitatively and quantitatively and key outcomes presented. For

Table 1. Key words and search terms to be used in database searches.

Indicator	Description
Population	Child OR Infant OR Pediatric OR "young adult" OR Preschool OR Pregnant OR Woman OR Women OR Lactating OR Breastfeeding OR Adolescent OR toddler
Intervention	Trial OR Programme OR Intervention OR Experiment OR Supplementation OR Implementation OR Feed OR Consumption OR "Livestock production" OR "livestock ownership" OR Pastoral OR Livestock OR Cattle OR Camel OR Goat OR Sheep OR Small ruminant OR Poultry OR Chicken OR Fish OR Aquaculture OR fish pod OR Pig OR Meat OR Beef OR mutton OR Pork OR dairy OR egg OR honey OR "animal source food" OR "animal products" OR "foods of animal origin" OR "nutrition sensitive agriculture" OR value chain OR Beekeeping OR "animal health care" OR water OR shelter OR training Or extension services
Outcome	Nutrition OR nutrition status OR nutrition outcome OR Growth OR Linear Growth OR Malnutrition OR Undernutrition OR Stunting OR Wasting OR underweight OR Micronutrient OR micronutrient status OR anemia OR hemoglobin OR hemoglobin OR folate OR vitamin OR Vitamin A OR Vitamin B12 OR iron OR Ferritin OR zinc OR calcium OR MUAC OR anthropometric OR Height-for-age OR Weight-for-height OR Weight-for-age OR dietary diversity
Geographical location	Developing Countries OR Africa OR Africa, Northern OR Africa South of the Sahara OR Sub-Saharan Africa OR Africa, Central OR Africa, Eastern OR Africa, Southern OR Africa, Western OR Algeria OR Angola OR Benin OR Botswana OR Burkina Faso OR Burundi OR Cameroon OR Cape Verde OR Central African Republic OR Chad OR Comoros OR Congo OR "Cote d'Ivoire" OR Djibouti OR "Democratic Republic of the Congo" OR Egypt OR Eritrea OR Ethiopia OR Gabon OR Gambia OR Ghana OR Guinea OR Guinea-Bissau OR Kenya OR Lesotho OR Liberia OR Libya OR Madagascar OR Malawi OR Mali OR Mauritania OR Mauritius OR Morocco OR Mozambique OR Namibia OR Niger OR Nigeria OR Rwanda OR Senegal OR Seychelles OR Sierra Leone OR Somalia OR South Africa OR Sudan OR Swaziland OR Tanzania OR Togo OR Tunisia OR Uganda OR Zambia OR Zimbabwe

MUAC – mid-upper arm circumference

Table 2. Inclusion and exclusion criteria to be used to assess study eligibility.

Criteria	Include	Exclude
Location	Studies conducted in Africa	Studies conducted in other continents
Population	Children below 5 years, OR pregnant women OR Lactating women	
Intervention	Livestock interventions contributing to production and consumption of animal source foods (milk, meat, eggs and fish) and livestock value chains	Crop agriculture Biofortification Home gardening Irrigation programs
Outcome	Nutrition outcomes including; anthropometry (weight-for-age z-score, height-for-age z-score, weigh-for-height z-score, MUAC, micronutrient status and health related outcomes	Health outcomes not directly related to nutrition
Publication date	Any date	
Publication type	Peer reviewed articles and online reports	Unpublished reports
Study designs	Experimental, quasi-experimental and observational studies, cross-sectional longitudinal intervention-control comparisons and randomized field trials	Literature reviews
Publication language	English	Other languages

MUAC – mid-upper arm circumference

Table 3. Data abstraction variables for the full text articles included in the review.

#	Variable	Description
1	Author(s)	The lead author of the study
2	Year	The year the study was published
3	Study geographical location	The country study was done
4	Title	Full title of the study
5	Publication type	Peer reviewed journal article, report or student thesis
6	Study design	Experimental (controlled trials), or observational (Cohort studies, case-control studies, and cross-sectional studies)
7	Study participants	Study population characteristics
8	Overall sample size	Number of study participants included in the study
9	Exposure measure	For observational studies
10	Intervention type	For experimental studies
11	Outcome measured	Micronutrient status and anthropometry – height-for-age(stunting), weight-for-height(wasting) and weight-for-age(underweight)
12	Intermediate outcome measured	Dietary diversity, income and morbidity
13	Effect of intervention on nutrition	The difference in nutrition outcomes between intervention and control groups
14	Statistical significance	Measures of statistical significance used and their corresponding values
15	Study findings	Summary of key study findings
16	Study limitations	
17	Conclusion	
18	Reference	

the qualitative data, a summary of key outcomes will be provided using Excel. For the quantitative synthesis statistical software RevMan 5.1 will be used. The primary outcome measure will be the nutrition status of children below five years and pregnant and lactating women and will be measured through micronutrient status or anthropometry (stunting, wasting and underweight). The intermediate outcome measure will be dietary diversity, incomes and morbidity.

Homogeneity in reporting metrics of the included studies will be assessed. If a sufficient number of studies reporting on effect of livestock interventions on nutrition are identified and there is consistency in reporting metrics, a meta-analysis will be conducted on this subset of studies. Pooled/summary effect estimate of livestock interventions will be calculated using relative risk ratios (RR) and their corresponding 95% confidence intervals (CI). The percentage of variations across the studies and their impact on the meta-analysis will be quantified by calculating and reporting the statistical measure of heterogeneity (I^2 statistic) and obtaining a summary estimate of the effect of livestock interventions on nutrition. For the studies included in the quantitative synthesis, a fixed and random effect models will be used to calculate the RR and 95% CI based on the level of heterogeneity (I^2 statistic)[25,26]. If high levels of heterogeneity are detected ((I^2 >=50% or P <0.1) we will perform a sub-group analysis to determine and explain the source of heterogeneity. If heterogeneity is observed in the sub-group analysis, a meta-regression will be conducted.

Validity/risk of bias assessment

Individual studies will be assessed for both internal and external validity. The Grades of Recommendations, Assessment, Development and Evaluation (GRADE) guidelines[27] will be used to assess study validity/risk of bias. Studies will be scored as either low, medium and high quality based on five criteria; counterfactual analysis, sample size and power calculations, nutrition outcome assessment, intermediate outcome assessment and confounding bias assessment. Overall assessment of risk of bias for each study will be determined through weighted judgement of the established criteria.

Presentation of results

Data summarized and synthesized using qualitative methods will be presented inform of summary tables of key outcomes together with a narrative description of the studies using excel.

For the quantitative analysis (meta-analysis) statistical software RevMan 5.1 will be used for analysis and the output will be presented graphically using a forest plot indicating point estimate and 95% confidence interval of observed effect for each individual study together with summary estimate and its confidence interval.

Dissemination of information

The review findings will be disseminated through open access publication of the results, as well as dissemination in seminars and workshops

Study status

We are currently piloting the study selection process

Data availability

Underlying data

No data are associated with this article

Extended data

Open Science Framework: Impact of livestock interventions on maternal and child nutrition outcomes in Africa: A systematic review and meta-analysis protocol. https://doi.org/10.17605/OSF.IO/7GMHC[24]

This project contains the following extended data:
- Data Abstraction sheet.xlsx (Study data extraction sheet)

Reporting guidelines

Open Science Framework: PRISMA-P checklist for 'Impact of livestock interventions on maternal and child nutrition outcomes in Africa: A systematic review and meta-analysis protocol' https://doi.org/10.17605/OSF.IO/7GMHC[24]

Data are available under the terms of the Creative Commons Zero "No rights reserved" data waiver (CC0 1.0 Public domain dedication).

References

1. World Health Organization(WHO): **Nutrition in the WHO African Region.** Brazzavile, 2017.
    Reference Source

2. Development Initiatives: **2018 Global Nutrition Report: Shining a light to spur action on nutrition.** Bristol, UK. 2018.
    Reference Source

3. Unicef, World Health Organization, T. W. Bank: **Levels and Trends in Child malnutrition. Key findings of the 2018 edition.** *Midwifery.* 2018; 1–6.
    Reference Source

4. Ruel MT, Alderman H, Maternal and Child Nutrition Study Group: **Nutrition-sensitive interventions and programmes: How can they help to accelerate progress in improving maternal and child nutrition?** *Lancet.* 2013; **382**(9891): 536–551.
    PubMed Abstract | **Publisher Full Text**

5. United Nations Economic and Social Council: **Report of the Inter-Agency and Expert Group on Sustainable Development Goal Indicators Note.** New York, 2016.

6. Development Initiatives: **2020 Global Nutrition Report: Action on equity to end malnutrition. Bristol, UK.** 2020.
    Reference Source

7. OECD/FAO: **Agriculture in Sub-saharan Africa: Prospects and challenges for the next decade, OECD-FAO Agriculture Outlook 2016-2025.** Paris, 2016.

8. Ruel MT: **Can food-based strategies help reduce vitamin A and iron deficiencies?** *Int Food Policy Res Inst.* 2001.
    Reference Source

9. Berti PR, Krasevec J, FitzGerald S: **A review of the effectiveness of agriculture interventions in improving nutrition outcomes.** *Public Health Nutr.* 2004; **7**(5): 599–609.
    PubMed Abstract | **Publisher Full Text**

10. Grace D, Dominguez-Salas P, Alonso S, *et al.*: **The influence of livestock-**

derived foods on nutrition during the first 1,000 days of life. 2018; 67.
Reference Source

11. Leroy JL, Frongillo EA: **Can Interventions to Promote Animal Production Ameliorate Undernutrition?** *J Nutr*. 2007; **137**(10): 2311–2316.
PubMed Abstract | **Publisher Full Text**

12. Randolph TF, Schelling E, Grace D, *et al.*: *Invited Review*: **Role of livestock in human nutrition and health for poverty reduction in developing countries.** *J Anim Sci*. 2007; **85**(11): 2788–2800.
PubMed Abstract | **Publisher Full Text**

13. Girard AW, Self JL, McAuliffe C, *et al.*: **The effects of household food production strategies on the health and nutrition outcomes of women and young children: A systematic review.** *Paediatr Perinat Epidemiol*. 2012; **26 Suppl 1**: 205–222.
PubMed Abstract | **Publisher Full Text**

14. Webb P, Kennedy E: **Impacts of agriculture on nutrition: Nature of the evidence and research gaps.** *Food Nutr Bull*. 2014; **35**(1): 126–132.
PubMed Abstract | **Publisher Full Text**

15. Harvey M, Dangour A, Taylor A, *et al.*: **Can agriculture interventions promote nutrition?** 2014; 70.
Reference Source

16. Fiorella KJ, Chen RL, Milner EM, *et al.*: **Agricultural interventions for improved nutrition: A review of livelihood and environmental dimensions.** *Glob Food Sec*. 2016; **8**: 39–47.
Publisher Full Text

17. Pandey VL, Mahendra Dev S, Jayachandran U: **Impact of agricultural interventions on the nutritional status in South Asia: A review.** *Food Policy*. 2016; **62**: 28–40.
PubMed Abstract | **Publisher Full Text** | **Free Full Text**

18. Ruel MT, Quisumbing AR, Balagamwala M: **Nutrition-sensitive agriculture: What have we learned so far**? 2018; **17**: 128–153.
Publisher Full Text

19. Neumann C, Harris DM, Rogers LM: **Contribution of animal source foods in improving diet quality and function in children in the developing world.** *Nutr Res*. 2002; **22**(1–2): 193–220.

20. Zhang Z, Goldsmith PD, Winter-Nelson A: **The Importance of Animal Source Foods for Nutrient Sufficiency in the Developing World: The Zambia Scenario.** *Food Nutr Bull*. 2016; **37**(3): 303–316.
PubMed Abstract | **Publisher Full Text**

21. Sadler K, Mitchard E, Abdi A, *et al.*: **Milk Matters: The impact of dry season livestock support on milk supply and child nutrition in Somali Region, Ethiopia.** *F Exch - Emerg Nutr Netw ENN*. 2012; **44**: 8–11.
Reference Source

22. Liberati A, Altman DG, Tetzlaff J, *et al.*: **THE PRISMA statement for reporting systematic reviews and meta-analyses of studies that evaluate health care interventions: explanation and elaboration.** *J Clin Epidemiol*. 2009; **62**(10): e1–e34.
PubMed Abstract | **Publisher Full Text**

23. Moher D, Liberati A, Tetzlaff J, *et al.*: **Preferred reporting items for systematic reviews and meta-analyses: the PRISMA statement.** *J Clin Epidemiol*. 2009; **62**(10): 1006–1012.
PubMed Abstract | **Publisher Full Text**

24. Muema J: **Impact of livestock interventions on maternal and child nutrition outcomes in Africa: A systematic review and meta-analysis protocol**. 2020.
http://www.doi.org/10.17605/OSF.IO/7GMHC

25. DerSimonian R, Laird N: **Meta-analysis in clinical trials.** *Control Clin Trials*. 1986; **7**(3): 177–188.
PubMed Abstract | **Publisher Full Text**

26. Riley RD, Higgins JPT, Deeks JJ: **Interpretation of random effects meta-analyses.** *BMJ*. 2011; **342**(7804): d549.
PubMed Abstract | **Publisher Full Text**

27. Guyatt GH, Oxman AD, Schünemann HJ, *et al.*: **GRADE guidelines: A new series of articles in the Journal of Clinical Epidemiology.** *J Clin Epidemiol*. 2011; **64**(4): 380–382.
PubMed Abstract | **Publisher Full Text**

Open Peer Review

Current Peer Review Status: ✓ ✓

Version 2

Reviewer Report 27 October 2021

https://doi.org/10.21956/aasopenres.14436.r28923

✓ **Willy Kiboi** [iD]

School of Nursing and Public Health, Chuka University, Chuka, Kenya

The revisions have satisfactorily addressed the concerns.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Maternal and Child Nutrition

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

Reviewer Report 04 October 2021

https://doi.org/10.21956/aasopenres.14436.r28924

✓ **Nazia Binte Ali** [iD]

Maternal and Child Health Division (MCHD), International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b), Dhaka, Bangladesh

The article is now suitable for indexing.

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Maternal and child health and nutrition in the context of low and middle income countries

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard.

- -

Version 1

Reviewer Report 27 August 2021

https://doi.org/10.21956/aasopenres.14251.r28797

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Willy Kiboi (iD)

School of Nursing and Public Health, Chuka University, Chuka, Kenya

The paper is generally well written. The methodology used is appropriate but requires some improvements. The following comments may help improve the paper;

- In the abstract and the introduction sections, the authors may wish to explain why they are excluding underweight children, when in the methodology they state that they will be considered (Table 2).

- Let the authors write all abbreviations in full in their first use.

- The authors talk about maternal and child nutrition outcomes in the topic, and yet the aspect of maternal nutrition (pregnant and lactating mothers) is relatively silent in the whole paper.

- In the second paragraph of the introduction section, the authors mention that several reviews have been conducted to assess the contribution/impact of general agriculture interventions including livestock production on nutrition. Could the authors explain why the review will be necessary if such data exists?

- In the objectives of the review, it's not clear what the authors mean by characteristics of livestock interventions (objective 2).

- The authors may consider explaining further how the study selection will be conducted e.g. how will duplicate and irrelevant articles be excluded.

- In the study designs to be included, the authors may wish to redefine the designs. For example, quasi-experimental designs are part of experimental studies. I also find the term "observational studies" to be a broad term when explaining a research design. I suggest that the authors be more specific on the research designs that they wish to include in their review.

- Below Table 2 is the word MUAC (mid-upper arm circumference) which seems to be

misplaced. If it is an explanation of the abbreviation, then the authors may wish to have a section with a list of all used abbreviations and their explanations.

○ In the data management section, the authors state that only articles where there is concurrence between the two reviewers will be included in the review. Inconsistent with that statement, the subsequent statement says that the disagreement between the two reviewers will be discussed with a third reviewer. The researchers may wish to relook at those statements.

○ Furthermore, the authors mention that the primary outcome measure will be the nutrition status of children below five years and women of childbearing age. I find this to have departed from the earlier stated study population (pregnant and lactating women). Women of reproductive age may include all women aged 15-49 as defined by WHO.

○ In the study's heterogeneity assessment, the authors have some contradictory statements. For example, the authors state that "if high levels of heterogeneity are detected, we will perform a subgroup analysis to determine and explain the sources of heterogeneity". In the subsequent statement the authors state that "If heterogeneity is substantial, a meta-analysis will not be performed".

○ The authors may consider conducting a meta-regression if heterogeneity is further observed in the subgroup analysis.

Is the rationale for, and objectives of, the study clearly described?
Yes

Is the study design appropriate for the research question?
Yes

Are sufficient details of the methods provided to allow replication by others?
Partly

Are the datasets clearly presented in a useable and accessible format?
Not applicable

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Maternal and Child Nutrition

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 22 Sep 2021
Josphat Muema, Institute of Tropical and Infectious Diseases, University of Nairobi, Nairobi, Kenya

Thank you for your insightful comments. We have carefully addressed each of the comments as detailed below.

In the abstract and the introduction sections, the authors may wish to explain why they are excluding underweight children, when in the methodology they state that they will be considered (Table 2).
  ○ This has been reviewed and underweight children has been included

Let the authors write all abbreviations in full in their first use.
  ○ All abbreviations have been written in full in their first use

The authors talk about maternal and child nutrition outcomes in the topic, and yet the aspect of maternal nutrition (pregnant and lactating mothers) is relatively silent in the whole paper.
  ○ This has been clarified. Studies evaluating maternal nutrition outcomes for pregnant and lactating mothers will be included in the review.

In the second paragraph of the introduction section, the authors mention that several reviews have been conducted to assess the contribution/impact of general agriculture interventions including livestock production on nutrition. Could the authors explain why the review will be necessary if such data exists?
  ○ Most of the reviews have focused on crop agriculture. The few livestock reviews have not been done specifically for Africa and have not focused on their impact on nutrition for children under five years and pregnant and lactating women. Our review is aimed at providing evidence for the impact of livestock interventions on nutrition outcomes for children under five years and pregnant and lactating women who are among the most nutritionally vulnerable groups specifically in Africa setting.

In the objectives of the review, it's not clear what the authors mean by characteristics of livestock interventions (objective 2).
  ○ This has been clarified, it will be in terms of design and implementation strategies.

The authors may consider explaining further how the study selection will be conducted e.g. how will duplicate and irrelevant articles be excluded.
  ○ This has been clarified. The duplicates and irrelevant articles will be excluded using the Rayyan QCRI application which is a web and mobile phone app for systematic reviews

In the study designs to be included, the authors may wish to redefine the designs. For example, quasi-experimental designs are part of experimental studies. I also find the term "observational studies" to be a broad term when explaining a research design. I suggest that the authors be more specific on the research designs that they wish to include in their review.
  ○ For clarity quasi-experimental designs has been removed and examples of observational studies to be considered provided including cohort studies, case-control studies, and cross-sectional studies

Below Table 2 is the word MUAC (mid-upper arm circumference) which seems to be misplaced. If it is an explanation of the abbreviation, then the authors may wish to have a section with a list of all used abbreviations and their explanations.
  ○ All other Abbreviations have been defined in the text except MUAC which has not been used in the text hence defined under the table where it is used.

In the data management section, the authors state that only articles where there is concurrence between the two reviewers will be included in the review. Inconsistent with that statement, the subsequent statement says that the disagreement between the two reviewers will be discussed

with a third reviewer. The researchers may wish to relook at those statements.
  ○ This has been clarified. Studies will be examined independently by two reviewers. Studies that meet inclusion criteria will pass for full text review for eligibility by two reviewers. Any disagreement between them over the eligibility of any study will be decided through discussion with a third reviewer.

Furthermore, the authors mention that the primary outcome measure will be the nutrition status of children below five years and women of childbearing age. I find this to have departed from the earlier stated study population (pregnant and lactating women). Women of reproductive age may include all women aged 15-49 as defined by WHO.
  ○ For consistency, this has been reviewed and clarified to be pregnant and lactating women

In the study's heterogeneity assessment, the authors have some contradictory statements. For example, the authors state that "if high levels of heterogeneity are detected, we will perform a subgroup analysis to determine and explain the sources of heterogeneity". In the subsequent statement the authors state that "If heterogeneity is substantial, a meta-analysis will not be performed".
  ○ This has been clarified and redundancies in the statement removed. Sub-group analysis will be performed for heterogeneity assessment.

The authors may consider conducting a meta-regression if heterogeneity is further observed in the subgroup analysis.
  ○ We agree with the reviewer that it will be beneficial to conduct a meta-regression if heterogeneity is observed in the subgroup analysis. This has been included in the protocol

Competing Interests: No competing interest

Reviewer Report 12 April 2021

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Nazia Binte Ali iD

Maternal and Child Health Division (MCHD), International Centre for Diarrhoeal Disease Research, Bangladesh (icddr,b), Dhaka, Bangladesh

Many congratulations to the authors for selecting such a timely and important topic for review. The evidence generated by this paper will be important to the policymakers and researchers to identify effective modalities of livestock interventions for improving maternal and child nutrition statuses. Overall the paper is well written with well-established rationales. I have few comments on the methodology which may improve the manuscript;
  1. For selecting keywords for literature search, I would suggest including MeSH terms. This will

help identify all the potential keywords and will reduce the chance of missing.

2. Although it was mentioned in table 2 that any publication date will be considered, it is better to cite that in the method write up.

3. Table 2 is contradictory to the method write-up in terms of literature exclusion criteria. In the table exclusion criteria it was mentioned that unpublished reports will be excluded while in the method section it was mentioned that grey literature will be included. I suggest to clarify the inconsistencies.

4. Table 2: mentioned that feasibility studies will be excluded from this review. Feasibility studies encompass a wide range starting from pilot projects to effectiveness studies. What was the rationale behind this exclusion?

5. There is mention about using multiple search engines. In that case, the first step will be the identification and removal of duplicate literature. I suggest including duplicate identification and removal methods.

Is the rationale for, and objectives of, the study clearly described?
Yes

Is the study design appropriate for the research question?
Yes

Are sufficient details of the methods provided to allow replication by others?
Partly

Are the datasets clearly presented in a useable and accessible format?
Not applicable

Competing Interests: No competing interests were disclosed.

Reviewer Expertise: Maternal and child health and nutrition in the context of low and middle income countries

I confirm that I have read this submission and believe that I have an appropriate level of expertise to confirm that it is of an acceptable scientific standard, however I have significant reservations, as outlined above.

Author Response 22 Sep 2021
Josphat Muema, Institute of Tropical and Infectious Diseases, University of Nairobi, Nairobi, Kenya

Thank you for your comments which have significantly improved our article. We have carefully addressed each of the comments as follows

For selecting keywords for literature search, I would suggest including MeSH terms. This will help identify all the potential keywords and will reduce the chance of missing.
  ○ We agree with the reviewer and Medical Subject Headings (MeSH) has been included as part of the search strategy.

Although it was mentioned in table 2 that any publication date will be considered, it is better to cite that in the method write up
  ○ This has been included in the methods as part of the inclusion criteria.

Table 2 is contradictory to the method write-up in terms of literature exclusion criteria. In the table exclusion criteria, it was mentioned that unpublished reports will be excluded while in the method section it was mentioned that grey literature will be included. I suggest clarifying the inconsistencies.
  ○ We agree with the reviewer, and for consistency we have deleted the section in the text indicating inclusion of grey literature.

Table 2: mentioned that feasibility studies will be excluded from this review. Feasibility studies encompass a wide range starting from pilot projects to effectiveness studies. What was the rationale behind this exclusion?
  ○ Majority of pilot and feasibility studies are non-randomized and do not include power calculations to test hypothesis. However, some are conducted within standards hence could provide vital evidence. Consequently, in this review feasibility studies will be evaluated against the set criteria and those that meet the set criteria will be included

There is mention about using multiple search engines. In that case, the first step will be the identification and removal of duplicate literature. I suggest including duplicate identification and removal methods.
  ○ Duplicates will be removed using the Rayyan QCRI web and mobile app for systematic reviews.

Competing Interests: No competing interest