

1. Review title

Mapping food system factors influencing antimicrobial resistance: a causal loop diagram informed by a systematic umbrella literature review

2. Start date

7 June 2023 (Date of searches)

3. Anticipated completion date

March 2024

4. Stage of review at time of this submission

Article screening

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7. Organisational affiliation of the review

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9. Funding sources

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10. Conflicts of interest

None to declare

11. Research aim

The aim of this umbrella review is to identify the evidence of associations between determinants of AMR that are situated in the food system. We then aim to synthesise the existing evidence in the form of a CLD, allowing these complex inter-relationships to be clarified.

12. Study type

Systematic umbrella review

13. Identifying and selecting studies

We will conduct a search of Ovid (Medline), Scopus, Agricola and Dimensions using the following search strategy:

("Antimicrobial resistance" OR "anti-microbial resistance" OR "antibiotic resistance" OR "anti-biotic resistance" OR AMR OR ABR OR "anti-microbial use" OR "antimicrobial use" OR "anti-microbial stewardship" OR "antimicrobial stewardship" OR "drug resistance" OR "anti-biotic use" OR "antibiotic use" OR "antibiotic usage" OR "antibiotic consumption" OR drug resistance, bacterial/ or beta-lactam resistance/ or cephalosporin resistance/ or penicillin resistance/ or chloramphenicol resistance/ or drug resistance, multiple, bacterial/ or kanamycin resistance/ or tetracycline resistance/ or trimethoprim resistance/ or vancomycin resistance/).ab.

AND

("Systematic review" OR "Scoping review" OR "meta-analysis").ab.

AND

(Livestock OR agri* OR agro* OR food OR farm* OR aquaculture OR dairy OR meat OR poultry OR crop OR crops OR egg OR eggs OR fish OR seafood OR goat* OR pig* OR sheep OR cows OR cattle OR aquafarming OR Food Preservation/ or Salmonella Food Poisoning/ or Food Safety/ or Food Contamination/ or food.mp. or Food/ or Food Handling/ or Food Quality/ or Agriculture/).ab.

We will also use citation searching of the included papers to identify evidence of more upstream drivers of risk factors for AMR.

Studies identified through the searches will be collated and double-screened using the online platform Covidence. Studies will be included where they meet all of the following criteria:

- Refers to the food system
- Refers to antimicrobial use or resistance
- Describes at least one relationship between at least two variables (exposure and outcome)
- Is a Systematic review (including systematic scoping reviews) of peer-reviewed literature (quantitative or qualitative studies; observational or experimental studies)
- Has an English-language abstract

Studies with an English-language abstract will be included. Where full-texts are written in a language other than English, they will either be single-screened and reviewed by a member of the team that speaks the language (French or Spanish), or machine translated.

Study selection process will be reported using the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) template.

14. Data extraction

We will extract the following data from included studies:

- Title
- Lead author
- Publication year
- Objectives
- Range (years) of included studies
- Number of studies included in review
- Types of studies included (study design)
- Country or geographic focus
- Country income, as classified by the World Bank¹
- Method of analysis (narrative synthesis, meta-analysis)
- Relationships evidenced in review, characterised as:
 - Exposure
 - Outcome
 - Relationship type (+ or -)
 - Delay (yes/no)
 - Evidence type

Data extraction will be undertaken by one member of the research team and reviewed by another. Conflicts will be resolved by consensus.

15. Quality assessment

Methodological quality of reviews that meet the inclusion criteria will be assessed using the JBI Checklist for Systematic Reviews and Research Syntheses.² Quality assessment will be undertaken by two independent researchers. Disagreements will be resolved through consensus. Reviews with low methodological quality will be excluded from the synthesis.

16. Data synthesis

Study characteristics will be presented in tabular form. We will also use the information about relationships extracted from the study to develop a CLD. In line with established methodologies to develop systems-informed theory from qualitative data,^{3,4} we will merge relationship data by harmonising variable names and grouping variables and causal relationships into overarching categories. Through this process – informed by the axial coding phase used to develop theory from qualitative data in approaches based on Grounded Theory⁵ – we will iteratively develop a final CLD.

17. Sub-group analysis

No sub-group analysis will be performed.

18. References

1. World Bank. World Bank Country and Lending Groups – World Bank Data Help Desk.
<https://datahelpdesk.worldbank.org/knowledgebase/articles/906519-world-bank-country-and-lending-groups> (2020).
2. Aromataris, E. & Munn, Z. Chapter 10: Umbrella reviews. in *JBI Manual for Evidence Synthesis* (JBI, 2020).
3. Kim, H. & Andersen, D. F. Building confidence in causal maps generated from purposive text data: mapping transcripts of the Federal Reserve. *System Dynamics Review* **28**, 311–328 (2012).
4. Kopainsky, B. & Luna-Reyes, L. F. Closing the loop: promoting synergies with other theory building approaches to improve system dynamics practice. *Systems Research and Behavioral Science* **25**, 471–486 (2008).
5. Corbin, J. & Strauss, A. *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. (SAGE Publications, 2014).