

Foodborne disease hazards and burden in Ethiopia: A systematic literature review, 1990-2019

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Introduction

Foodborne diseases (FBDs) affect billions of people each year, posing a health burden similar to malaria or nutritional deficiencies. Ethiopia faces multiple challenges due to lack of infrastructure and basic pre-requisites for food safety such as clean water and environment, washing facilities, as well as low level of food safety regulation and incentives for producing safer food. Better evidence on the source and scale of the problem is needed to help inform policy makers, producers and consumers.

Objective

To conduct a comprehensive systematic literature review (SLR) of FBDs occurrence in Ethiopia, including hazard prevalence and impact.

Materials and methods

A SLR according to Cochrane and PRISMA guidelines. PubMed and CAB Direct were searched for relevant publications between 1990 and 2019 (inclusive). Observational studies, reviews and grey literature were included. Reviewers screened titles and abstracts, and selected publications were reviewed in full for quality assessment and data extraction.

Results

In total 128 articles (Figure 1) met the inclusion criteria. High levels of microbial contamination in different food value chains were often found in the typically small, ad hoc, observational studies. Several hazards and different food commodities were reported.

Important value chains were less frequently studied, including vegetables, fruits, crops, fish, sheep, goats, and camel. There were few reports on the incidence of human FBDs or resulting health and economic impacts.

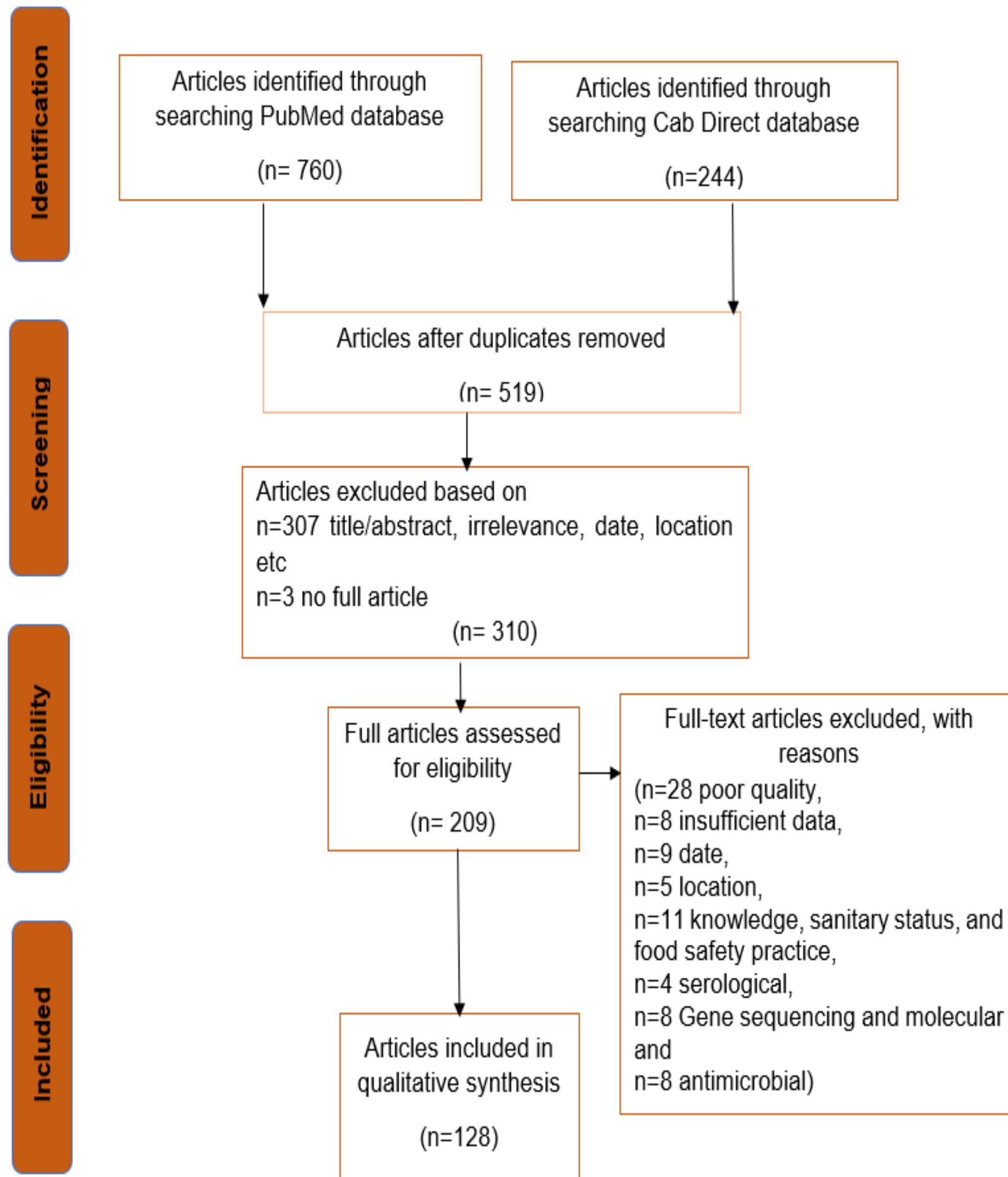


Figure 1: Flow chart of the process followed during the literature search.

The number of articles on this topic increased over time, with the last years included in this SLR registering the higher number of articles published (Figure 2).

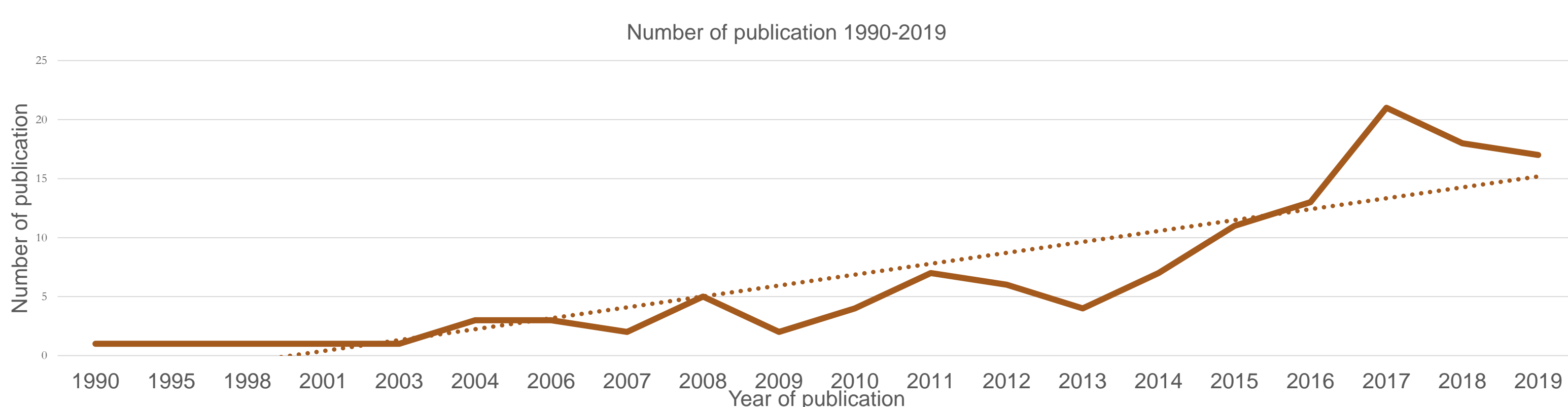


Figure 2. Number of publications on FBDs in Ethiopia between 1990 and 2019.

Studies were conducted in major cities and were not representative of all regional states (Figure 3).

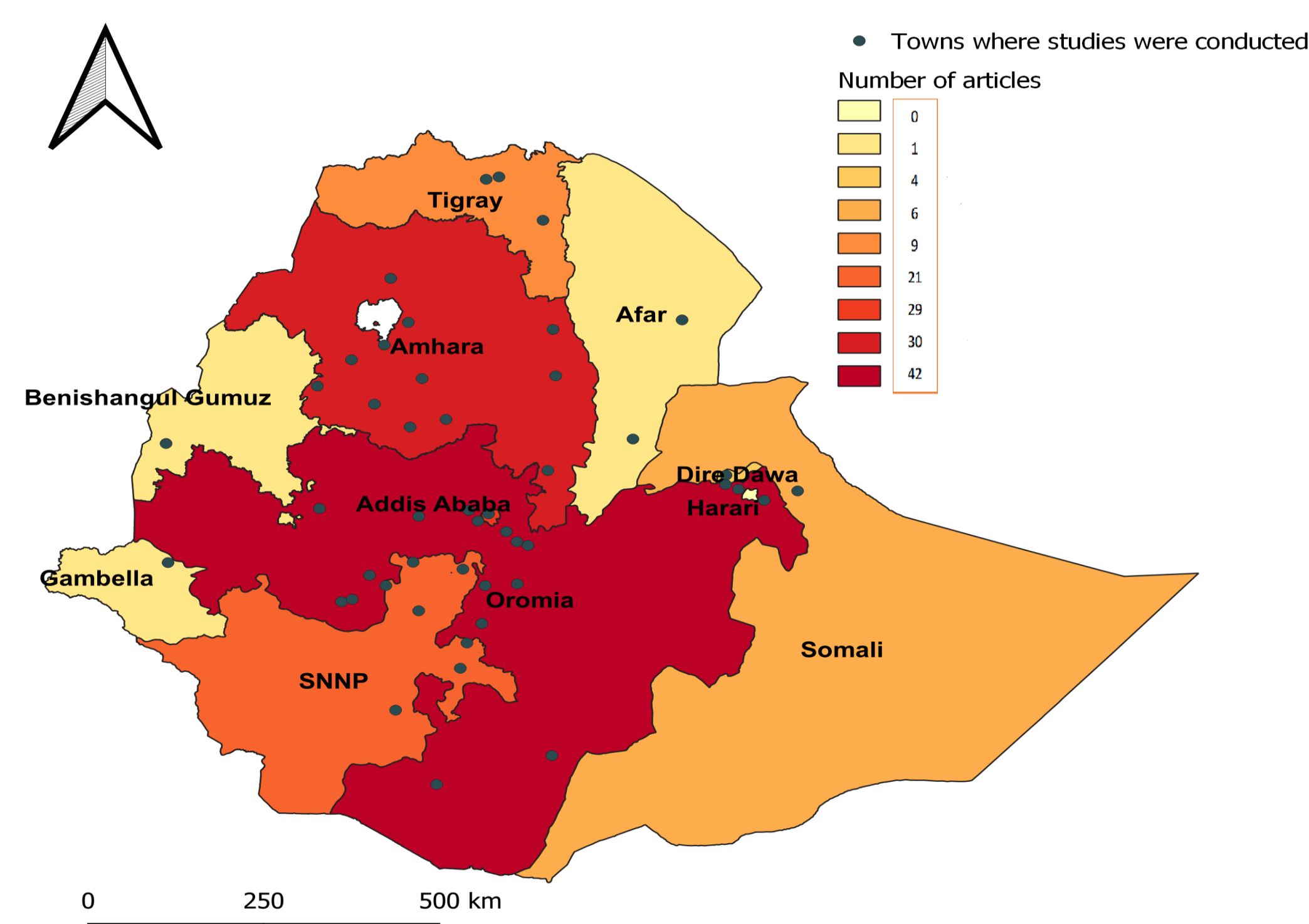


Figure 3. Spatial distribution of regions and towns where the studies were conducted.

Results

Some of the most important bacteria in terms of public health (Non-Typhoidal *Salmonella* (NTS), *Listeria*, *Campylobacter* etc.) got less coverage (Figure 4). *Entamoeba*, *Giardia* and *Ascaris* were the parasitic hazards most commonly studied (Figure 5)

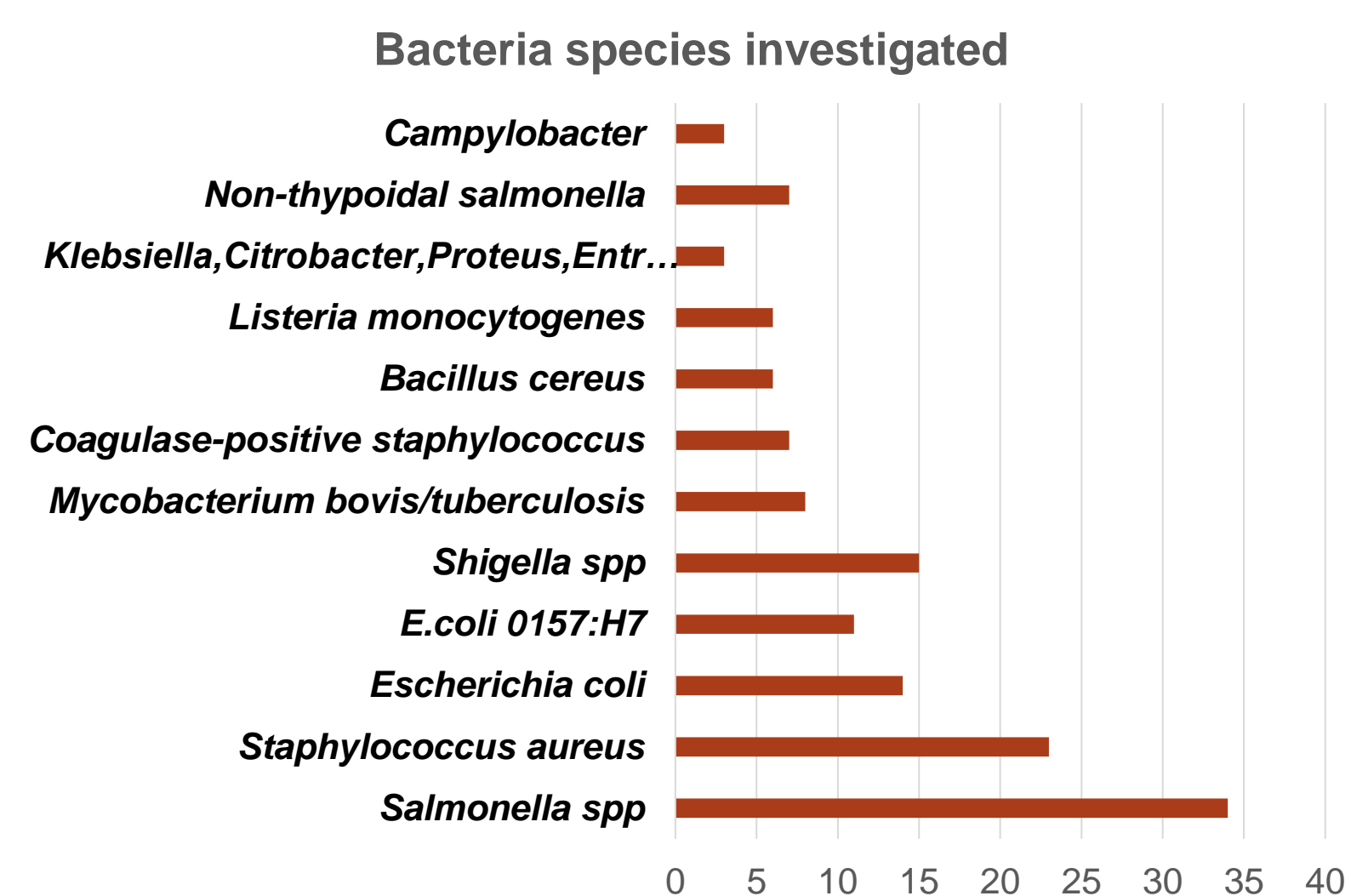


Figure 4: Number of articles reporting a particular bacteria species.

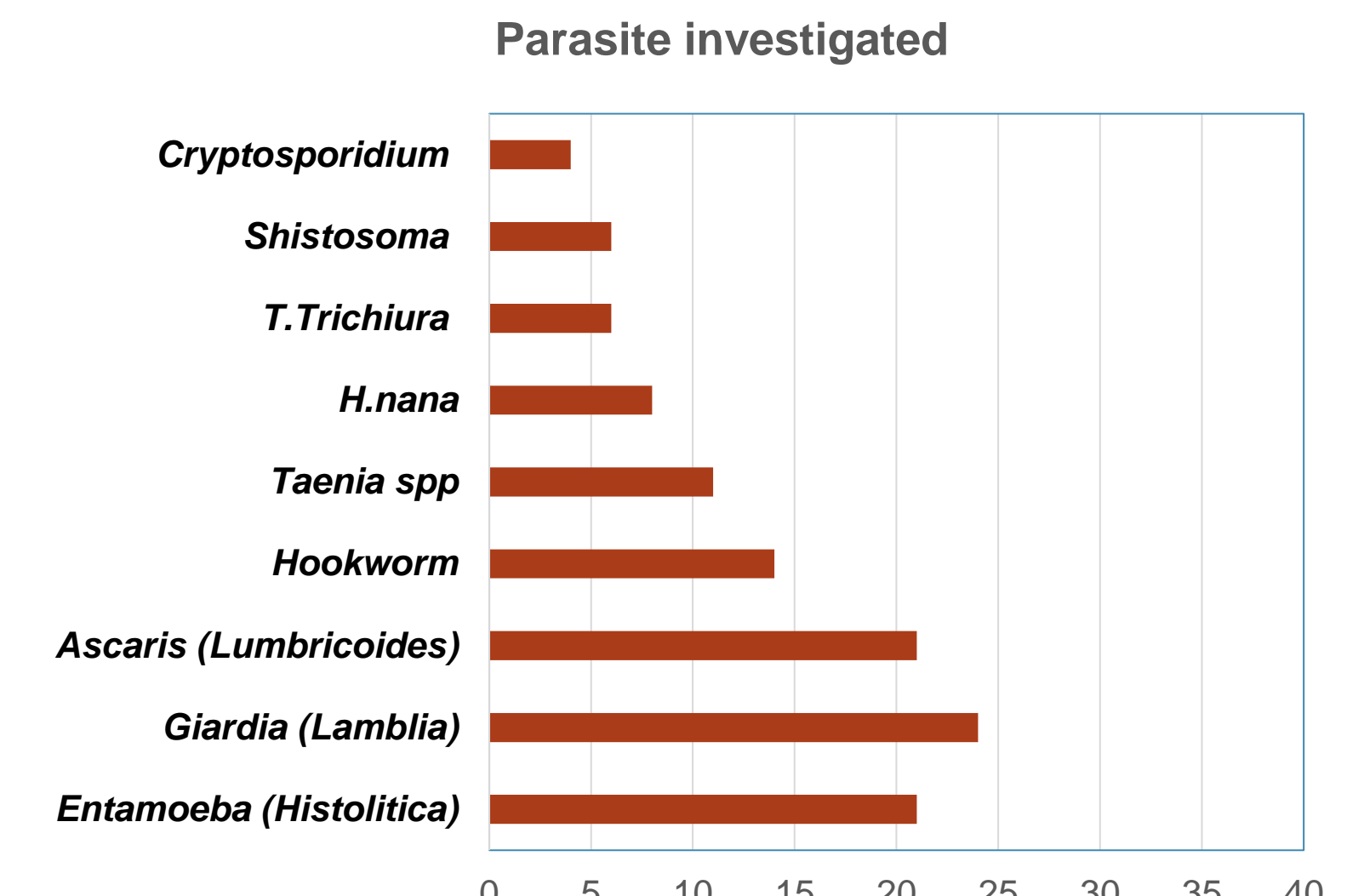


Figure 5: Number of articles reporting a particular parasites.

Beef (especially raw beef) and dairy (mainly raw milk) value chains were the most reported (Table 1).

Table 1. Summary of eligible articles (N=128)

Summary of eligible articles	Details
Study type	Cross-sectional (n= 125, 97.6%), other (n=3, 2.3%)
Study focus	Prevalence (n=120, 94%), incidence(n=7, 5.5%), impact(n=1,0.8%)
Study target *	Food (n=82,64%), human (n=48, 37.5%), environment (n=10, 7.8%)
Hazard type	Biological (n=119, 93%), chemical(n=6, 4.7%), other (n=3, 2.3%)
Value chain*	Beef (n=36, 28%), dairy (n=30, 23.4%), poultry (n=10,7.8%), crop (n=7, 5.5%), egg (n=6, 4.7%), vegetable (n=6,4.7%), fruit (n=5, 4%), camel (n=4,3.1%), sheep and goat (n=3, 2.3%), fish (n=3, 2.3%), pork (n=1, 0.8%)
Beef commodities¥	Raw beef (n=21, 58.3%), carcass (n=10, 27.8%), minced meat (n=6, 16.7%), ready to eat mortadella (n=2,5.6%), burger and pizza meat (n=1,2.8%)
Dairy commodities"	Raw milk (n=26,56.7%),cheese (n=9, 30%), pasteurized milk (n=5,16.7%), cream (n=3,10%), yoghurt (n=2,6.7%)
Human population!!	Workers in food establishment (n=16, 33.3%), dairy farm workers (n=3, 6.25%), slaughterhouse and butchery workers (n=7, 14.5%), children (n=8, 16.7%), pregnant women (n=2,4.2%), other (n=2,4.2%)

*More than one reports may focus on different targets and value chains. !! total number of reports on human n=48.
¥ Total number of reports in beef value chain n=36, " Total number of reports on dairy value chain n=30

Different prevalence rates with different bacteria species were reported in the beef value chain (Figure 6).

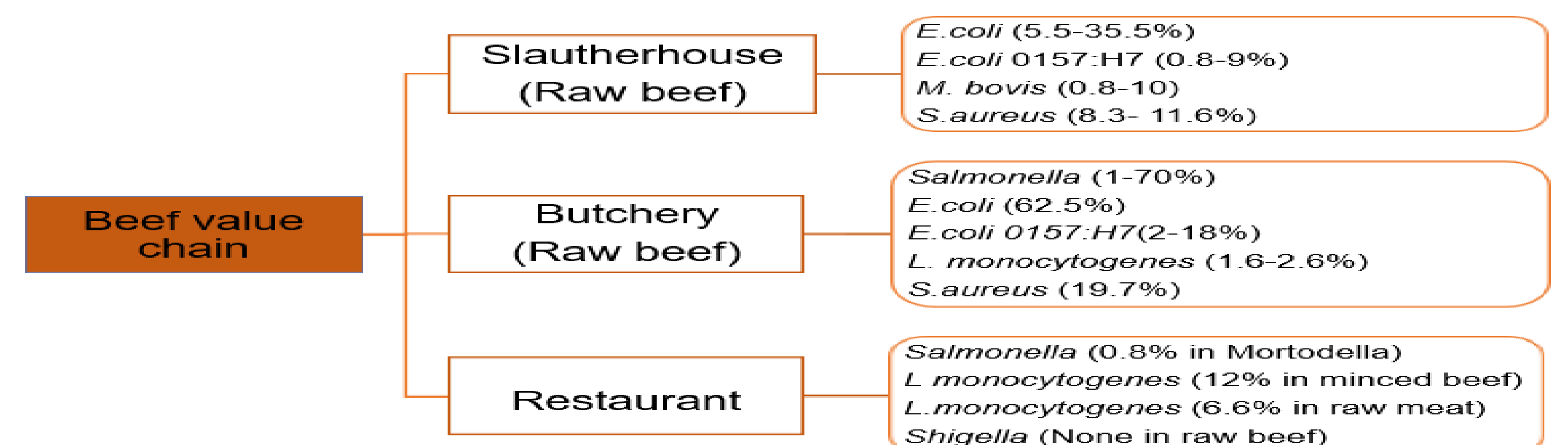


Figure 6. Prevalence of bacteria species identified in beef value chain.

In the dairy value chain,

- *Staphylococcus* (14.3- 73.2% in farms and 80% from collection centers),
- Coagulase-negative *Staphylococcus* (5-15% from farms), *Listeria* spp. (4- 13% of samples from retailer),
- *Bacillus cereus* (up to 63% of samples from markets and 0.6-0.8% from producers),
- *Salmonella* spp. (in 3-20% of farms and 6% of retailer shops) and
- *E. coli* (7% on farms to above 60% at retailer milk shops) were reported in raw milk.

Conclusion

Very little has been done to assess FBDs burden in Ethiopia. However, the SLR finds high levels of contamination. In both beef and dairy value chains contamination was observed with increasing prevalence from farm/slaughterhouse to point of sale. More systematic and ongoing evaluation of contamination should be implemented together with initiatives to improve food safety.

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