Prevalence of Campylobacter in South and Southeast Asia from Chicken Origin: A Systematic Review and Meta-analysis

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Take home message

Poultry meat is a key protein source in Bangladesh. This study demonstrated widespread prevalence of *Campylobacter* species from chicken origin specially in the live bird market where human-poultry interaction is very intense as well as in raw and cooked meat which can directly cause foodborne illness posing threat towards public health. So, this review suggests to conduct a comprehensive study on the risk factors associated with the spread of Campylobacter to mitigate public health risk.

Background and objectives

Campylobacter have been recognized as a major cause of foodborne diseases (or illness), being responsible for an estimated 400–500 million cases of diarrhea each year worldwide. Poultry, mainly chickens, are considered important reservoirs of this microorganism.

This systematic literature review aimed to assess the prevalence of *Campylobacter* in chickens and chicken products in South and Southeast Asia, how it varied according to country, source and type of sample and to identify data gaps.

Methods

PRISMA Guidelines

Search term:

The search used the Boolean search criteria "**A AND B AND C**", as follows:

A. Campylobacter*

B. (Chicken) OR (chickens) OR (broiler) OR (layer) OR (poultry) OR (Egg*)

C. (South Asia*) OR (Southeast Asia*) OR (Afghanistan*) OR (India*) OR (Pakistan*) OR (Bangladesh*) OR (Sri Lanka*) OR (Nepal*) OR (Bhutan*) OR (Maldives*) OR (Indonesia*) OR (Malaysia*) OR (Singapore*) OR (Philippines*) OR (East Timor*) OR (Brunei*) OR (Cambodia*) OR OR (Lao*) OR (Myanmar) OR (Burma*) OR (Thailand*) OR (Vietnam*) OR (Viet Nam)

Embase · PubMed · Web of Science · ProQuest

For grey literature → Google Scholar

Inclusion criteria:

- Published between January 2000- May 2020
- Published research articles and unpublished data
- Observational studies describing the
  - identification/prevalence of *Campylobacter* spp or
  - risk factors associated with the prevalence of *Campylobacter* spp
- Sample: Chickens and/or chicken meat/eggs/processed products
- Geographical area: South and south-east Asia
- Diagnostic method: standard bacteriological culture
- Published in English language

Reference management → MENDELEY

Screening

- Independently screened by two reviewers
- Checked by a third reviewer

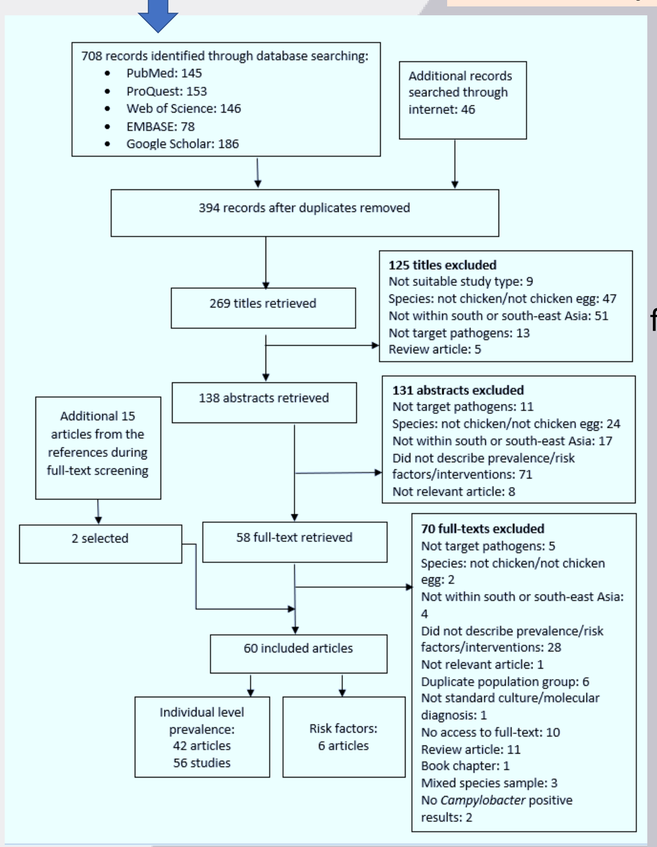

Figure-1: Flow of selected studies

Data Extraction and Analysis

Microsoft word for data extraction → Data were entered into excel

Spatial data was analyzed using ArcGIS

Analyzed using STATA-16

- **Random-effect model was used**
- **No significant co-variate identified in meta-regression**
- **Subgroup analysis based on country, source and sample type**

Results: Individual level

- Heterogeneity, I^2 = 98.2%; p<0.001
- **Test of group difference, $Q_b(9)$: 74.1, p=<0.001**

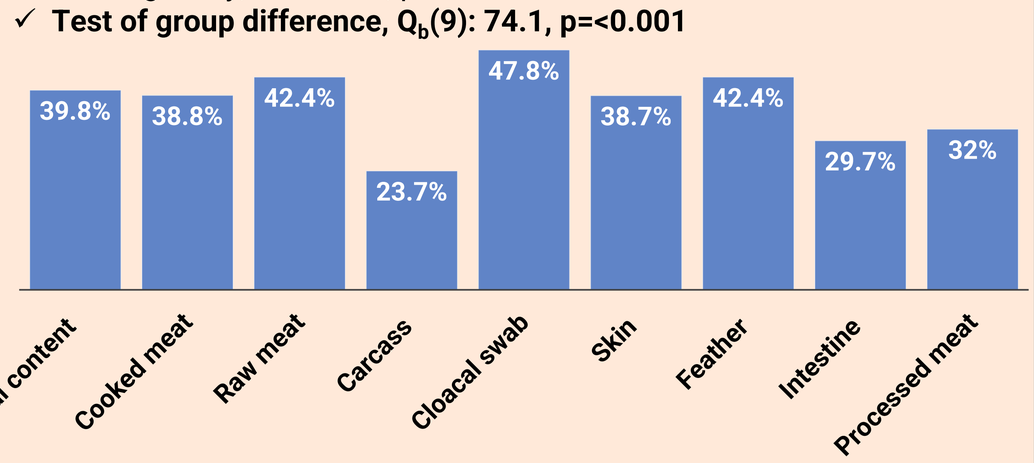

Figure-3: Estimated prevalence of *Campylobacter* in different chicken samples

Source	No. of studies	Prevalence (%)	95% Confidence Interval	Heterogeneity, I^2 (%)	P
Farm	11	45.6	35.1, 56.2	97.8	<0.001
Live bird market	**20**	**53.3**	**41.9, 64.7**	**97.1**	**<0.001**
Slaughterhouse	8	31.0	19.8, 42.3	96.3	<0.001
Restaurant	3	42.3	29.2, 55.4	81.6	<0.001
Super shop	3	54.8	28.2, 81.5	95.7	<0.001
Household	2	30.8	0.001, 80.4	99.3	<0.001
Mixed	3	19.5	6.7, 32.2	80.4	<0.001
Unclear	6	25.6	4.9, 46.3	99.0	<0.001

Table-1: Estimated prevalence of Campylobacter in chickens from different sources

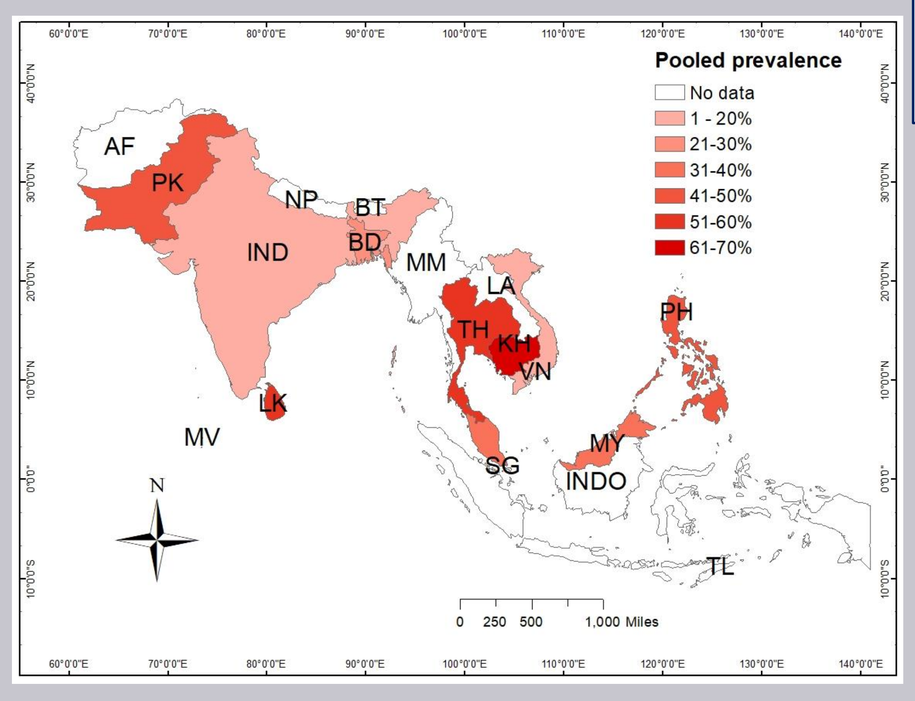

Figure-: Estimated prevalence of *Campylobacter* in chickens in different countries of south and south-east Asia

- Heterogeneity,I^2 = 98.2%; p-value<0.001
- **Test of group difference, $Q_b(8)$: 34.4, p=<0.001**

- Heterogeneity,I^2 = 98.2%; p<0.001
- **Test of group difference, $Q_b(7)$: 21.3, p=<0.001**

Overall prevalence:
42.4% (95%CI: 36.1%, 48.7%);
(Heterogeneity,I^2 = 98.2%; p<0.001)

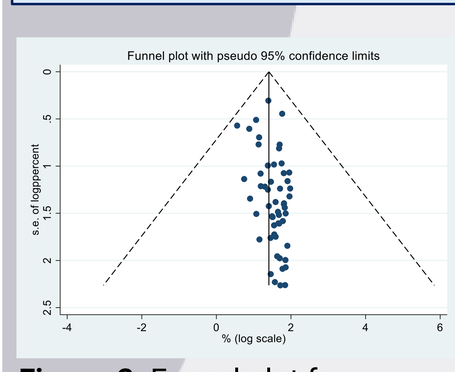

Figure-2: Funnel plot for examination of publication bias

- Qualitatively symmetrical association with prevalence of *Campylobacter* in the funnel-plot analysis.
- Regression-based egger's test →there was small study effect on the prevalence of *Campylobacter* (p= 0.04).

Conclusion: The prevalence of Campylobacter is quite high in all the strata analyzed and significantly highest in Thailand, cloacal swab samples and live bird market source with a good number of studies. However, between study heterogeneity on the basis of the I^2 statistic was high (98.2%) for all the strata.

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