



Non-Typhoidal Salmonella in Humans in India, Vietnam, Bangladesh and Sri Lanka: A Systematic Review

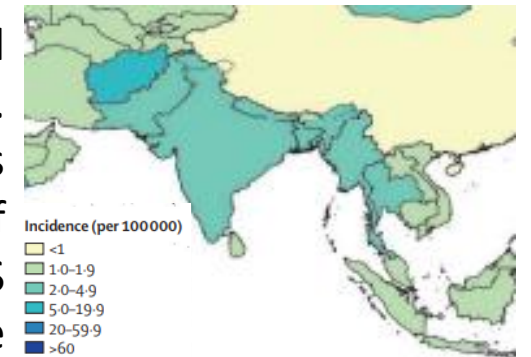
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Non-Typhoidal Salmonella (NTS) infections usually present as self-limiting diarrhoeal illness although approximately 5% of cases develop bacteraemia or invasive infection. Invasive NTS (iNTS) is associated with severe life-threatening complications such as sepsis. The rising incidence of antimicrobial resistance (AMR) increases the risk of mortality. We conducted a systematic review to estimate the proportion of NTS isolated, serovar burden, serovar-specific AMR, and case fatality rate (CFR) rate in the four hub countries.



Non-typhoidal Salmonella invasive disease incidence rates (per 100k) in 2017 (GBD)

Methods

- A systematic search of Medline, Embase, Global Health, Web of Science Core Collection databases, Wiley Cochrane Library, WHO Global Index Medicus
- Studies published between 01/01/1980 - 18/12/2020.
- Limited to four hub study countries
- Inclusion Criteria: Studies which had data on molecular biology, AMR, source attribution, quantitative data on incidence, mortality and morbidity

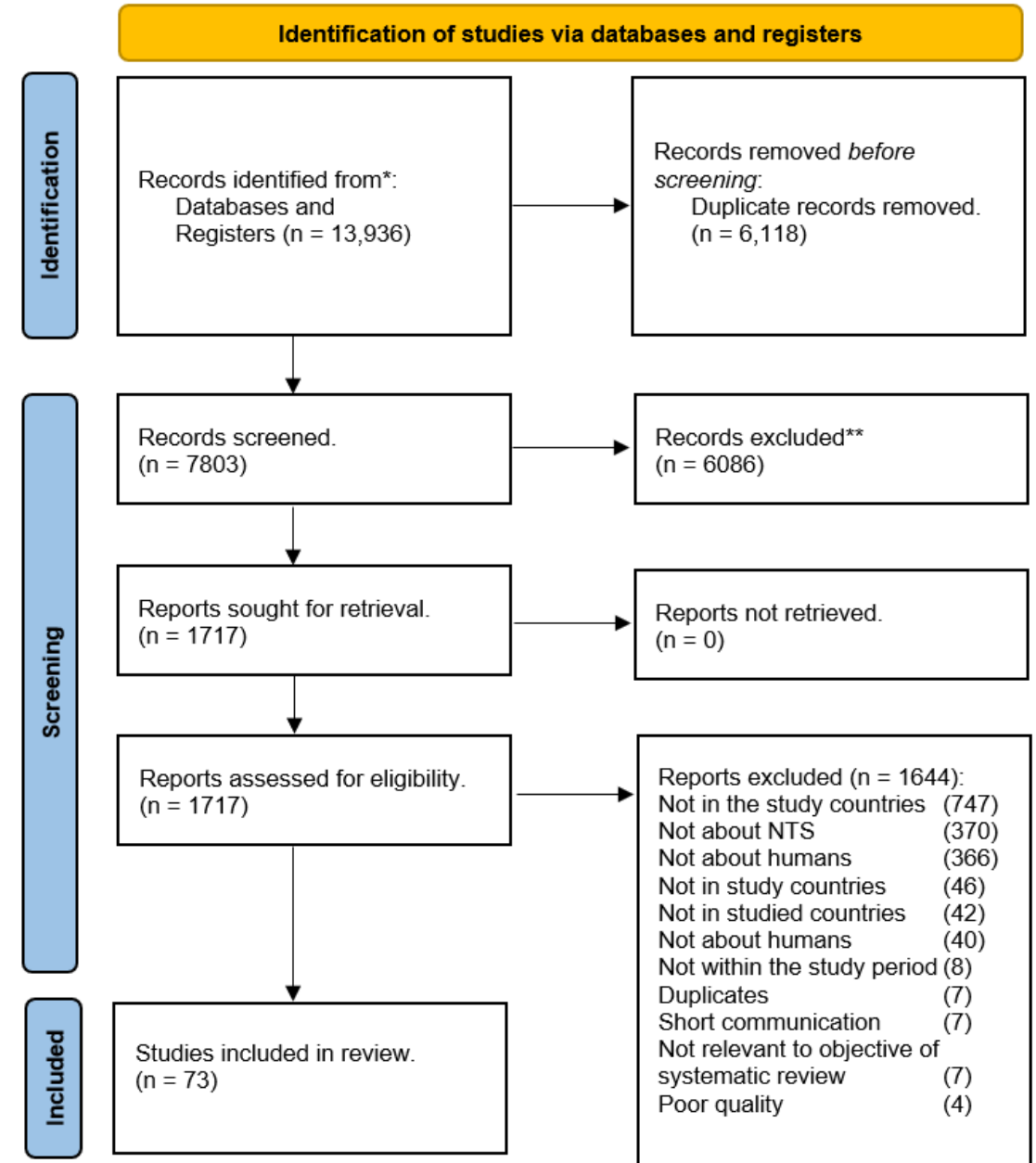
Results

- Identified 13936 articles, after screening 73 eligible
 - India (57/73), Vietnam (9), Bangladesh (5) Sri Lanka (2)
 - 44 prevalence studies, 22 case reports, 7 case series

Conclusions

- Pooled isolation rate estimate:
 - NTS 2.1% (1.2-3.2%)
 - iNTS 0.3% (0.1%-0.5%)
- Pooled Case Fatality Rate for NTS: 14.8% (4.0%-29.6%)
- Multi-drug resistance
 - India: NTS 30.2% (2-68%), iNTS 22.3% (0-67%)
 - Vietnam: NTS 41.9% (21-64%) iNTS 41.2% (34-49%).

PRISMA 2020 flow diagram



Conclusions (cont.)

- 79 different serovars from 6031 isolates
- MLST data; 98 different ST's, ST11 (*S. Enteritidis*) present in all countries.

Limitations

- Paucity of studies from Sri Lanka and Bangladesh
- Heterogeneity between studies
- Most of the studies were hospital-based surveillance

Top 10 ranking serovars. *S. Enteritidis*, *S. Paratyphi B Var Java*, *S. Typhimurium* and *S. Weltevreden* were present in all four countries.

Rank	1	2	3	4	5	6	7	8	9
India	<i>S. Typhimurium</i> (898, 29.0%)	<i>S. Weltevreden</i> (322, 10.4%)	<i>S. Worthington</i> (316, 10.2%)	<i>S. Bareilly</i> (255, 8.2%)	<i>S. Newport</i> (151, 4.9%)	<i>S. Enteritidis</i> (145, 4.7%)	<i>S. Infantis</i> (132, 4.3%)	<i>S. Choleraesuis</i> (61, 2.0%)	<i>S. Kentucky</i> (46, 1.5%)
Vietnam	<i>S. Typhimurium</i> (299, 34.7%)	<i>S. Enteritidis</i> (93, 10.8%)	<i>S. Weltevreden</i> (80, 9.3%)	<i>S. Stanley</i> (75, 8.7%)	<i>S. Newport</i> (42, 4.9%)	<i>S. Rissen</i> (20, 2.3%)	<i>S. Java</i> (16, 1.9%)	<i>S. Choleraesuis</i> (15, 1.7%)	<i>S. Kentucky</i> (12, 1.4%)
Bangladesh	Group C1 (693, 34.2%)	Group B (533, 26.3%)	Group C2 (254, 12.6%)	Group E (186, 9.2%)	Group D (119, 5.9%)	Group G (79, 3.9%)	<i>S. Typhimurium</i> (21, 1.0%)	<i>S. Java</i> (16, 0.8%)	<i>S. Enteritidis</i> (6, 0.3%)
Sri Lanka	<i>S. Enteritidis</i> (21, 50.0%)	<i>S. Java</i> (4, 9.5%)	<i>S. Weltevreden</i> (4, 9.5%)	<i>S. Corvallis</i> (3, 7.1%)	<i>S. Chester</i> (3, 7.1%)	<i>S. Worthington</i> (2, 4.8%)	<i>S. Typhimurium</i> (1, 2.4%)	<i>S. Stanley</i> (1, 2.4%)	<i>S. Mbandak</i> (1, 2.4%)

Acknowledgements: Everyone in the hub!

Ampicillin Resistance iNTS rates higher in Vietnam than in India

