

Spatial and Temporal Patterns of Typhoid and Paratyphoid Fever Outbreaks: A Worldwide Systematic Review, 1990-2016

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Vaccine
Institute**

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Why Enteric Fever Outbreaks Review?

- ❑ Outbreaks are not often included in disease burden studies
- ❑ May not be captured in surveillance studies
- ❑ Enhances the comprehensiveness of disease burden
- ❑ Outbreak are not systematically collected and reported: under reported
- ❑ Helpful in geo-spatial risk-prediction models

Systematic Literature Review

- PRISMA guidelines
- Medical literature databases PUBMED and EMBASE
- Epidemiology-specific databases GIDEON and ProMEDmail (<https://www.gideononline.com/> , <http://www.promedmail.org/>)
- From January 1st 1990 to December 31st 2016
- English language
- Outbreak definition: Author defined
- Diagnostic criteria (Any: culture, serology, clinical)

Search Methodology

Search terms

((“typhoid” OR “typhoid fever” OR “salmonella typhi” OR “s. typhi” OR “salmonella infection” OR “enteric fever” OR “paratyphi” OR “paratyphoid” OR “paratyphoid fever”) AND (“outbreaks” OR “resurgence” OR “re-emergence” OR “relapse”))

Duplicates removed

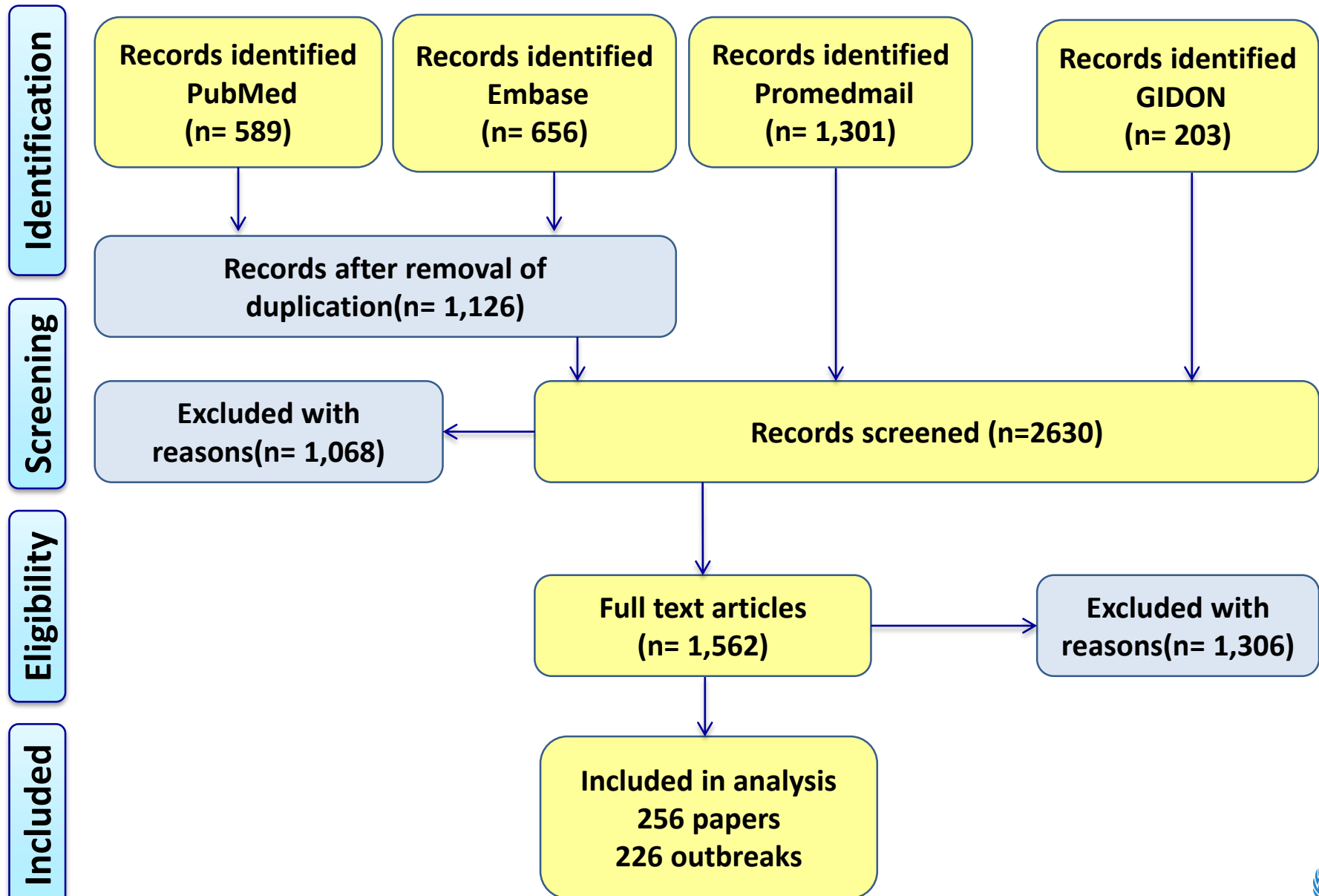
Unique outbreaks identified

Linked to GIS using google map

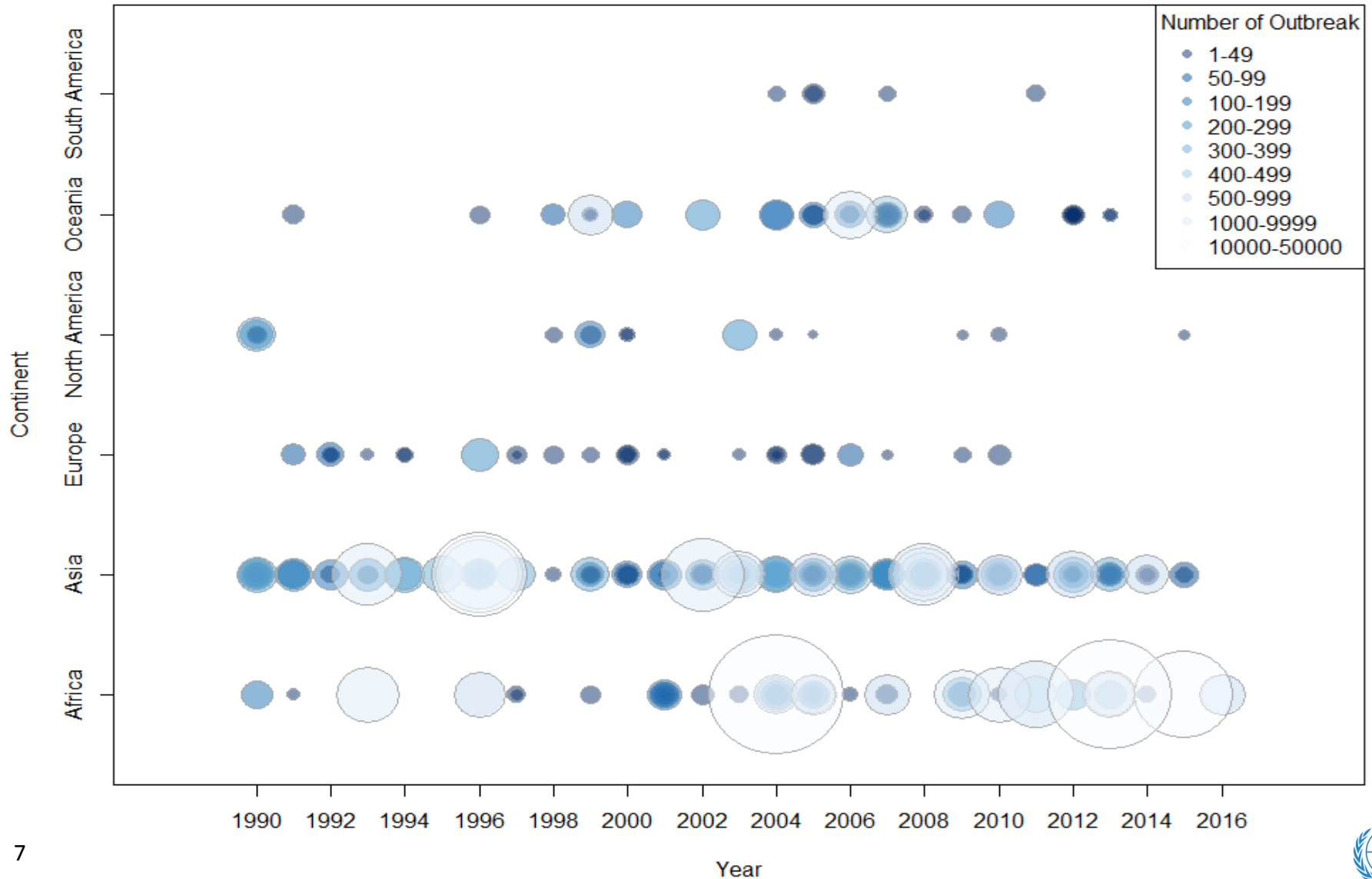
Predefined data extraction

Two researchers involved

PRISMA Flow Chart of Literature Review



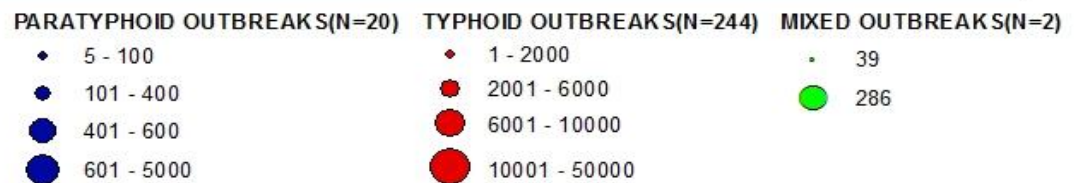
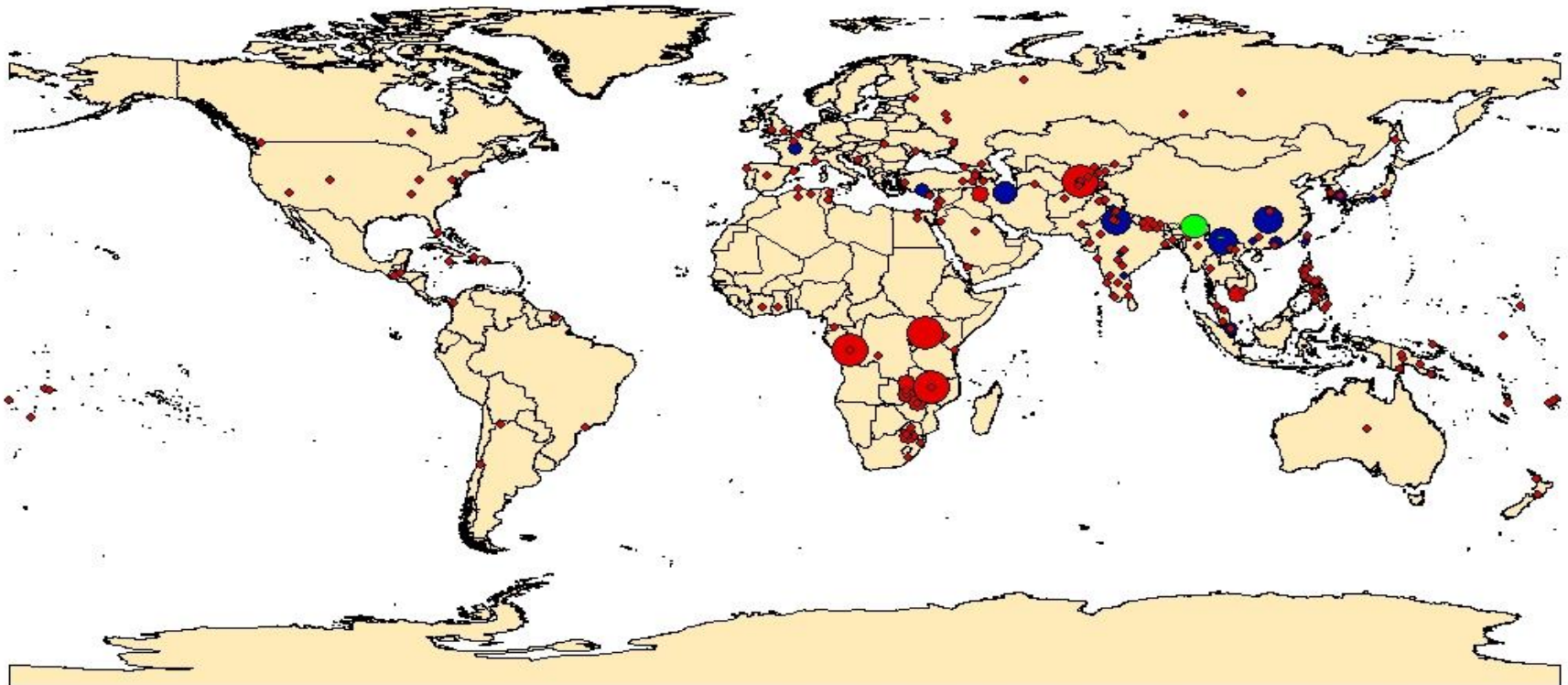
Distribution of Outbreaks 1990-2016



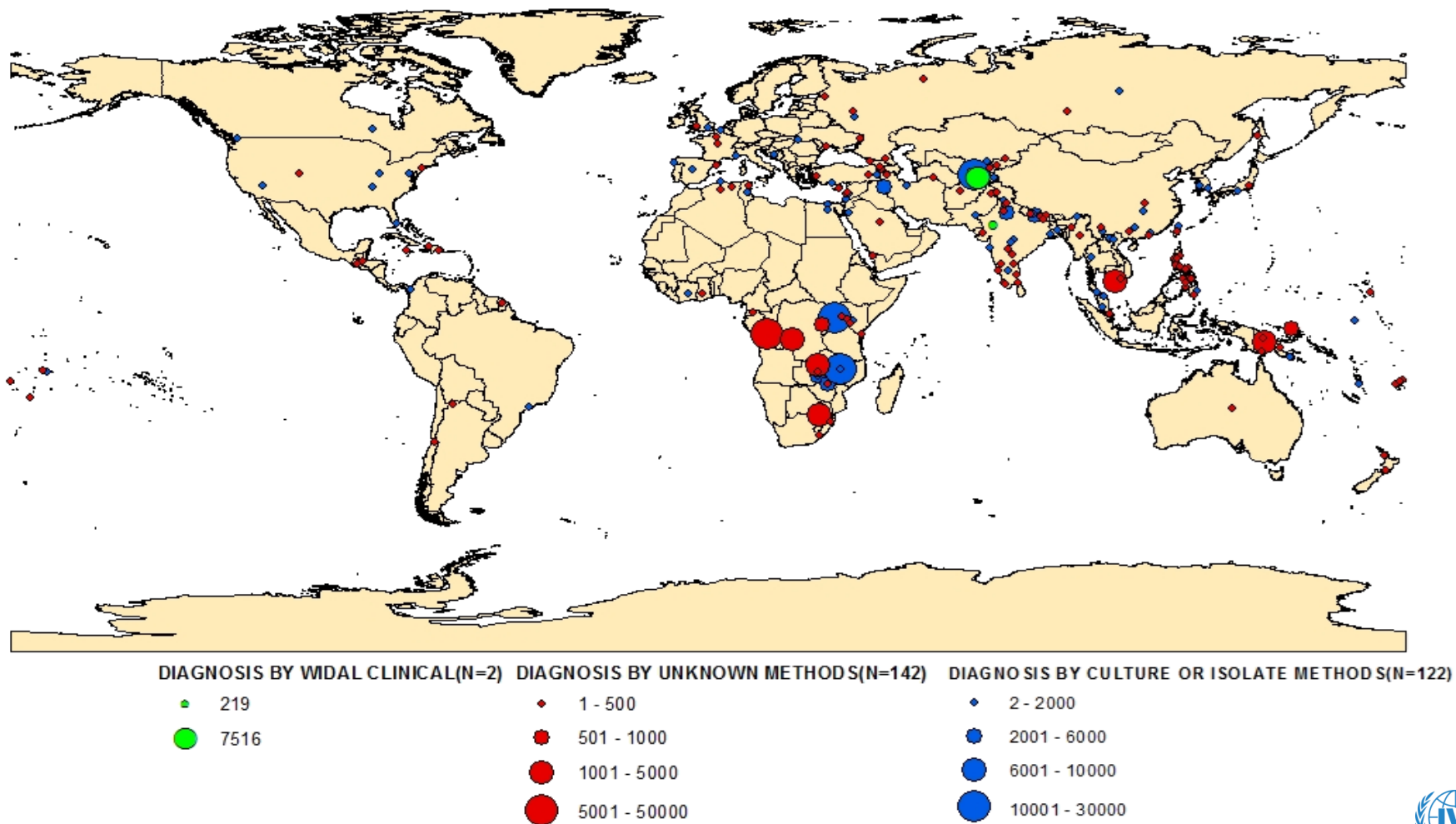
Number of Outbreaks and Cases

Region	No. outbreaks	Min. cases	Max. cases	Sum of cases	Mean	Median	Std. Dev
Africa	45	4	42,564	107,030	2,378	144	7,766
Asia	135	2	10,677	55,998	415	83	1,330
Europe	27	1	277	856	32	16	53
North America	17	2	321	932	55	12	91
South America	5	13	44	102	20	17	13
Oceania	37	2	1,200	3,852	104	28	219
Total/overall	266	1	42,564	159,347	632	50	2,590

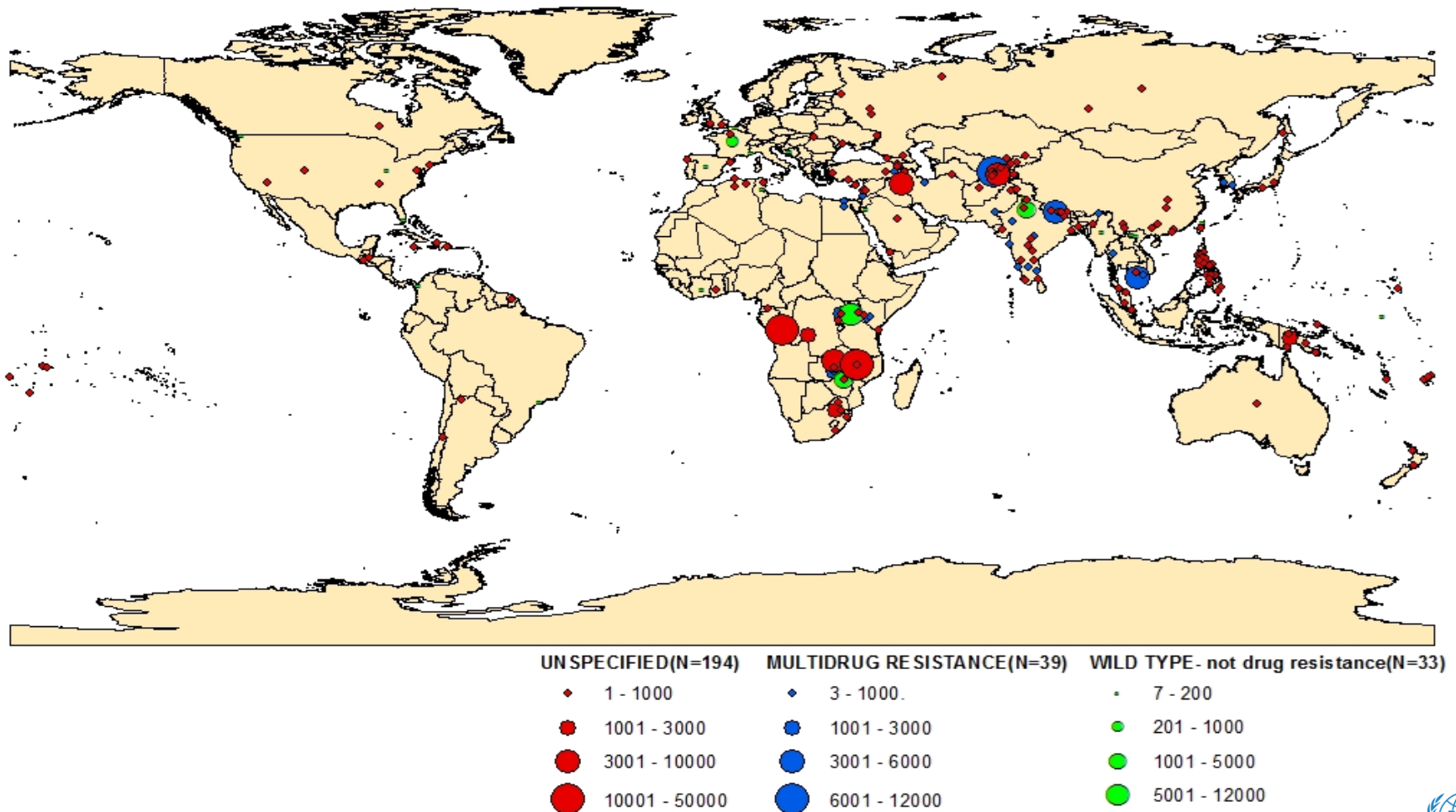
Typhoid and Paratyphoid Outbreaks



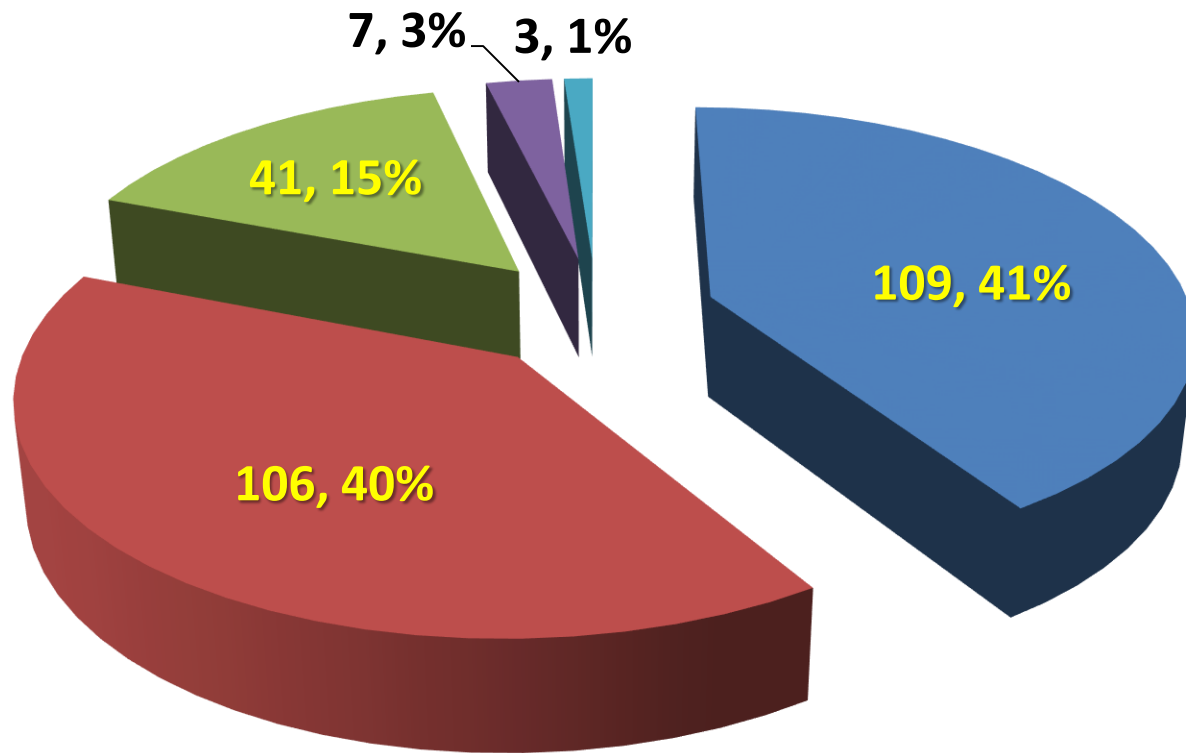
Diagnostic Method Used in Outbreaks



Multidrug-Resistant Outbreaks



Reported Causes for Outbreaks



■ No cause reported

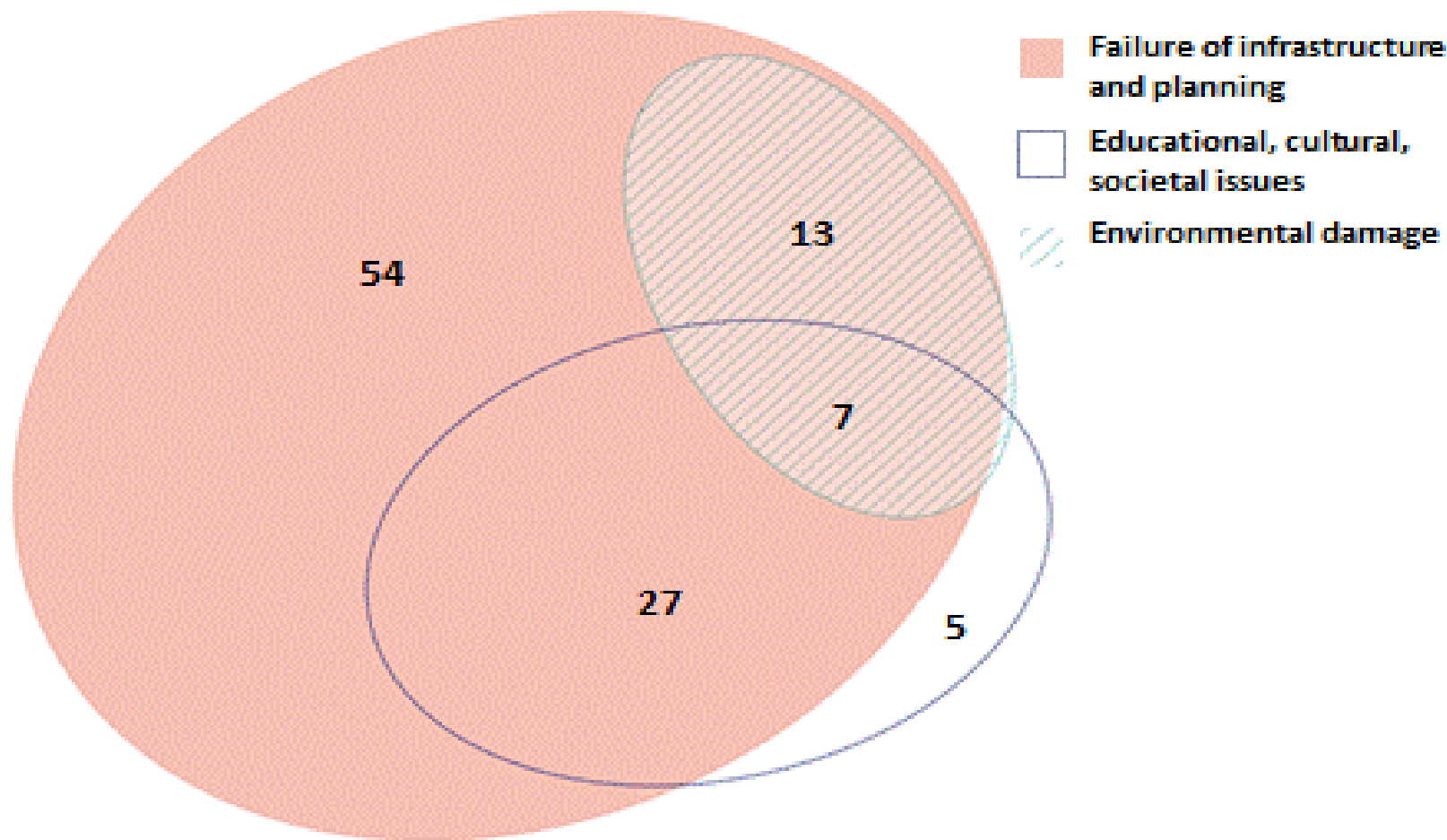
■ Soley foodborne

■ Person to person

■ At least contaminated water

■ Imported

Risk Factors for Contaminated Water Outbreaks



There were no outbreaks that attributed environmental damage only and no outbreaks that attributed environmental damage and educational, cultural, societal issues



Discussion

- ❑ Reported outbreaks overlap the geographical areas that are typhoid endemic
- ❑ Contaminated water is the most important cause for outbreak
- ❑ Value of monovalent typhoid vaccine in Asia as typhoid and paratyphoid appears to be more common

Limitations

- ❑ Outbreaks are author defined, could not verify against WHO definition
- ❑ Different health systems have different capacity to identify and report outbreaks- underestimation
- ❑ Known typhoid endemic areas may not report outbreaks- underestimation
- ❑ Data bases, particularly ProMEDmail may have underreporting bias for LMICs

Conclusion

- ❑ Enteric fever outbreak burden remains high in endemic LMICs
- ❑ Outbreak data should be taken into account when prioritising resources and public health policies and actions
- ❑ Typhoid vaccination should be considered to control outbreaks as recommended by WHO, as well as improving water and sanitation is important
- ❑ Need to standardize detection, reporting, and monitoring of outbreaks in a consistent manner

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ASANTENI !

THANK YOU !

Any Question?

