

Schools as a Platform for Rapid Typhoid Seroepidemiological Assessments: Evidence from Nepal

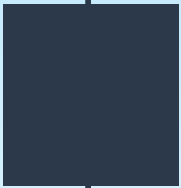
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Background

- High typhoid burden in Kathmandu Valley; limited evidence in the other regions of Nepal.
- Blood culture surveillance studies are expensive, logistically intensive, and take many years to complete
- Serologic surveys are an alternative approach to generate accurate typhoid incidence estimates
- Schools are a potential alternative population to quickly estimate typhoid burden, but it's unclear whether they provide a representative sample for assessing community exposure to *S. Typhi*





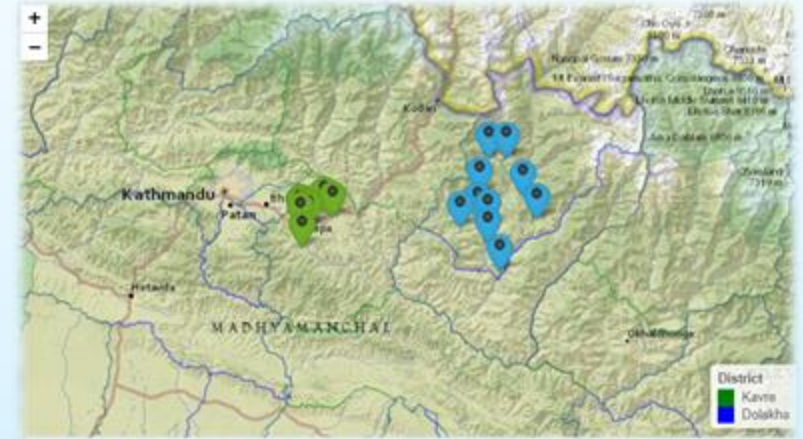
Objectives

- Determine the feasibility of using a school-based sampling frame for typhoid sero-epidemiology, evaluating participation rates and resource requirements
- Compare school-based and population-based seroincidence estimates from the same communities to determine whether school-based estimates provide unbiased estimates compared with population-based surveys



Methods

- Random sample of 18 primary and secondary schools
 - 8 in Kavre district
 - 10 in Dolakha district
- Up to 100 children randomly selected from each school
- Inclusion criteria: Age between 4 and 18 years
- Fingertick capillary blood collected onto filter paper
- HlyE IgG and IgA antibody levels determined by kinetic ELISA
- Estimated seroincidence in each community using previously published methods (Aiemjoy et al, 2022)



Sampling characteristics of students in the School study

| Characteristic | Dolakha | Median | Kavre | Median |
|---------------------|-----------------|-----------|-----------------|-----------|
| | N = 522 | | N = 816 | |
| Age Category | 522 | | 816 | |
| <5 | 27 (5.2%) | 4 | 9 (1.1%) | 4 |
| [5-15] | 444(85%) | 11 | 747(92%) | 9 |
| 16+ | 51 (9.8%) | 16 | 60 (7.4%) | 16 |
| Sex | 522 | | 816 | |
| Female | 273 (52%) | | 412 (50%) | |
| Male | 249 (48%) | | 404 (50%) | |



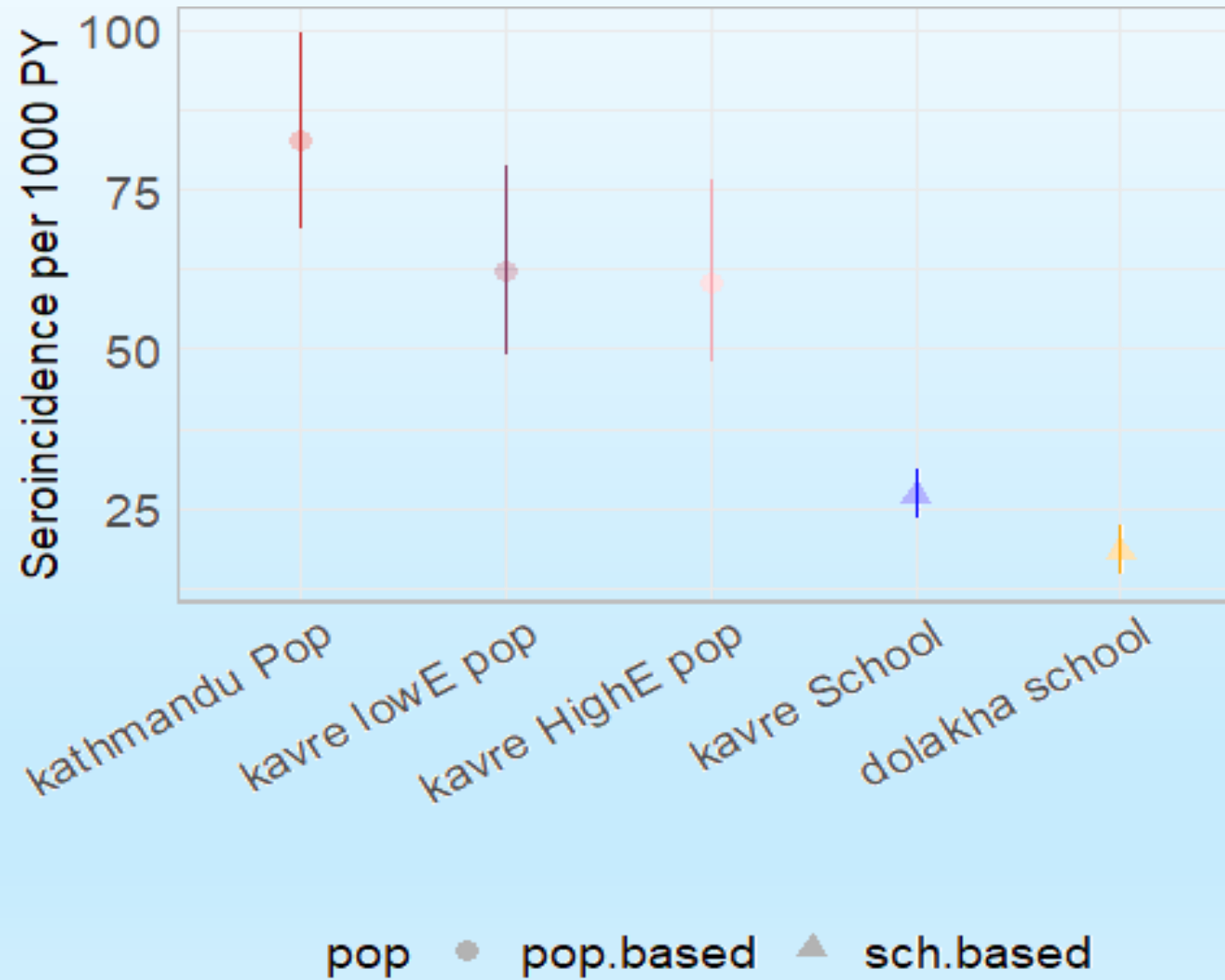
School and Population Sample

| | Population | | School | |
|---------------------------|-----------------|-----------------|----------|---------|
| | Kathmandu | Kavre | Kavre | Dolakha |
| Median age (IQR) | 12.0 (5.8–17.8) | 10.2 (5.1–15.7) | 11(8-14) | 9(7-12) |
| Sample size | 353 | 481 | 816 | 522 |
| Duration of study, Months | 24 | 24 | 4 | 2 |
| Research Staff Required | 8 | 8 | 4 | 4 |
| Consent Rate | 76.5% | 86.4% | 88.3% | 98.3% |

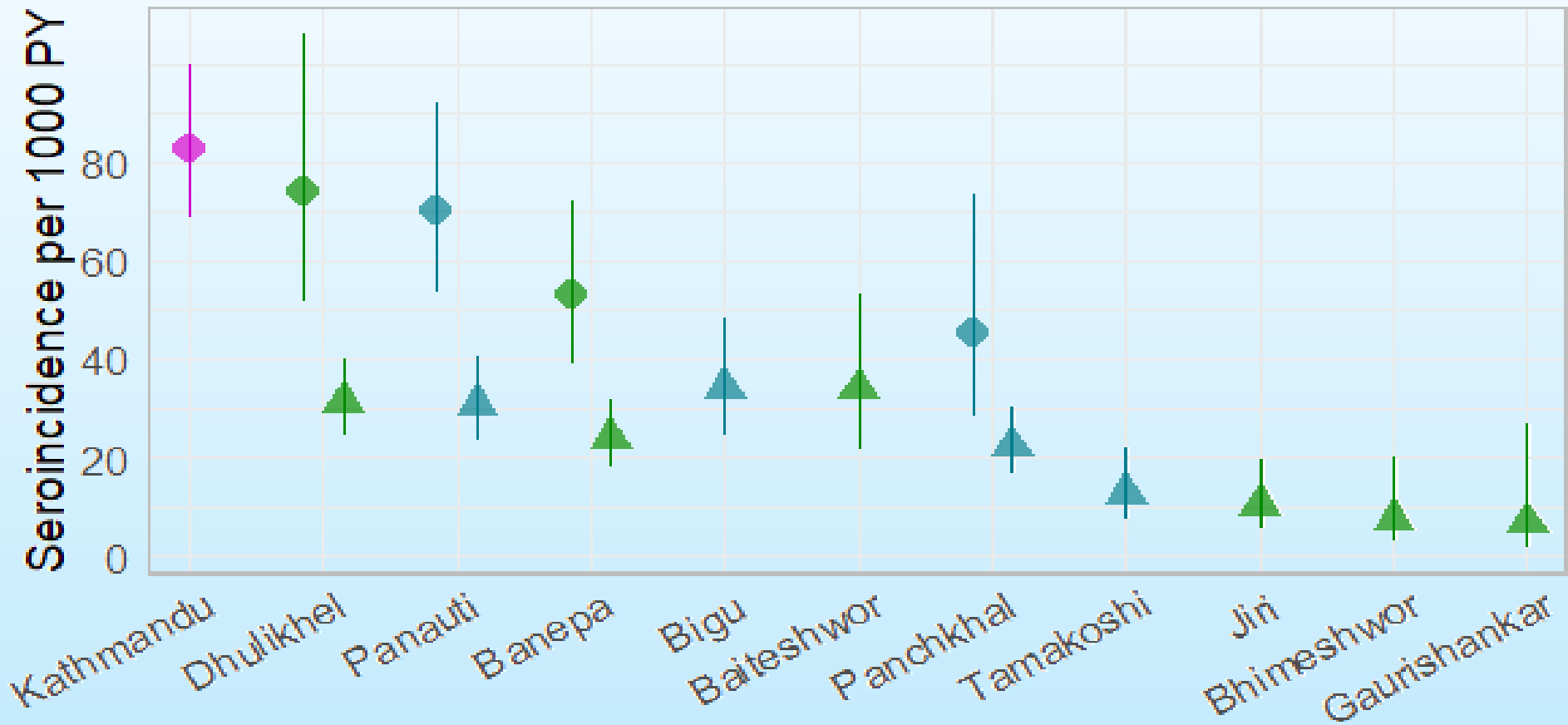


RESULTS

Seroincidence by District and Sampling frame



Seroincidence by Municipality and Sampling frame



catchment Kathmandu kavre Kavre pop.-based survey school survey

Conclusions

- Seroincidence estimates derived from school based sampling were lower than those derived from household surveys
- Participation rates were higher in school based surveys compared with household surveys, and sampling was able to be performed in a fraction of the time and with fewer personnel, markedly reducing costs
- School-based surveys could enable rapid mapping of typhoid risk in communities where blood culture-based surveillance is not available, as well as monitoring of typhoid exposure trends following vaccine introduction
- Based on our findings, it can be inferred that Dolakha, a rural district exhibits a lower incidence rate and bears a significantly reduced burden of typhoid.

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