

A scoping literature review of global dengue age-stratified seroprevalence data: estimating dengue force of infection in endemic countries

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Background

- **Dengue** poses continuous **challenges** to public health globally, with half of the population at risk of infection
- Dengue transmission intensity and burden is **poorly characterized**, with difficulties in assessing the impact of new interventions
- **Age-stratified seroprevalence** studies help reconstruct the immunity profile of the population:
 - the force of infection (FOI), i.e., the per-capita probability of infection for a susceptible person
 - the (unobserved) infection burden

Aim of the study

- Scoping literature review to **collate dengue age-stratified seroprevalence data worldwide**:
 - Using online databases Medline and Embase
 - Looking for papers published between **2014 and 2022**
 - dengue endemic countries
- **Estimate location-specific force of infection (FOI)** from the identified age-stratified seroprevalence datasets.

Materials and Methods

- Search terms:
dengue AND sero* AND (prevalence OR seroprevalence OR positiv* OR seropositiv*)
- The workflow followed during the literature review is described in Figure 1

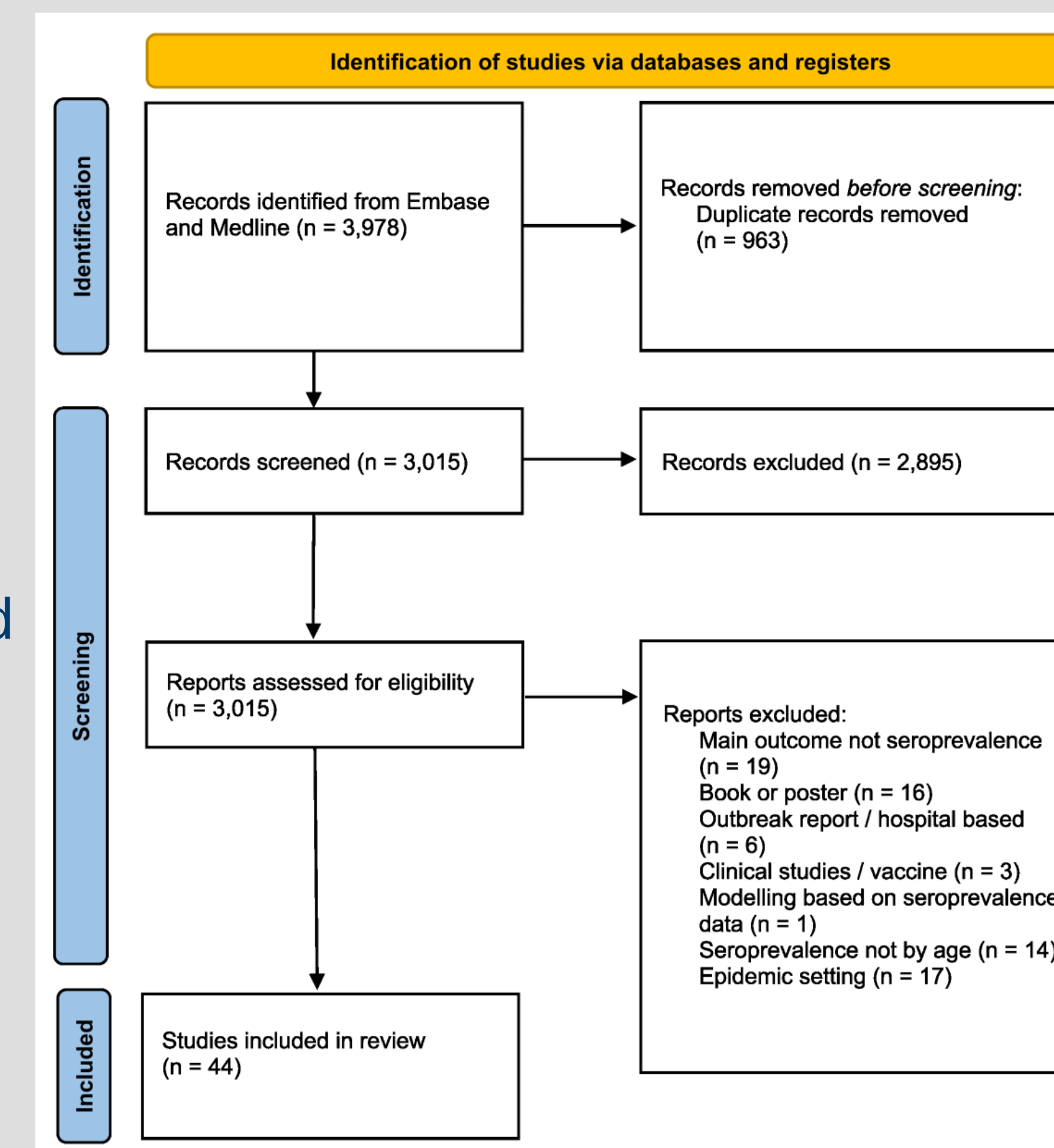


Figure 1 Workflow of the literature search from articles identified in the online databases to articles screening and selection.

- Catalytic models with constant infection hazard
 - With no antibody decay

$$z_a = 1 - e^{-\lambda a}$$

- With antibody decay

$$z_a = \frac{\lambda}{\lambda + \alpha} (1 - e^{-a(\lambda + \alpha)})$$

Results

- Our analysis identified 44 new publications, with **47 new datasets** from 20 endemic countries
- Countries with first published age-stratified dengue seroprevalence studies
 - **Guadeloupe, Martinique, Burkina Faso**
- **Large heterogeneities** in FOI
- Highest FOIs in **Sri Lanka, India, Thailand and Indonesia**
 - FOI values equal or above 0.14, with expected average age of (first) infection around 7 years
- Lowest FOIs in **Taiwan and Saudi Arabia**
 - Median FOI estimates between 0.001 and 0.005 in the former and 0.008 and 0.017 in the latter

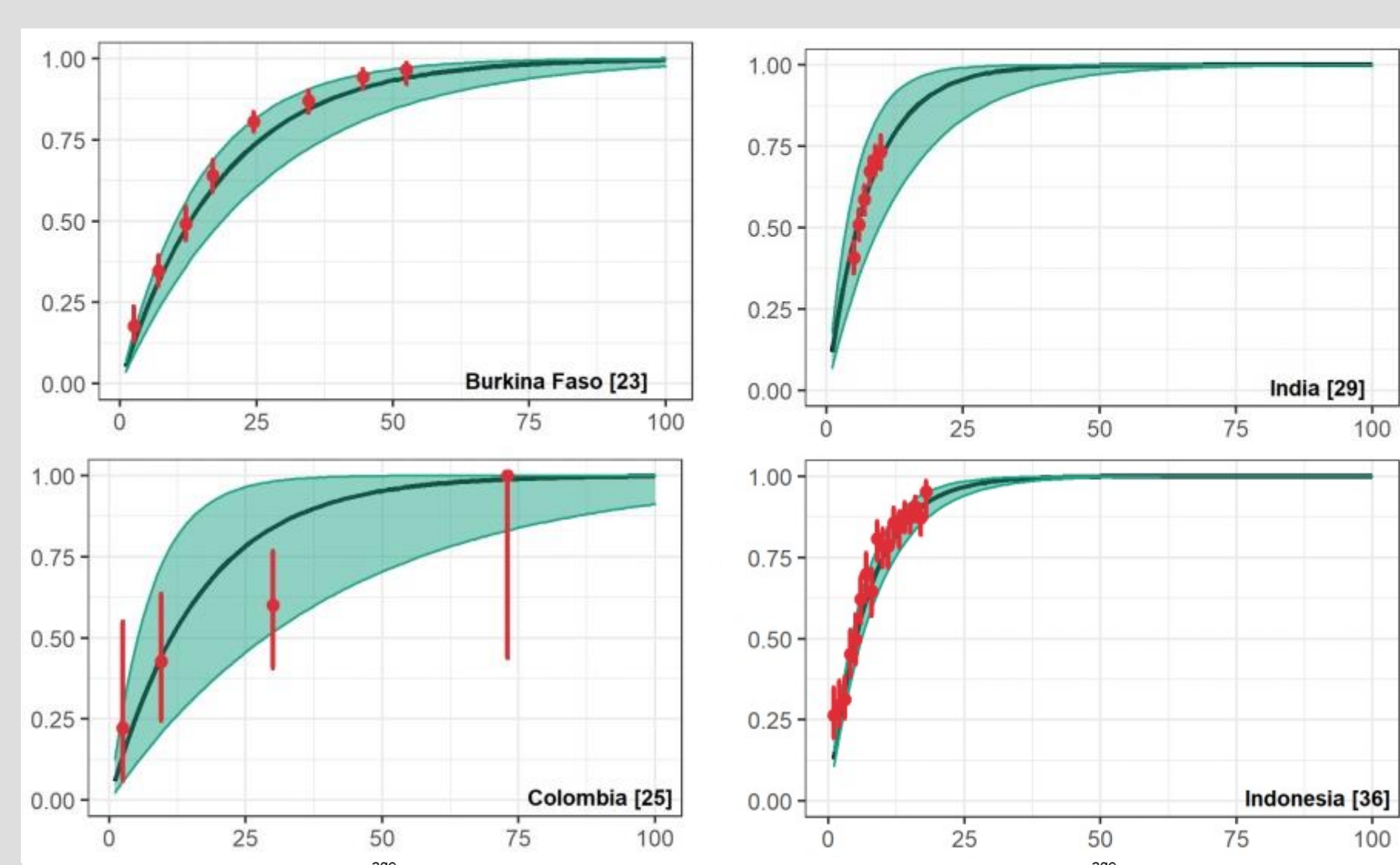


Figure 3 Examples of model fit obtained under model A.

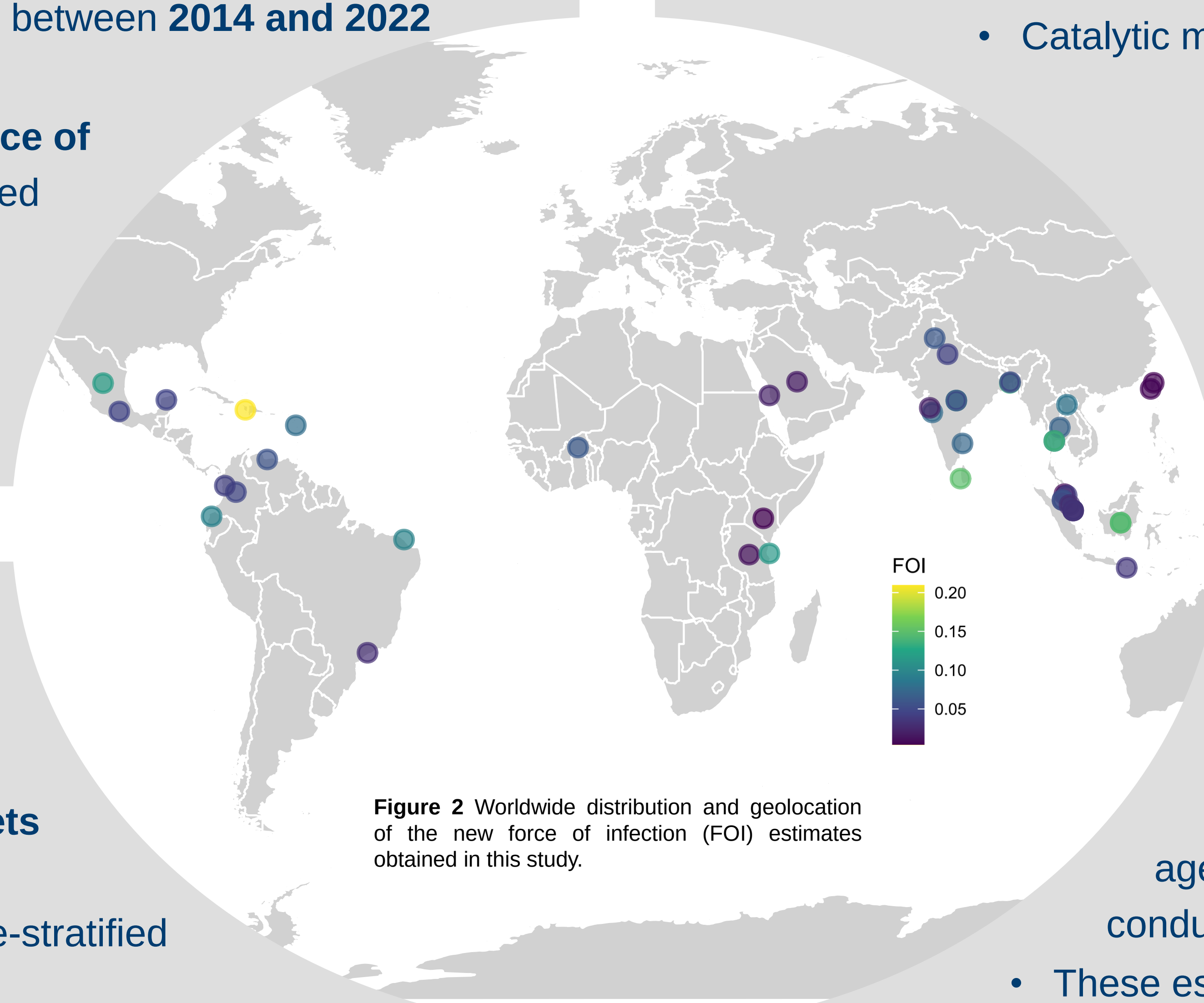


Figure 2 Worldwide distribution and geolocation of the new force of infection (FOI) estimates obtained in this study.

Conclusions

- This study generated **47 new FOI estimates** from geolocated age-stratified seroprevalence studies conducted in endemic countries only
 - These estimates contribute to current efforts to better **characterise dengue FOI** and burden **globally**.
- This, in turn, can help inform the optimal implementation of public health interventions

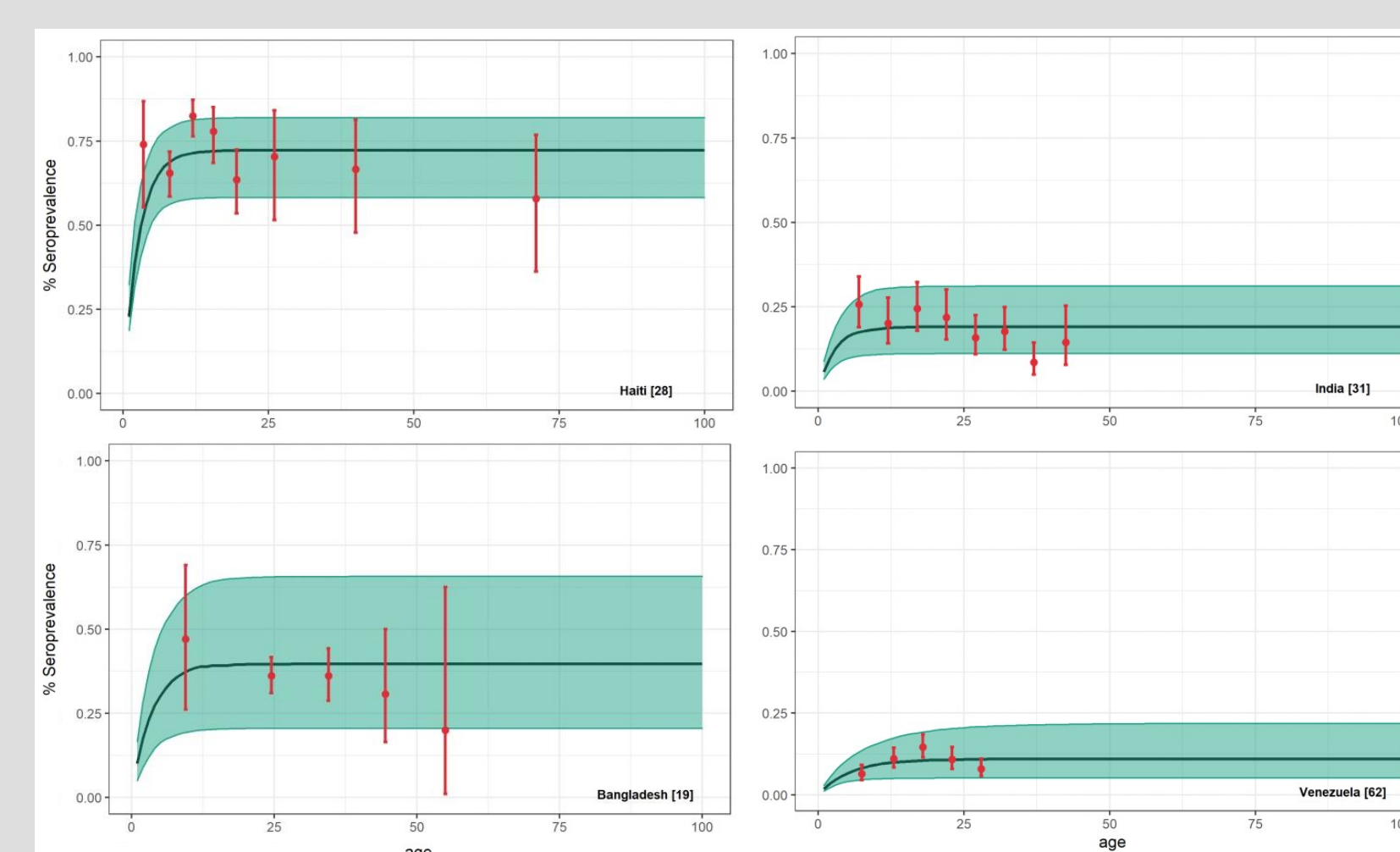


Figure 4 Examples of model fit obtained under model B.

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