

# Evolution of Tuberculosis Vaccine Modelling studies: Insights from studies in India

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## Background

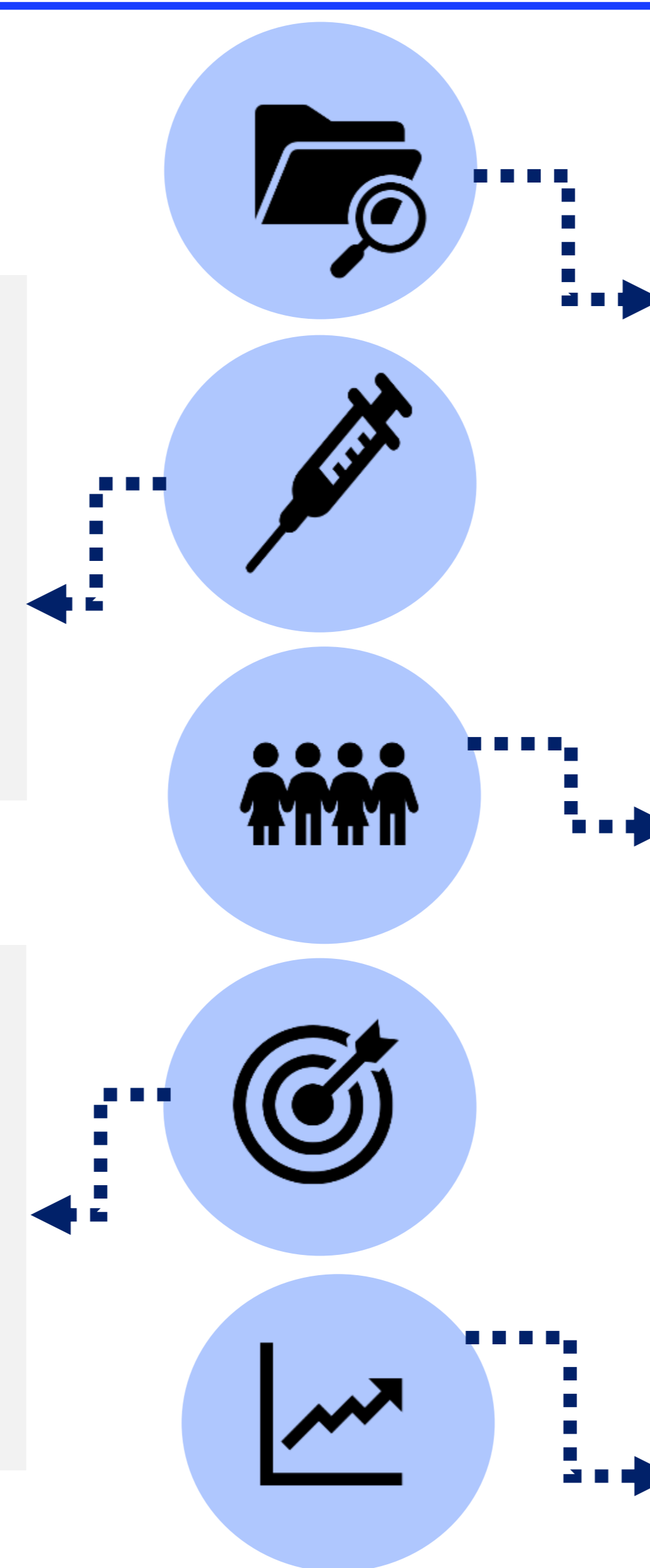
- TB remains a **major global health challenge**.
- **New TB vaccines are recognized as a priority tool** to meet global TB targets and a robust vaccine pipeline.
- **Mathematical models can provide insight into the epidemiological and economic impacts of vaccine rollout.**
- Reviewing these models will help policymakers better understand the quality of modelling evidence and inform future strategies.

## Methods

- Focusing on India, we performed a **scoping review** to identify and evaluate studies that have used mathematical modeling to assess the epidemiological and economic impact of TB vaccine introduction in India.
- By reviewing these studies, we thus aimed to gain a comprehensive understanding of the current evidence base and identify areas for future research.

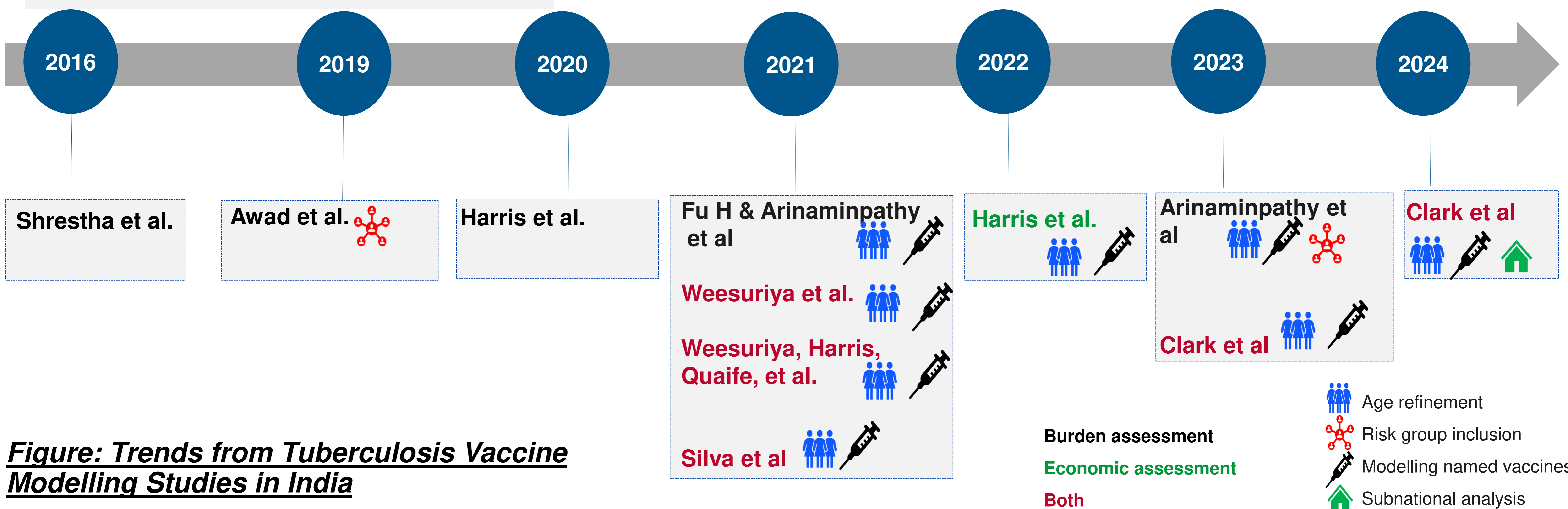
## Results

- **Vaccines Modelled:** Most studies (72%) evaluated **prevention-of-disease (PoD)** vaccines; some also considered prevention-of-infection (PoI) vaccines.
- **Efficacies & Impact:** Modelled vaccine efficacies ranged from 50-80%.
- **Disease impact:** POD vaccines were projected to prevent millions of TB cases and deaths by 2050.
- **Economic Impact:** Vaccine introduction estimated to be cost-effective (against a comparator of no vaccine), especially in adults.



- From 2014 to date, **eleven modelling studies** were published
- Five focused on disease impact, one on economic impact, and five on both.
- **Target Populations:** Focus on adolescents and adults; most models simulated mass vaccination campaigns combined with routine immunizations.
- **Notable trends over time include:**
  - Incorporation of more **refined age structures**
  - Incorporation of **risk groups** as potential targets for prioritisation (more recently)
  - Moving from hypothetical to **named vaccines**.
  - Most studies adopted a **national perspective**, with only one conducting sub-national analysis.

**India Studies – a lot has been done .....**



**Figure: Trends from Tuberculosis Vaccine Modelling Studies in India**

## Conclusion

- Synthesis of these modeling studies reveals an **evolution in target populations, interventions, and rollout strategies**, driven by prioritisation of risk groups, advancements in the vaccine pipeline, varying coverage levels, and delivery mechanisms.
- However, persisting gaps include **inadequate inclusion of at-risk demographics** as well as the **integration of vaccines with emerging programmatic strategies** for diagnosis, treatment, and prevention. **Addressing these gaps in future modeling studies** holds promise for maximising benefits within available resources by **enabling country specific decision making**.

## Acknowledgements

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