Review of modelling evidence on catch up immunization

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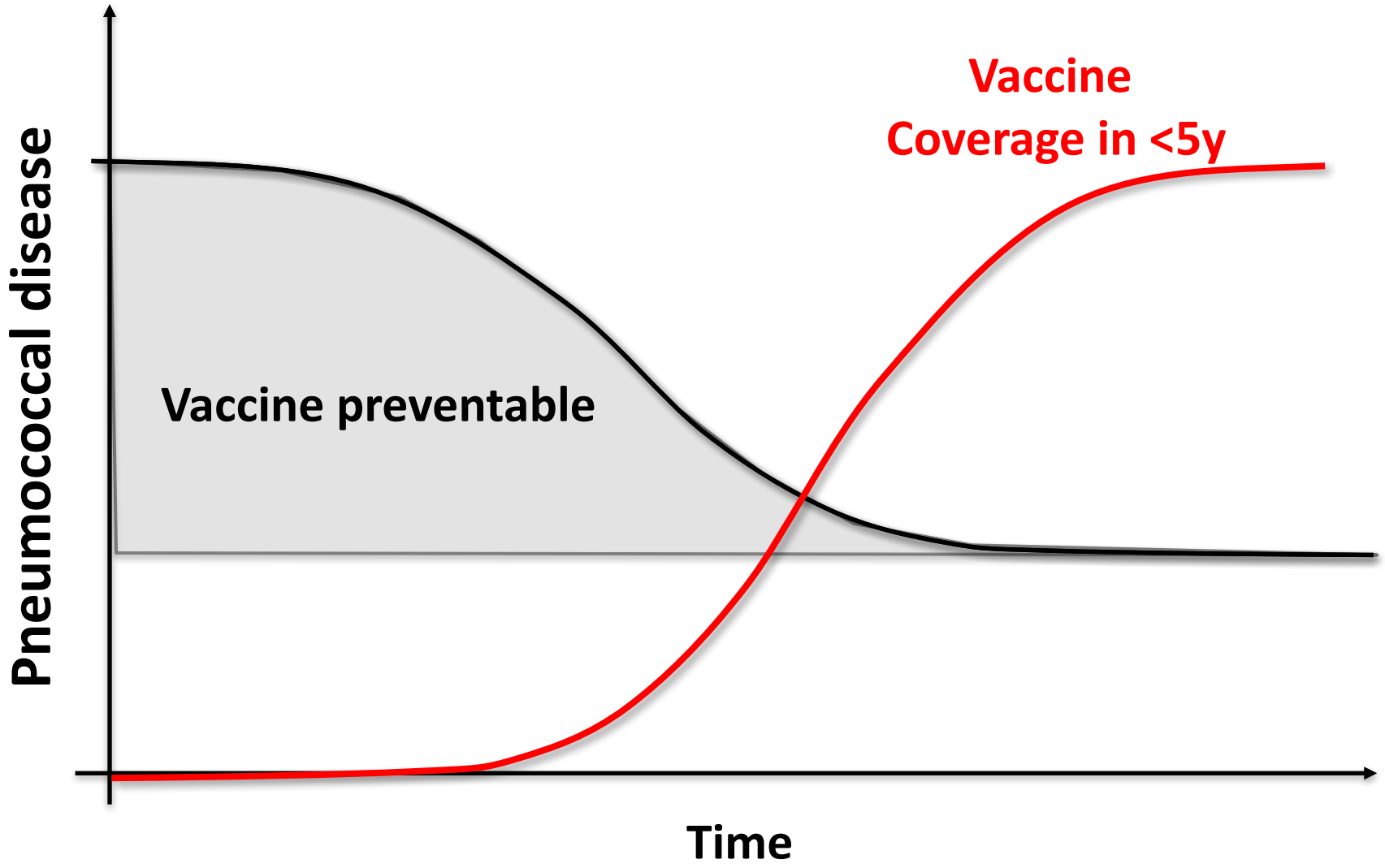
WHO SAGE on Immunization

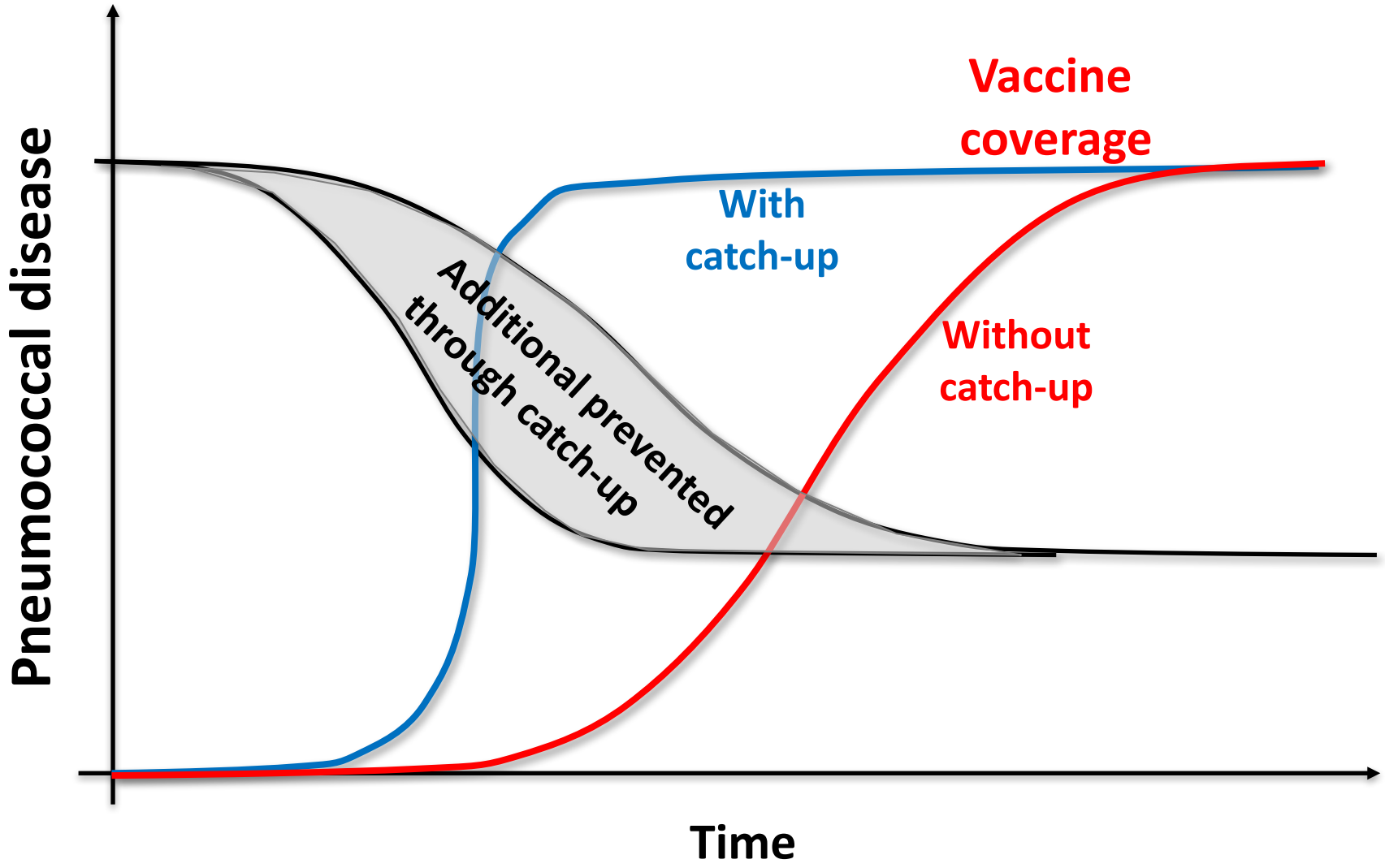
Outline

- Catch-up at PCV introduction - concept
- Methods
- Results
- Conclusions
- Limitations and study needs

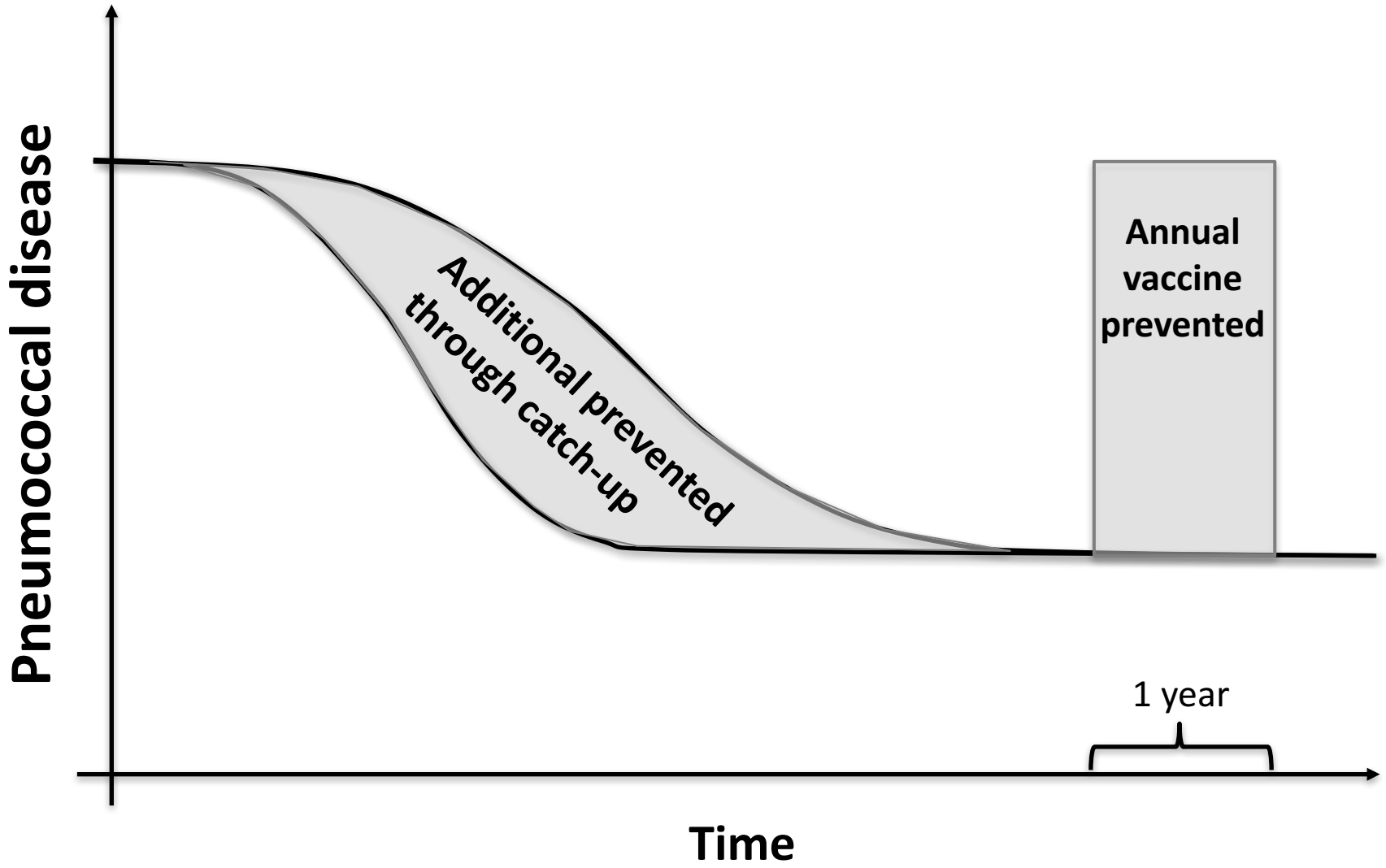
Catch-up at PCV introduction: Concept



Catch-up at PCV introduction: Concept

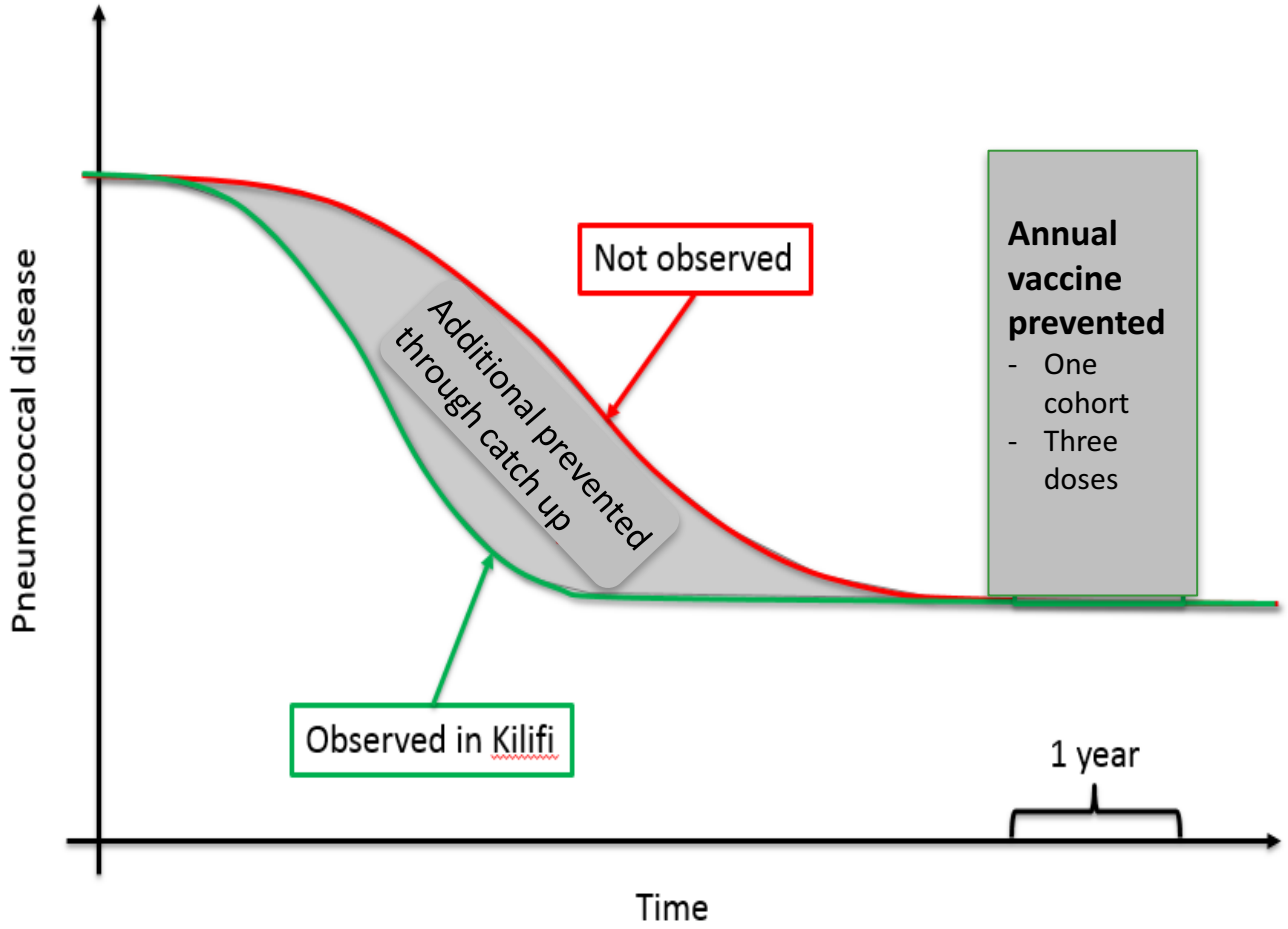


Catch-up at PCV introduction: Concept



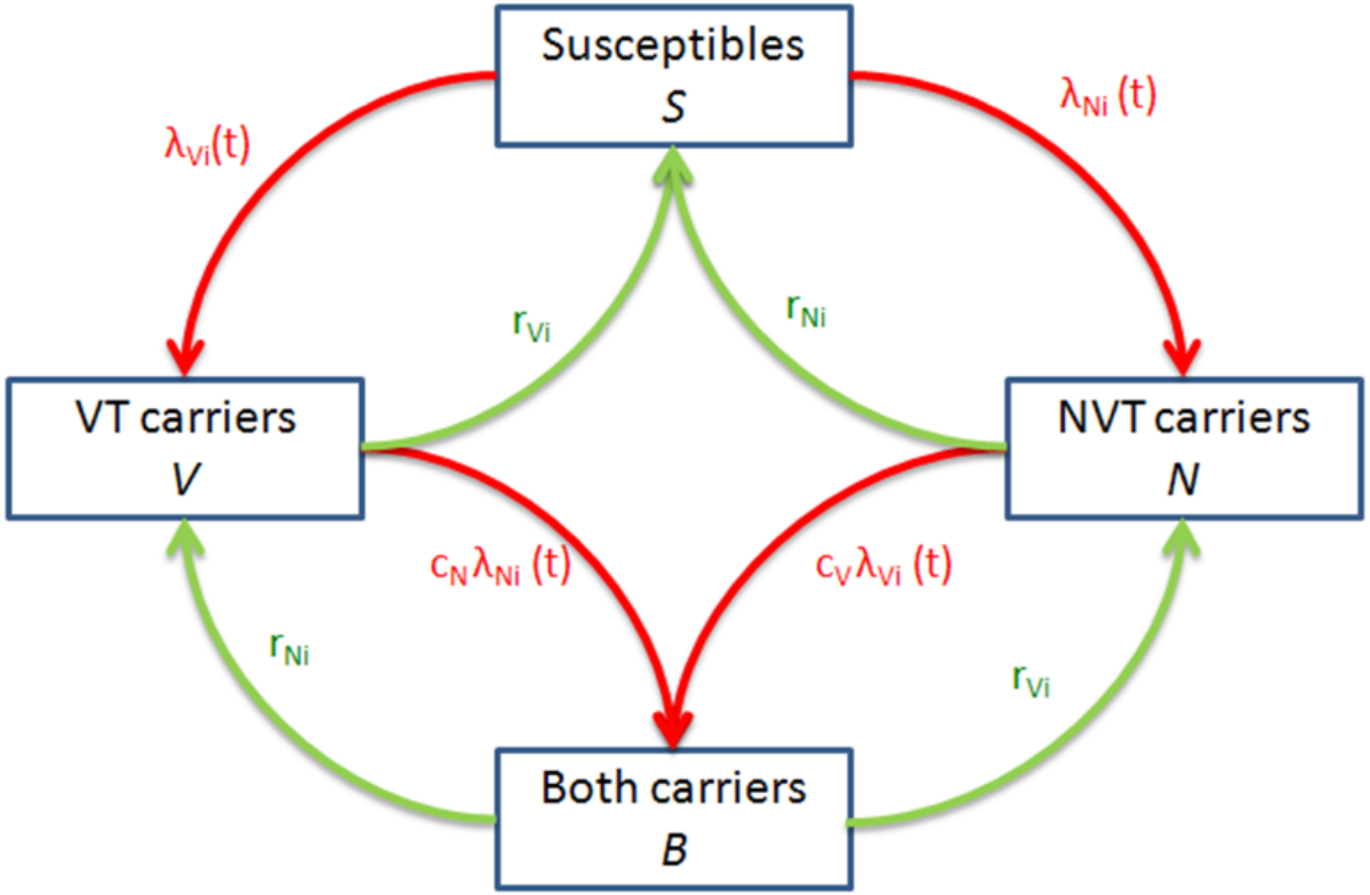
Approach

- Study site: Kilifi, Kenya
- PCV10 introduced in 2011
- Detailed monitoring of the study population pre-and post vaccination
- Fitted model to the observed changes in carriage and disease
- Changed the vaccine coverage in the model to simulate
  - No catch-up
  - U1 catch-up
  - U2 catch-up
  - (U5 catch-up – observed)



Model

- Deterministic
- Age structured
- Vaccine protection differentiated by
  - At least 2 dose at infancy &
  - At least 1 booster dose
- Age structured mixing
- Fitted with adaptive MCMC

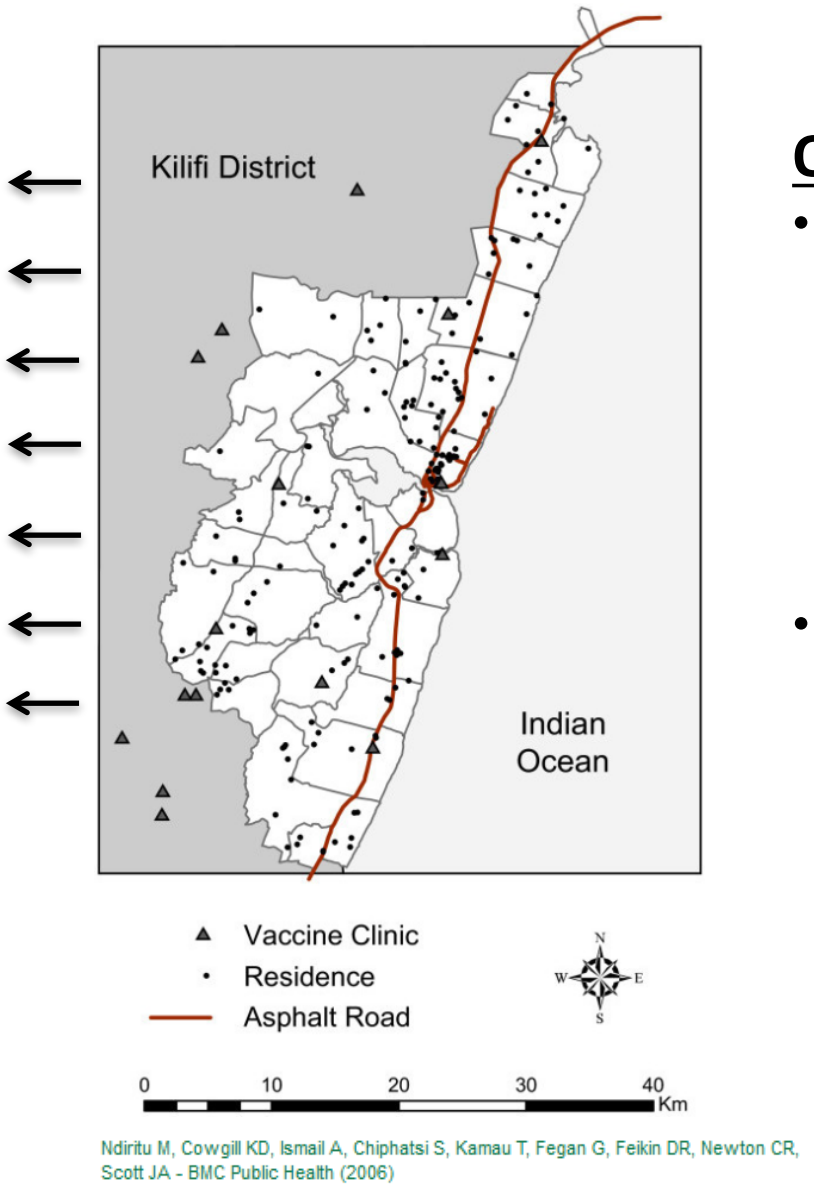


Choi et al 2011

Study site & data

From Kilifi:

- Population data
- Contact patterns
- Outcomes
  - **Carriage prevalence**
  - **Invasive Pneumococcal Disease (IPD)**
- Clearance rates
- Vaccine coverage
- VE carriage
  - Used as prior



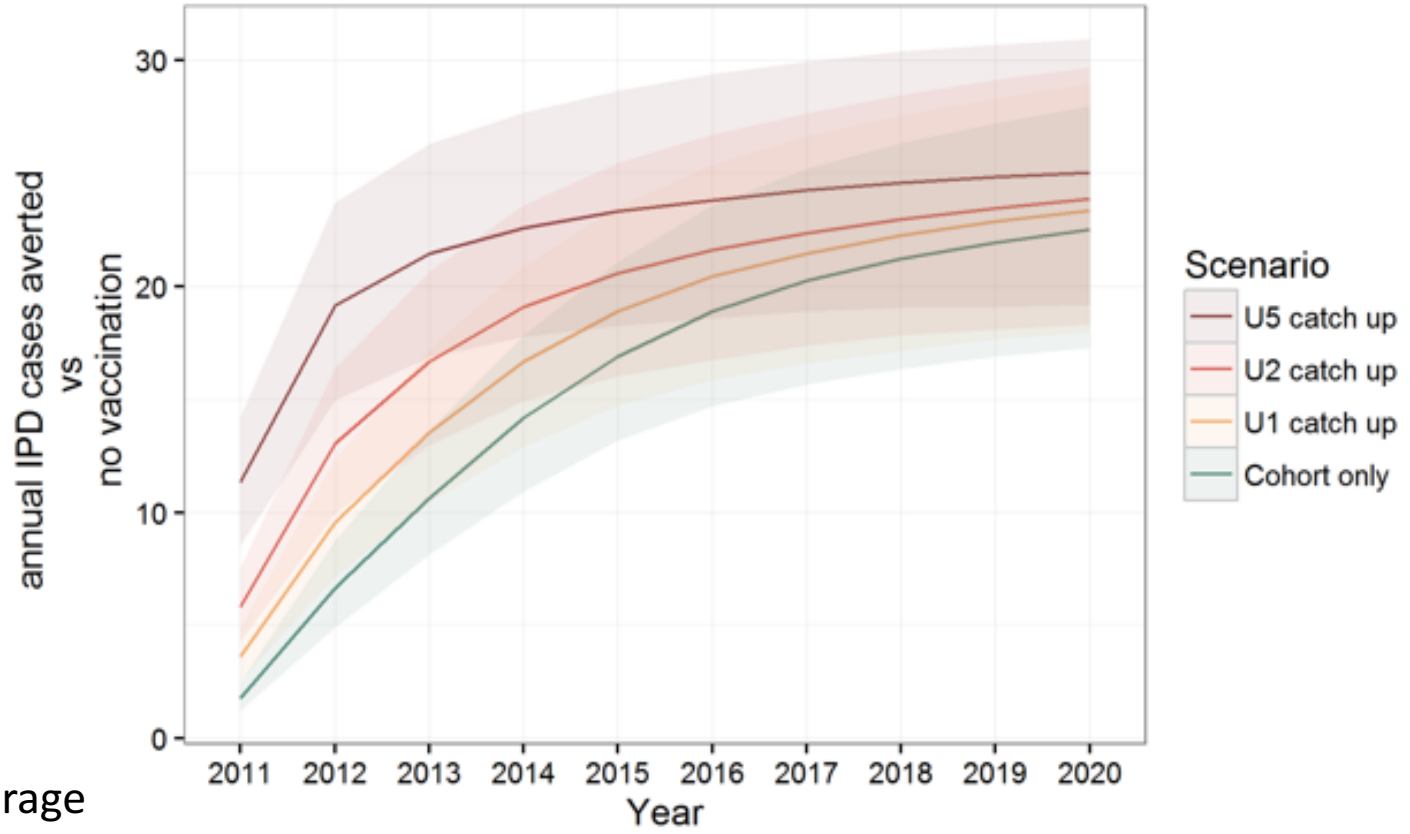
Ndiritu M, Cowgill KD, Ismail A, Chiphatsi S, Kamau T, Fegan G, Feikin DR, Newton CR, Scott JA - BMC Public Health (2006)

Other parameters:

- Estimated **with** prior:
  - Competition
  - Duration of vaccine protection
  - Relative level of infant protection
  - VE IPD
- Estimated **without** prior:
  - Susceptibility to infection
  - Invasiveness

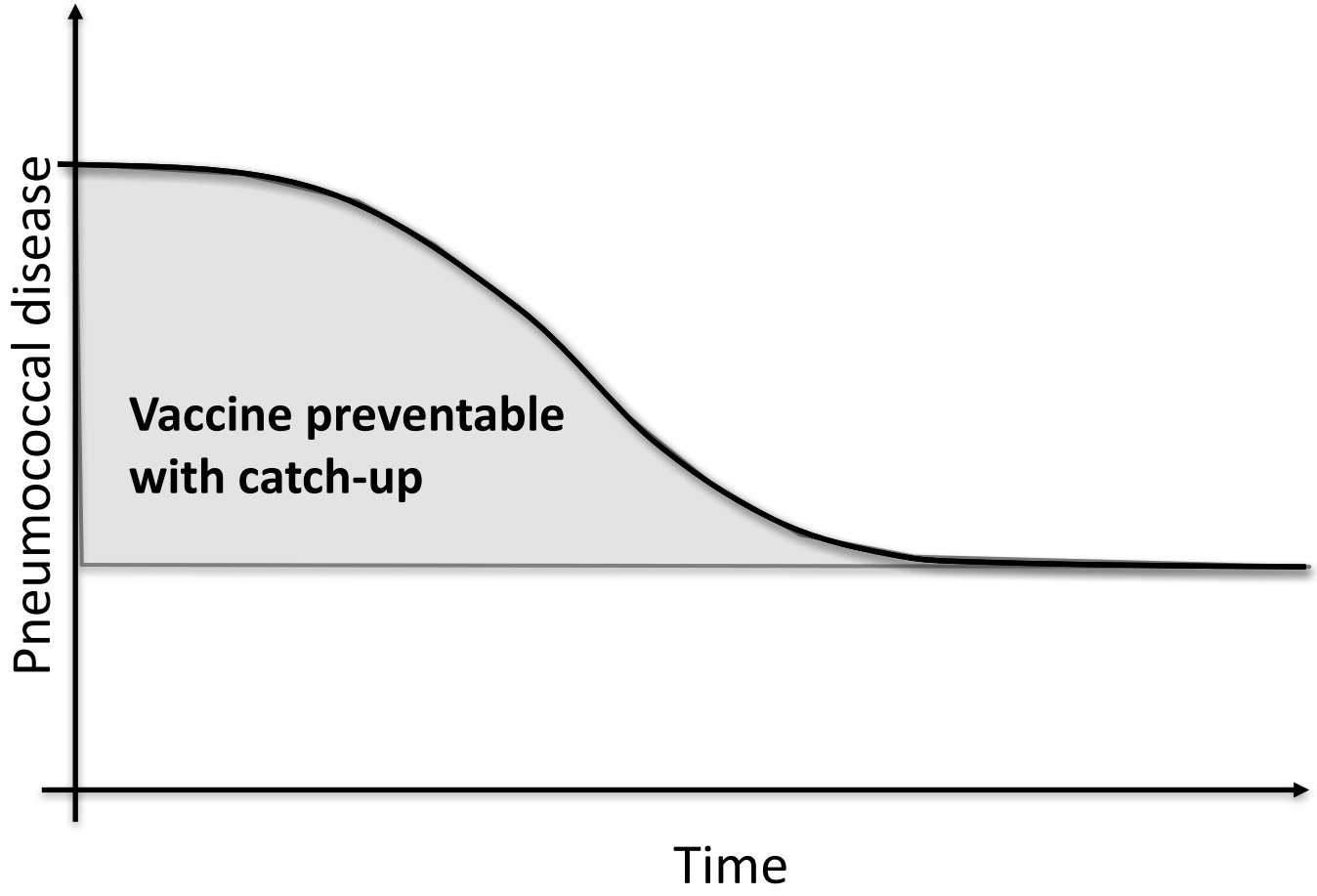
Results: Kilifi

- The models fit the data well
- PCV catch-up campaigns accelerate
  - Direct effects
  - Indirect effects
- Kilifi: Introduction with <5y catch-up prevented more disease per dose than:
  - <2y catch-up
  - <1y catch-up
  - Routine use without catch-up
- Robust to alternative assumptions:
  - Routine vaccine coverage and catch-up coverage
  - VE and duration of protection of routine and catch-up
  - Use of either 1 or 2 dose catch-up in >12m olds
- … But **not** robust to "setting"



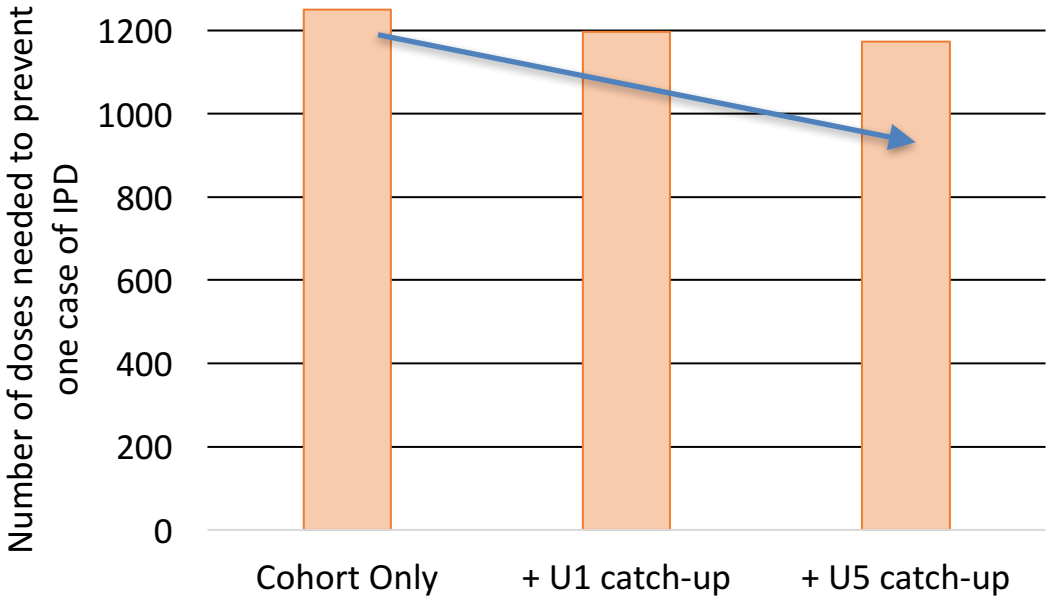
Study site & data II

- Study site: Nha Trang, Vietnam
- No PCV introduced yet
- Some monitoring of the study population
  - Carriage
  - Contacts
  - (IPD)
- Similar model used
- In comparison with Kilifi
  - Lower pneumococcal carriage prevalence (40% vs 75% in <5y)
  - Hence, predicted quicker impact of routine vaccination
  - Hence, smaller vaccine scope for catch-up to increase impact

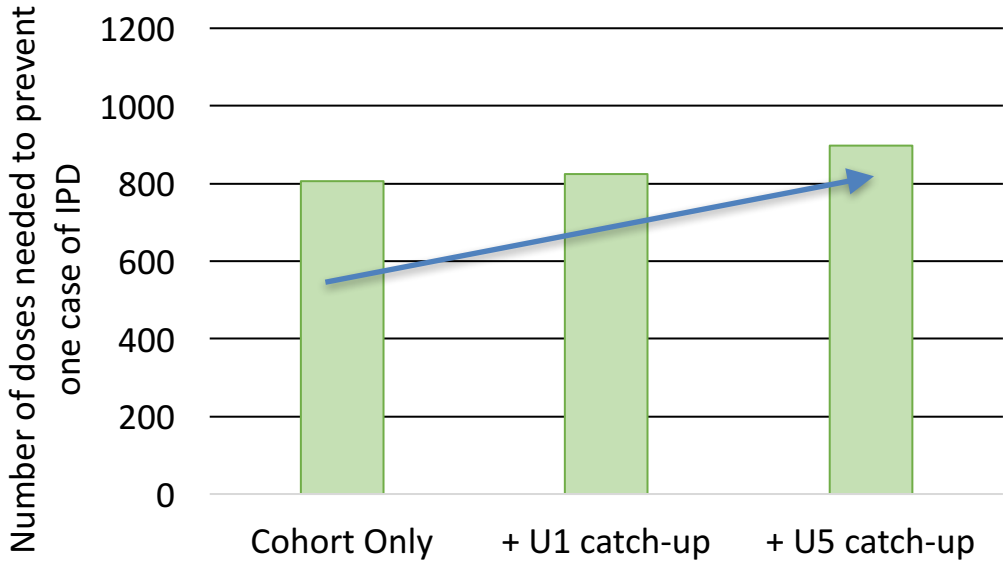


Results - efficiency

Kilifi



Nha Trang



Limitations

- Limitations
  - Only two settings studied
  - No obvious threshold to define setting where catch-up campaigns at introduction are efficient use of PCV
  - **Did not look at**
    - Logistics
      - Delays of introduction because of campaigns
      - Disruptive effects of campaigns on routine coverage
      - Costs of delivery for catch-up campaigns
    - Campaigns:
      - To accelerate the impact of a switch in products
      - In settings with established PCV programme (but low coverage)
      - As outbreak response

Future data needs

- Eligible Surveillance Sites
  - Carriage prevalence
  - IPD incidence
  - Social mixing across all age groups for relevant settings
- VE of 1 vs 2 dose in older children
- Waning of PCV protection

Acknowledgements

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- Olivier Le Polain,
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