Rotavirus vaccination: tailoring vaccination schedules to local epidemiology & operational realities

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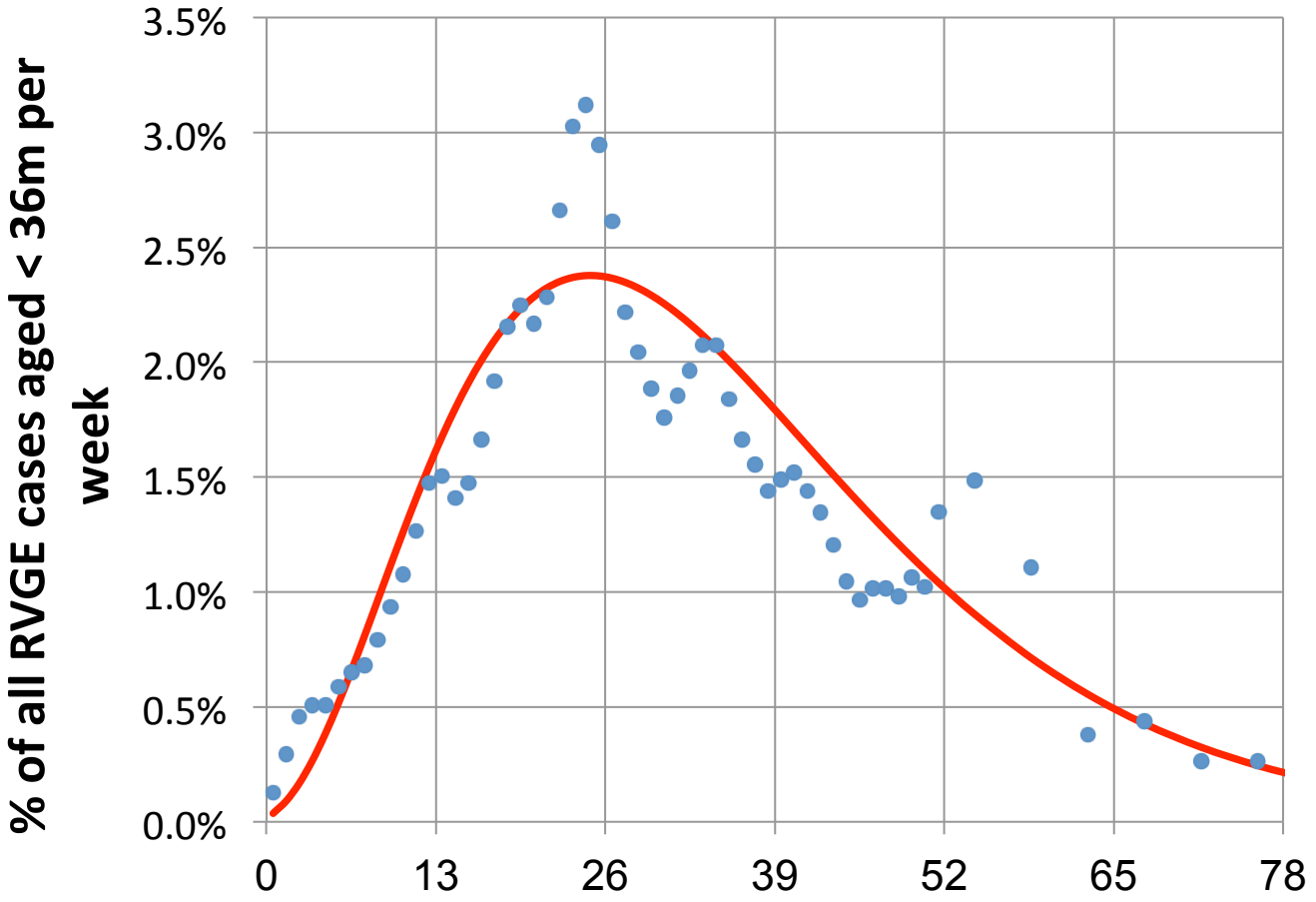
Synopsis

- Estimating public health impact
  - Vaccine efficacy
  - Age at RVGE
  - Vaccination coverage and timeliness
- Data on age at RVGE
- Data on coverage and timeliness
- Model estimates of impact of changing schedules

Age at RVGE

Hospital admissions, Blantyre, Malawi 1997-2007



Source: Turner et al

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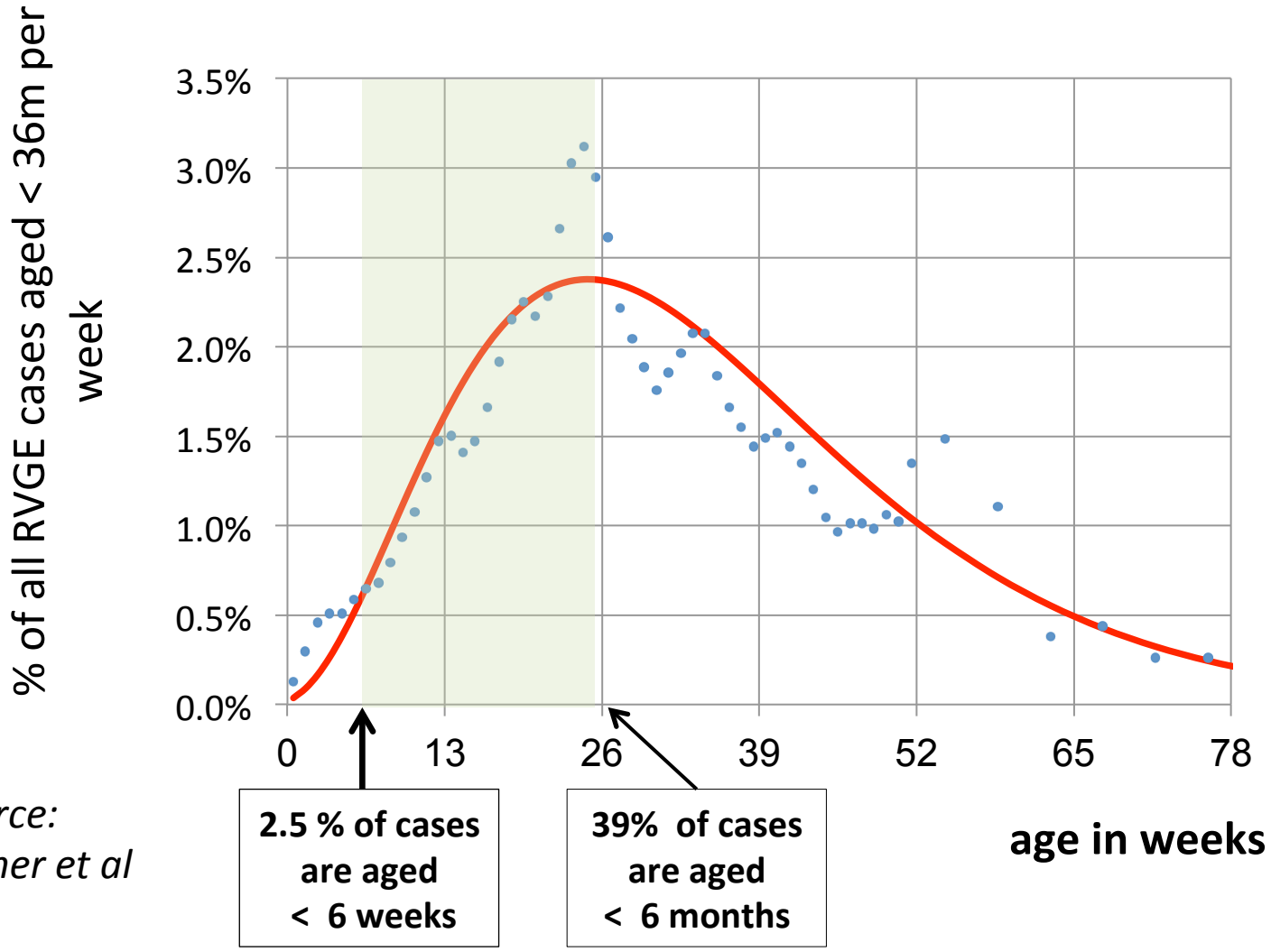

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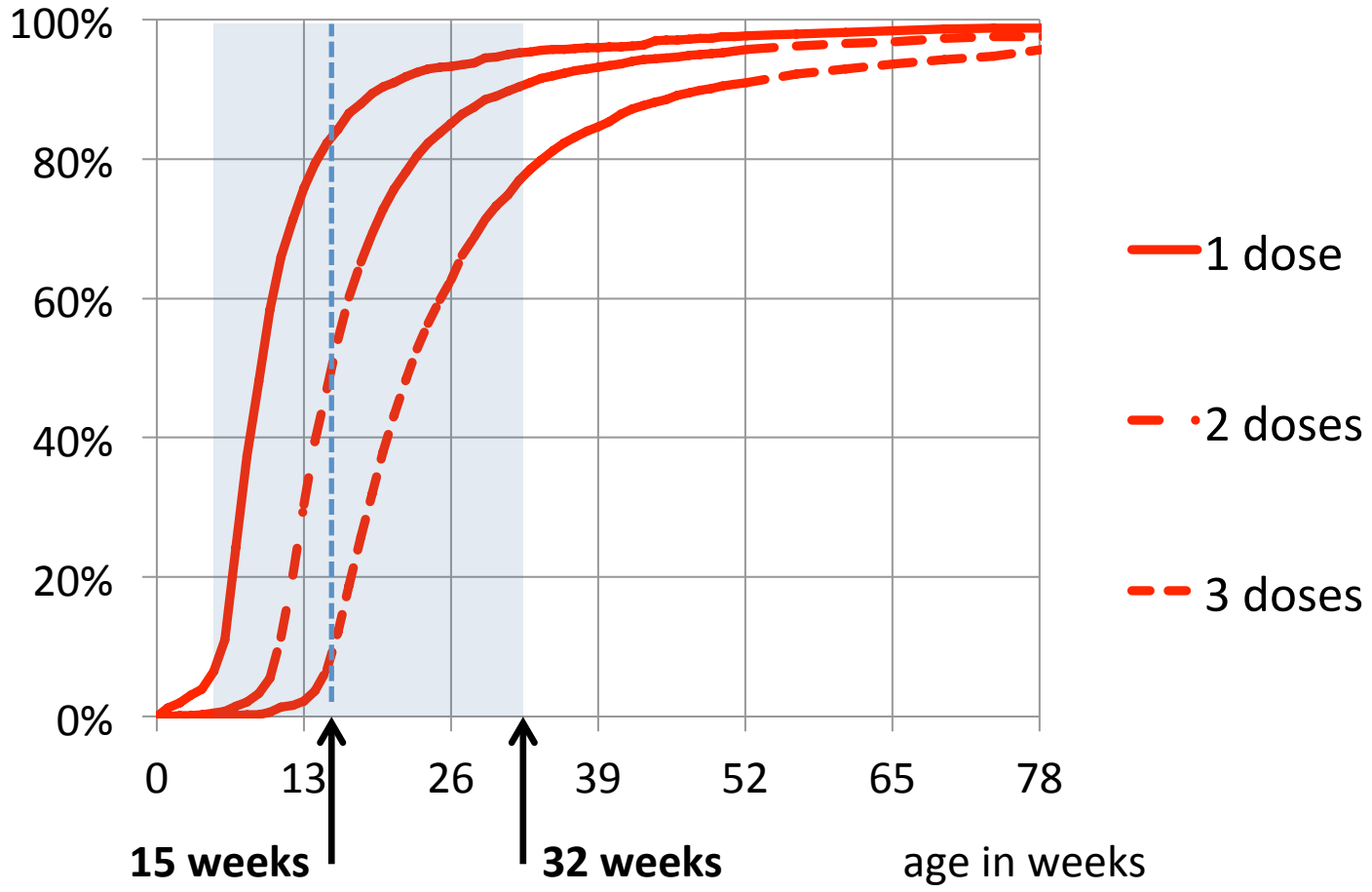
Age at vaccination:

Malawi: coverage from MICS3 survey data for DTP



Estimating protection by 1, 2, 3 doses at different ages

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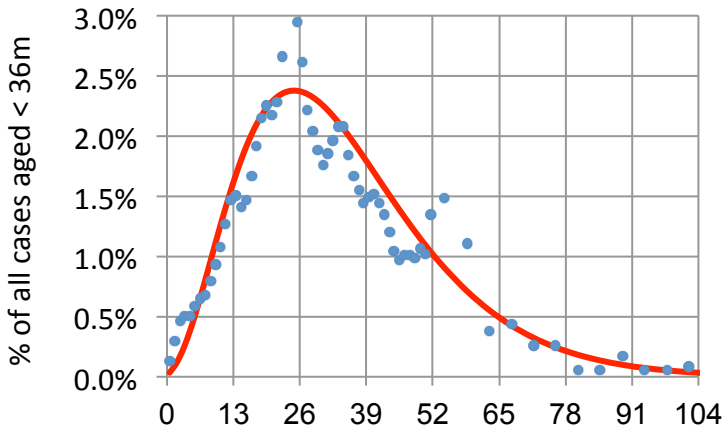
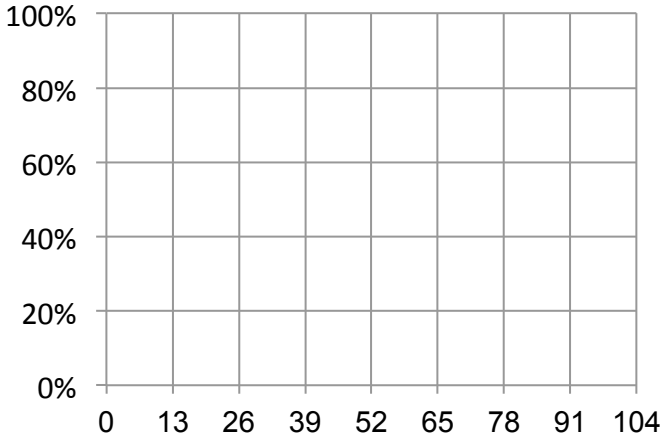
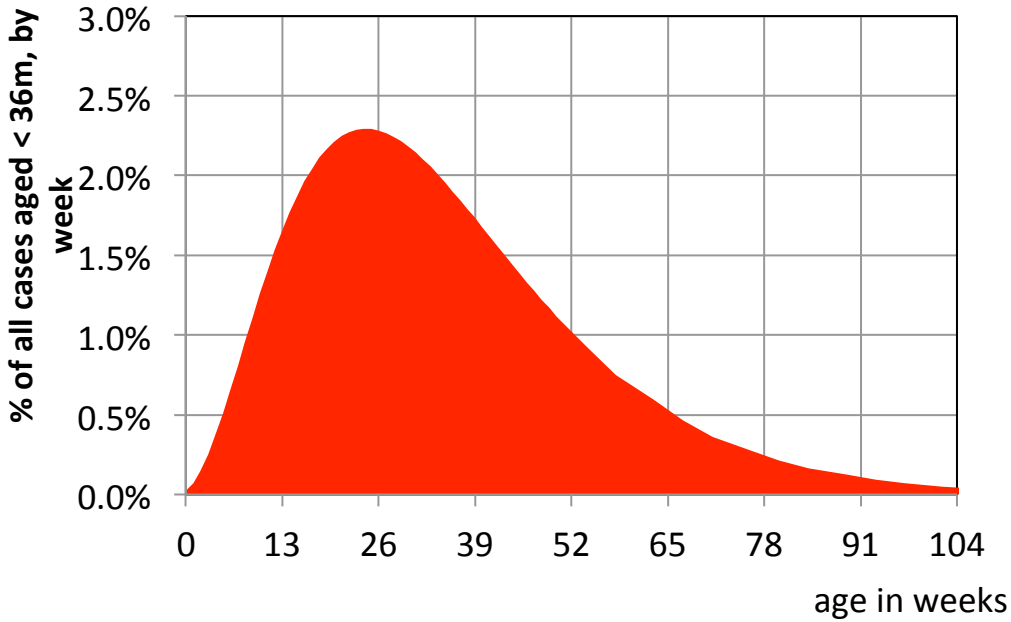


EPI coverage based on
DTP in Malawi, 2004-6





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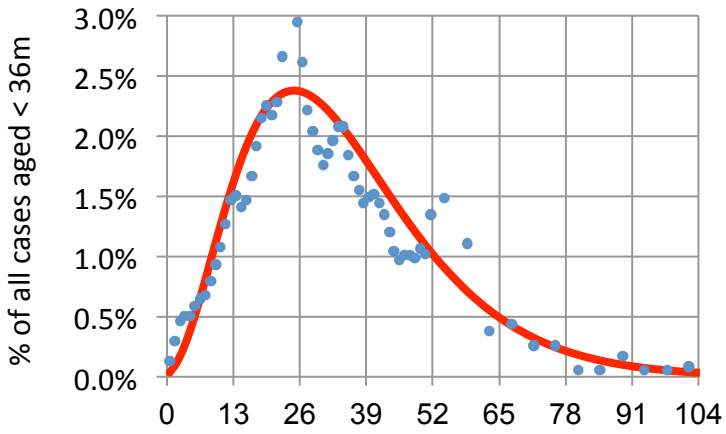

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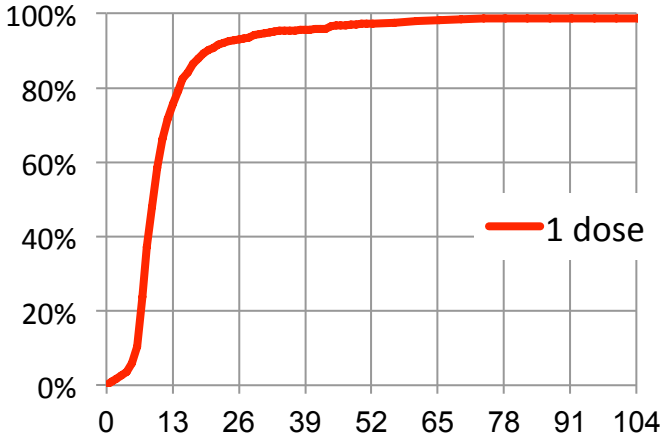

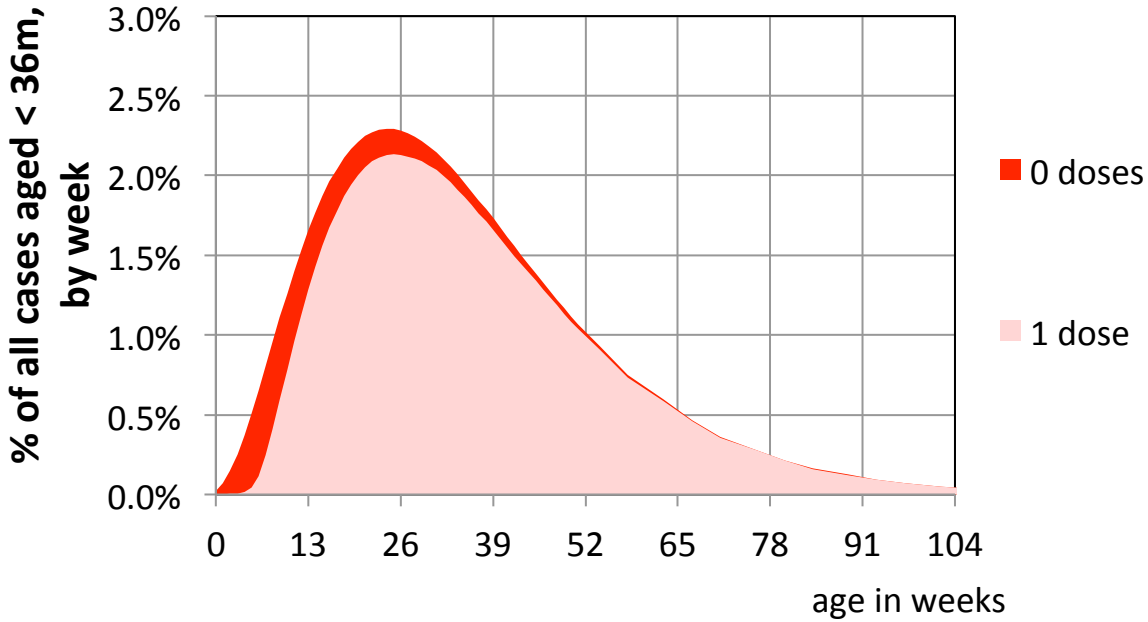

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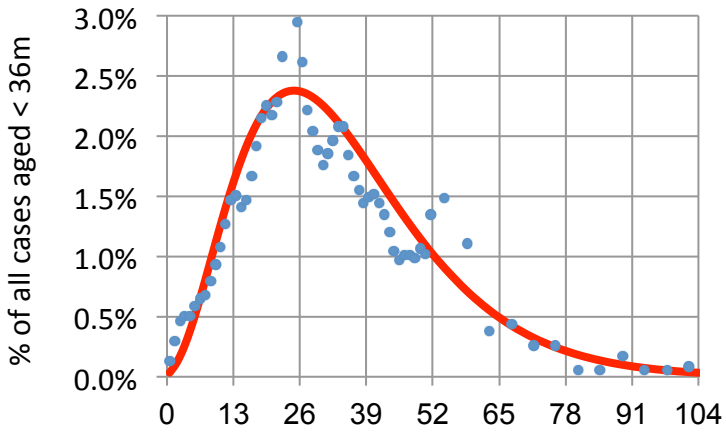

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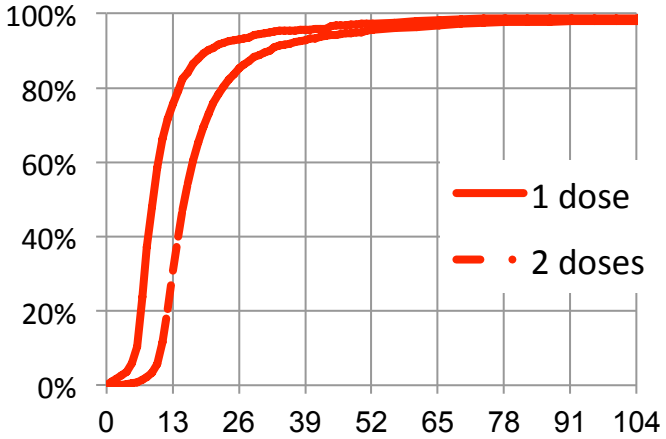

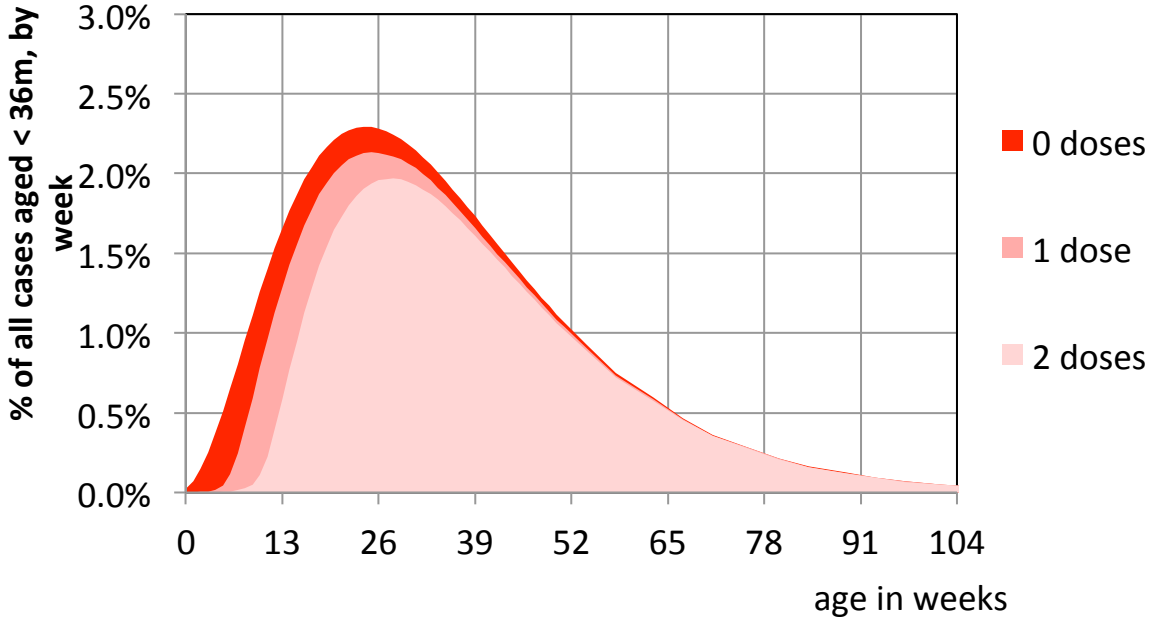

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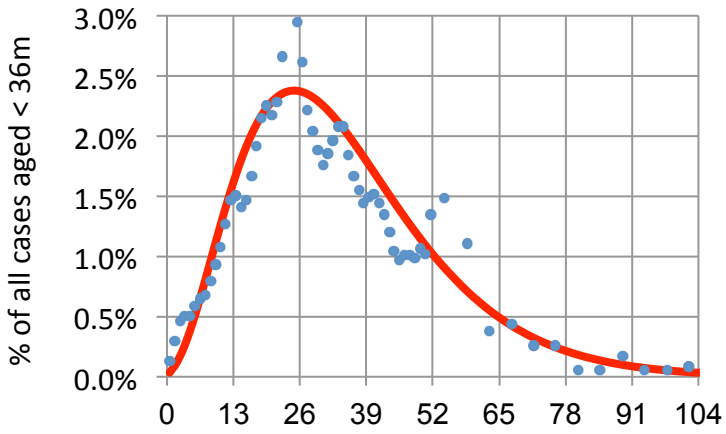

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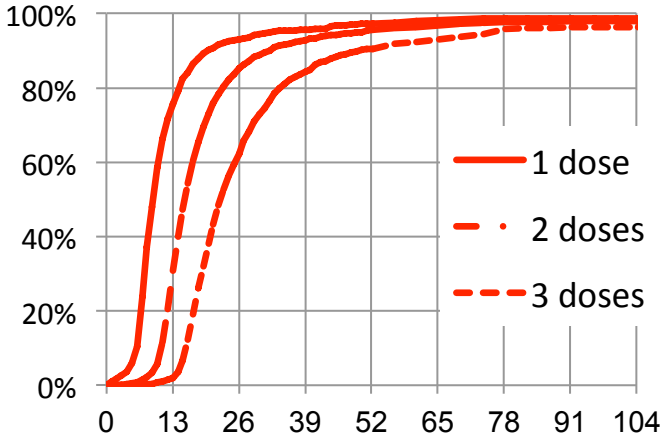

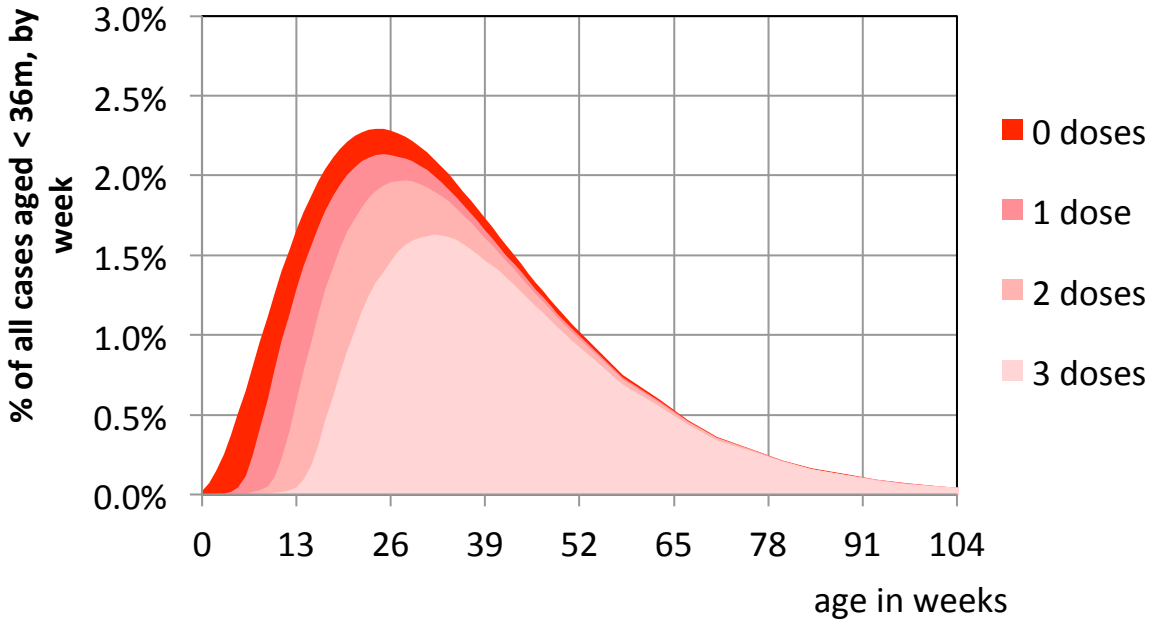

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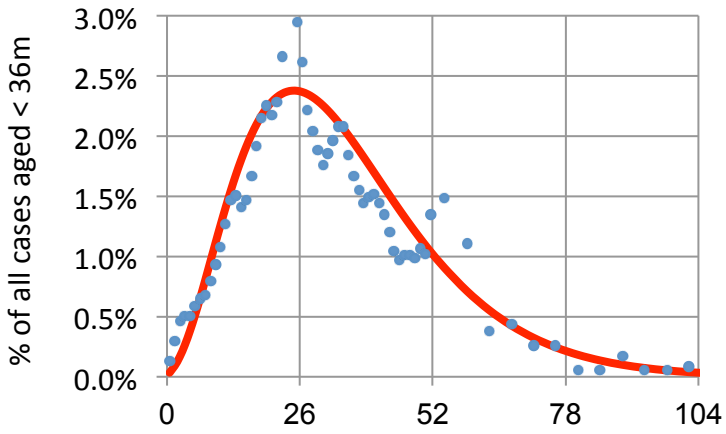

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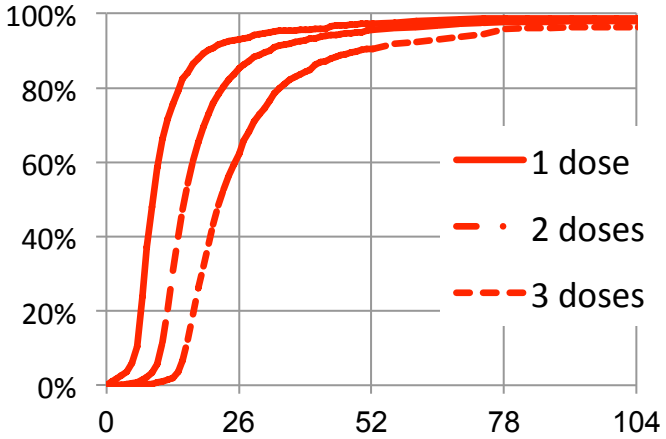
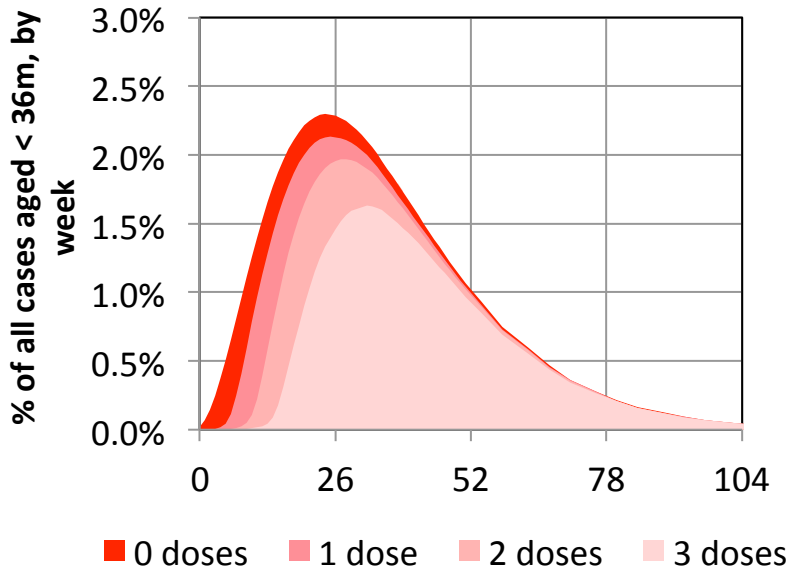
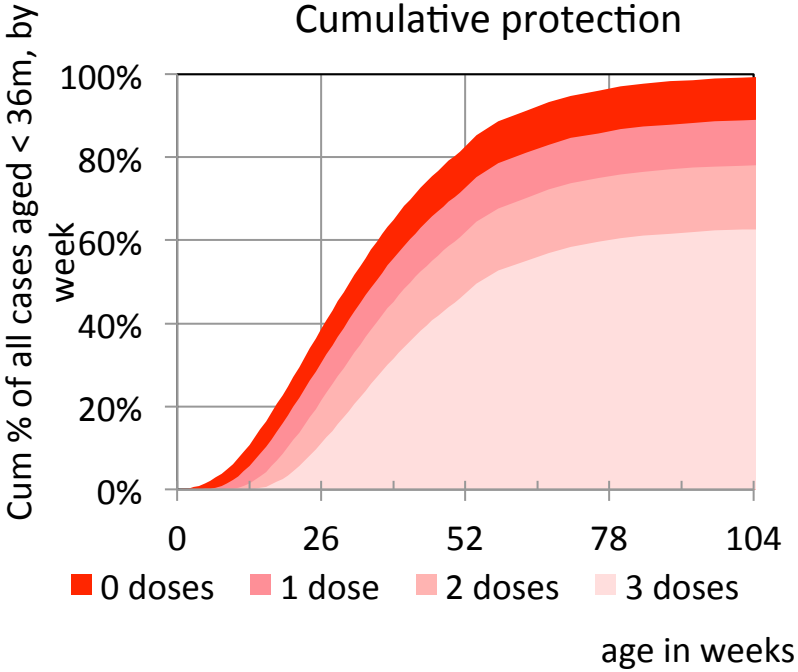




Cumulative protection



Estimating % of cases *prevented* at different ages

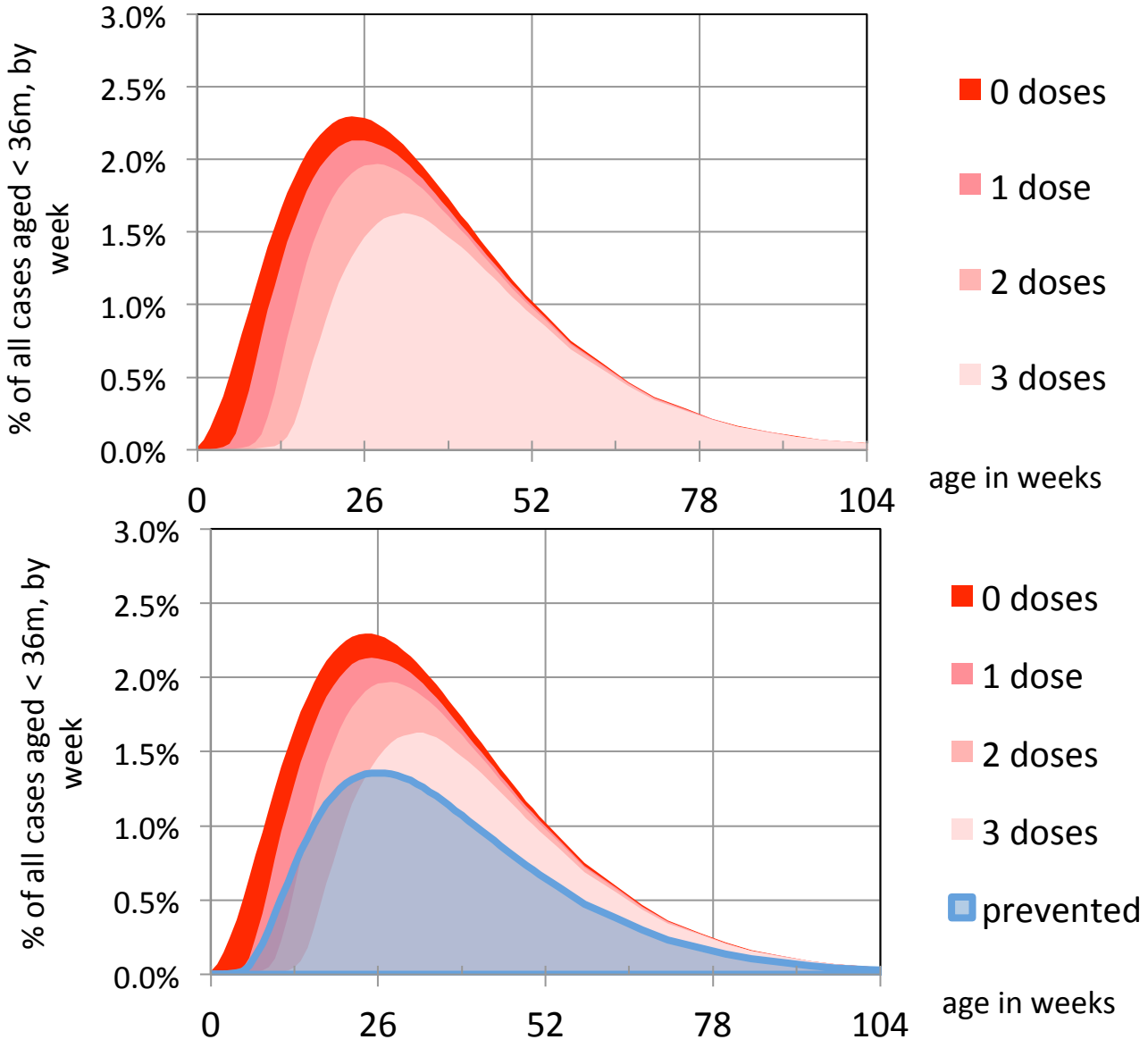
Efficacy scenario:

"Very severe RVGE in Africa"

Dose 1: 50%

Dose 2: 65%

Dose 3: 65%



Age at RVGE: studies in 38 populations

Selection criteria:

included if more than 100 subjects aged < 3 years

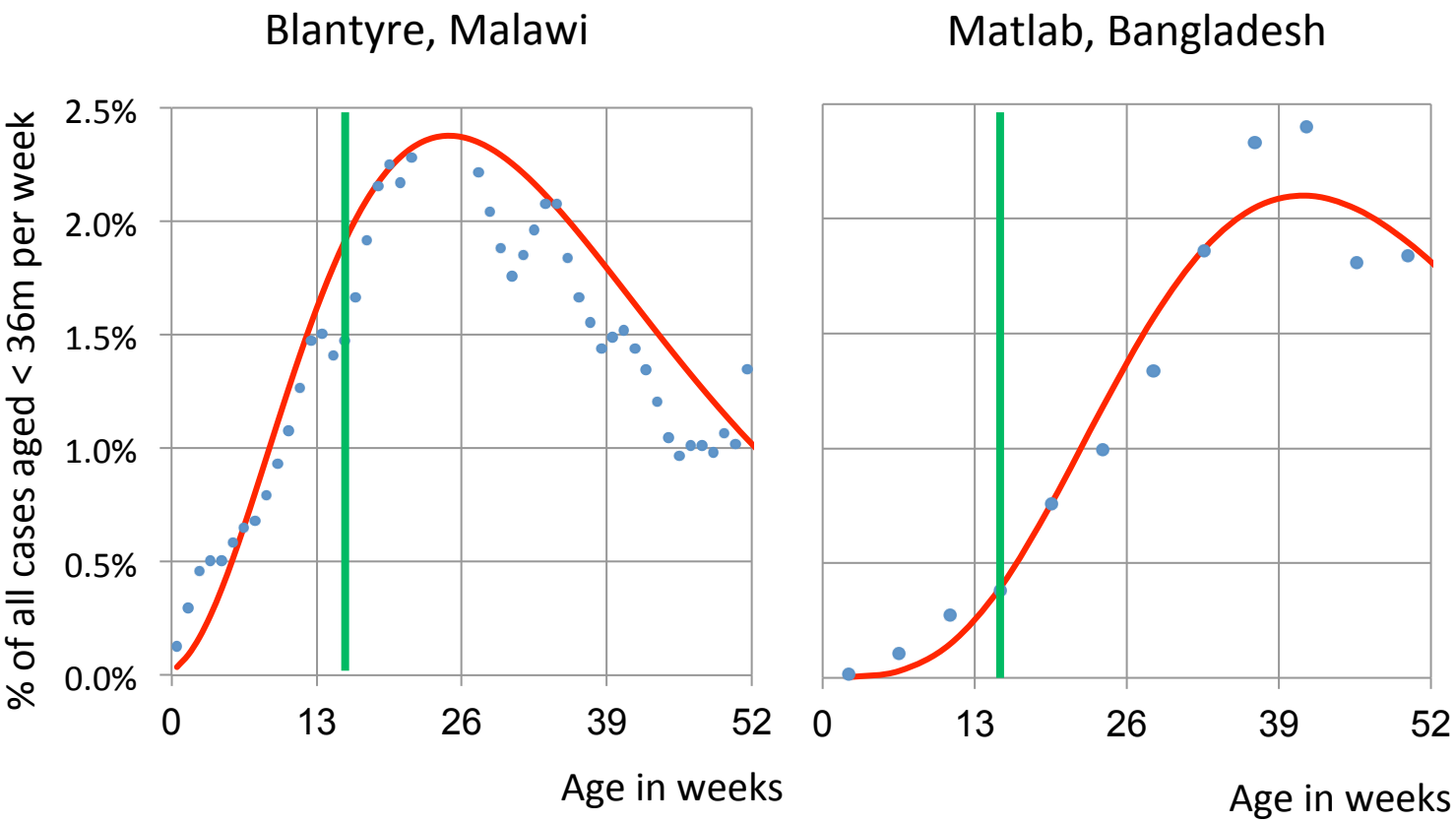
ages in bands of <=1 month up to 1 year

study period before introduction of rotavirus vaccine

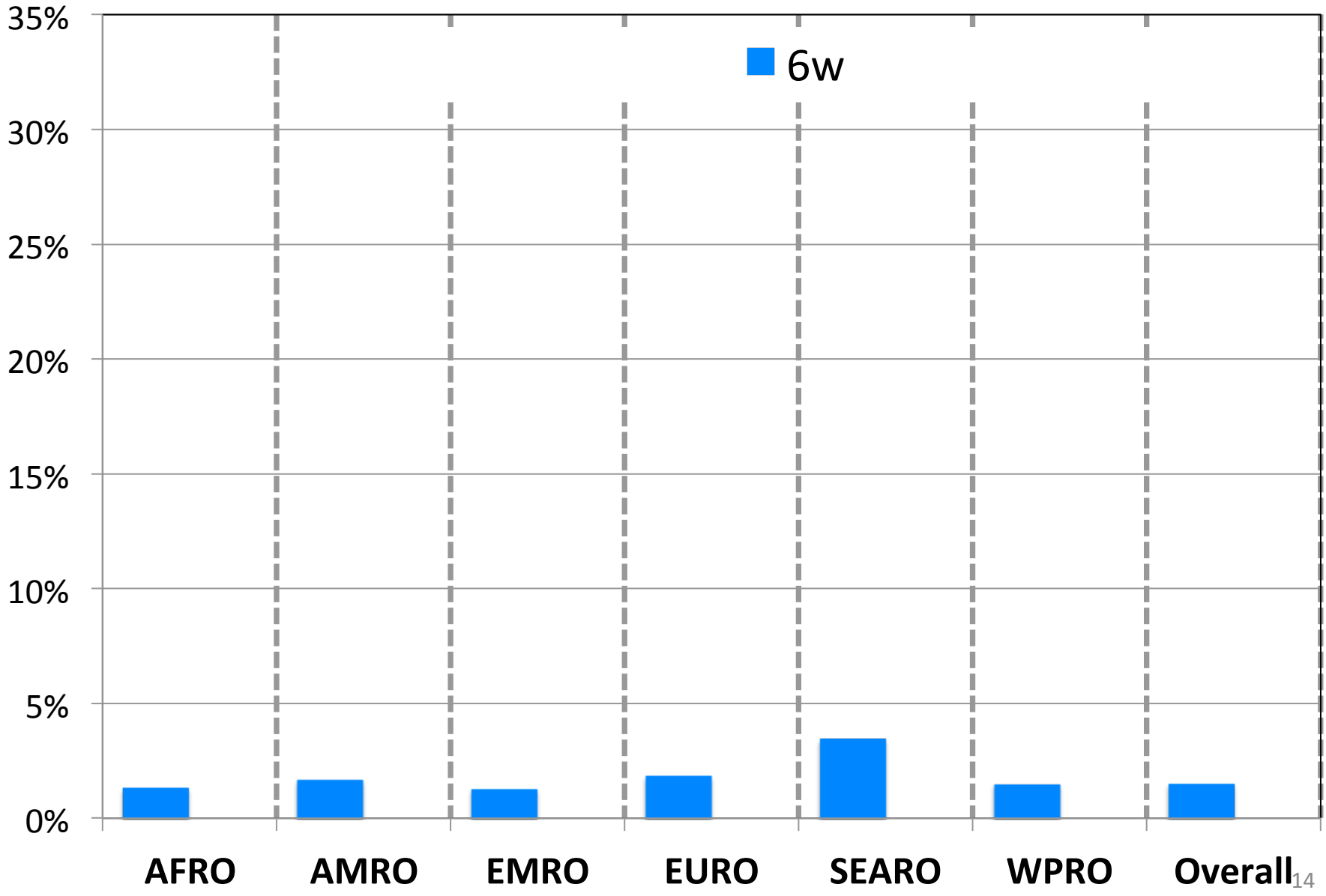
From: AFRO 4, AMRO 3, EMRO 13, EURO 7, SEARO 5, WPRO 6

Numbers of events (median, IQR) 665 (380-1046)

Age at RVGE:
examples of earlier and later peaks



% with RVGE before target vaccination ages: medians for studies in each WHO region



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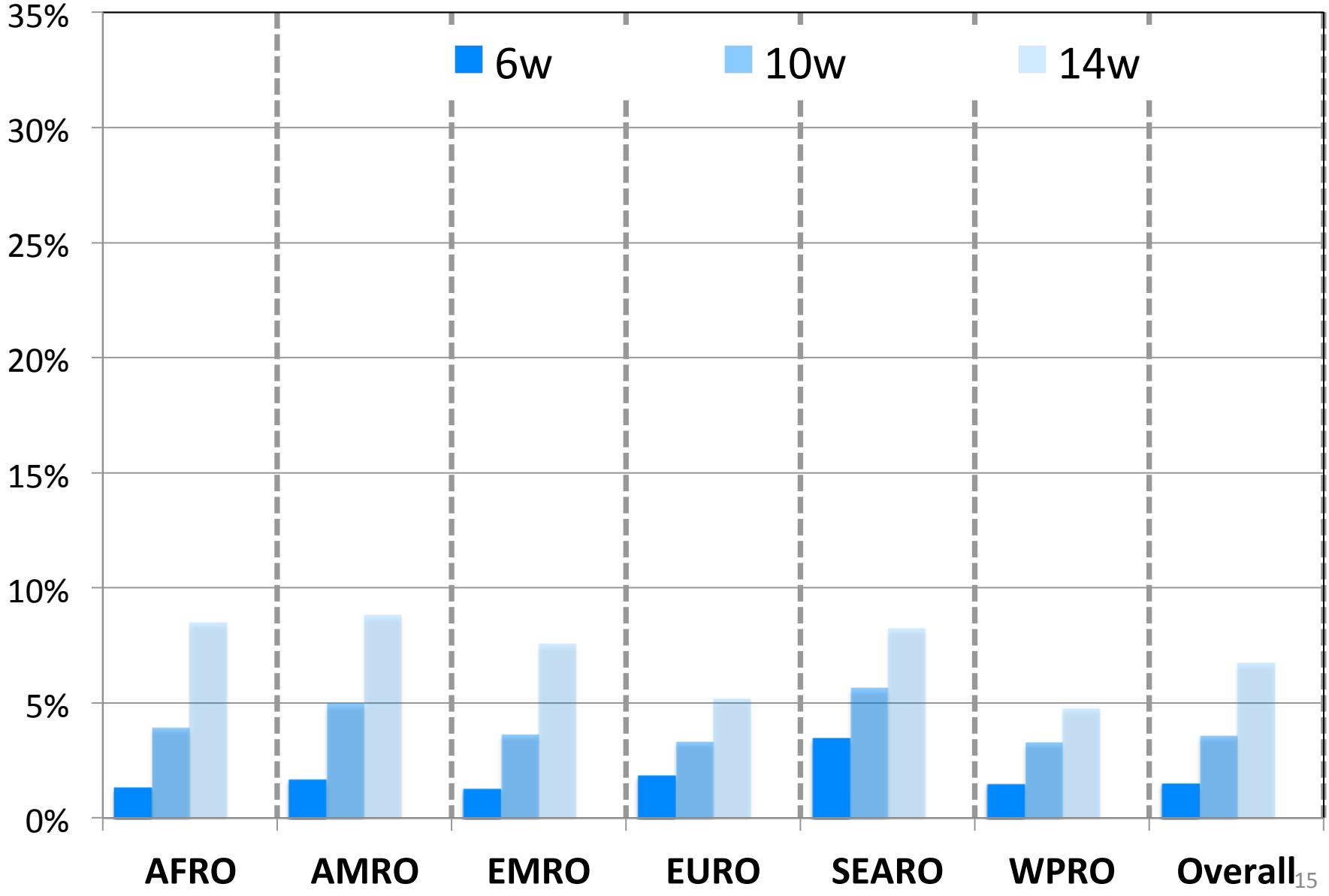

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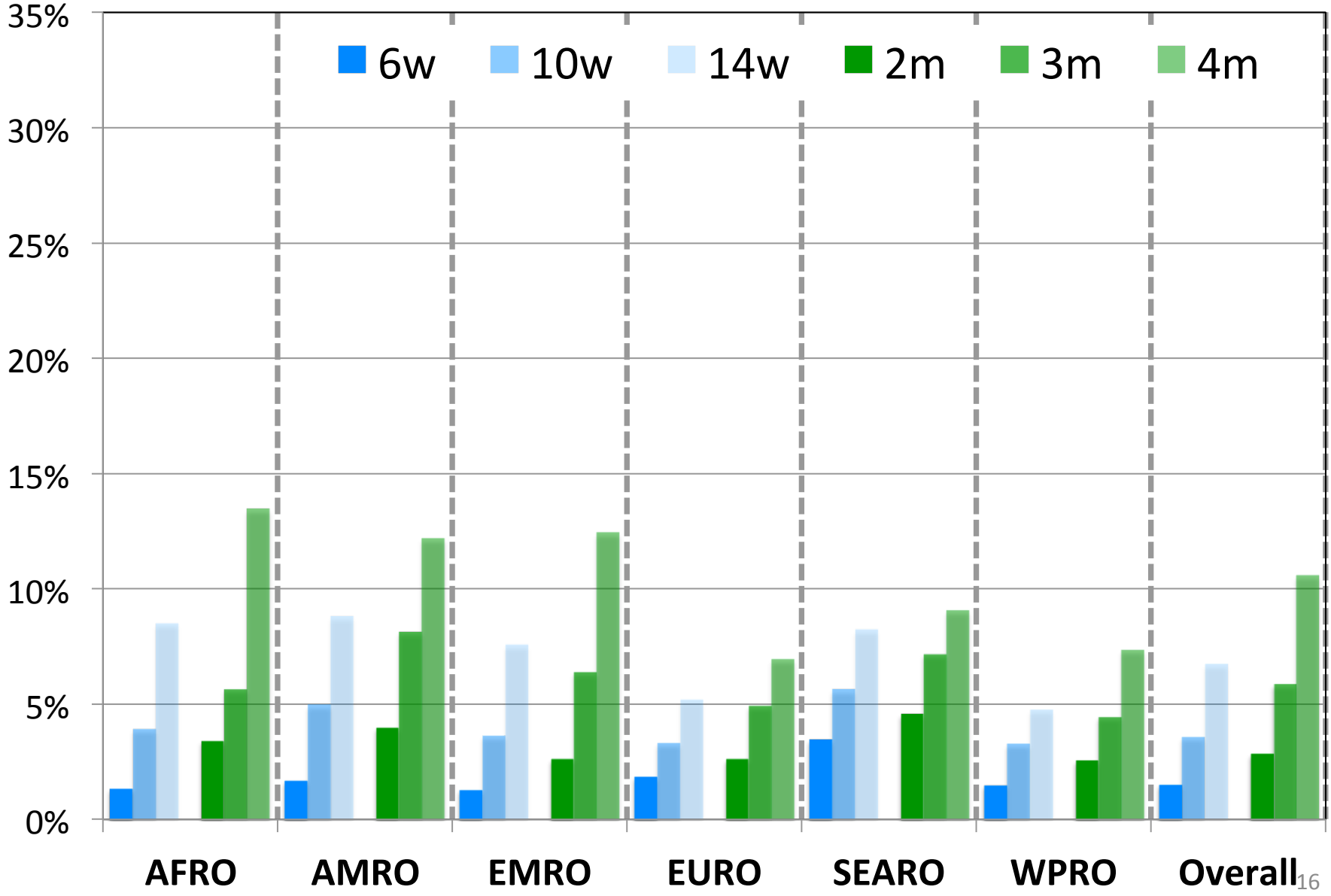

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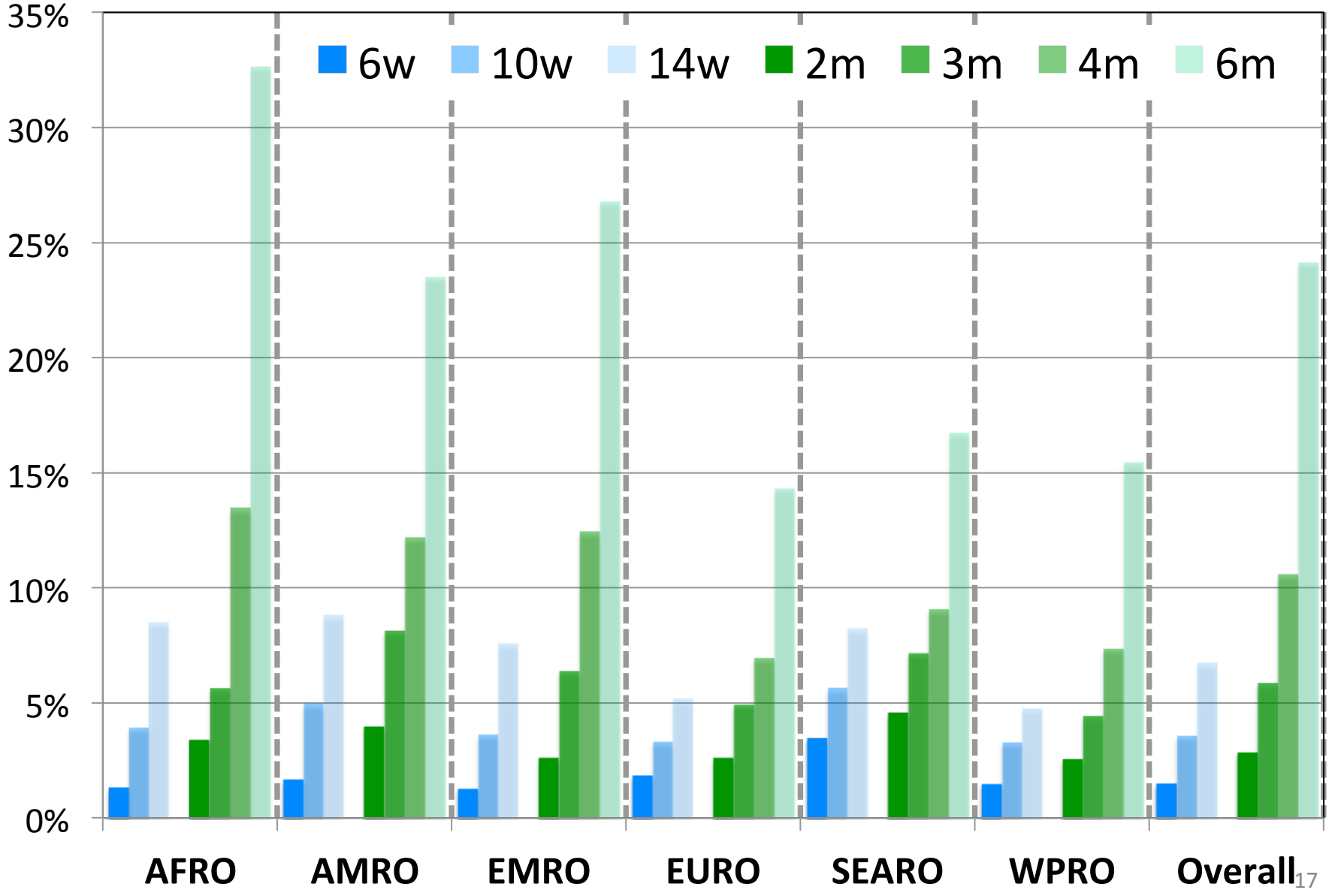


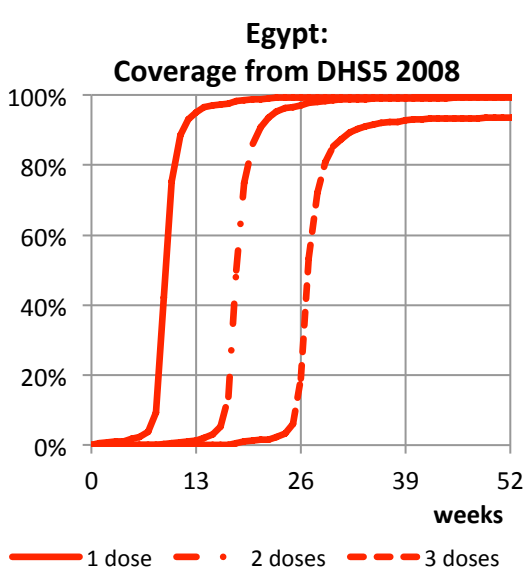
Age at vaccination: data from 46 countries

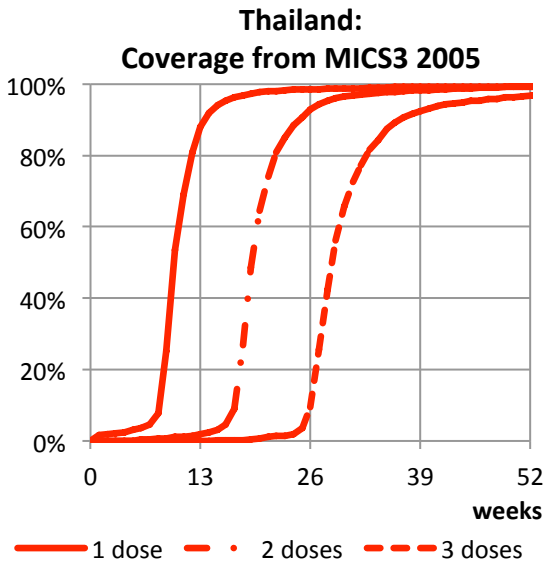
Representative population data from:

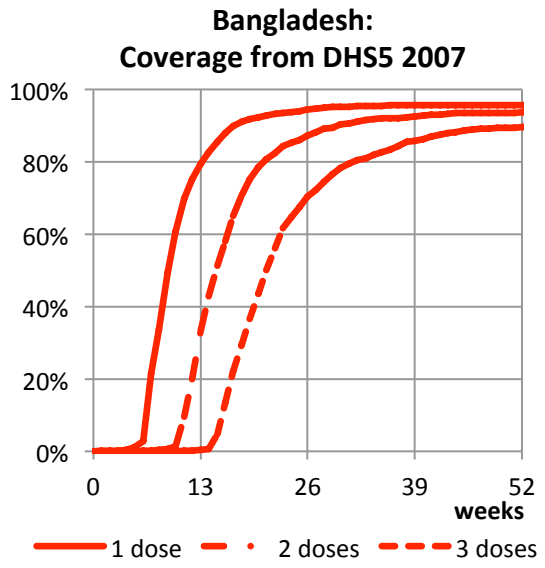
- 26 DHS surveys
  - 2004-9 sample median (IQR) = 5,183 (3,491-6,750)
- 20 MICS surveys
  - 2005-7 sample median (IQR) = 3,926 (2,355-5,879)

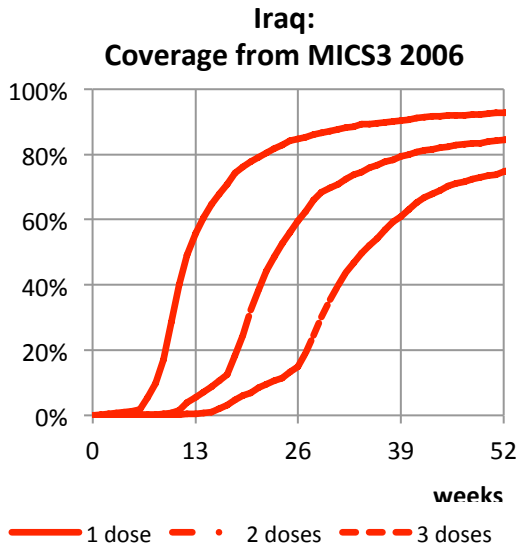
- AFRO 25, AMRO 7, EMRO 6, EURO 2, SEARO 3, WPRO 3

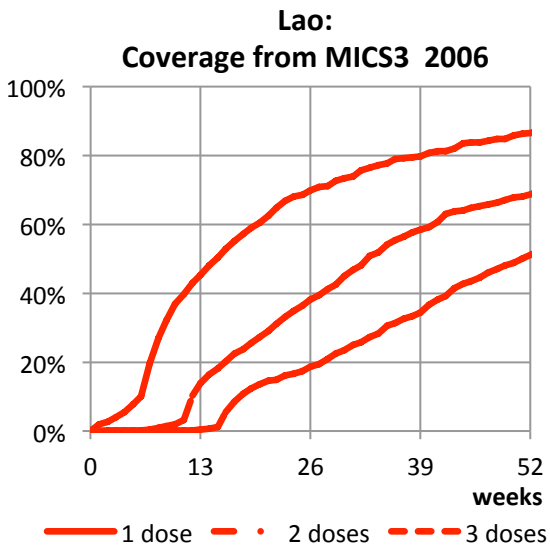
Variation in coverage by age: 6 countries

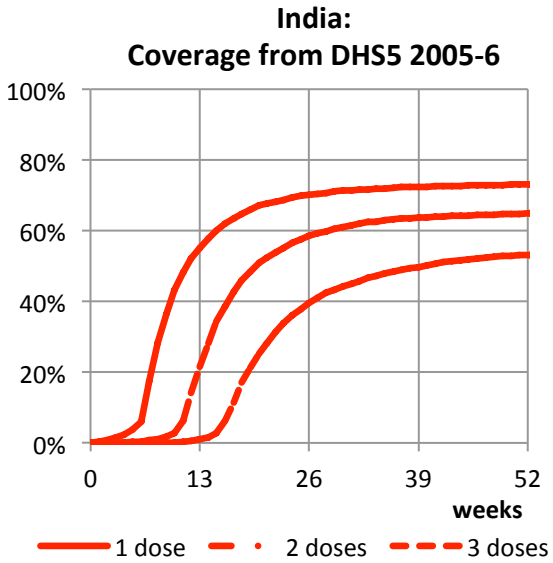








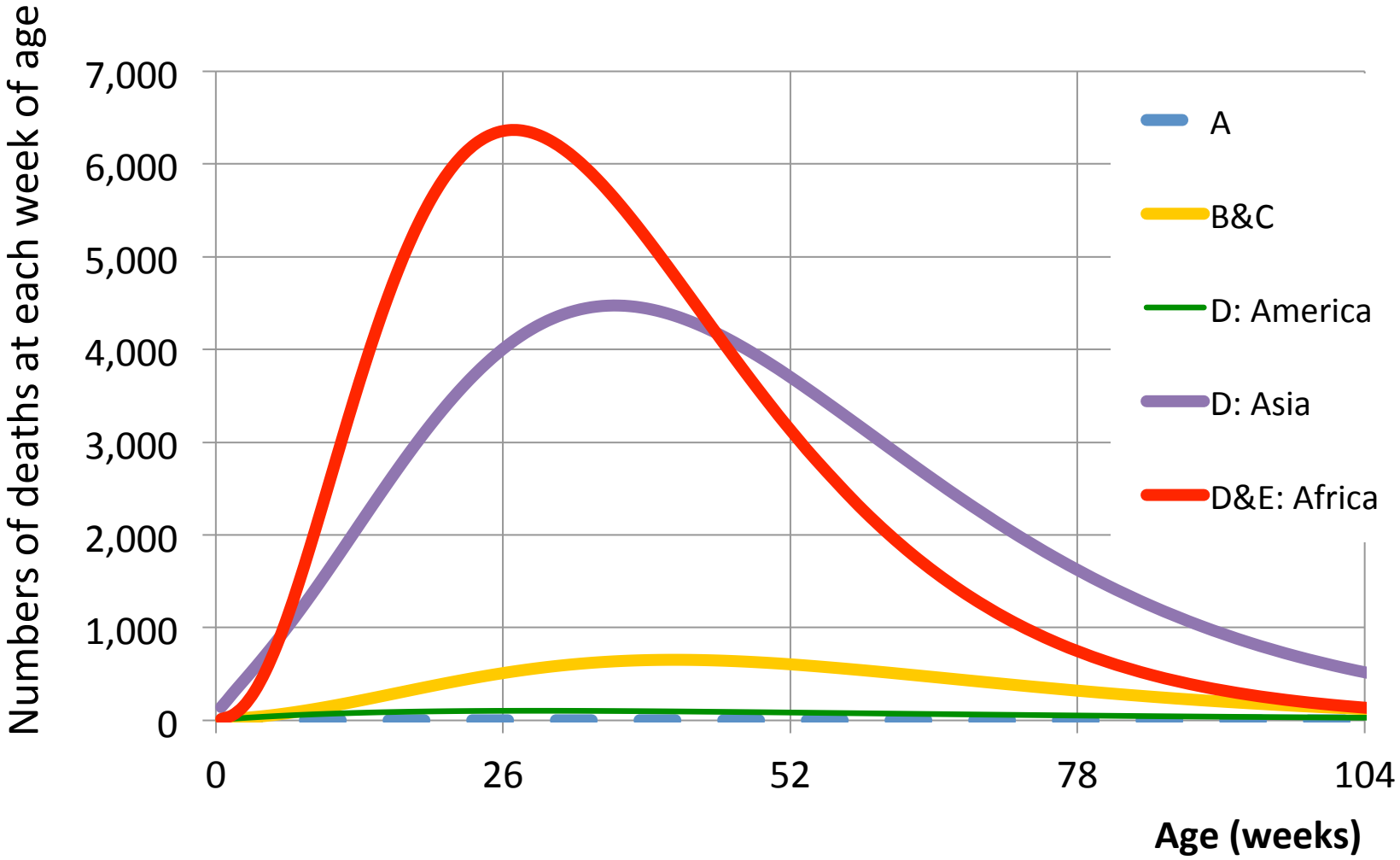




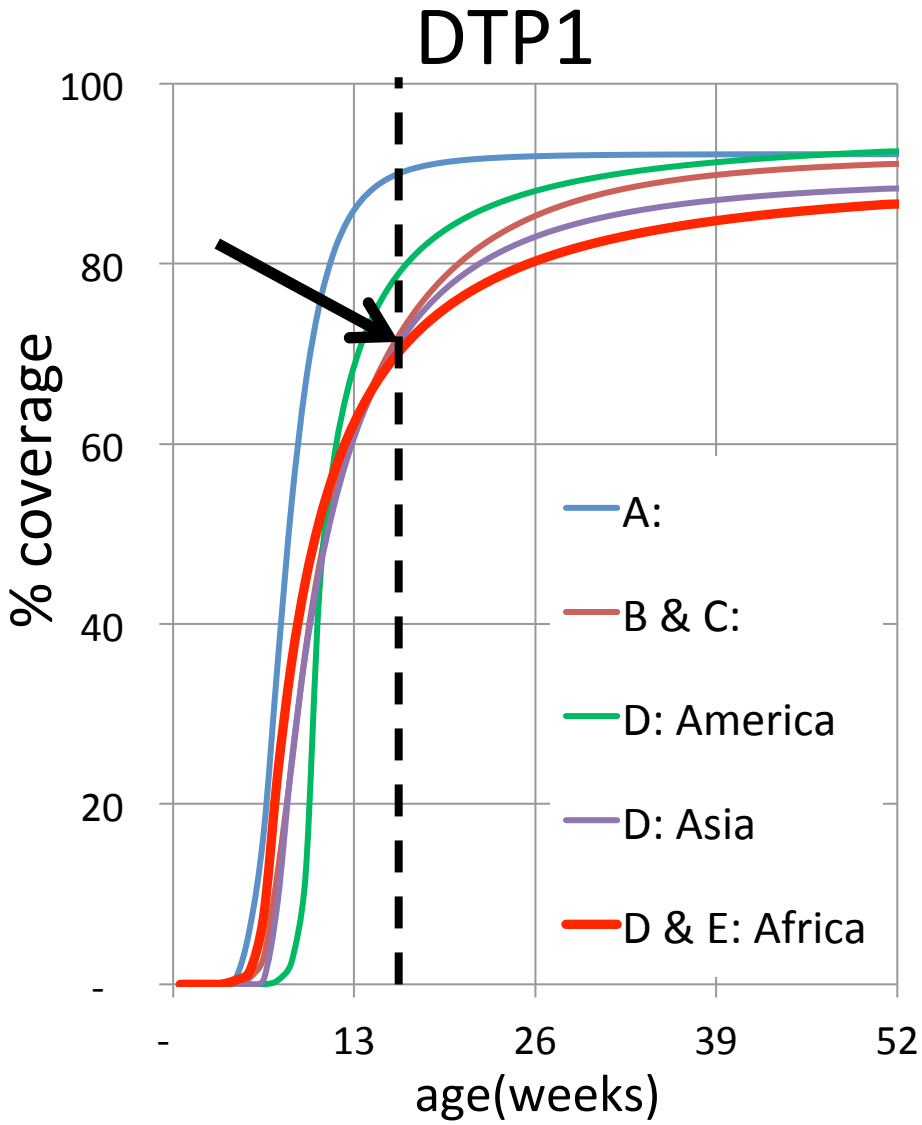
The model

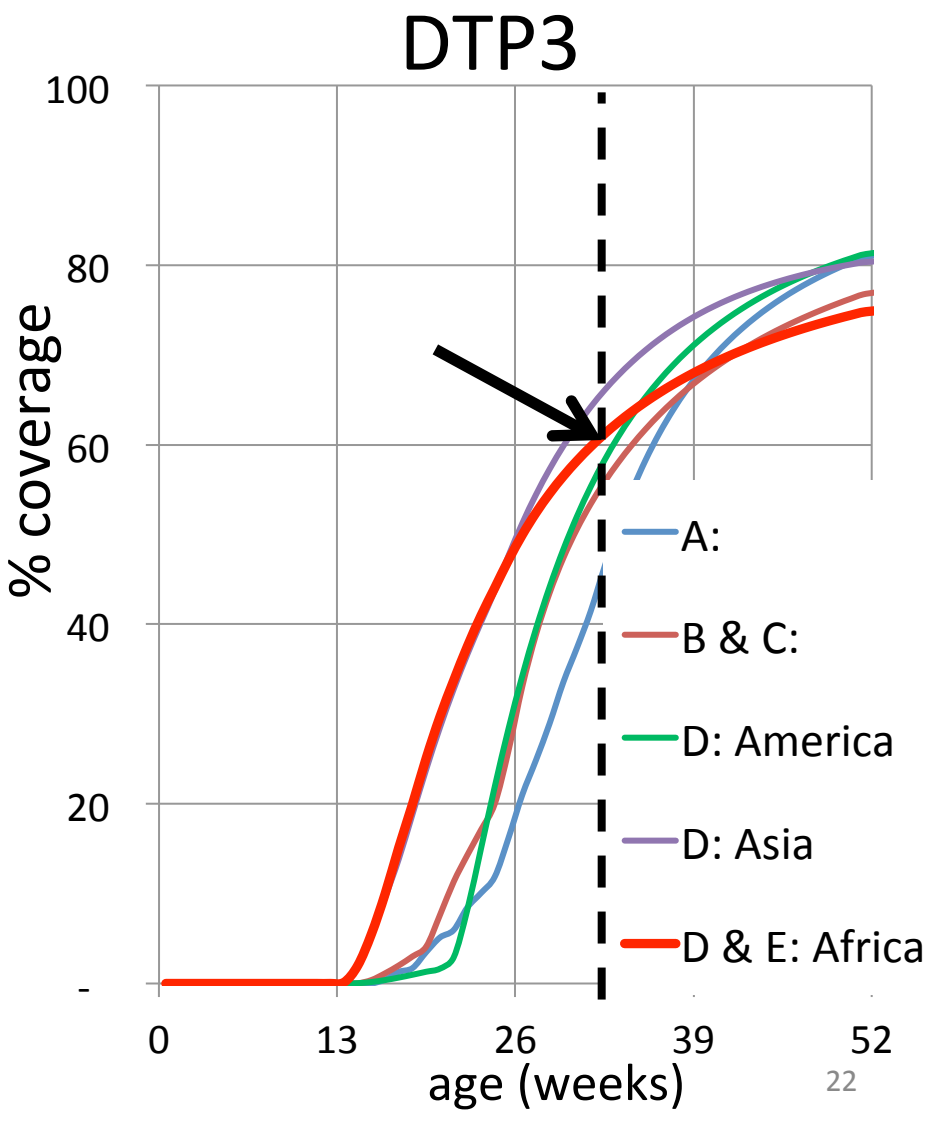
- Developed from QUIVER-approved 'TriVac' by Andy Clark at LSH&TM
- Analysis at *country level*, aggregated to WHO mortality strata
- Numbers of deaths in each country from WHO national estimates (total 453,000 in 2008)
- Assumes age distribution of RVGE mortality to be same as (hospital) morbidity.

Model estimates: Baseline distributions of estimated RVGE deaths/year by WHO mortality stratum

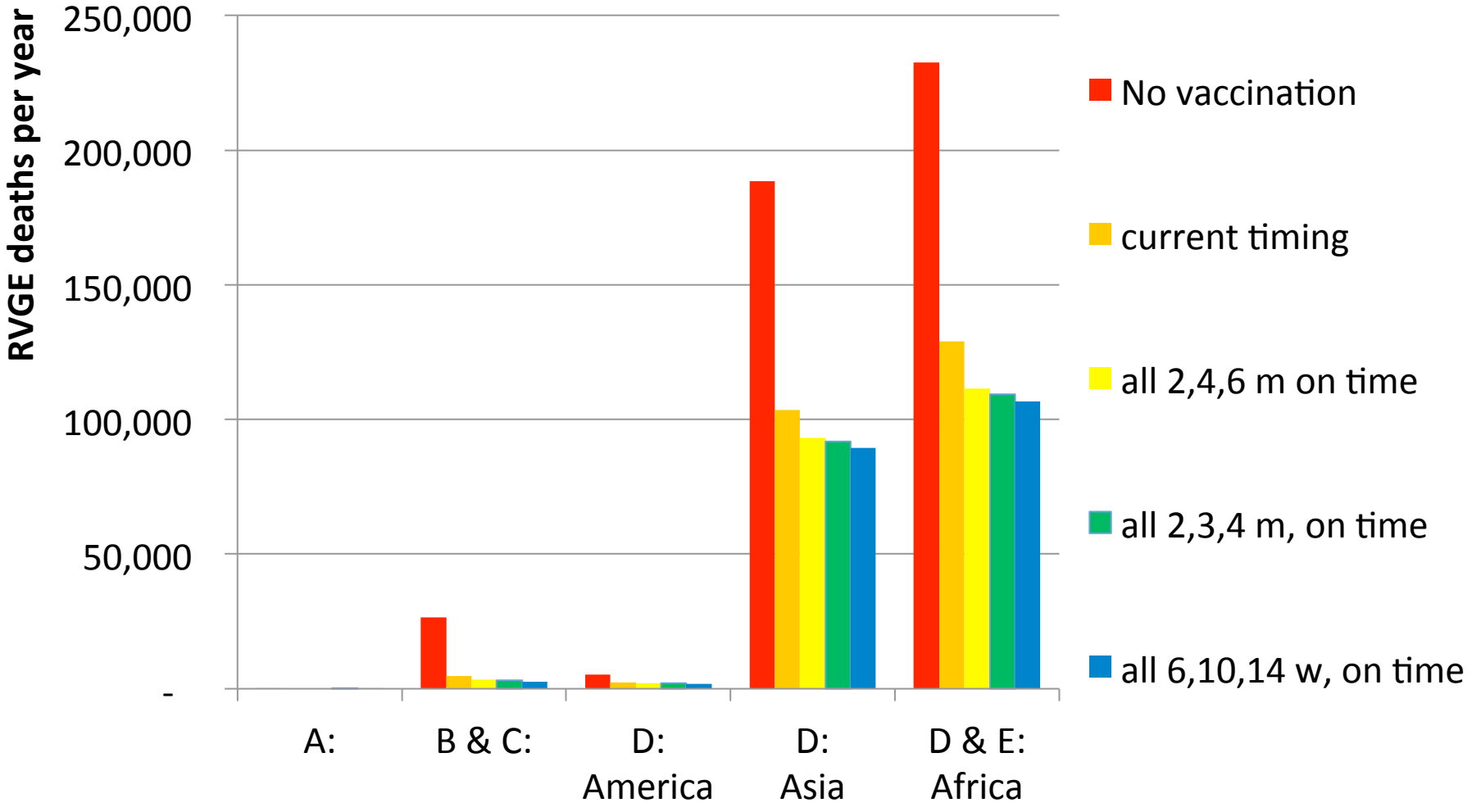


Model estimates: age-specific DTP coverage by WHO mortality stratum (but heterogeneous)





Model estimates: impact of vaccines on RVGE deaths/year for various schedules



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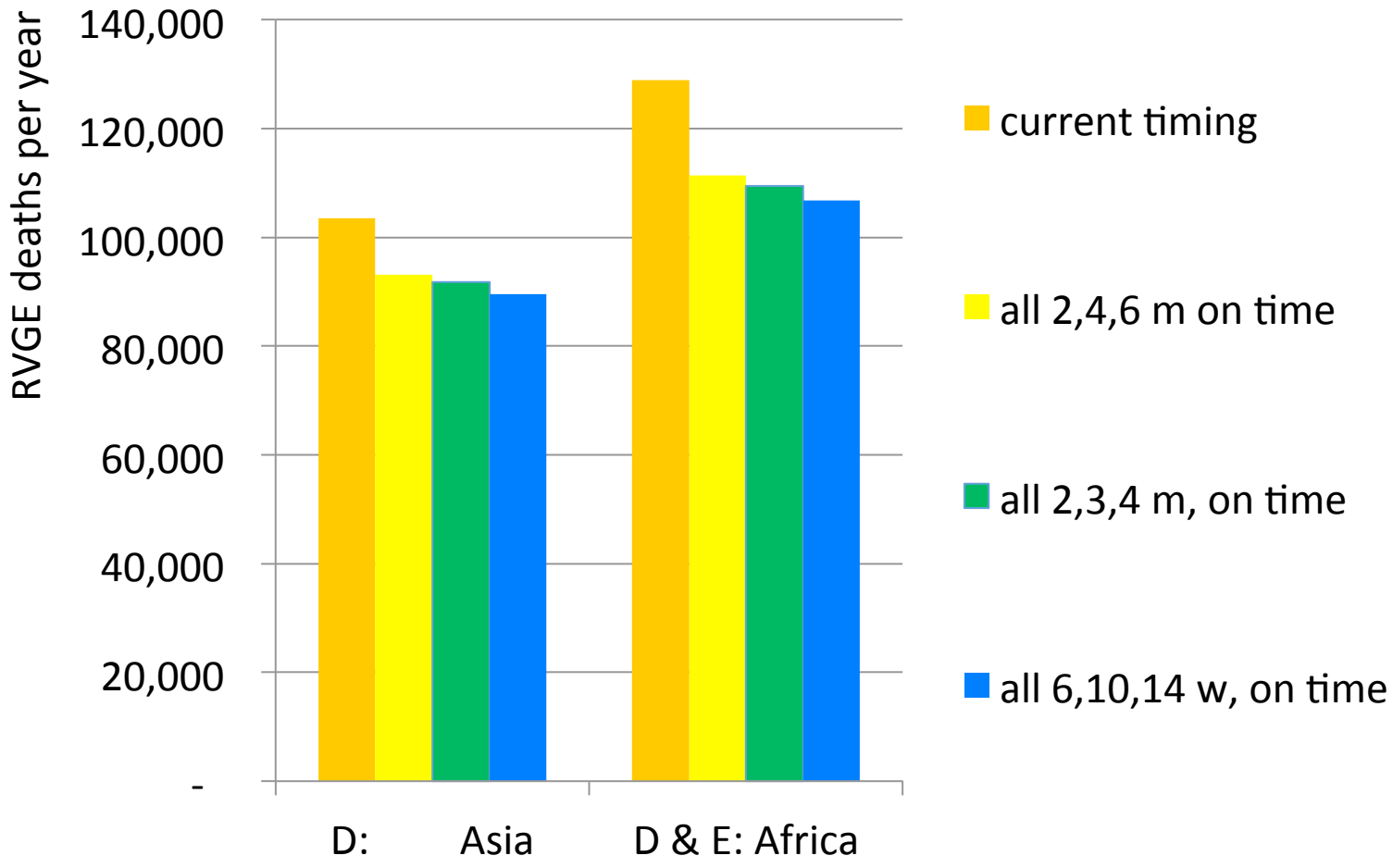

Conclusions

Strategy 1. Shift to earlier schedule

Consider if a large RVGE burden in very young, and late vaccination.

Review national data or estimates on

- age at RVGE disease
- timeliness of vaccination.

but better data needed on effect of age at vaccination on durability of protection

Strategy 2. Improve coverage

Consider if current age-specific coverage is low, especially in high risk populations

Strategy 3. Unrestricted schedules

[next presentation]