

# Just another brick in the wall? School-based clustering of measles susceptibility



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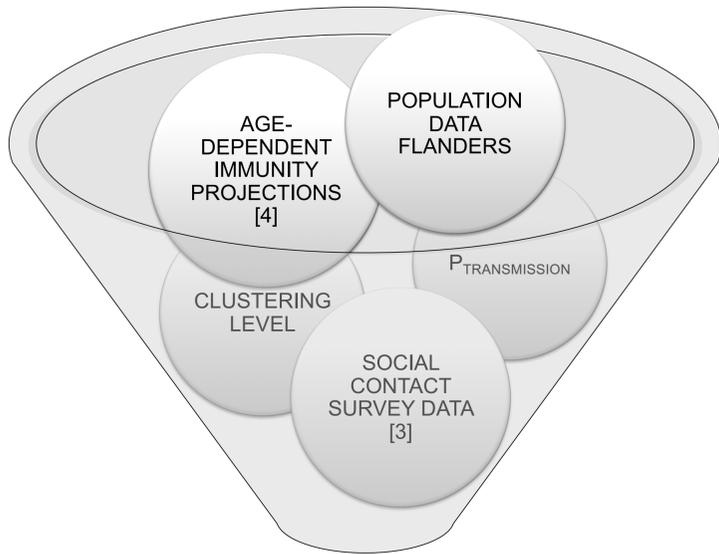
## WE FOUND

clustering of susceptible children in schools increases risk and persistence of measles outbreaks

- Clustering of susceptible individuals could be the **reason why elimination of measles is so hard to attain**.
- Clustering within **schools**: unvaccinated children may attend the same schools / seek more contact [1,2].



## INDIVIDUAL-BASED MODEL



STRIDE [5]

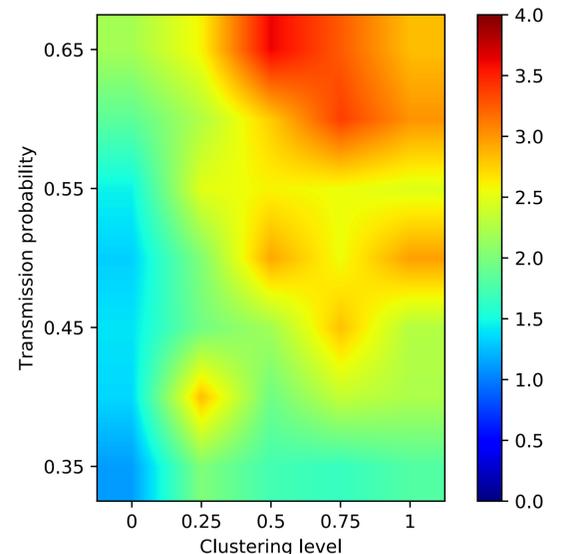
(an individual-based, stochastic model for the transmission of infectious diseases)

5 levels of clustering (0 to 1)  
7 values for  $P_{\text{transmission}}$  (0.35 to 0.65 ~  $R_0$  11.4 to 19.2)

100 simulations per scenario

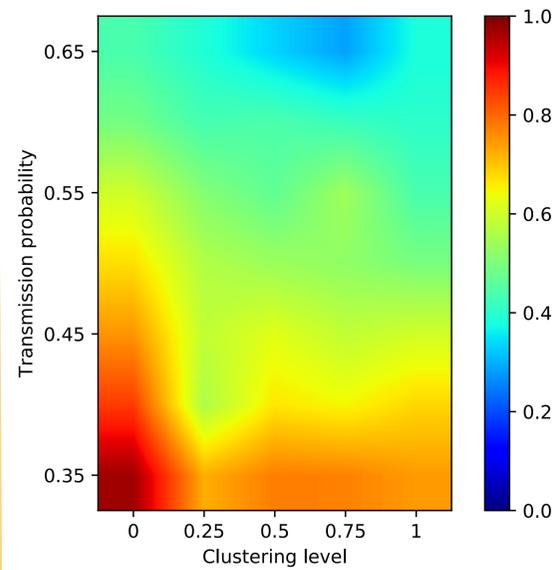
## EFFECTIVE R INCREASES

With clustering:  
already more transmissions at beginning of outbreak!



Effective R (= number of cases infected by index case in partially immune population)

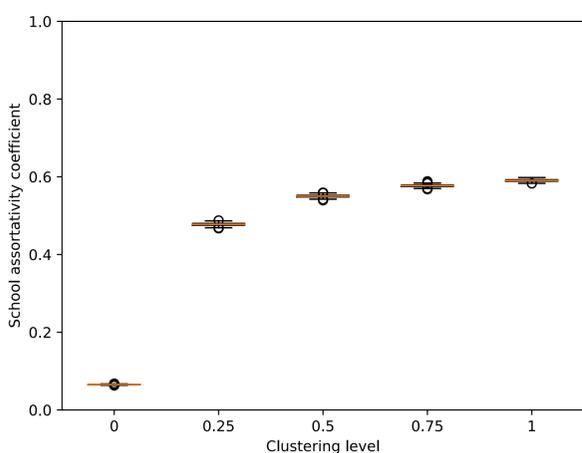
## ESCAPE PROBABILITY DECREASES



Clustering has impact throughout entire epidemic

Escape probability over a period of 730 simulated days.

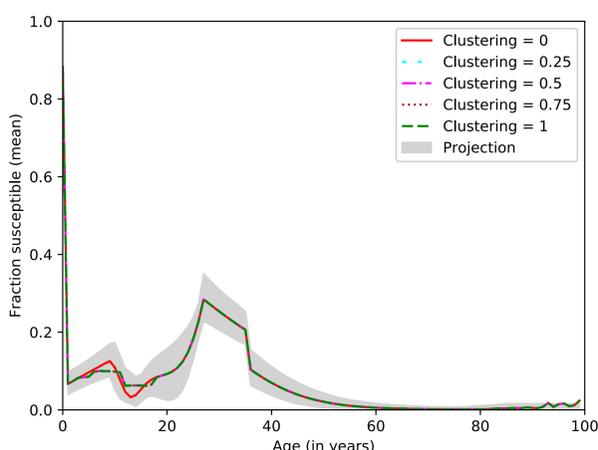
## SCHOOL ASSORTATIVITY COEFFICIENT



School assortativity coefficient for different clustering levels

Measure for clustering of unvaccinated individuals within schools  
→ **school assortativity coefficient** [6]

Age-dependent immunity levels in simulated population consistent with projections



Fraction of susceptibles per year of age for different clustering levels. Grey shape = 95% percentile interval of projections [4].

## FUTURE WORK

- Introduce dynamic population in Stride (births, deaths, changes in household structure)
- Investigate clustering of susceptible individuals in different populations (Belgium, other European countries)

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