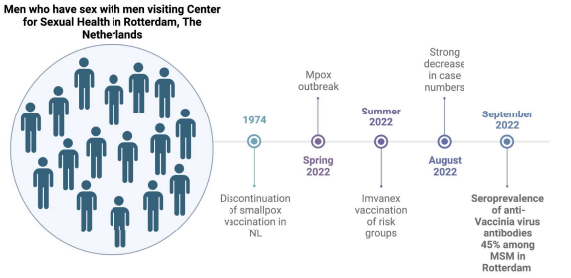
MODELLING THE RISK OF FUTURE MPOX OUTBREAKS IN THE NETHERLANDS

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BACKGROUND



Aim: to predict whether the current seroprevalence levels can prevent future mpox outbreaks

METHODS

- A modified stochastic SEIR model was developed based on the Gillespie algorithm
- Stratfication based on vaccination status: unvaccinated, historically smallpox vaccinated, newly Imvanex vaccinated
- Model was calibrated to exponential phase of the mpox outbreak in the Netherlands (a total of 1289 reported infections in 2022)

EQUATIONS

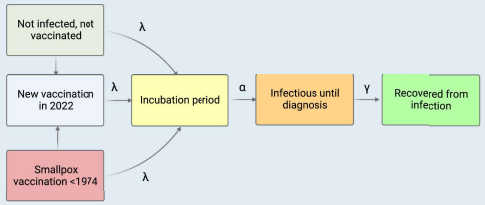
$$S_{t+1} = S_t - \frac{\beta . S . I}{N} \quad (1)$$

$$Vhist_{t+1} = Vhist_t - \frac{\beta.(1-VEhist) . Vhist . I}{N} \quad (2)$$

$$Vnew_{t+1} = Vnew_t - \frac{\beta.(1-VEnew) . Vnew . I}{N} \quad (3)$$

$$E_{t+1} = E_t - \alpha . E_t \quad (4)$$

$$I_{t+1} = I_t - \gamma . I_t \quad (5)$$

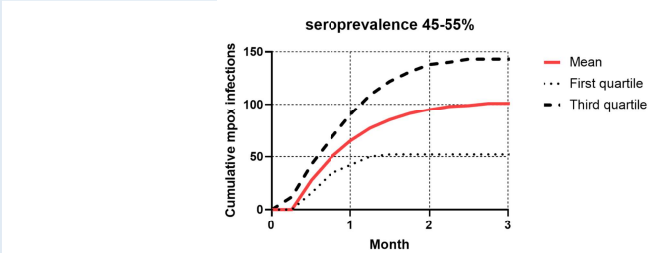


MODEL PARAMETERS

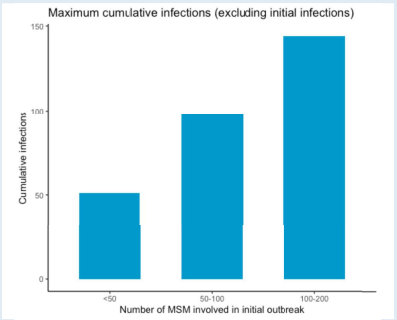
Parameter	Symbol	Range	Ref
MSM at risk of mpox	S	20,000 - 50,000	
MSM involved in seeding	E/I	15 - 200	Calibrated
Proportion historically vaccinated	V_{hist}	25 - 35%	1
Proportion vaccinated in 2022	V_{new}	20%	Estimated
Incubation period	α	8 (95% CI 6.5 - 9.8) days	2
Transmissibility	β	0.25 - 1.5 days	Calibrated
Mean infectious period until diagnosis	γ	1 - 7 days	Calibrated
Vaccine effectiveness • Historic vaccination • Vaccination in 2022	VE_{hist} VE_{new}	75 - 95% 83 - 89%	3,4

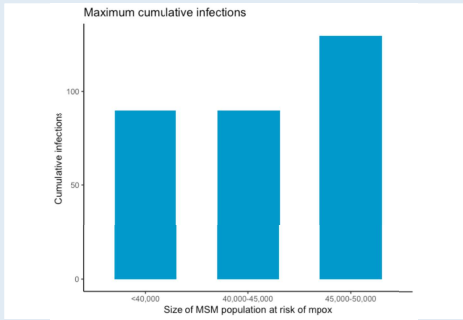
RESULTS

Size of a future mpox outbreak among MSM in the Netherlands



Sensitivity analysis on the impact of two key variables on the size of a future mpox outbreak





CONCLUSIONS

1. We predict that increased seroprevalence during 2022 (by vaccination or infection) would strongly reduce the size and duration of future mpox outbreaks among MSM.
2. Our findings emphasize the importance of vaccine-induced immunity in risk groups to prevent future outbreaks.

References

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