

# OPTIMAL VACCINATION STRATEGIES AND RATIONAL BEHAVIOUR IN SEASONAL EPIDEMICS

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We consider a SIRS model with time dependent transmission rate. We assume time dependent vaccination which confers the same immunity as natural infection. We study two types of vaccination strategies: (i) optimal vaccination, in the sense that it minimizes the effort of vaccination in the set of vaccination strategies for which, for any sufficiently small perturbation of the disease free state, the number of infectious individuals is monotonically decreasing; (ii) Nash-equilibria strategies where all individuals simultaneously minimize the joint risk of vaccination versus the risk of the disease. The former case corresponds to an optimal solution for mandatory vaccinations, while the second corresponds to the equilibrium to be expected if vaccination is fully voluntary. We are able to show the existence of both optimal and Nash strategies in a general setting. In general, these strategies will not be functions but Radon measures. For specific forms of the transmission rate, we provide explicit formulas for the optimal and the Nash vaccination strategies. [1]

## References

- [1] Doutor, P., Rodrigues, P., Soares, M.d.C., Chalub, F.A.C.C. (2016). *Optimal vaccination strategies and rational behaviour in seasonal epidemics*, J. Math. Biol., **73**: 1437–1465. doi:10.1007/s00285-016-0997-1