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*Waning immunity and epidemiological outcomes*

A goal in the control of infectious diseases is to generate herd immunity, the level of immunity needed in a population to effectively protect everyone (vaccinated and vaccinated). Immunity is generated from infection and vaccination, but immunity can also wane over time. We have studied the effects of waning immunity with changing demographics and seasonal forcing. An array of periodic solutions can be generated from such models, and chaos. We will discuss implications in mathematical modelling and public health control.