

# Threshold quantities for epidemics \*

Mick Roberts

Centre for Mathematical Biology,  
IIMS & NZIAS, Massey University, Albany,  
Private Bag 102 904, North Shore Mail Centre, Auckland, New Zealand;  
Email: [m.g.roberts@massey.ac.nz](mailto:m.g.roberts@massey.ac.nz)

## Abstract

The fundamental quantity in the epidemiology of infectious diseases is the basic reproduction number, defined as the expected number of secondary cases that would arise from a typical primary case in a susceptible population. The value of the basic reproduction number determines whether an epidemic of an emerging infection may occur, or if an endemic infection will persist. It also provides an estimate of the control effort needed to eradicate an infection. The concept of the basic reproduction number leads one to think in terms of infection generations rather than chronological time. Where populations comprise host individuals that respond to the infection in different ways, these concepts lead to the ideas of the next generation matrix and the type reproduction number. The derivation and meaning of these quantities, and their implications for the control of infectious diseases will be discussed. Examples will include sexually transmitted infections, vector transmitted infections, pandemic influenza and HIV.

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