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The basic reproductive ratio: does the emperor have no clothes?

The basic reproductive ratio, R_0 , is defined as the number of secondary infections arising from a single individual during his or her entire infectious period, in a population of susceptibles. This concept is fundamental to the study of epidemiology and within-host pathogen dynamics. Most importantly, R_0 often serves as a threshold parameter that predicts whether an infection will spread. Related parameters which share this threshold behaviour, however, may or may not give the true value of R_0 . We give a brief overview of common methods of formulating R_0 and surrogate threshold parameters from deterministic, non-structured models. We also review common means of estimating R_0 from epidemiological data. Finally, we survey the recent use of R_0 in assessing emerging diseases such as SARS and avian influenza, a number of recent livestock diseases, and vector-borne diseases malaria, dengue and West Nile Virus.