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Stochastic processes in epidemic modelling and simulation. (English) [Zbl 1017.92030](#)

Shanbhag, D. N. (ed.) et al., Stochastic processes: Modelling and simulation. Amsterdam: North-Holland. Handb. Stat. 21, 285-335 (2003).

Introduction: This article aims to discuss the uses of stochastic processes in epidemiology, mathematical modelling and the simulation of epidemics. This is a very large area and it will not be possible to cover the entire literature on the topic. Instead, we aim to survey the main areas. We start by looking at some classical applications of stochastic processes in epidemic theory, namely the Chain Binomial, followed by the simple and general stochastic epidemic models. In Section 4 we consider the application of stochastic processes in spatial epidemic modelling, particularly percolation processes, simulation modelling and diffusion processes. One of the major motivations for studying epidemic models is to make predictions about control strategies such as vaccination of susceptible individuals or removal of infected ones, so Section 5 discusses stochastic models for the control of epidemics. Section 6 looks at applications of stochastic modelling for several specific diseases, including HIV/AIDS. This is followed by a description of some uses of stochastic methods in parameter estimation and hypothesis testing. A brief summary concludes our survey.

For the entire collection see [\[Zbl 1009.00011\]](#).

MSC:

- [92D30](#) Epidemiology
- [60G35](#) Signal detection and filtering (aspects of stochastic processes)
- [92C60](#) Medical epidemiology
- [62P10](#) Applications of statistics to biology and medical sciences; meta analysis
- [60J70](#) Applications of Brownian motions and diffusion theory (population genetics, absorption problems, etc.)
- [60K35](#) Interacting random processes; statistical mechanics type models; percolation theory

Cited in **2** Documents

Keywords:

[chain binomial models](#); [threshold theorems](#); [spatial models](#)