Chitnis, Nakul. 2011. Introduction to Mathematical Epidemiology: Deterministic Compartmental Model. Notes. 12 pp.

See <u>http://www.luchsinger-mathematics.ch/ME-DeterministicCompartmentalModels.pdf</u> . Accessed 28 March 2023.

Introduction: Deterministic compartmental models form the simplest models in the mathematical study of infectious disease dynamics. They assume that a population is homogenous (all people are the same) and the only distinction is in their disease state. Unlike stochastic models, deterministic compartmental models consider the population level mean behavior of the system. In deriving and analyzing these models, we usually perform the following five steps.

- 1. Derive model and compartments.
- 2. Write equations corresponding to these compartments.
- 3. Derive parameter values from data/literature.
- 4. Numerically simulate equations.
- 5. Mathematically analyze equations.
 - Analytically solve equations.
 - Evaluate equilibrium points.
 - Determine stability of equilibrium points.
 - Derive threshold conditions.
 - Draw phase portraits.
 - Perform bifurcation analysis. Perform sensitivity analysis.