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Linda Allen, Sophia Jang and Lih-Ing W. Roeger* (lih-ing.roeger@ttu.edu),
Department of Mathematics and Statistics, Texas Tech University, Lubbock, TX 79409. *Predicting
Population Extinction or Disease Outbreaks with Stochastic Models*. Preliminary report.

Random effects can lead to population extinction or the failure of a disease outbreak. However, randomness is a behavior not observed in deterministic models. To account for random effects, we formulate analogous stochastic models which are discrete-time Markov chains. A simple birth and death process leads to an analytical formula for the probability of extinction that depends on the initial population size. To illustrate the utility of the formula, it is applied to the logistic growth model and the SIR epidemic model during the exponential growth phase to predict population or disease extinction. (Received January 14, 2015)