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Linda J.S. Allen. *Disease Emergence and Persistence in a Multi-Patch Stochastic Epidemic Model with Demographic, Environmental and Periodic Variability.*

Seasonality and contact patterns are subject to changes in the environment and population demography. These in turn affect the dynamics of disease spread. We investigate the effects of demographic, environmental and periodic variability on disease emergence and persistence in continuous-time, nonhomogeneous stochastic epidemic models, where the disease is spread between several regions or patches. The continuous-time nonhomogeneous stochastic processes have either discrete or continuous random variables. A multitype branching process approximation is used to estimate the probability of a disease outbreak for various patch connectivities and periodicity assumptions in transmission and dispersal. In addition, a system of stochastic differential equations is used to investigate the effect of the three types of variability near the endemic state. The implications of these results for disease control are also discussed. (Received September 16, 2019)