

1125-92-2412

**Calistus N Ngonghala\*** ([calistusnn@ufl.edu](mailto:calistusnn@ufl.edu)), 1400 Stadium Rd, Department of Mathematics, University of Florida, Gainesville, FL 32611, and **Matthew H Bonds**, 641 Huntington Ave, Boston, MA 02115. *Mathematical exploration of virtuous versus vicious cycles of human health and economic development.*

The livelihoods of the rural poor are nested within ecological communities. The poor rely heavily on their immediate natural environment for subsistence and suffer high morbidity and mortality due to infectious diseases. We show how the dynamics of poverty can be modeled, focusing on infectious diseases. Interactions between infectious diseases and economics can create reinforcing feedbacks associated with persistent poverty, characterized by a stable, low level, equilibrium; or poverty traps characterized by multiple stable equilibria in ecological-economic space. The inherent complexity of these relationships, combined with the spatial/temporal scales at which they occur in the real world, create empirical challenges for estimating parameters and validating the models. We use numerical methods to evaluate the parameter spaces for various combinations of these coupled systems. We find that 13-20% of the feasible parameter space generate bistable outcomes, or poverty traps, and identify key parameters that are most influential to the outcomes of the systems. Combined, these models provide a general framework for deeper theoretical and empirical explorations of infectious diseases and other ecological driver of poverty. (Received September 20, 2016)