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Divine Wanduku* (wandukudivine@yahoo.com), 4202 East Fowler Avenue, PHY, Tampa, FL 33620-5700, and **Gangaram Ladde**. *GLOBAL ANALYSIS OF A STOCHASTIC TWO-SCALE NETWORK HUMAN EPIDEMIC DYNAMIC MODEL WITH VARYING IMMUNITY PERIOD.*

The recent rapid spread of infectious diseases of humans are closely associated with the complex human population spatial structure and the underlying large-scale inter-patch connection human transportation. Furthermore, the disease endemicity fluctuations within patch dwelling populations are closely related with the hereditary features of the disease. We present an stochastic SIR delayed dynamic epidemic process in a two-scale population dynamic structure. The disease confers natural immunity to recovered individuals with varying immunity time lengths. The immunity time delay accounts for the time-lag during which recovered individuals with natural immunity become susceptible. We investigate the stochastic asymptotic stability of the disease free equilibrium of the two-scale structured mobile population, and the impact on the emergence, propagation and resurgence of the disease. The presented results are demonstrated by numerical simulation results. (Received January 13, 2012)