1077-60-1376 **Divine T Wanduku*** (dwanduku@mail.usf.edu), Department of Mathematics and Statistics, University of South Florida, 4202 East Fowler Avenue, PHY, Tampa, FL 33620-5700, and **Gangaram S Ladde** (gladde@usf.edu), Department of Mathematics and Statistics, University of South Florida, 4202 East Fowler Avenue, PHY, Tampa, FL 33620-5700. *Stability of stochastic two-scale network delayed SIR epidemic dynamic model with temporary immunity period.*

Complex population structure and the large-scale inter-patch connection human transportation underlie the recent rapid spread of infectious diseases of humans. Furthermore, the fluctuations in the endemicity of the diseases within patch dwelling populations are closely related with the hereditary features of the infectious agent. We present an SIR delayed stochastic epidemic dynamic process in a two-scale population dynamic structure. The disease confers temporary natural or infection-acquired immunity to recovered individuals. The time delay accounts for the time-lag during which naturally immune individuals become susceptible. We investigate the stochastic asymptotic stability of the disease free equilibrium of the scale structured mobile population, under random environmental fluctuations and the impact on the emergence, propagation and resurgence of the disease. The presented results are demonstrated by numerical simulation results. (Received September 19, 2011)