Effects of nonlinear incidence functions and time delay on the dynamics of cholera model

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Cholera is a severe diarrheal bacterium disease that can result in death within hours if left unattended [1]. Robust delay differential equation-cholera model using different incidence functions representing different human and/or pathogens mixing behaviors are formulated and fully analyzed. It is established that the cholera-free equilibrium, irrespective of the incidence type, is globally asymptotically stable when the basic reproduction number is less than unity. When the reproduction number is greater than one, the cholera - endemic equilibrium emerged and is locally asymptotically stable for certain delay values. Thereafter, formation of periodic solutions with delay as the bifurcation parameter occurred. Numerical simulations suggests that one of the incidence functions is prominent in controlling the epidemic.

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