1145-34-2269 **Hem Raj Joshi*** (joshi@xavier.edu), Xavier University, Department of Mathematics, 3800 Victory Parkway, Cincinnati, OH 45207-4441. *Application of SIR Model and Optimal Control.*

We develop an optimal control model of SIR type. In this model, the control is education or information given to the public to manage a disease outbreak when effective treatments or vaccines are not readily available or too costly to be widely used. We study stability analysis and use optimal control theory on the system of differential equations to achieve the goal of minimizing the infected population. We illustrate our results with some numerical simulations.

As an application of SIR model, we develop a mathematical model of HIV epidemiology to explore a possible mechanism by which mass incarceration can lead to increased HIV incidence. The results are particularly relevant for mass incarnation of under representative communities. Through mathematical analysis and numerical simulation, we demonstrate that young male shortage in the community lead to higher HIV incidence. (Received September 25, 2018)