Cost-Effectiveness Analysis of Leptospirosis Model

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Abstract

The aim of this paper is to investigate the effectiveness and cost-effectiveness of leptospirosis control measures, preventive, vaccination, treatment of infective humans and vectors that may curtail the disease transmission. For this, a mathematical model for the transmission dynamics of the disease that includes preventive, vaccination, treatment of infective humans and vectors measures are considered. To assess the relative impact of each of the constant control parameters measures the sensitivity index of the basic reproductive number to the models parameters is calculated. In the time-dependent constant control case, Pontryagins Maximum Principle is used to derive necessary conditions for the optimal control of the disease. The cost-effectiveness analysis is carried out using Incremental Cost-Effectiveness Ratio (ICER) for all the possible combinations of the disease control measures. Our results revealed that the most cost-effective strategy for the control of leptospirosis is the combination of the vaccination and treatment of infective livestocks. Though the combinations of all control measures is also effective, however, this strategy is not cost-effective and so too costly. Therefore, more efforts from policy makers on vaccination and treatment of infectives livestocks regime would go a long way to combat the disease epidemic