Mathematical Modelling of the impact of Quarantine and Isolation-based control interventions on the Transmission Dynamics of Lassa fever

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Lassa fever is an acute viral hemorrhagic fever caused by the Lassa virus. It was first discovered in Nigeria in 1969 when two missionary nurses died of Lassa fever. Lassa fever infection is endemic in West African countries such as Nigeria, Sierra Leone, Guinea, Ghana and other West Africa Countries. It infects 100,000 - 300,000 cases annually with approximately 5,000 deaths. About 15 - 20% of people hospitalized for Lassa fever died from the illness. There are few studies done on the modelling of Lassa fever transmission and control dynamics so far but none has considered the effect of quarantine and Isolation as control interventions against the transmission dynamics of Lassa fever. This paper studied the deterministic model of Lassa fever transmission dynamics with quarantine and isolation as control measures. The model is shown to be mathematically well-posed and epidemiologically meaningful. Detailed analyses (both qualitative and quantitative) were carried out to determine the equilibrium points, their stabilities, and the basic reproduction number necessary to control the Lassa fever transmission in the population. Numerical simulations were carried out to illustrate the analytical results.