# Modeling Transmission Dynamics of Rabies in Nepal

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Rabies is a neglected tropical disease caused by Rhabdovirus and often transmitted to humans and animals through the bites of infected animals. Even though vaccines against rabies are available, rabies still remains a burden killing significant number of humans as well as domestic and wild animals in many parts of the world, including Nepal. In this study, we develop a mathematical model to describe transmission dynamics of rabies in Nepal. In particular, an indirect interspecies transmission from jackals to humans through dogs, which is relevant to the context of Nepal, is one of the novel features of our model. Using our model with some parameters estimated from human rabies data, we calculated the basic reproduction number ($R_0$) for Nepal, and performed sensitivity analysis to identify that the dog-related parameters are primary contributors to $R_0$. We find that even though intraspecies basic reproduction numbers of both dogs ($R_0^D$) and jackals ($R_0^J$) are less than 1, the rabies epidemic may still occur ($R_0 > 1$) due to interspecies transmission. Our results show that, along with dogs, jackals also play important roles in the persistence of rabies in Nepal, and that only the currently practiced pre-exposure vaccines to dogs and post-exposure vaccines to the exposed humans are not sufficient to eradicate rabies. In addition, our model suggests that control strategies, such as dog sterilization and dog culling, may help reduce the prevalence and outbreak significantly but the jackal vaccination may not be as effective as other preventive strategies. These results may be useful to design effective prevention and control strategies for mitigating the rabies burden in Nepal.