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Abstract: Protecting children from vaccine-preventable diseases, such as measles, is among primary goals of health administrators worldwide. Since vaccination turned out to be the most effective strategy against childhood diseases, developing a framework that would predict an optimal vaccine coverage level needed to control the spread of these diseases is crucial. In this article, we use a compartmental mathematical model of the dynamics of measles spread within a population with variable size to provide this framework. We rely on a compartmental model expressed by a set of differential equations based on the dynamics of measles infection. In order to apply vaccination strategies, theoretical results show that adding a second opportunity strategy to the routine immunization program enhances herd immunity with lower vaccination coverage.

Consideration is given to determining the stability of the disease-free state and optimal vaccination strategies.

Keywords: measles, compartmental mathematical model, herd immunity, second opportunity, vaccination, optimal strategy