

## A SIR MODEL FOR ANALYZING THE IMPACT OF COVID-19 VACCINATIONS IN SRI LANKA

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### Abstract

The world has been gripped by Corona pandemic since 2019. In Sri Lanka, the first case of COVID-19 was reported late January 2020 and that was a Chinese nationalist the first local case was identified in the second week of march. Vaccines are supposed to have an effective way to reduce the impact of diseases and pandemics. However, there is a counter-argument taking place about the impact of vaccination among people. The introduction of the COVID-19 vaccines to the world and their acceptance or refusal and its effects wanted to be analyzed by research. The government of Sri Lanka commenced its COVID-19 vaccination program on 28 January 2021. In this study, we formulated a SIR model that had been created by using the JRC method as our results revealed that the JRC method is the more suitable method to govern the spread of disease in Sri Lanka. Then, we used this model to analyze the impact of COVID-19 vaccinations in Sri Lanka. Based on our study, we found that the transmission rate ( $R_0$ ) is gradually reduced with the number of the vaccine. At the initial stage, the transmission rate was at 1.1282. After the first vaccination, it was reduced to 1.023 then after the third vaccination, it was come down to 1.0195 and hence recommend that vaccination will be most beneficial for the Island. Also, we found that the efficacy of vaccinations, particularly three doses, provided a buffer against COVID-19 infection. Finally, we concluded from the JRC model we created that ongoing high vaccine response results in a shorter time to manage the COVID-19 epidemic in Sri Lanka.

**Keywords:** *COVID-19, mathematical modeling, removal rate, reproduction value, vaccination*