

The worldwide outbreak of COVID-19 starting in China in late 2019 has raised questions about the most effective methods to control a disease outbreak before vaccines are available. Through the analysis of the reproductive number of COVID-19 for different countries compared with that country's response measures, we attempt to identify the effectiveness of the quarantine containment methods for this pandemic. In order to achieve this, we developed a mathematical SIR (Susceptible-Infected-Recovered) model for the spread of COVID-19 that utilizes quarantine groups. Using the next generation matrix method, the reproductive numbers, both basic and effective, are calculated for countries including China, South Korea, Italy, Spain, Germany, France, and Singapore. As quarantine measures are continually put in place, we observe changes in the effective reproductive number and compare results between countries to analyze the effectiveness of quarantine as a method of containment for COVID-19.