

Mathematical Analysis of the Dynamics of COVID-19 in Africa under the Influence of Asymptomatic Cases and Re-Infection

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Abstract

Coronavirus pandemic (COVID-19) hit the world in December 2019, and only less than 5% of the 15 million cases were recorded in Africa. A major call for concern was the significant rise from 2% in May 2020 to 4.67% by the end of July 15, 2020. This drastic increase calls for quick intervention in the transmission and control strategy of COVID-19 in Africa. A mathematical model to theoretically investigate the consequence of ignoring asymptomatic cases on COVID-19 spread in Africa is proposed in this study. A qualitative analysis of the model is carried out with and without re-infection, and the reproduction number is obtained under re-infection. The results indicate that increasing case detection to detect asymptotically infected individuals will be very effective in containing and reducing the burden of COVID-19 in Africa. In addition, the fact that it has not been confirmed whether a recovered individual can be re-infected or not, then enforcing a living condition where recovered individuals are not allowed to mix with the susceptible or exposed individuals will help in containing the spread of COVID-19.

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