

Chapter 4

Transmission Dynamics of Covid-19 from Environment with Red Zone, Orange Zone, Green Zone Using Mathematical Modelling



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Abstract The novel corona virus or Covid-19 spread had its inception in November of 2019, and in March 2020, it was declared as a pandemic. Since its initial stage, it has now already infected over 5 million people, leading to the lockdown of countries around the world, and a halt on global as well as national travel across the globe. Based on this, the research proposes a mathematical Covid-19 model to study the outcome of these classified zones under different control strategies. In the nonlinear mathematical model, the total population has been divided into seven compartments, namely Susceptible, Exposed, Red zone, Orange zone, Green zone, Hospitalized, and Recovered. The spectral radius is calculated to analyze dynamics of the Covid-19. To control the spread of the virus, the parameters of controls are Medical Intervention, Partial Lockdown, and Strict Lockdown. This model has been validated with numerical data. The conclusion validates the implementation of lockdown in curbing Covid-19 cases.

Keywords Covid-19 · Red zone · Orange zone · Green zone · Basic reproduction number · Optimal control

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Introduction

World were faced Flu pandemic in nineteenth century, Spanish and Asian flu pandemics in 20th Century, Swine flu pandemic in 2009–10 in the first decade of twenty-first Century and nowadays, world is facing Covid-19 pandemic disease.

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