Wikno, 16th–20th September 2025

IMPACT OF AGE-STRUCTURE DEPENDENT CONTROL DURING THE FIRST TWO YEARS OF COVID-19 PANDEMIC IN THE BASQUE COUNTRY

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ABSTRACT

The age distribution of the population certainly impacts the spread and control of infectious diseases [1, 2]. In this article, we propose and analyze an infectious disease, Coronavirus disease 2019 (COVID-19), a viral disease declared apandemic by WHO. It has posed the greatest threat to global public health.The proposed work is a phase wise retrospective study of the Basque country of Spain. Understanding the dynamic of the virus could help make future predictions on the evolution of epidemics. Our goal is to study the dynamics of the COVID-19 disease over the firsttwo years. Considering understanding the dynamics of disease severity betweenyoung and old population during the first two years of the pandemic, we propose a deterministic modeling framework stratifying the total human population into two groups: older and younger, assuming different risks for severe disease manifestation. In addition to analyzing the proposed model mathematically, athorough sensitivity analysis was carried out using the PRCC method to pin-point the crucial parameters impacting the transmission dynamics of COVID-19 in the overall hospitalized population.We observed that the population younger than 70 would contribute more to the overall force of infection than the older population. However, unlike the current age-based models, the new models offer different perspectives on how population age impacts disease severity in the COVID-19 pandemic.

Keywords: Deterministic COVID-19 model, Stability analysis, data analysis, age-structure, sensitivity analysis

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