DONGLIN HAN, University of Alberta

Retrospective estimation of proportion of total infections of COVID-19 during the first wave in Alberta

Mathematical modeling has been extensively used during the COVID-19 pandemic to project the spatial and temporal trend of the transmission and spread of the infection. However, earlier model projections were overestimated due to factors such as limited data and understanding of the virus at the beginning of the pandemic, rapidly evolving situations, and changes in human behavior. After almost three years of the pandemic, with all the medical knowledge we have gained of the SARS-Cov-2 virus and its variants, information on the public health measures that were implemented, and the epidemiological and public health data on the pandemic that are available, can we use mathematical models to retrospectively estimate the proportion of a population that were infected during a COVID-19 wave? Our study aimed to give an affirmative answer to this question, by demonstrating how simple mathematical models of COVID-19 of SIR type can be used to produce estimations of the proportion of infected population during the first COVID-19 wave in the Province of Alberta, Canada, during March-May of 2020. We analyzed daily new COVID-19 case and testing data during the period from March 5 - June 1, 2020 from Alberta Health and incorporated information on changes in public health measures related to COVID-19, such as social gathering restrictions, school closures, testing policies, quarantine and isolation, and contact tracing, to ensure accurate reflection in our model. Our modeling approach was also adapted to provide dependable long-term model projections for subsequent COVID-19 waves.