

Differential Impacts of the COVID-19 Pandemic on Sociodemographic Groups in England: A Mathematical Model Framework

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The Coronavirus disease-2019 (COVID-19) pandemic has had a great impact on the world, redefining how we work, respond to public health emergencies and control efforts, and sparking an increase in research efforts. The aim of this study is to understand the differential impacts of the COVID-19 Pandemic on sociodemographic groups in England, United Kingdom (UK), and to study the effectiveness of nonpharmaceutical interventions within social groups. We developed a deterministic, ordinary differential equation multi-risk structured model of the disease outcomes, with a focus on the total number of infections, reported cases, hospitalised individuals, and fatally ill people in the population. The model takes into account social mixing patterns within and between deprivation deciles, as well as time-dependent interventions (lockdown) to help observe the disease trajectory following the implementation of control measures. Our model was able to capture the significant difference between the total numbers of infected people and the number of confirmed cases reported.