# Abstract

Covid-19 is a highly prevalent contagious disease, with high fatalities. With the absence of a one bullet drug or vaccine, infected individual is highly likely to die within a short time. The transmission and progression of Covid-19 can be described using distinct stages, namely exposure and latency, infectiousness, and recovery with waning immunity or death. This implies that, mathematical model will place individuals into four compartments, that is, Susceptible (S), Exposed (E), Infective (I) and Recovered (R), representing a SEIR model. Due to its fast fatal capacity, changes in population due to births do not affect the disease dynamics, but for the purpose of monitoring deaths, a compartment for deaths (D) is incorporated. The analysis of intervention strategies necessitates modification of SEIR model to include Quarantine (Q), Isolation (I), and Homebased care (H) compartments. In this paper, Public health Education Campaign, Quarantine and testing, Isolation, Treatment, use of facemask and Social distance intervention strategies were analyzed. Numerical results indicated that the most responsive mitigation strategy is use of quality facemask and observance of social distance. At 90% adherence to this plan reduces the force of infection from $\beta=0.0197$ to $\beta=0.0033$. This will consequently reduce the basic reproductive ratio from $R_0=14.0362$ to $R_0=2.3388$, which prevents 99.37% of population from contracting the disease. However, it is shown that a combination of other intervention strategies have synergetic effect of bringing down reproductive ratio to less than one. Sensitivity analysis indicated that isolation and treatment of infected individuals in government facilities is the most effective method with elasticity of $v=-6.4$, but due to financial implications, the alternative homebased care need to be fortified. This means, for Covid-19 pandemic to die off, we require early identification of infected individuals through mass testing and immediate isolation. In order to optimize financial constraints associated with isolation, currently at $\alpha=11\%$, the threshold efficacy of other intervention strategies should be enhanced to; public health campaign $\epsilon > 50\%$, complacency $\xi < 30\%$, facemask quality $c > 89\%$, social distance $r > 2m$, and mass testing $\tau > 0.27$. With these interventions, it is estimated that the reproductive ratio, reduces to less than one after 225 days from the first occurrence of Covid-19, and the epidemic will then begin to decline gradually to insignificant levels.