Intermediate-level of governmental intervention: more intense interventions introduced by the government include social distancing, closure of sports, cultural and religious events, universities and schools, and the restriction of human mobility. The interventions lead to 10% isolation during January 21-February 20, 15% isolation during February 20-March 10, and 30% isolation from March 11 till June 20, 2020. This would result in a cumulative number of 11,000 deaths (95% UL: 4,500 – 21,600).

High-level of governmental intervention: interventions are more intense than scenario IV, but they still lack military interventions. The added interventions include ban of within/between city transportations, city quarantine, and isolation and contact tracing of suspected cases. The interventions lead to 10% isolation during January 21-February 20, 15% isolation during February 20-March 10, and 40% isolation from March 11 till June 20, 2020. This would decrease the cumulative number of deaths to 7,700 (95% UL: 3,200 – 15,000).

Conclusions

Interventions leading to increased isolation rate have a profound effect on the spread of infection and the number of associated deaths. Maximum interventions require harmonized intra/inter sectoral collaborations. The more severe the interventions become, the slower the incidence of the disease and the slope of the cumulative death curve will be.

To update our dynamic models, five scenarios were considered in which different levels and durations of intervention lead to different isolation rates. In each scenario, trend of COVID-19 cumulative death is modeled between January 21 and June 20, 2020.

Basic scenario (no interventions): No intervention by the government and the public is assumed, leading to 0% isolation. This would result in an exponential growth of deaths and a cumulative number of 113,000 deaths by June 20, 2020 (95% uncertainty level [UL]: 53,400, 200,000).

Only public attention: this would lead to 10% isolation, persisted uniformly throughout the abovementioned period. This would result in a decrease in the growth rate of deaths, but an exponential growth would still be present and result in a cumulative number of 33,000 deaths by June 20, 2020 (95% UL: 14,700, 62,000).

Minimum-level of governmental intervention: community education by the government is assumed; leading to 10% isolation during January 21-February 20, 15% isolation during February 20-March 10, and 20% isolation from March 11 till June 20, 2020. This would result in a cumulative number of 17,600 deaths (95% UL: 7,300 – 34,400).

COVID-19 Cumulative Death in Iran: an Update of the Dynamic Models

To update our dynamic models, five scenarios were considered in which different levels and durations of intervention lead to different isolation rates. In each scenario, trend of COVID-19 cumulative death is modeled between January 21 and June 20, 2020.

Basic scenario (no interventions): No intervention by the government and the public is assumed, leading to 0% isolation. This would result in an exponential growth of deaths and a cumulative number of 113,000 deaths by June 20, 2020 (95% uncertainty level [UL]: 53,400, 200,000).

Only public attention: this would lead to 10% isolation, persisted uniformly throughout the abovementioned period. This would result in a decrease in the growth rate of deaths, but an exponential growth would still be present and result in a cumulative number of 33,000 deaths by June 20, 2020 (95% UL: 14,700, 62,000).

Minimum-level of governmental intervention: community education by the government is assumed; leading to 10% isolation during January 21-February 20, 15% isolation during February 20-March 10, and 20% isolation from March 11 till June 20, 2020. This would result in a cumulative number of 17,600 deaths (95% UL: 7,300 – 34,400).

To the total number of hospitalized COVID-19 patients. ** Based on available data, we considered patients with death outcome, as well as those admitted to ICU or under mechanical ventilation as more severe cases. The information in this chart is based on hospitalized cases, and outpatients are not included in this calculation. Inclusion of outpatients and asymptomatic cases would decrease the proportion of severe cases. a To increase the sample size, analysis of death cases is done on the data in the last week.

Source: National Committee on COVID-19 Epidemiology, Ministry of Health and Medical Education, IR Iran