

Preventive Measurement against COVID-19 Spreading: Immigration Cessation, Office Closing, and Holiday Postponement—Simulation Analysis

Dear Editor,

Worldwide spreading of coronavirus disease (COVID-19) becomes an emergency problem globally. The control of disease needs good policy planning and the policies have to be properly adjusted to contexts in each setting. How to cut the chain of COVID-19 progression is a common question in disease control management. Several preventive measurements are proposed and might be applicable. Indeed, it is necessary to use systematic evaluation to appraise the efficacy of alternative preventive options for disease prevention and control.^[1] The common preventive measurements for COVID-19 include immigration cessation, office closing, and holiday postponement.^[2,3] Immigration cessation is the blockage of international connections that might be useful for controlling imported COVID-19 disease. If this method is selected before there is any emerged case in the country, it will be the most effective technique. Office closing, including school closing, is the method to control the public place that might be the common spreading place when the disease already occurs and locally spreads. Holiday postponement is another option that is based on the concept to prevent mass population movement within the country that might mean carrying disease from the big city to rural towns.

Here, the authors perform a simulation study using a mathematical modeling technique to assess the three mentioned preventive measurements in the context of Thailand, the second country in which the disease has existed since early January 2020. The situation analysis is based on the present situation in Thailand (3 months after the first occurrence of disease in Thailand) with 212 accumulated cases of COVID-19 (1 death case, 41 completely cured cases, 170 remained case; disease occurrence rate = 212/90 or 2.36/day and remission rate = 42/90 or 0.47 case/day). Regarding the occurrence of disease, 125 cases were imported cases giving the imported cases per overall cases ratio equal to 125:212 or 1:1.7 (importing rate = 125/90 or 1.39 case/day and local transmission rate = 82/90 or 0.91/day). The area of disease outbreak covers 26 from 76 provinces of Thailand (only Bangkok, the capital, has more than one patient). The density of cases per area in Bangkok and other areas is equal to 187/1569 case/km² and 25/511551 case/km². The density of cases per area in Bangkok and other areas is equal to 187/8.28 or 22.58 case/million population and 25/69.04

or 0.36 case/million population. Mathematical modeling simulation is done based on the previously described primary data applied with these primary assumption conditions: a) immigration cessation completely blocks imported cases, b) office closing completely blocks local spreading in a public place, and c) holiday postponement completely blocks mass population movement from the capital city outside (the estimated rate for movement out based on local data is 2,200,000 persons/day of the long holiday period and the longest holiday period is 5 days). Simulation is run for 1 month period. The results are shown in Table 1.

The combination of immigration cessation and office closing regardless of holiday postponement is the most effective solution for reducing overall numbers of COVID-19 cases. Nevertheless, if holiday postponement is applied to a combination of immigration cessation and office closing, there will be more COVID-19 cases in the capital, which means the increased density of cases in the small area of the capital. Holiday postponement without immigration cessation and office closing is the worst option for reducing overall numbers of COVID-19 cases and this alternative method results in the same number of COVID-19 cases as using no preventive measurement.

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Conflicts of interest

There are no conflicts of interest.

Table 1: Preventive measurement against coronavirus disease (COVID-19) spreading: Immigration cessation, office closing, and holiday postponement and corresponding expected number of cases

| Preventive measurement combination* | Expected number of cases | | |
|-------------------------------------|--------------------------|-------|---------|
| | Capital | Rural | Overall |
| None | 133 | 93 | 226 |
| A | 109 | 76 | 185 |
| A + B | 93 | 65 | 158 |
| A + B + C | 101 | 57 | 158 |
| B | 117 | 82 | 199 |
| B + C | 125 | 74 | 199 |
| C | 141 | 85 | 226 |

*A=Immigration cessation, B=Office closing and C=Holiday postponement

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