Evaluation of the US governors' decision when to issue stay-at-home orders

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Abstract

Rationale, aims and objectives In the US, the reluctance of the federal government to impose a national stay-at-home policy in wake of COVID19 pandemic has left the decision of how to achieve social distancing to individual state governors. We hypothesized that in the absence of formal guidelines, the decision to close a state reflects the classic Weber-Fechner law of psychophysics- the amount by which a stimulus (such as number of cases or deaths) must increase in order to be noticed as a fraction of the intensity of that stimulus. Methods On April 12, 2020 we downloaded data from the New York Times database from all 50 states and the District of Columbia; by that time all but 7 states had issued the stay-at-home orders. We fitted the Weber-Fechner logarithmic function by regressing the log2 of cases and deaths respectively against the daily counts. We also conducted Cox regression analysis to determine if the probability of issuing the stay-at-home order increases proportionally as the number of cases or deaths increases. Results We found that the decision to issue the state-at-home order reflects the Weber-Fechner law. Both the number of infections ($p=<0.0001$; $R2=0.79$) and deaths ($p<0.0001$; $R2=0.63$) were significantly associated with the decision to issue the stay-at-home orders. The results indicate that for each doubling of infections or deaths, an additional 4 to 6 states will issue stay-at-home orders. Cox regression showed that when the number of deaths reached 256 and the number of infected people were over 16,000 the probability of issuing "stay-at-home" order was close to 100%. We found no difference in decision-making according to the political affiliation; the results remain unchanged on July 16,2020. Conclusions when there are not clearly articulated rules to follow, decision-makers resort to simple heuristics, in this case one consistent with the Weber-Fechner law.

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