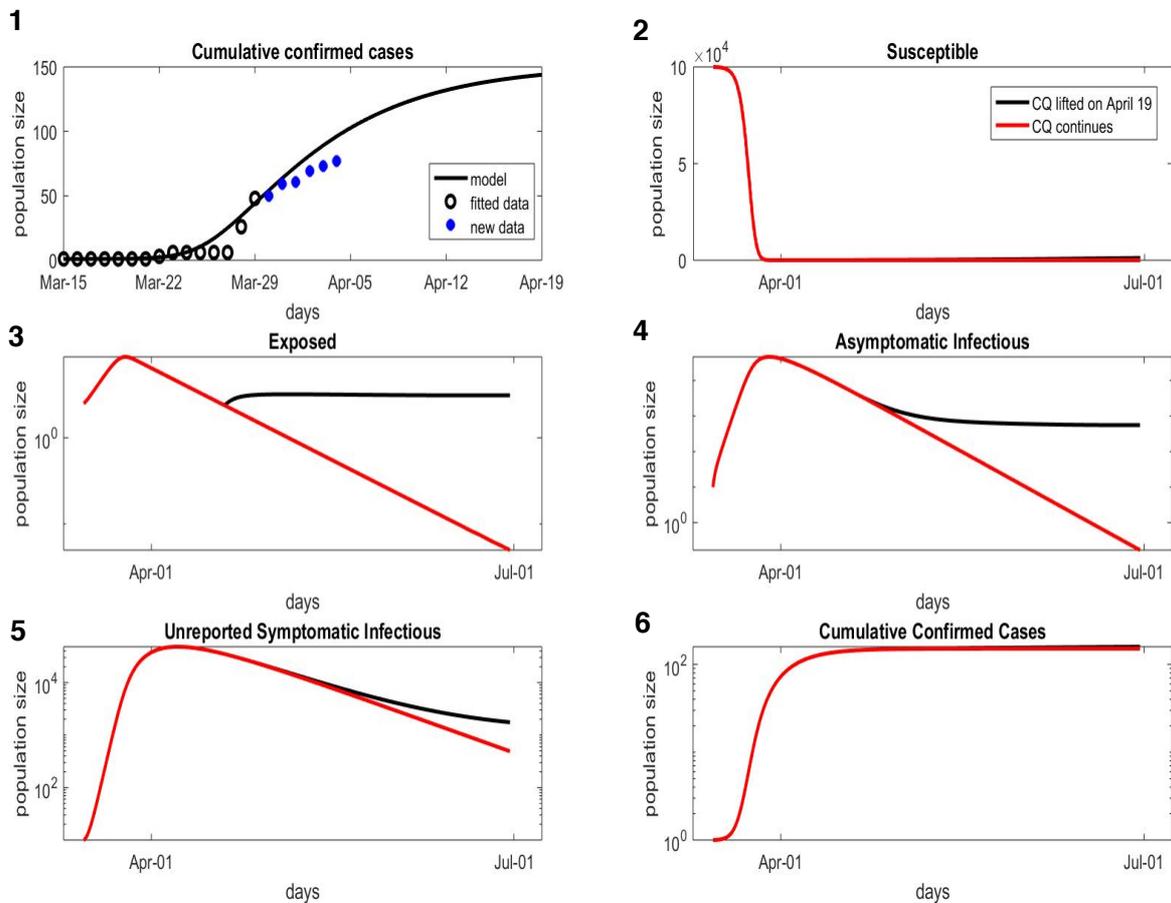# Davao City should consider extending community quarantine beyond April 19 and conduct more tests for COVID-19—UP Mindanao Researchers

(1) Fit of model to recorded cumulative confirmed data, from 15 March to 29 March 2020. New data points (from 30 March to 4 April 2020) are embedded to show model precision. (2-6) In other panels, projected population size of each subpopulation, in logarithmic scale, are derived by solving the model equations numerically to show different testing scenarios. SOURCE: Mata et al. (2020a)

A recent study by the Interdisciplinary Applied Modeling (IAM) laboratory of the University of the Philippines (UP) Mindanao recommends that "the local government should consider extending the community quarantine" beyond the April 19 end date of the community quarantine in Davao City. The IAM lab is part of the UP COVID-19 Pandemic Response Team – Bioinformatics and Modeling Group, which is mainly composed of mathematicians across the different UP campuses.

The team headed by Dr. May Anne Mata, an associate professor in applied mathematics specializing in mathematical biology, simulated a model to predict the effect of lifting the community quarantine on April 19 and July 1 based on parameter estimates obtained by fitting an epidemiological model to the cumulative confirmed cases in the Davao Region from March 15 to April 4.

The model has five population categories, namely, Susceptible (at risk to contract the disease), Exposed (infected but not infectious), Asymptomatic Infectious (without symptoms but infectious), Confirmed Cases (assumed isolated and will not infect the susceptible), and Unreported Infectious (includes only those with symptoms).

"When CQ [community quarantine] is lifted on April 19, the infected population will continue to persist . . . For instance, we see that the exposed population is stable from May to July after it peaks during the last week of March," the study finds. "However, if we maintain CQ at the status quo's rates of transmission and confirmation, we observe a decreasing trend in the number of exposed individuals around mid-May."

Dr. Mata, however, cautions that the model estimates are dependent on various assumptions and only show a possible, more likely scenario. Hence, predicting the appropriate lifting date is difficult and can only be accurately obtained by increasing the number of observations and updating parameter estimates.

"Lifting the quarantine prematurely is very risky. To be safe, perhaps we can extend the community quarantine for 14 days. If we get 0 new cases and 0 new PUIs [persons under investigation] within that period, then we can lift the community quarantine," Dr. Mata suggests.

The next phase of the study will fit the model on data within the duration of the enhanced community quarantine (ECQ) from April 4 to 19, covered by EO no. 23A series 2020, to see if the strategy is effective.

Extending the community quarantine, however, has an economic tradeoff, one that is difficult to model at this time. "We just don't have data on logistics like total budget of Davao City government for COVID-19 response, breakdown per barangay, cost of goods distribution, budget per household, just to name a few, to do a model on this. Also, this will require a different modeling strategy."
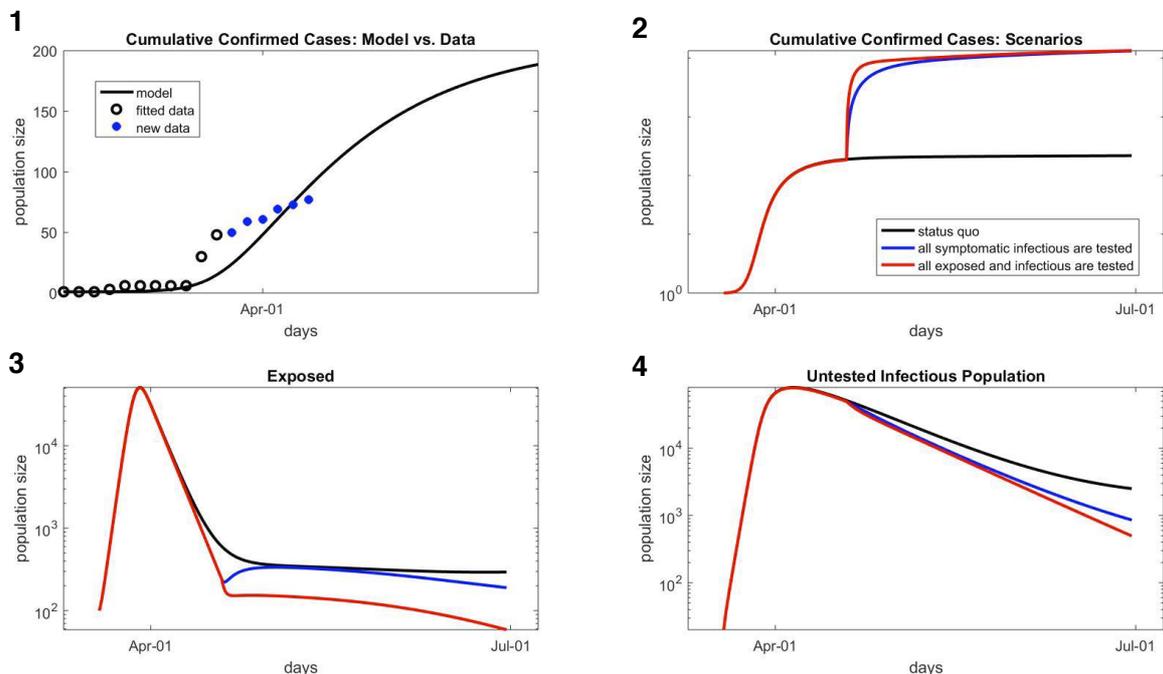

(1) Fit of model to recorded cumulative confirmed data, from 15 March to 29 March 2020. New data points (from 30 March to 4 April 2020) are embedded to show model precision. (2-4) In other panels, projected population size of each subpopulation, in logarithmic scale, are derived by solving the model equations numerically to show different testing scenarios. Note that the untested infectious population is the sum of asymptomatic infectious and unreported symptomatic infectious populations. SOURCE: Mata et al. (2020b)

Using the same data, another study by the team shows the importance of testing persons under monitoring (PUMs) and persons under investigation (PUIs). "We recommend that the government should consider testing more PUMs and/or PUIs in the region for early detection of infected population so that these individuals will be isolated immediately from the susceptible pool," the study states. This point is particularly important for asymptomatic individuals who may show no signs of disease but may freely and unknowingly spread the disease to the population.

In another study, researcher Zython Paul Lachica and other members of the IAM lab team collated available information from COVID-19 positive cases from the Department of Health within a 40-day observation period to assess the risk factors that increase a patient's hazard rate.

The study yielded the following preliminary findings: "Male COVID-19 positive patients are estimated to face a hazard rate of 12.79 times the hazard faced by female patients. Coughing patients face a hazard that is 28.35 times the hazard of those who have no cough. Furthermore, a patient with pre-existing condition"—such as hypertension, kidney problem, and/or diabetes—"may have a hazard rate of 2,838 times the hazard rate of patient without any preexisting conditions. On the other hand, patients who are 55 to 64 years old and 65 to 74 years old face hazard rates that are less than patients who are 75 years and older." It should be noted that these results are based on preliminary data, and the hazard estimates will be fine-tuned once more data becomes available.

Based on these findings, the study recommends prioritizing for testing patients who are 75 years and older and those with preexisting medical conditions once they experience coughing, persons under monitoring who might be asymptomatic patients, as well as those with high exposure to the COVID-19 positive patients such as health workers.
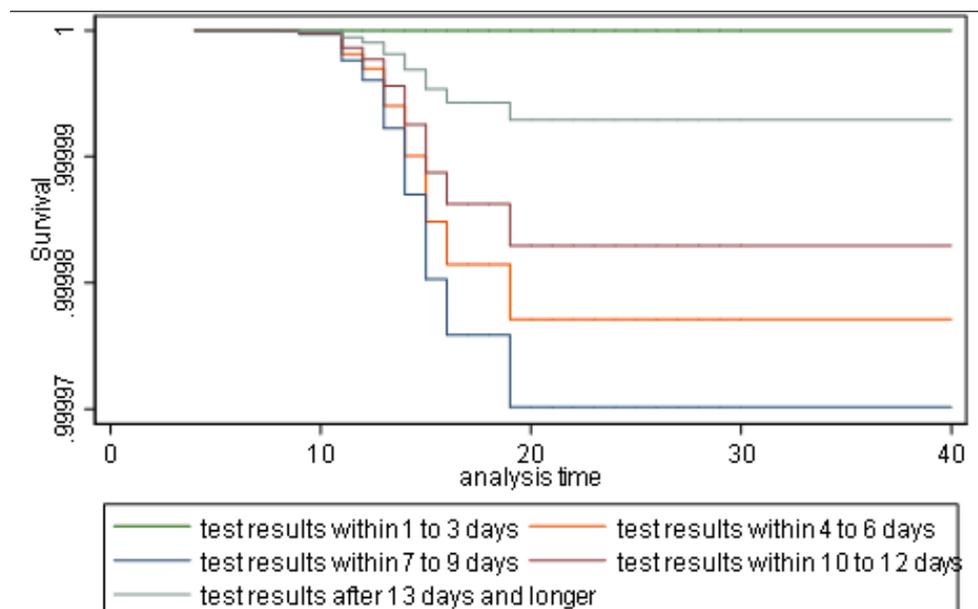
Estimated survival curves of COVID-19 positive patients in terms of test result duration.
SOURCE: Lachica et al. (2020)

Setting up more testing centers in the different regions is vital to contain COVID-19 cases as the study shows that "having test results within 1 to 3 days after the onset of symptoms reduces hazard rates to almost 0%." Survival rates decrease dramatically as the number of days before getting the test results increase.

The IAM lab was initiated by researchers from UP Mindanao's Department of Mathematics, Physics, and Computer Science to help the government in making science-based decisions. The three studies by the lab were already sent for review to the UP COVID-19 Pandemic Response Team and are freely shared to local decision makers as input for strategies.

Since last March, UP Mindanao through the Philippine Genome Center (PGC) Mindanao has entered into talks with the Department of Health XI, Davao del Norte LGUs, and the private sector to establish a COVID-19 testing laboratory that will be attached to the Davao Regional Medical Center (DRMC) in order to supplement the testing capacity of the Southern Philippines Medical Center (SPMC) in the Davao Region.

SOURCES

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For more information about the UP COVID-19 Pandemic Response Team:
https://www.up.edu.ph/covid-19-updates/#pandemic

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