

**Forecast Report No. 10
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***COVID-19 FORECASTS IN THE PHILIPPINES: NCR and CEBU as of June 8, 2020**

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KEY FINDINGS

1. As of June 8, 2020, the data shows an escalation in new Covid-19 cases in the Philippines, from an average of 222 new Covid-19 cases per day during Enhanced Community Quarantine (ECQ) in NCR, to 375 new cases per day during Modified Enhanced Community Quarantine (MECQ) in NCR, to 549 cases per day during General Community Quarantine (GCQ) in NCR.
2. The current reproduction number R_0 in the Philippines is still greater than 1, and measured at around 1.2 (based on the number of new case reports, and the test result reports). This indicates that the pandemic is still spreading and the curve has not yet flattened.
3. Of the 22,474 cases as of June 8, 8.3% or 1,855 cases are uncategorized, i.e. no region of residence is indicated. There are 1,105 repatriates (or 4.9% of the total number of cases) who tested positive for Covid-19.
4. Using the current value of R_0 , based on the current number of cases in the Philippines (including uncategorized cases) and assuming the trends continue, this projects to a total of 40,000 Covid-19 cases by June 30, with 1,850 deaths.
5. The reproduction number R_0 in the National Capital Region (NCR) is estimated between 0.96 and 1.19. Using the lower value of R_0 , this projects to 16,500 Covid-19 cases and 1,070 deaths in NCR by June 30. Taking into account the uncategorized cases, this projects to 20,500 Covid-19 cases and 1,200 deaths in NCR by June 30.
6. The reproduction number R_0 in the province of Cebu is estimated to be 1.96. Assuming trends continue, this projects to 11,000 Covid-19 cases and 90 deaths in the province of Cebu by June 30.
7. There is still a backlog of 6,359 cases, the difference between the number of individuals who tested positive, based on the reports of the testing centers, and the official number of cases in the Philippines.

BACKGROUND

On May 16, 2020, the National Capital Region (NCR) was placed under Modified Enhanced Community Quarantine (MECQ) after being under Enhanced Community Quarantine (ECQ) for two months. While community quarantine and curfews were still in effect, the relaxation allowed more sectors of the economy to open. In this report, we examine, using data from the Department of Health (DOH) from March 1 to June 8, 2020, the **effects of increased mobility on community transmissions**. We also would like to emphasize the following:

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1. The opinions and recommendations in this report, are those of the authors and contributors and do not reflect the position of the University of the Philippines.
2. A mathematical model is just a model and is at best an approximation of reality. Models are based on assumptions and observed data. A mathematical model is only as good as the data used in its calculations.
3. The period of the study is March 1 to June 8, 2020.
4. Testing typically requires 5 to 7 days until results are available.
5. The lag that occurs in reporting and identification of cases has a significant effect on the model. For example, delays in reporting cases may cause the transmission rate to artificially decrease over the short term, when it would actually have been much higher had there been no delay. The measured transmission rates assume accuracy and honesty of data, and any deviations in the data structure may cause calculations and forecasts in the model to change dramatically.

COVID-19 in the PHILIPPINES

Figure 1 shows the new Covid-19 cases in the Philippines from March 20 to June 8, 2020, based on data from the Department of Health (DOH). The figure shows an increase in the number of new cases beginning May 24. Figure 2 shows the average number of daily Covid-19 cases for the dates from April 1 to May 15, from May 16 to May 31, and from June 1 to June 8 (based on DateRepConf of DOH data, new data from the Department of Health was disaggregated according to the date of reporting of confirmed cases). The first period coincided with the implementation of Enhanced Community Quarantine (ECQ) in NCR, the second period coincided with implementation of Enhanced Community Quarantine (MECQ) in NCR, and the third period coincided with the implementation of General Community Quarantine (GCQ) in NCR.

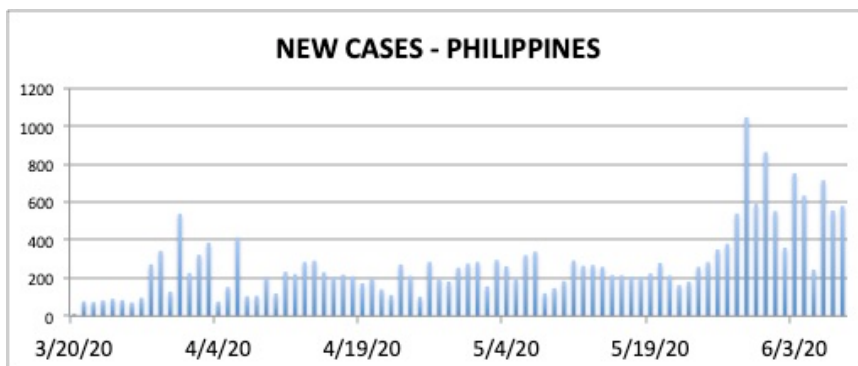


Figure 1. The number of new Covid-19 cases in the Philippines from March 20 to June 8.

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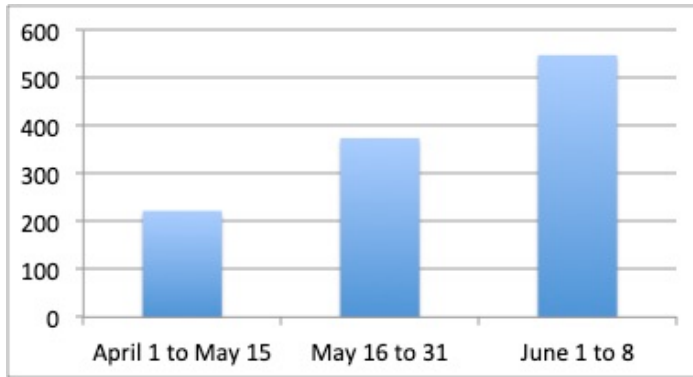


Figure 2. The average number of new Covid-19 cases per day in the Philippines for the periods: April 1 to May 15, May 16 to 31, and June 1 to 8. These dates coincided with the implementation of ECQ, MECQ, and GCQ, respectively, in NCR.

Figure 3 shows the aggregate test result data backlog for the Philippines, shown as the difference between the number of individuals who tested positive for Covid-19 and the official number of Covid-19 cases. As of June 7, 2020, the backlog accounts for 6,359 cases.

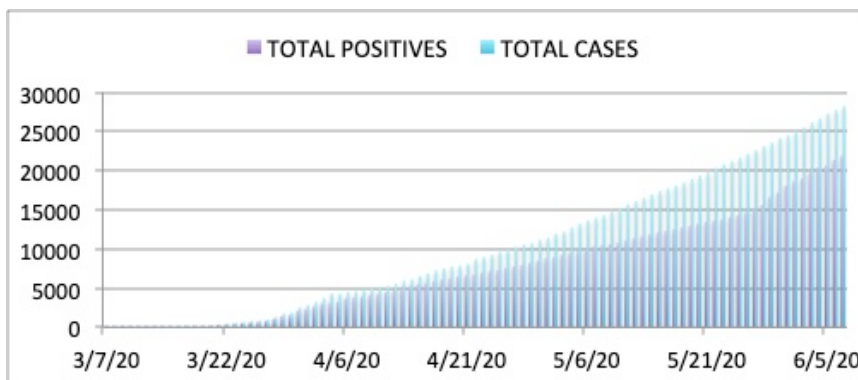


Figure 3. Total number of individuals who tested positive and the official number of Covid-19 cases in the Philippines, from March 24 to June 7. The difference between the two is the data lag of the Department of Health. As of June 7, 6,359 cases have not been validated.

Figure 4 shows the distribution of Covid-19 cases in the Philippines into the three geographical regions. The distribution also includes the number of repatriates (1,105 or 4.9%). NCR has the highest percentage of cases at 54.5%, followed by Visayas with 16.8%, the rest of Luzon with 12.8%, and Mindanao with 2.8%. There are 1,855 cases or 8.3% that are uncategorized, i.e. the region of residence of the case is not included. If repatriates and uncategorized cases are not included, NCR accounts for 62.7% of cases.

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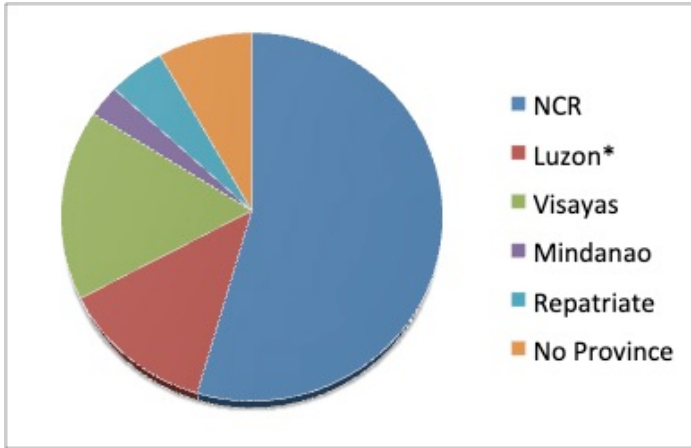


Figure 4. Distribution of all Covid-19 cases in the Philippines. NCR accounts for 54.5% of all cases, while the rest of Luzon accounts for 12.8%. Visayas accounts for 16.8% of cases while Mindanao accounts for 2.8% of all cases. There are 1,105 cases (4.9%) classified as repatriates, while 1,855 cases or 8.3% are currently uncategorized (i.e. it is not indicated the region of residence of the Covid-19 case, and it is not indicated if the case is a repatriate).

Figure 5 shows the 7-day moving average value of the reproduction number R_0 , which measures the spread of the pandemic. A value $R_0 < 1$ indicates the pandemic is slowing down and the curve is flattening, while $R_0 > 1$ indicates the pandemic is still spreading. The first estimate (blue) is based on the number of Covid-19 cases in the Philippines, while the second estimate (red) is based on the number of positive individual test results, which accounts for the backlog in data. Taking into account the backlog of 6,359 cases actually causes the spike in new cases to be distributed along the timeline. In both estimates, the current value of in the Philippines is around 1.2

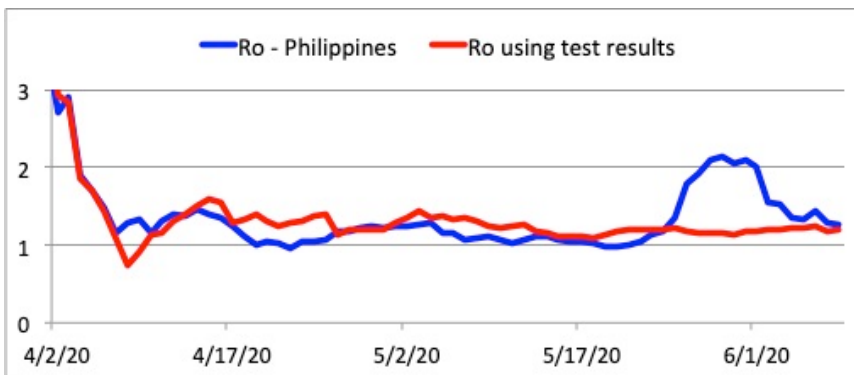


Figure 5. Reproduction number R_0 for the Philippines, shown as a 7-day moving average, based on the number of new Covid-19 case reports per day (blue) and the number of individuals who tested positive (red), which accounts for the backlog in data. A value of $R_0 < 1$ indicates the pandemic is slowing, while a value $R_0 > 1$ indicates the pandemic is still spreading. In both estimates, the current value of R_0 is around 1.2.

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Using the current reproduction number for the Philippines of $R_0 = 1.2$ (see Figure 5), the forecast for the number of Covid-19 cases, assuming a continuation of current trends, is a total of 40,000 Covid-19 cases by June 30, and 1,850 total deaths due to Covid-19. The projections are shown in Figure 6.

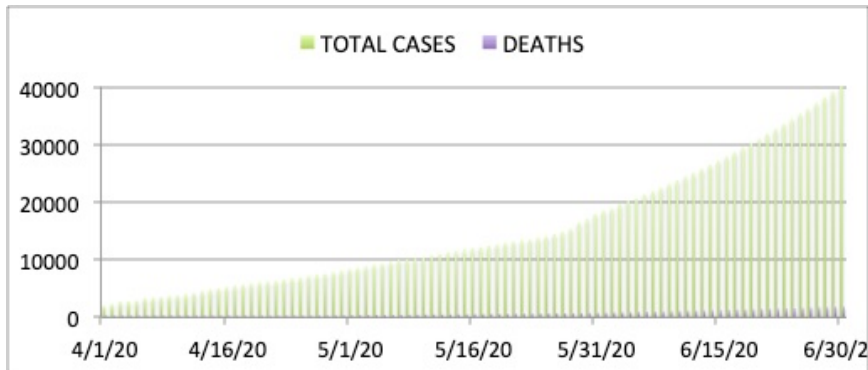


Figure 6. Forecasted number of Covid-19 cases and deaths in the Philippines, assuming the current reproduction number R_0 for the Philippines is maintained at 1.2 (see Figure 5). The projections show an increase in Covid-19 cases to 40,000 and 1,850 deaths by June 30.

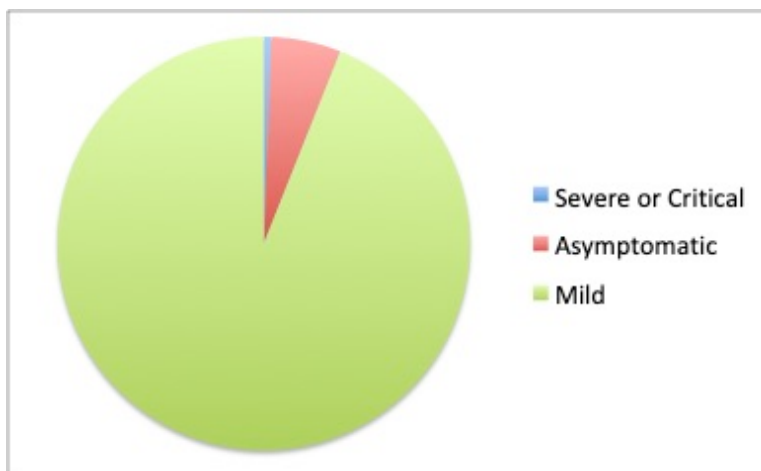


Figure 7. Distribution of active cases (total cases less recoveries and deaths) in the Philippines. The asymptomatic cases account for only 5.5% of all active cases, much less than the 30% to 70% reported in other countries. This opens the possibility that the official number of asymptomatic cases in the Philippines is underestimated.

Figure 7 shows the distribution of active Covid-19 cases (total number of cases less the number of deaths and recoveries) in the Philippines. As seen in the chart, only 5.5% of the active cases are asymptomatic. The trend in Covid-19 infections worldwide is that the proportion of asymptomatics is increasing and needs to be

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accounted for. There is a possibility that asymptomatic transmission is more rapid. In Italy and in China as of April 2020, it is estimated that 50 to 75% of cases were asymptomatic. This was not the case at the start of the pandemic where the estimate was at most 30% asymptomatic. The present Philippine estimate is likely an underestimate. To verify this, testing a wider population sample should be done. This is needed to be able to manage future surges in infection and identify low risk sectors of the population who can work and those at higher risk who need to be confined to their residences. Asymptomatic cases may have contributed to the increase in the number of NCR cases.

COVID-19 in the NATIONAL CAPITAL REGION

Around 60% of all active Covid-19 cases are in the NCR. The reproduction number R_0 in NCR was estimated based on confirmed cases in NCR. A second estimate of R_0 assumed that 50% of uncategorized cases (currently at 1,855 cases in the Philippines) are in NCR. The estimates are shown as a 7-day moving average in Figure 8. The current value of R_0 in NCR is 0.96, which is less than 1. If half of uncategorized cases are included in the calculations, the current estimate of R_0 is around 1.2, around the same value in the Philippines.

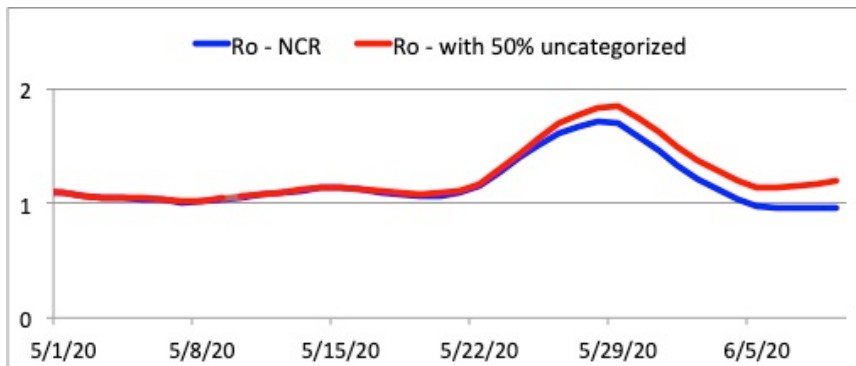


Figure 8. Reproduction number R_0 for NCR, shown as a 7-day moving average, based on the number of new Covid-19 case reports per day (blue). The second estimate assumes half of uncategorized cases are in NCR (red). In the first estimate, the current value of R_0 is around 0.96, while in the second estimate, the current value of R_0 is around 1.2, approximately the same value in the Philippines.

Two projections are shown in Figure 9. The first projection uses the current number of Covid-19 cases in NCR and assumes that the current value of the reproduction number R_0 is maintained at 0.96. The second projection includes half of the 1,855 uncategorized cases and assumes that the reproduction number R_0 is maintained at 1.2. The first forecast projects a total of 16,500 cases and 1,070 deaths in NCR by June 30. The second forecast projects 20,500 cases and 1,200 deaths in NCR alone by June 30.

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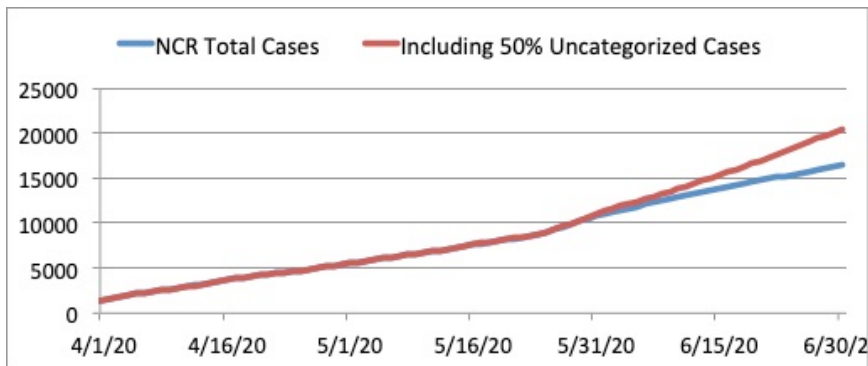


Figure 9. Forecasted number of Covid-19 cases in NCR. The first forecast uses the reported number of cases in NCR and assumes the current value of R_0 is maintained at 0.96. The second forecast assumes that half of the 1,855 uncategorized cases in the Philippines are in NCR, and assumes that the current value of R_0 (with half the uncategorized cases) is maintained at 1.2. The first projection leads to 16,500 cases and 1,070 deaths in NCR by June 30. The second projection shows 20,500 cases and 1,200 deaths by June 30.

HOSPITAL RECOVERY RATE IN NCR

Figure 10 shows hospitalization data reported by hospitals to the Department of Health, showing the number of patients currently admitted in hospital wards (red), the number of patients admitted who recovered (green), and the number of patients admitted who died (blue), from March 6 to June 9. As shown in the figure, the number of patients currently admitted in hospitals in NCR has decreased, lessening the current burden to hospitals. The current hospital load in NCR is 1,200 admitted patients. The hospital recovery rate (number of patients admitted who recovered) and hospital mortality rate (number of patients admitted to hospitals who died) are shown in Figure 11. The recovery rate has increased to almost 50%. While the hospital mortality rate is currently at 15%.

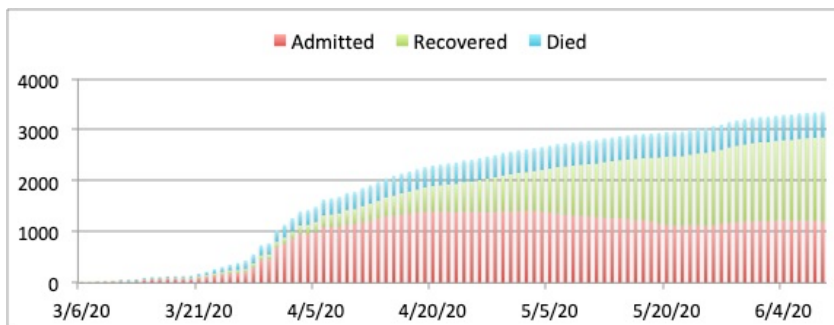


Figure 10. Number of Covid-19 cases in NCR who are currently admitted in hospitals (red), who recovered after being admitted to a hospital (green) and who died after being admitted to a hospital (blue). The current hospital load in NCR is 1,200 Covid-19 patients.

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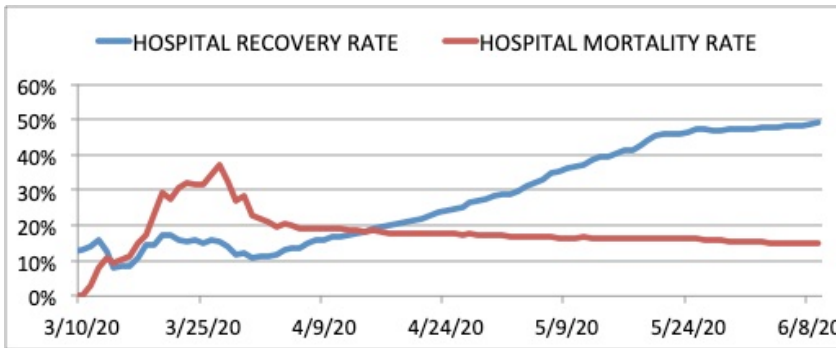


Figure 11. Hospital Recovery Rate (fraction of those admitted to hospitals who recovered) and Hospital Mortality Rate (fraction of those admitted who died) in NCR, from March 10 to June 9. The hospital recovery rate is at 50%, while the hospital mortality rate is at 15%. The hospital mortality rate is higher than the mortality rate for Covid-19 due to the higher proportion of severe and critical cases admitted to hospitals.

COVID-19 in CEBU PROVINCE

The province of Cebu is the second major battleground in the fight against Covid-19. Figure 12 shows the reproduction number R_0 (as a 7-day moving average) in the province of Cebu. Although this value has decreased to below 1 by May 20, a surge in new cases, and increased testing have caused the value of R_0 to increase again to 2. This puts the province of Cebu in the high-risk classification once again. Assuming that the value of R_0 is maintained, the forecast for Cebu province shows 11,000 cases and 90 deaths by June 30. The province of Cebu, specifically the metropolitan areas, will need to implement measures to reduce community transmissions and control the spread of the pandemic.

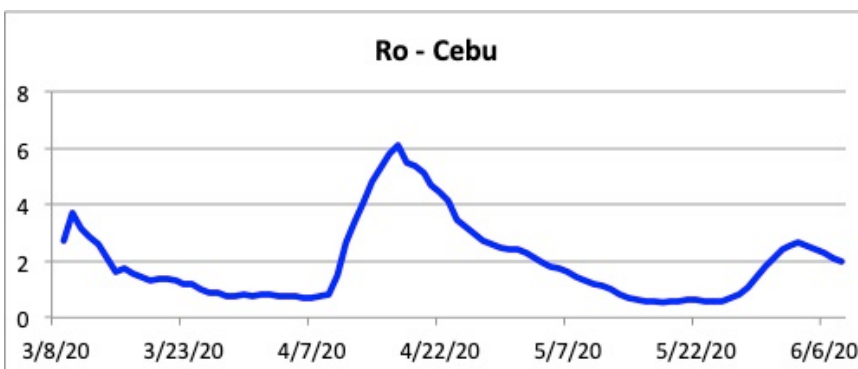


Figure 12. Reproduction number R_0 for Cebu province, shown as a 7-day moving average, based on the number of new Covid-19 case reports per day. The current value of R_0 is around 2. Assuming that this value of R_0 is maintained, the province of Cebu is on track for 11,000 Covid-19 cases and 90 deaths by June 30.

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SUMMARY AND RECOMMENDATIONS

1. We are still in a situation where there is **significant community transmission in the Philippines**. Our estimate of the reproductive number of the virus in the **country is around 1.2**. Assuming that the reproduction number, R_0 remains and there is no significant change in the interventions and strategies by government, based on our projections, by June 30 there could be an escalation to 40,000 cases and 1,850 deaths. In our view, this represents a significant increase that needs to be examined and given appropriate and immediate response by the government. If the progressive increase continues, we could possibly experience exponential growth in the number of cases and deaths seriously compromising our collective efforts to contain the virus.

While the increase in reproduction number R_0 is a cause for concern, it is not a reason for all of us to panic. The situation is still manageable. Our health system is not about to be overwhelmed. The period under ECQ and MECQ has allowed the government to scale up some capacity to deal with the pandemic. But we need to intensify efforts. This requires a timely and appropriate response from the government and the continued support and cooperation of civil society and the private sector.

2. Given that the data received from the DOH appears to have a lag, the current reproduction number R_0 in NCR is estimated between 0.96 and 1.2. The latter number assumed that 50% of currently uncategorized cases are in NCR. This classifies the **NCR as a medium to high-risk area**. The number of new Covid-19 cases needs to decrease for 14 days as per international health policy consensus. That there is an observed disconnect between declining trends in R_0 and in the rise and fall of new cases reveals a data reporting problem. The processing of uncategorized cases will likely reveal the real relationship of R_0 and decreasing cases which should be correlative with each other, a decrease of R_0 and new cases go together.

The projection for NCR is 16,500 cases and 1,070 deaths by June 30. If half of the uncategorized cases are included, the projection is 20,500 cases and 1,200 deaths by June 30.

In Cebu province, the current reproduction number R_0 is almost 2. This classifies **Cebu as a high-risk area**, which means the Covid-19 virus is still spreading in the province. This should be a cause for concern for both the national and the local government of Cebu.

To this end, we recommend that the government review its strategies for social distancing and other health protocols in NCR and Cebu. The easing of quarantine

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restrictions must be matched with tighter monitoring, stricter social distancing, and the wearing of PPEs (masks and other protective equipment) and increased testing and surveillance as the working population begins to increase their exposure.

Without continued vigilance on the part of the government, private sector, civil society, and citizens, the continued relaxation of restrictions in the NCR and in Cebu may lead to the pandemic getting out of control. If both national and local governments fail to provide a prompt and adequate response, all the societal and financial sacrifices of society could be wasted, and we will likely experience another wave. This may lead to yet another round of more stringent restrictions, which could be harder for the government to implement and will likely undermine economic recovery.

3. The National Government must maintain its capability to employ its full spectrum of protocol options to effectively respond to the continuing Covid-19 pandemic. The government must ensure that the gains of the past two months be sustained. To this end, we reiterate our recommendation that the government provide a transparent and effective mechanism for placing further restrictions in provinces or cities, should the threat of an outbreak become apparent. Further, we recommend the adoption of a Covid-19 alert level system similar to that of the United Kingdom that will be easy for the public to understand and follow.

We have made significant progress in testing partly seen in the increased number of cases detected. The treatment has also improved with the decline in mortality and an increase in the recovery of Covid-19 cases. We laud the government for these initial successes. We recommend to the government to urgently scale up the other aspects of the test, trace, and treat strategy especially in the fast-tracking of accreditation of Covid-19 laboratories and deployment of information systems and other interventions to improve the Turn Around Time (TAT) of our testing centers.

4. Further, in its effort to scale up capacities of our health system, the government must ensure the following: (1) increased capacity of the national health care system to deal with the potential outbreaks, (2) enough testing capability, including maximization of increased capacity, to cope with the expected increase in cases, (3) enough PPE supplies for our front-liners, and (4) effective and aggressive contact tracing.

On contact tracing, we laud the government's announcement that it will augment the 38,000 contact tracers employed by LGUs by hiring additional 126,000 contact tracers. This move will bring us to the ideal ratio of one contact tracer for

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every 800 people. While delayed, it is still an important move given the increase in Covid-19 community transmission.

We also need an aggressive and decentralized contact tracing strategy to flatten the curve. Local governments will be the first to feel the impact of any change in quarantine protocols and should be at the forefront of contact tracing. For instance, Baguio City is a model for contact tracing. The keys to Baguio's success are the 4Cs of Collaboration, Coordination, Cooperation, and Communication. The government should roll out the Baguio contact tracing model nationwide.

5. We exhort the Department of Health (DOH) to urgently resolve issues regarding the accuracy and timeliness of its data on Covid-19 cases in the country. To date, there still exists a significant backlog of 6,359 unvalidated cases and 1,855 uncategorized cases in the DOH Covid-19 database. If not urgently resolved, these significant and continuing challenges regarding DOH Covid-19 data will undermine not just the government's ability to monitor spread of the virus but also hamper its ability to implement appropriate and timely responses to manage the pandemic on the ground. Without accurate and accessible DOH data on Covid-19, our national and local government officials as well as other stakeholders will not be able to make decisions crucial to managing the pandemic.

To this end, we laud the Department of Health for addressing backlogs in the validation of positive Covid-19 cases by installing the COVID-KAYA, a new case and contact tracing reporting system for epidemiology and surveillance officers, health care providers, and laboratory-based users, which will address the issues previously encountered. We recommend that the DOH fast-track these initiatives to improve data management, quality, and access, which is crucial for decision-making during the pandemic.

6. Given the resumption of activities, the private sector especially businesses must also step-up their efforts to complement the initiatives of government including ensuring safety in workplaces, providing testing as needed, and operationalizing policies to facilitate contact tracing in the workplace. The cooperation of our business establishments will significantly reduce the risk of workplace transmission while jump-starting economic recovery.

The increase poses a new occupational hazard for the workforce as they return to their jobs, hence guidelines must be quickly made and recommended by the labor sector to mitigate the spread of Covid-19 from workplace to home and vice versa. The Department of Health algorithm for clearing for return to work found in Annex A of the DOH Joint Administrative Order 2020-0001 should be effectively communicated to occupational health professionals.

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7. The whole of government or whole of nation approach to the Covid-19 pandemic continues to be an effective and viable strategy to manage the health crisis. This being said, a key institution in the whole nation approach is the Local Government Unit (LGU). The LGU system will be the key implementor of the national government strategy and program to fight Covid-19. It is against this backdrop, that the national government, through the support of Congress, must enable and empower LGUs by allocating more resources, expertise and capacity, especially at the Barangay level. To this end, a greater share of the stimulus package and in the national budget must be allocated for LGUs to enable them to implement the national strategy to fight Covid-19 and realize their goal of creating “safe communities” around the country.

The government must re-examine and re-calibrate its strategies to ensure that the transmission does not increase beyond the capacity of the health care system to respond. Further resumption of economic activities is a major decision that should be made with a clearer picture of the pandemic based on accurate data.

As the government continues a calibrated and gradual reopening of the economy, it is incumbent among individuals to exercise their citizenship and leadership to ensure that health guidelines are implemented such as social distancing, the wearing of masks, and proper hygiene. As we reopen, everybody becomes a front liner in the cause of managing the pandemic. What we do as individuals is important to ensure that the efforts of the government in fighting the pandemic succeed. Let us not forget that the pandemic is still here and it still remains a threat to public health. We still have a lot to do. With the cooperation and collaboration of government, business, civil society, and each and every Filipino, we are on our path to overcoming the pandemic.

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For questions or clarifications related to the technical or other aspects of this policy note, please send an email to [gdavid@math.upd.edu.ph](mailto:g david@math.upd.edu.ph).

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