

Forecast Report No. 7
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COVID-19 FORECASTS IN THE PHILIPPINES: Post-ECQ Report

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INTRODUCTION

It is now exactly two months since Enhanced Community Quarantine (ECQ) was implemented by President Rodrigo Duterte on the island of Luzon. Our first report on the Covid-19 pandemic in the Philippines was published on April 8, 2020. Since then, we have published a total of 7 reports. Several provinces have now transitioned to General Community Quarantine (GCQ), while those regions with the highest risk of spreading the pandemic have been moved to a Modified ECQ (MECQ). In this paper, we examine Covid-19 cases in key provinces and LGUs in the Philippines, based on data from the Department of Health.

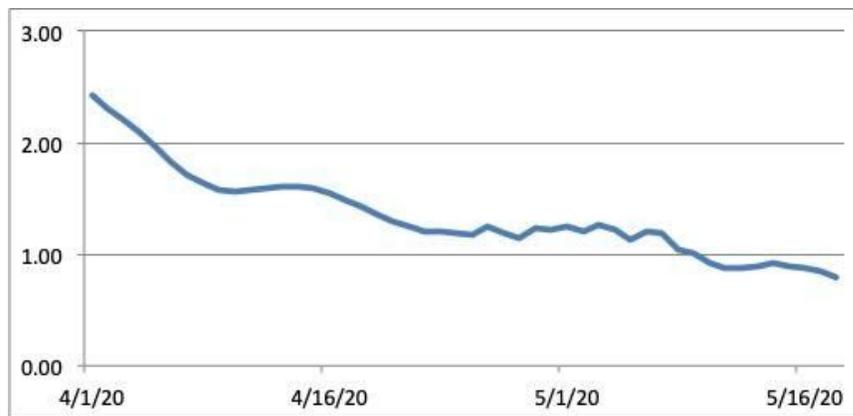


Figure 1. Reproduction number R for the entire Philippines from April 1, 2020 to present. Plotted is the 7-day re-filtered moving average of R .

Figure 1 shows the reproduction number R for the entire Philippines from April 1 to May 16, plotted as a re-filtered 7-day moving average. The reproduction number R measures the rate of spread of Covid-19. A value $R > 1$ indicates that the pandemic is spreading and the number of new Covid-19 cases is increasing, while $R < 1$ indicates this number is decreasing. The reproduction number R has been decreasing since April 1, from 2.5 to less than 1 currently. The decrease in the reproduction number may be solely attributed to the Enhanced Community Quarantine (ECQ), despite some challenges the nation faced with regard to mass testing and contact tracing. On the other hand, the nationwide trend only shows the average for the entire country. Trends vary according to region, province and LGU. It is towards this end that there has always been a need for more granular analysis of the pandemic. In the next sections, we look at the trends in specific provinces and LGUs in the Philippines that are currently under ECQ, MECQ and GCQ.

COVID-19 CASES IN THE NATIONAL CAPITAL REGION (NCR)

Among the more than 12,000 Covid-19 cases in the Philippines, 64% were reported in the National Capital Region. As of May 16, 2020, NCR is still under the Modified Enhanced Community Quarantine. In many LGUs in NCR, the number of cases per week is still increasing. For convenience in the presentation of results, the LGUs were grouped into three: the LGUs with the most number of Covid-19 cases in NCR (Group A), to the LGUs with the least number of Covid-19 cases (Group C), and those in between (group B).

Group A: Quezon City, Manila, Paranaque, Makati, Mandaluyong and Pasig.

Group B: Taguig, Caloocan, Pasay, San Juan, Las Pinas and Muntinlupa.

Group C: Marikina, Valenzuela, Malabon, Navotas and Pateros.

Figure 2A, 2B and 2C show the number of new Covid-19 cases per week. “This week” is the number of Covid-19 cases for the week from May 10 to 16; “Previous week” consists of new Covid-19 cases for the week from May 3 to 9; “2 weeks ago” gives the number of new Covid-19 cases for the week from April 26 to May 2. There was an increase in week-to-week new Covid-19 cases for Mandaluyong, Pasig, Taguig, Pasay, Las Pinas, Muntinlupa, Marikina, Valenzuela and Pateros. On the other hand, there was a decrease in the number of new Covid-19 cases as of the most current week for Quezon City, Manila, San Juan, Malabon and Navotas. Due to expected time delays in reporting current data (see our Report No. 6 and 6b), the number of new Covid-19 cases for the week May 10 to 16 may still increase as new data comes in.

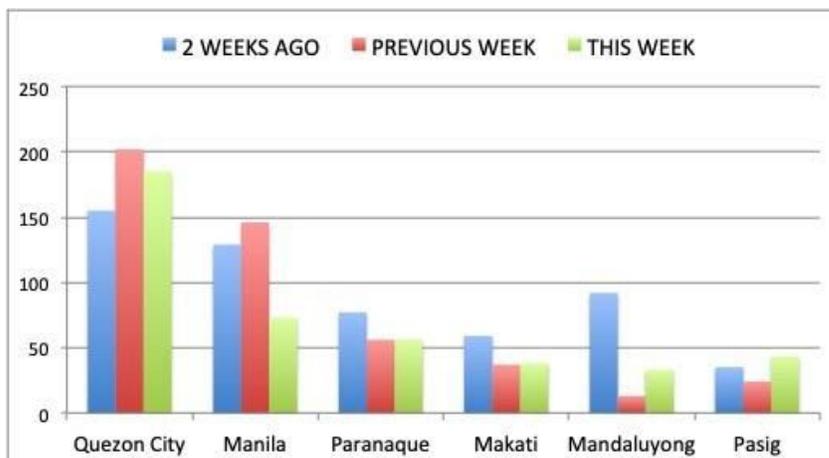


Figure 2A. Week-to-week Covid-19 cases for May 10 to 16 (this week), May 3 to 9 (previous week) and April 26 to May 2 (2 weeks ago) for NCR Group A. Pasig and Mandaluyong had increases in new Covid-19 cases from the previous week.



Figure 2B. Week-to-week Covid-19 cases for NCR Group B. Taguig had the largest increase in weekly Covid-19 cases. Pasay, Las Pinas and Muntinlupa also had increases in new cases compared with the previous week. San Juan had a decreasing trend in new Covid-19 cases.

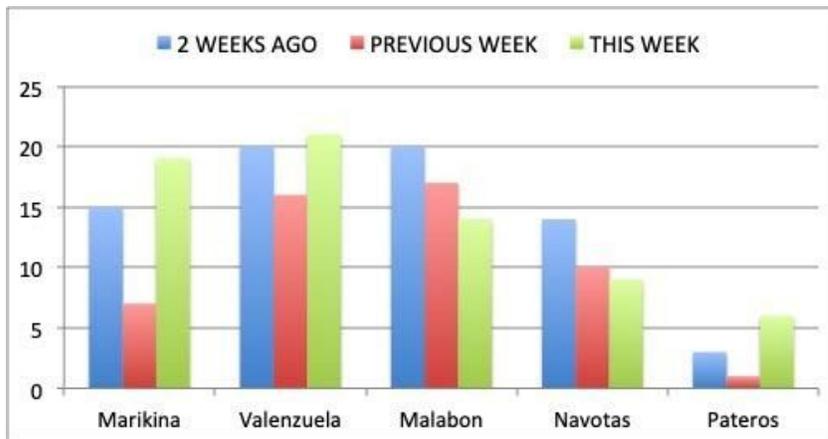


Figure 2C. Week-to-week Covid-19 cases for NCR Group C. Marikina, Valenzuela and Pateros had increases in new Covid-19 cases compared with the previous week. Malabon and Navotas both had decreasing trends in new Covid-19 cases.

Figures 3A, 3B and 3C show the average daily number of new Covid-19 cases for the week from May 10 to 16, given per million of population (note: the 2020 population of each LGU was extrapolated from 2010 to 2015 population data). As mentioned in our Report Number 6 and 6b, a benchmark for measuring the state of the pandemic in a region, province or LGU is 1 new Covid-19 case per day per million of population. A value less than 1 is excellent and indicates low risk of a pandemic. A

value greater than 1 indicates medium to high risk of a pandemic. A high number of new cases pose a risk to the LGU's health care facilities of becoming strained due to the higher proportion of the population being afflicted with Covid-19.

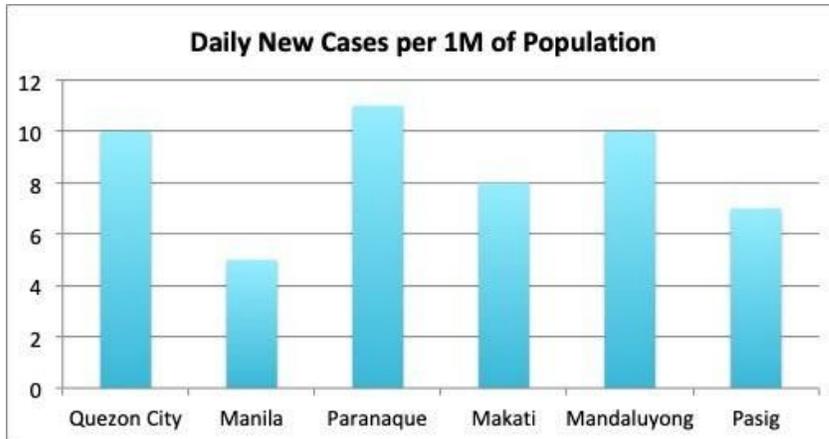


Figure 3A. Number of new Covid-19 cases per day per million of population for the week of May 10 to 16 for NCR Group A. A low risk assessment is given if this number is 1 or below.

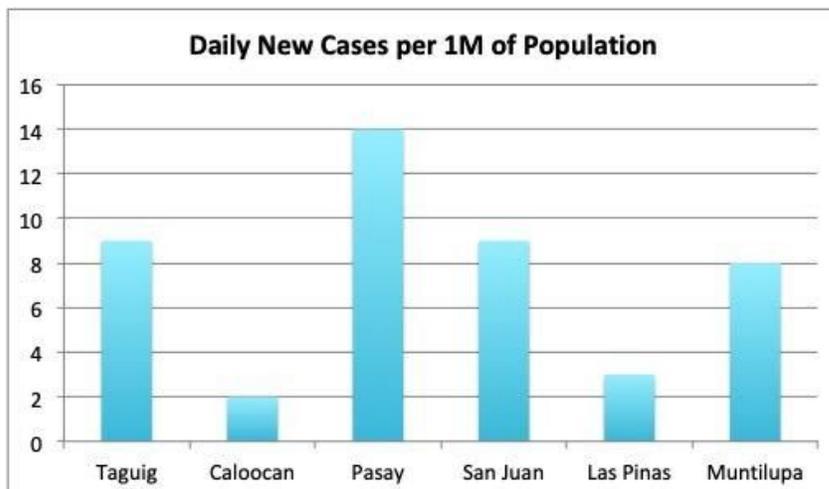


Figure 3B. Number of new Covid-19 cases per day per million of population for the week of May 10 to 16 for NCR Group B.

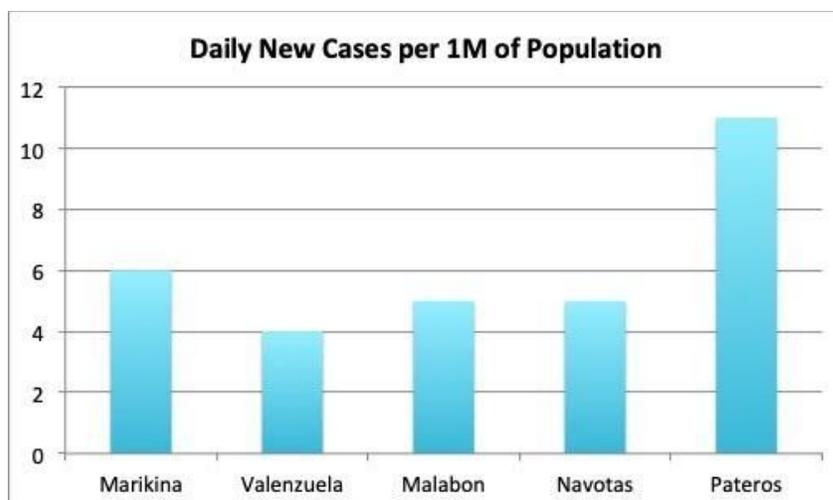


Figure 3C. Number of new Covid-19 cases per million of population for the week of May 10 to 16 for NCR Group C.

As shown in the figures, the highest number of new Covid-19 cases per million in NCR are in Pasay, Paranaque, Pateros, Quezon City and Mandaluyong – all these LGUs reported at least 10 new Covid-19 daily cases per million of population during the past week. On the other hand, Caloocan, Las Pinas and Valenzuela all reported less than 4 new daily cases of Covid-19 per million of population during the week from May 10 to 16.

Table 1 presents the number of Covid-19 cases and deaths in each LGU using current data (May 16), and our forecasts for June 15, 2020. For each LGU, the current levels in transmissions were used to make projections for the next 30 days. The projections assume trends continue, i.e. there is a continued implementation of ECQ. Any modifications in ECQ may cause an increase in the number of total cases and deaths.

Table 1. Projected numbers for NCR LGUs for June 15, assuming ECQ is in place and transmissions continue based on their current trends. The numbers do not include almost 1,000 pending cases in NCR (for validation, etc.) in the DOH database.

	Actual Cases (May 16)	Actual Deaths (May 16)	Projected Cases (June 15)	Projected Deaths (June 15)
Caloocan	293	29	380	40
Las Pinas	220	14	260	18
Makati	542	33	680	44
Malabon	82	7	135	13
Mandaluyong	540	35	640	44
Manila	1009	82	1320	117
Marikina	158	18	205	26
Muntinlupa	214	24	340	43
Navotas	57	9	65	12
Paranaque	569	46	745	66
Pasay	295	18	455	30
Pasig	400	48	520	70

Pateros	31	2	50	3
Quezon City	1796	154	2540	240
San Juan	272	35	280	40
Taguig	358	13	550	20
Valenzuela	145	9	215	14
NCR	6981	576	9380	840

COVID-19 CASES IN CEBU CITY, MANDAUE CITY AND LAGUNA

We now look at data of Covid-19 cases in Laguna, Cebu City and Mandaue City – the areas that are still under ECQ. In addition, we include in the list Batangas, Davao City and Zamboanga City, for the reason that these provinces and LGUs still have a significant number of new Covid-19 cases and are worth including in the study.

Figure 4 shows the number of new Covid-19 cases over the past 3 weeks: May 10 to 16 (This week), May 3 to 9 (Previous week) and April 26 to May 2 (2 weeks ago) for Batangas, Cebu City, Davao City, Laguna, Mandaue City and Zamboanga City. Cebu City still sees many new Covid-19 cases, although the trend has decreased as of the most current week. Batangas and Laguna saw slight increases in new Covid-19 cases. Zamboanga City, on the other hand, saw an increase from 0 new Covid-19 cases for the week April 26 to May 2, to 77 for the week May 10 to 16. Zamboanga City must be monitored closely to ensure that the pandemic does not spread. If we are not careful, the city may follow the state of pandemic in Cebu City.

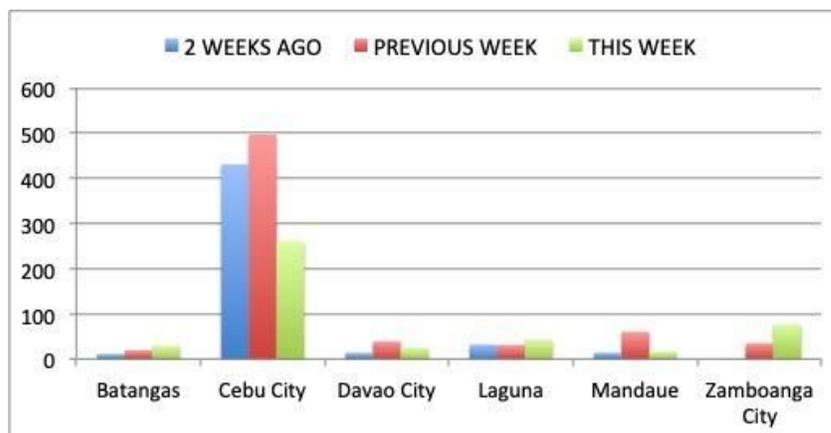


Figure 4. Number of new Covid-19 cases for the week of May 10 to 16 (newest), May 3 to 9 (previous) and April 26 to May 2 (2 weeks ago) for Batangas, Cebu City, Davao City, Laguna, Mandaue and Zamboanga City. There is an increasing trend of new Covid-19 cases in Zamboanga City.

Figure 5 shows the average daily number of new Covid-19 cases for the week from May 10 to 16, given per million of population. Batangas has 1.5 new Covid-19 cases per day per million of population, while Laguna and Davao City have 2 new cases per day per million of population. On the other hand, Cebu City and Zamboanga City both had more than 10 new cases per day per million of population.

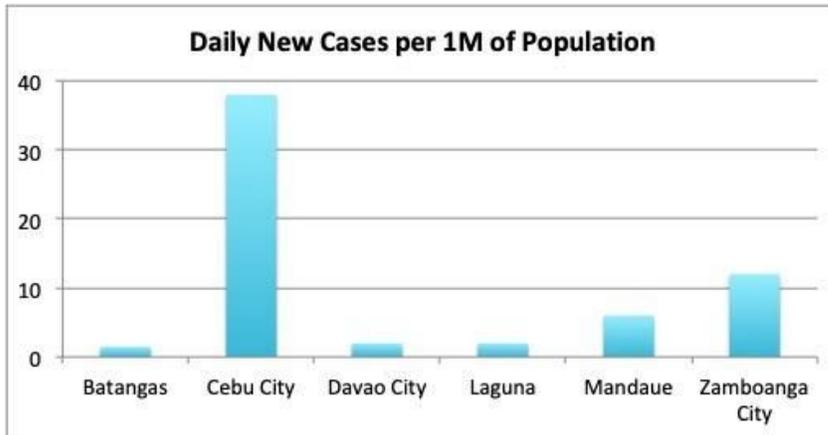


Figure 5. Number of new Covid-19 cases per million of population for the week from May 10 to 16 for Batangas, Cebu City, Davao City, Laguna, Mandaue and Zamboanga City. Cebu City and Zamboanga City both have very high numbers, greater than 10 new cases of Covid-19 per day per million of population. Batangas has a value of 1.5, while both Davao City and Laguna have 2 new Covid-19 cases per day per million of population.

Figure 6 shows the average reproduction number R for the week from May 10 to May 16. The value of R for Cebu City has decreased below 1. This is a positive sign and shows the trend for new Covid-19 cases is decreasing. However, the raw numbers are still very high, (see Figure 5), and Cebu City needs to reduce the number of new Covid-19 cases even further. Laguna and Mandaue also have $R < 1$. Davao City and Batangas both have values of R just greater than 1 due to slightly increasing trends (based on the day-to-daily reports). On the other hand, Zamboanga City has a very high value of R , which indicates the numbers are escalating, and care must be taken to prevent the pandemic from spreading further. Zamboanga City needs to be closely monitored.

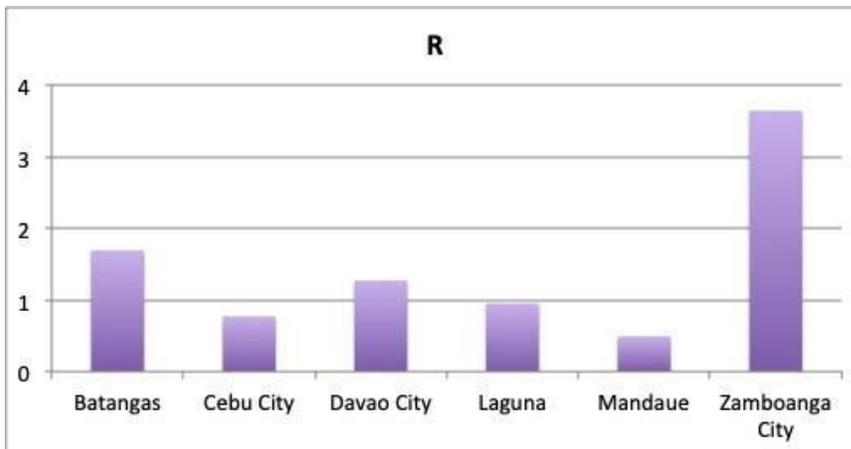


Figure 6. Average reproduction number R for the week of May 10 to 16 for Batangas, Cebu City, Davao City, Laguna, Mandaue and Zamboanga City. Zamboanga City has a large R , indicating Covid-19 is spreading in that area.

Table 2 presents the forecasts for June 15 for these provinces and LGUs. The forecasts used current data (May 16) for cases and deaths, and projected the trends for 30 days. In the case of Zamboanga City, a transmission rate that was decreasing each day was assumed. Cebu City and Zamboanga City need to be monitored closely, and measures should be put in place to prevent the spread of the pandemic.

Table 2. Projected numbers for Batangas, Cebu City, Davao City, Laguna, Mandaue and Zamboanga City for June 15, assuming transmissions continue based on their current trends. In the case of Zamboanga City, a steady decline in daily transmission rates was assumed.

	May 16 Cases	May 16 Deaths	June 15 Cases	June 15 Deaths
Batangas	145	14	315	34
Cebu City	1544	15	2485	29
Davao City	187	22	310	44
Laguna	410	11	610	17
Mandaue	100	2	135	3
Zamboanga City	121	2	950	17

RISK LEVELS OF PROVINCES AND LGUs

Using the calculated values of R and the number of new daily Covid-19 cases per million of population, the level of risk in each LGU is given below. A province or LGU is considered to be “high risk” if $R > 1$ and the number of new Covid-19 cases per day is greater than 1 per million of population. A province or LGU is considered “medium risk” if the number of new Covid-19 cases per day is greater than 1 per million of population and $R < 1$. A province or LGU is considered “low risk” if the number of new Covid-19 cases per day is less than 1 per million of population. Provinces with no new Covid-19 cases during the past week from May 10 to 16 have been removed from this list (i.e. marked “safe”). Referencing our previous Reports (No. 6 and 6b), high risk is equivalent to Grade D, medium risk is equivalent to Grade C, and low risk is equivalent to Grade B (“Safe” is equivalent to Grade A). We will use the more popular level of risk metric: low, medium and high risk, in this and in succeeding reports.

Lapu Lapu City had 8 new cases of Covid-19, Mandaue City had 17, Oriental Mindoro had 7 and Samar had 10, hence their inclusion in the medium risk group. These provinces and LGUs will need to be monitored closely for possible outbreaks in the next few weeks.

Batangas and Davao City both had a low number of cases for their population (but greater than 1). They were rated high risk because $R > 1$. Laguna had a low rate of transmission (i.e. $R < 1$), hence it was also included in the medium risk group. NCR, Cebu City and Zamboanga City are currently considered high risk.

Low Risk:

Albay	Antique	Bataan	
Benguet	Bulacan	Camarines Norte	
Camarines Sur	Cavite	Ifugao	Iloilo
	Lanao Del Norte	Misamis Oriental	Nueva Ecija
	Occidental Mindoro	Pampanga	Quezon
Rizal	Romblon	Tarlac	
Cebu province (not including Cebu City, Mandaue City, Lapu Lapu City)			

Medium Risk:

Lapu Lapu City	Laguna	Mandaue City
Oriental Mindoro	Samar	

High Risk:

Batangas	Cebu City	Davao City
NCR	Zamboanga City	

All other provinces not indicated have no new Covid-19 cases for the week May 10 to 16, and are in the Safe category.

COMPARING WITH PREVIOUS FORECASTS

In our Report No. 5 published on April 28, we made short-term forecasts up to May 15 based on the current trends in transmission rates. Here were some of our forecasts in that report:

For Calabarzon, we stated:

“Using current trends, our forecasts for May 15 is 1,400 Covid-19 cases and 85 deaths.”

The actual numbers are 1,340 confirmed cases (not including 30 pending cases) and 91 deaths. Calabarzon performed slightly better than our projections.

For Central Luzon, this was our statement:

“The forecast for the region assuming latest trends continue is 400 total Covid-19 cases and 28 deaths by May 15, 2020.”

The actual numbers are 410 confirmed cases (not including 7 pending cases) and 27 deaths. Central Luzon almost matched our forecasts.

For Cebu, we made several assumptions in our forecasts:

“The forecast for May 15 for Cebu, assuming the ECQ is implemented and will improve the situation, projects 1,300 total Covid-19 cases with 50 deaths.”

Currently, the numbers for Cebu are 1,743 confirmed cases and 25 deaths. Our forecasts under-predicted the actuals because we assumed a level of decreasing transmissions that were not met in actual experience.

For Panay Island, we wrote:

“The projections for Panay for May 15, using current trends in transmission rates, are a total of 65 cases of Covid-19 and 6 deaths due to Covid-19.”

The actual numbers are 76 confirmed cases of Covid-19 with 7 deaths.

For Davao City, we stated:

“Our forecasts, assuming a continued decrease in transmission due to the continued implementation of ECQ, project a total of 190 total cases of Covid-19 and 30 deaths by May 15. Continued strict implementation of the ECQ until such time is advised.”

The actual numbers are 177 cases of Covid-19 and 22 deaths. Davao City performed better than our forecasts.

For NCR, our forecasts were based on the existing trends in the whole of NCR. We wrote:

“Assuming a continuation of the current trends, our projections show 6,000 total cases of Covid-19 by May 15, with 430 deaths.”

The actual numbers are 6,981 confirmed Covid-19 cases (not including pending cases) and 578 deaths. The actual numbers exceeded our forecasts. Delays in reporting of current data (see Report 6b) may have caused an increase in the number of current cases that was not factored in the model. It is also possible that the trends in NCR changed for the worse during the period.

SUMMARY AND RECOMMENDATIONS

The ECQ has been working. The past ECQ has been critical in reducing transmission and deaths due to Covid-19 in the Philippines. We know this because the reproduction number R , which measures the rate of spread of the pandemic, has been decreasing since the beginning of ECQ as shown in Figure 1. Based on our data, the value of R for the entire Philippines has been decreasing, and in a number of provinces around the country, the spread of Covid-19 is either controlled or in a decelerating trend. ECQ was successful despite limited testing and contact tracing in the country. It does not mean, however, that the positive trend is irreversible.

Although the value of R for the entire Philippines has been decreasing, provincial level and LGU level analysis is needed in order to identify those areas which have managed the pandemic well, and those areas where the pandemic is still ongoing. For NCR and Cebu City, the number of new Covid-19 cases is still very high, and the value of $R > 1$, so the risk level of the pandemic is still high. In short, the transmission of the virus in the country is not yet controlled.

Mobility and proximity to other people are drivers of the Covid-19 pandemic. Considering that NCR is one of the most densely populated areas in the world, and in fact Manila, Pateros and Mandaluyong are top three among all cities and municipalities in the world (see Wikipedia), reducing mobility and proximity in NCR is a challenge. Social distancing and cooperation from our citizens become very important now that NCR is in MECQ.

On the other hand, the risk levels of the pandemic in Batangas, Davao City, and Zamboanga City are still significant. These areas should be monitored closely in the next weeks. Looking back at the case of Cebu City, which had only 24 Covid-19 cases on April 11 (with $R = 0.88$ at that time), new Covid-19 cases started to appear, and one month later, the number of cases in Cebu City had exceeded 1,400. This means that we cannot afford to be complacent, even in areas where the pandemic appears to be contained, because it takes just one spreader to start a second wave of the pandemic. The government should also closely monitor Samar and Oriental Mindoro, as a number of new Covid-19 cases appeared in those provinces recently.

Given the foregoing, we recommend the following:

1. That the national government continue significant restrictions in NCR and Cebu City and expand the same as necessary to other high-risk areas. We urge government to also monitor the situation in Zamboanga City, Batangas and Davao City as the risk levels of the pandemic in these areas are still significant. Even in areas under GCQ or those not under community quarantine, vigilance is still needed in order to ensure that any new cases are immediately detected and new outbreaks prevented. Our goal ultimately is not just to flatten the curve but to bend it downwards.
2. Given the recent decision by government to loosen restrictions and based on the experience of other countries, **the likelihood of a resurgence seems to be not a question of if but where, and how bad.** The virus is still with us and we have not yet developed herd immunity. In order to sustain the gains from the last ECQ and to build a momentum towards pandemic deceleration, the **government must ensure that health systems are capable of detecting, testing, isolating and treating every case of COVID-19, as well as tracing every contact.** It should effectively enforce the rules on physical distancing and health safeguards especially in malls and other establishments allowed to operate under the Modified Enhanced Community

Quarantine (MECQ). The gains that we achieved through our collective sacrifice should not be squandered by prematurely lifting or not strictly enforcing restrictions.

3. In less than two weeks, government will have to decide whether those under MECQ should transition to GCQ, revert back to ECQ or extend the MECQ. This decision should be based on the best available evidence. We recommend that government undertake, commission if necessary, studies on people's mobilities in areas under quarantine. These studies, using mobile (location) data and drilling down to the Barangay level, could provide scientific evidence on what has changed when we moved from ECQ to GCQ or MECQ. They can then inform a more refined risk analysis - which is vital to evidence-based policymaking.

To this end, we are also recommending a simplified risk analysis decision tool in reopening sectors of the economy and lessen epidemiological uncertainty based on 1) number of contacts, 2) contact intensity and, 3) modification and mitigation interventions. This is the most practical approach to assessing which economic sectors to reopen first with manageable risk outcomes. It will also allow for the efficient and practical application of modification and mitigation interventions, especially in contact tracing, mobility restrictions and onsite and work from home arrangements. The effectiveness of this risk decision tool is premised on large scale testing of the population.

4. We reiterate further our previous recommendation for government to expand further the testing capacity as we move towards opening certain sectors of the economy. We laud the Philippine government for ramping up testing to up to 10,000 tests per day. While this arguably may have caused an increase in the number of confirmed Covid-19 cases, it has given us a better picture of the state of the pandemic in the country that could serve as basis for the recalibration of the restrictions in the next few days. We recommend that the first priority is the testing of people in the workforce in the economic sectors initially reopened followed by testing in other sectors as the national economy is gradually reopened.

To this end, we also urge the government to study the possibility of using local trial of group testing protocols in order to potentially multiply the testing capacity for certain populations. Group testing is the method whereby swab specimens from multiple individuals are tested using a single test kit. Furthermore, we also recommend the trial of randomized testing, possibly using group testing, in zone-based populations. Randomized testing may provide a more reliable basis for determining prevalence rates and may be potentially used for smarter workplace-based infection control policies.

5. However, this testing capability would not be enough if we were to re-open. We reiterate that contact tracing (CT) is an important component in the fight against Covid-19. **Aggressive contact tracing should be a centerpiece of the strategy.** It will allow government to identify high risk individuals and target them for isolation/quarantine. This way we can break infection transmission and avoid reverting to ECQ or unnecessarily prolonging the transition to GCQ – efforts that also hurt the economy and strain the psycho-social wellbeing of citizens.
6. The challenge with CT is that it is labor intensive and time consuming. We laud government for committing resources to hire more contact tracers soon. But we need to **mobilize other sectors of society to help undertake aggressive contract tracing.** We need a people's army of contact tracers. A possible first step is to re-task the PNP from primarily manning checkpoints and/or arresting quarantine violators to take the lead in contract tracing teams. As CT is similar to detective work, the police already have the basic skills to do it. A complementary step is to mobilize, on a voluntary basis, students from medical, nursing and other allied health professions as contract tracers. Each contact tracing team could be composed of police and students. Both the police and the students need minimal training to do contract tracing. But they should be given adequate support (remuneration, health insurance etc.) and the necessary protective equipment (medical grade face masks, face shields, and isolation gowns) and digital devices. The latter is important because documentation and reporting should be digital by default so that errors in reporting can be minimized. The data reporting and platform should be standardized. This tracing data once anonymized can be incorporated into the Covid-tracker and must also be made open to all stakeholders. We reiterate that cultivating a culture of open data sharing will go a long way to improving everyone's (national government, local governments, private sector, civil society and individual citizens) effectiveness in contributing to the fight to stem the pandemic. Encouraging participative governance in this way can bring the country towards a better normal.
7. We also recommend that there should be a mechanism in place for placing a province or LGU back in ECQ, should the threat of a pandemic become significant. The threat of Covid-19 will still remain unless a vaccine is widely available. We need to provide criteria or a set of triggers not only for de-escalation but also to escalate restrictions that are clearly explained to the public.
8. We recommend the expansion of the health system in order to continue to have the ability not just to treat Covid19 cases but also other patients suffering from other diseases. Government allowing limited practice of medical students would add needed manpower. Provision of standard

personal protective equipment would also ensure that our health workers will not be exposed and will continue to be available to serve.

9. The effective implementation of the current MECQ can be realized through an aggressive government **information drive to inform individuals and businesses of their responsibilities on the new normal** especially the guidelines issued by the various agencies. We exhort government to further refine and harmonize the various guidelines regarding the MECQ and ensure that they are cascaded to stakeholders.

It also is important that government messaging should be made clearer and guidelines be localized effectively. Educating citizens and local partners would make them less prone to misinformation and confusion and less susceptible to simplistic solutions not based on sound policy. Proactive monitoring of public reception of guidelines and information would ensure immediate clarification and correction of confusing or wrong information.

10. Also, it is important that Congress, through its stimulus package, allocate funds to government and other higher education institutions such as the University of the Philippines (UP) for research on Covid-19. The strategic areas of research could include the development of effective treatment methods and cheaper platforms of testing. These and other strategic concerns need focused study given the duration before a vaccine, if any, could be deployed. The best minds in the country from all institutions should come together instead of working in silos and exchange and test ideas.
11. Government cannot do everything. The cooperation of business, civil society, and each and every individual is necessary to ensure the effective implementation of quarantine rules, the safety of workplaces, and the strict enforcement of physical distancing and other important health protocols. We recommend the formation of a broader coalition of organizations to support this initiative.

While we have collectively achieved a lot together, we must not be complacent as we are not yet on the other side of the curve. We are still in the early part of managing this crisis. The pandemic is ongoing and continues to be a clear and present danger to us all.

Moving forward, we need to collectively sustain the efficient and effective implementation of the MECQ and all the other quarantines all over the country. It is against this backdrop, that we continue to encourage ever greater cooperation and collaboration between government, the private sector, and civil society.