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COVID-19 FORECASTS IN THE PHILIPPINES: First Week of MECQ

Guido David, Ph.D.
Professor, Institute of Mathematics
University of the Philippines
Fellow, OCTA Research (www.octaresearch.com)

Ranjit Singh Rye, MPA
Assistant Professor, Department of Political Science
University of the Philippines and Fellow, OCTA Research (www.octaresearch.com)

Ma Patricia Agbulos, MBM
Associate, OCTA Research (www.octaresearch.com)

With contributions from

Erwin Alampay, Ph.D.
Professor,
National College of Public Administrations and Governance
University of the Philippines

Eero Rosini Brillantes
CEO, Blueprint Campaign Consultancy (www.blueprint.ph)

Emmanuel Lallana, Ph.D.
Alumnus and former faculty member, UP Diliman
CEO, Ideacorp, Inc.

Rodrigo Angelo Ong, MD
Professorial Lecturer, Science Society Program, College of Science
University of the Philippines

Paulo Redondo, MS
Associate, OCTA Research (www.octaresearch.com)

Michael Tee, MD, MHPED, MBA
Professor, UP College of Medicine
Chair, Philippine One Health University Network

Benjamin Vallejo Jr. Ph.D.
Professor, Institute of Environmental Science and Meteorology & the
Science Society Program, College of Science, University of the Philippines

I. KEY FINDINGS

On May 15, 2020, National Capital Region (NCR) was placed under Modified Enhanced Community Quarantine (MECQ). In this report, we focus on Covid-19 cases in NCR, Laguna, Cebu City and Davao City. The key findings are given below:

1. There are 7,119 individuals nationwide who have tested positive for Covid-19 (based on reports by the 36 testing centers) but have not yet been included in the official count of Covid-19 patients of the Department of Health. The official count of Covid-19 cases in the entire country is 14,035 (as of May 24). The number of individuals who tested positive as of May 24 is 21,154.

2. After 10 days of MECQ (May 16 to 25), there was almost no change in the week-to-week number of new Covid-19 cases in NCR, based on current data from Department of Health. The estimates are based on confirmed Covid-19 cases, and do not include cases that are still for validation, which as of May 25 account for 1,498 cases in NCR, nor do they include the 7,119 individuals nationwide mentioned in Item 1. The average number of new Covid-19 cases in NCR over the past week (May 19 to 25) is greater than 5 per day per million of population. Makati, Las Pinas and Pasay had the largest week to week increase in new Covid-19 cases, up by 170%, 60% and 58% respectively, from the previous week. These were offset by decreases in new Covid-19 cases in Mandaluyong, Marikina, Pasig, Quezon City and San Juan. The constantly changing patterns of new Covid-19 cases in the constituent LGUs suggest that NCR should be considered as a single region for quarantine purposes. In accordance with our risk assessment, NCR is classified as "High Risk."

3. Both Cebu City and Mandaue City had decreases in the number of Covid-19 cases, based on data released by the Department of Health. The trends do not take into account the 140 cases in Central Visayas that are currently for validation, and the 7,119 individuals nationwide mentioned in Item 1. While the reproduction number R for Cebu City and Mandaue City have decreased below 1, indicating flattening of the curve, this has to be sustained. The patterns reveal that both cities essentially are a single metropolitan area and should be managed as one in Covid-19 mitigation. Cebu City and Mandaue City are classified as "Medium Risk."

4. For Davao City, the reproduction number R is greater than 1, and there was a corresponding increase in case reports. In this regard, Davao City is classified as "High Risk."

5. In Laguna, the reproduction number R is greater than 1, moving the province in the "High Risk" category.

II. REPORT ON NCR

The total number of Covid-19 cases, aggregated, is shown in Figure 1. The number of Covid-19 cases in NCR as of May 25 is 7,736. Since March 25, data from the Department of Health (DOH) has shown there are Covid-19 cases in NCR that are for validation. This number has been steadily increasing, and as of May 25 is at 1,498 Covid-19 cases.

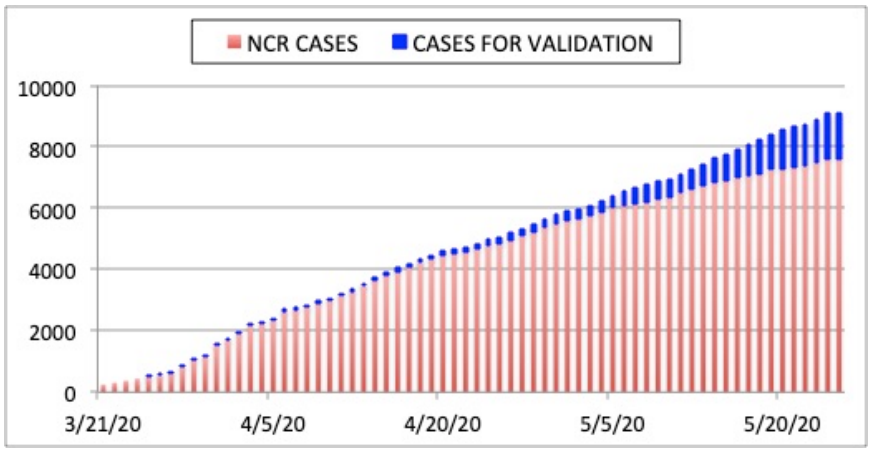

Figure 1. Aggregate number of Covid-19 cases in NCR (red), numbering 7,736 as of May 25, 2020. Also shown are Covid-19 cases in NCR for validation (blue), currently at 1,498.

Figure 2 shows the basic reproduction number *R* for NCR alone from April 1 to May 25, plotted as a moving average. Also shown is the value of *R* for NCR if the cases for validation are included. Not including cases for validation, the value of *R* for NCR has decreased to less than 1. A value $R < 1$ indicates a "flattening of the curve." If cases for validation are included in the calculation of *R*, the value of *R* increases to greater than 1. Given this uncertainty, it cannot be stated for a fact that the curve has flattened in NCR.

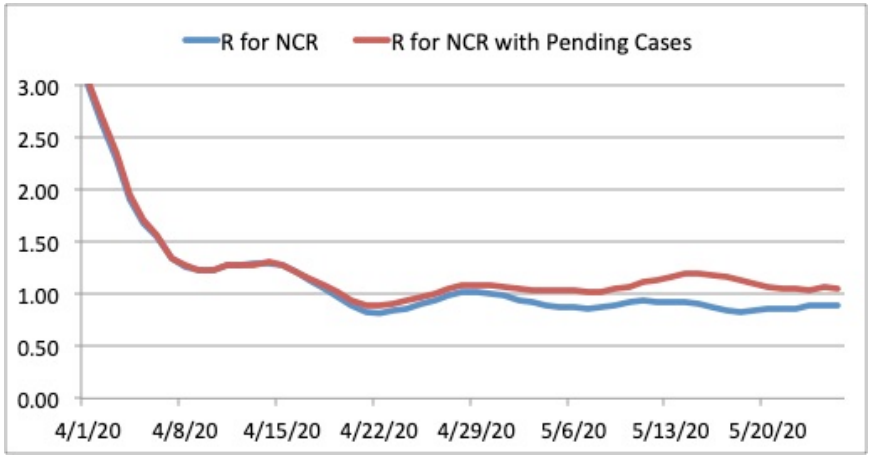

Figure 2. Reproduction number *R* for NCR (blue, shown as a 7-day moving average). The reproduction number *R* if pending Covid-19 cases in NCR are included is shown in red. A value $R < 1$ indicates "flattening of the curve." Due to the number of cases for validation, it is not clear if the curve has already flattened in NCR.

The LGUs of NCR are grouped into the following:

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.

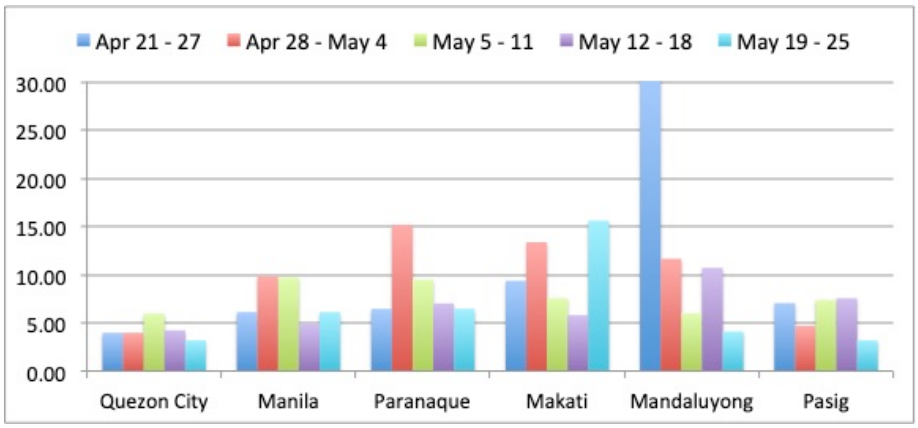

Figure 3A. Week-to-week Covid-19 cases pro-rated to population for NCR group A, showing the number of new Covid-19 cases per day per million of population for the weeks of: April 21 to 27, April 28 to May 4, May 5 to 11, May 12 to 18, and May 19 to 25. Makati had a 170% increase in new Covid-19 cases compared with the previous week, while Manila also had an increase. Quezon City, Paranaque, Mandaluyong and Pasig all had a decrease in new Covid-19 cases compared with the previous week.

Figures 3A, 3B and 3C show the number of new Covid-19 cases in each NCR group per week: April 21 to 27, April 28 to May 4, May 5 to 11, May 12 to 18, and May 19 to 25. The number of new Covid-19 cases for each week was averaged per day and divided by the population (in million). For example, for the week of April 21 to 27, Quezon City had 4 new Covid-19 cases per day per million of population. This metric is useful in measuring the proportion of the population who are afflicted with the disease. **A "Low Risk" is accorded to an LGU or province if there is less than 1 new case per day per million of population, based on metrics used in South Korea.** The population of each LGU was extrapolated to 2020 using statistical data. Currently, San Juan and Marikina had the lowest rate at about 2 new Covid-19 cases per day per million of population. The highest values currently are in Pateros with 20 new Covid-19 cases per day per million, followed by Pasay, Makati and Muntinlupa.

Another useful metric for assessing the risk level of an LGU or province is the week to week decline in new Covid-19 cases. Ideally, an LGU or province must have two successive weeks of decline in new Covid-19 cases. This standard was used in the USA. Based on figures 3A to 3C, Quezon City and Paranaque have had two successive weeks of decline in new Covid-19 cases, while San Juan has had three successive weeks of decline. On the other hand, Pasay, Las Pinas, Muntinlupa, Taguig, Caloocan

and Pateros had two successive weeks of increase in new Covid-19 cases, so they are trending in the opposite direction.

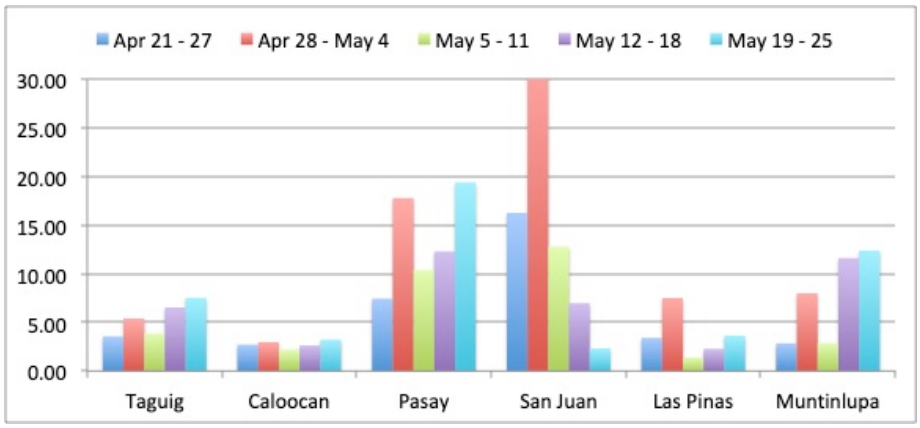

Figure 3B. Week-to-week Covid-19 cases pro-rated to population for NCR group B, showing the number of new Covid-19 cases per day per million of population for the weeks of: April 21 to 27, April 28 to May 4, May 5 to 11, May 12 to 18, and May 19 to 25. Las Pinas had a 60% increase in new Covid-19 cases, while Pasay's number of new cases increased by 58%. Pasay, Taguig, Las Pinas, Muntinlupa and Caloocan had two successive weeks of increasing new Covid-19 cases. On the other hand, San Juan had three successive weeks of decreasing new Covid-19 cases. San Juan has the lowest current value at 2.3 new Covid-19 cases per day per million of population.

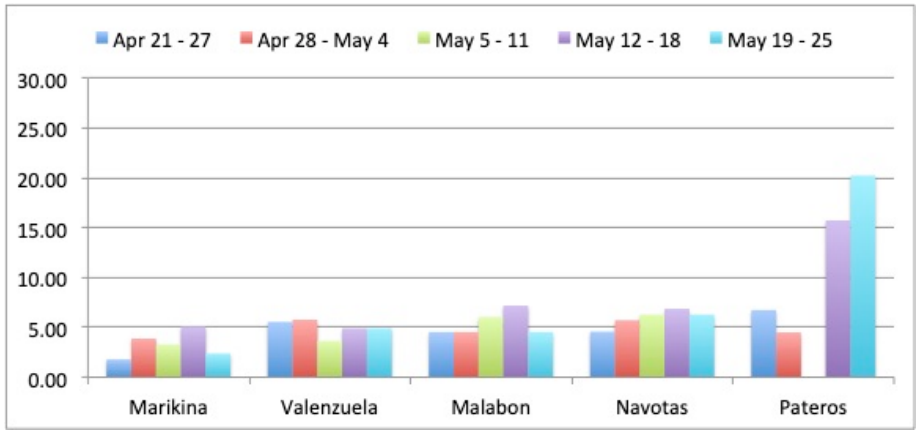

Figure 3C. Week-to-week Covid-19 cases pro-rated to population for NCR group C, showing the number of new Covid-19 cases per day per million of population for the weeks of: April 21 to 27, April 28 to May 4, May 5 to 11, May 12 to 18, and May 19 to 25. Pateros had two successive weeks of increase. Marikina currently has 2.4 new Covid-19 cases per day per million of population.

Table 1 shows the forecasts for the number of Covid-19 cases and deaths in each LGU in NCR for June 15, 2020, based on prevailing transmission rates as of May 25. Covid-19 transmission rates are very dynamic, and as a result, our projections are recalibrated every week depending on latest patterns, so this forecast will differ from our previous forecasts. If we include the cases for validation in NCR in the forecasts, then the projection is 12,700 total Covid-19 cases and 920 deaths by June 15 (there are 9,234 Covid-19 cases and 639 deaths as of May 25, if cases for validation are counted).

Table 1. Projected numbers for NCR LGUs for June 15, assuming ECQ is in place and transmissions continue based on their current trends. The forecasts do not take into account the 1,498 cases for validation in NCR (as of May 25) in the DOH database.

	Actual Cases (May 25)	Actual Deaths (May 25)	Projected Cases (June 15)	Projected Deaths (June 15)
Caloocan	338	32	450	48
Las Pinas	236	15	290	19
Makati	614	36	780	50
Malabon	99	7	140	11
Mandaluyong	561	37	600	43
Manila	1104	90	1360	120
Marikina	168	19	190	24
Muntinlupa	283	24	420	42
Navotas	77	9	100	15
Paranaque	603	48	690	61
Pasay	364	23	520	36
Pasig	449	51	520	66
Pateros	41	4	70	6
Quezon City	1929	161	2180	199
San Juan	275	36	280	39
Taguig	413	15	550	22
Valenzuela	182	9	200	12
NCR	7736	616	9340	813

III. REPORT ON CEBU CITY, MANDAUE CITY AND DAVAO CITY

Elsewhere around the country, the critical areas where the fight against the pandemic continues are Cebu City, Mandaue City, Laguna and Davao City. Shown in Figure 4 are the week-to-week new Covid-19 cases per day per million of population for Cebu City, Laguna, Mandaue City, NCR and Davao City. Also included for monitoring purposes are Batangas and Zamboanga City. Batangas reported less than 1 new Covid-19 case per day per million of population for the week of May 19 to 25, which puts it in the "Low Risk" category. Zamboanga City reported zero new cases for May 19 to 25. However, there are still 22 cases for validation in the Zamboanga peninsula, so it remains to be seen if any of these cases are credited to Zamboanga City. Zamboanga City is tentatively classified as "Low Risk." Cebu City and Mandaue City both had two successive weeks of declining new cases of Covid-19. However, both of them also had more than 1 new Covid-19 case per day per million. Both of them are currently classified as "Medium Risk," because the weekly *R* for Cebu City is 0.36 and for Mandaue City is 0.55, both less than 1. Davao City had an increase in new Covid-19 cases, and its average for the week of May 19 to 25 is 3.4 new Covid-19 cases per day per million of population. Its *R* value is 2.41, hence it is currently classified as "High Risk." Laguna has about 1.4 new Covid-19 cases per day per million of population. It currently has an *R* of 1.07, putting it in the "High Risk" category, although barely so. In NCR, the value of *R* is very close to 1. As a region, NCR has an average of 5 new Covid-19 cases per day per million of population. **With the uncertainty due to the high number of Covid-19 cases for validation in NCR**, the more cautious decision is to classify NCR as "High Risk."

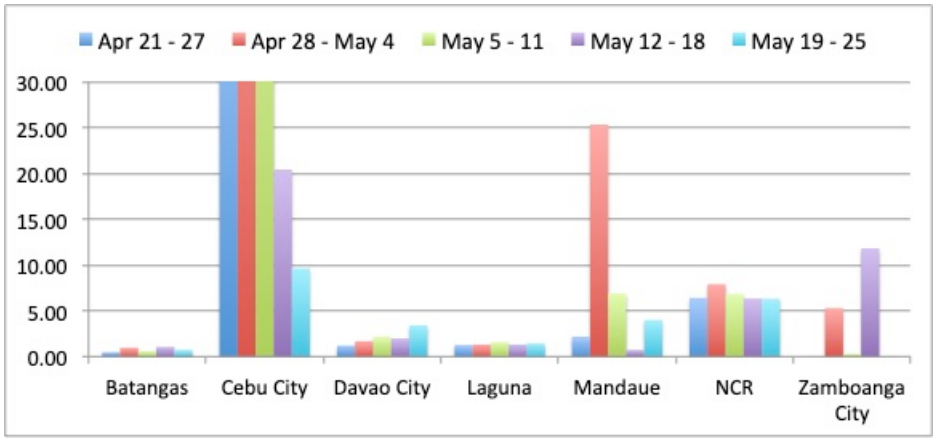

Figure 4. Week-to-week Covid-19 cases pro-rated to population for Batangas, Cebu City, Davao City, Laguna, Mandaue, NCR and Zamboanga City, showing the number of new Covid-19 cases per day per million of population for the weeks of: April 21 to 27, April 28 to May 4, May 5 to 11, May 12 to 18, and May 19 to 25. Batangas and Zamboanga City have less than 1 new Covid-19 case per day per million of population, so both are classified as "Low Risk." Cebu City and Mandaue City both had two successive weeks of decline in new Covid-19 cases, but both had more than 3 new Covid-19 cases per day per million of population, so both are classified "Medium Risk." Davao City and Laguna are classified "High Risk" due to the increasing number of Covid-19 cases, although in the case of Laguna, it was borderline. NCR is accorded a "High Risk" classification due to the number of new Covid-19 cases not decreasing, an average of more than 5 new Covid-19 cases per million of population, and the uncertainty in the cases that are still for validation.

LOW RISK: Batangas, Zamboanga City

MEDIUM RISK: Cebu City, Mandaue City

HIGH RISK: NCR, Bataan, Laguna, Davao City

Bataan was also classified as "High Risk" due to an increase in new Covid-19 cases, about 5.4 Covid-19 cases per day per million of population for the week of May 19 to 25, and a value of R = 2.76. All other provinces are in the Low Risk or Safe category. A relaxation of MECQ or General Community Quarantine (GCQ) in the "Low Risk" provinces may be considered, assuming other health protocols are in place.

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.

	Actual Cases (May 25)	Actual Deaths (May 25)	Projected Cases (June 15)	Projected Deaths (June 15)
Batangas	160	14	210	20
Cebu City	1618	15	1730	20
Davao City	220	22	380	41
Laguna	448	11	560	15
Mandaue City	111	2	130	3
Zamboanga City	121	2	130	3

The updated forecasts for the number of Covid-19 cases and deaths by June 15 for the above provinces and LGUs is provided in Table 2. Some forecasts have changed dramatically since our previous report (Report No. 7). Forecasts depend on current transmission rates; any major change in the trends will change the projections.

IV. DEPARTMENT OF HEALTH DATA GAPS

As reported in the media (see for example, Philippine Daily Inquirer: "DOH explains gap in COVID-19 data", May 24, 2020), there has been an increasing gap in the official count of Covid-19 cases in the Philippines reported by the Department of Health, and the number of individuals who tested positive for Covid-19, reported by the 36 testing centers all over the Philippines and included in the Department of Health database. As stated in the news article:

> *The Department of Health (DOH) explained that the "long and tedious" verification process as well as the lack of personnel ensuring the accuracy of data were among the reasons for the growing gap between the number of persons who had tested positive for the new coronavirus disease (COVID-19) and the reported confirmed cases.*

Read more: https://newsinfo.inquirer.net/1280036/doh-gap-in-virus-data-explained#ixzz6NTEN2Knj

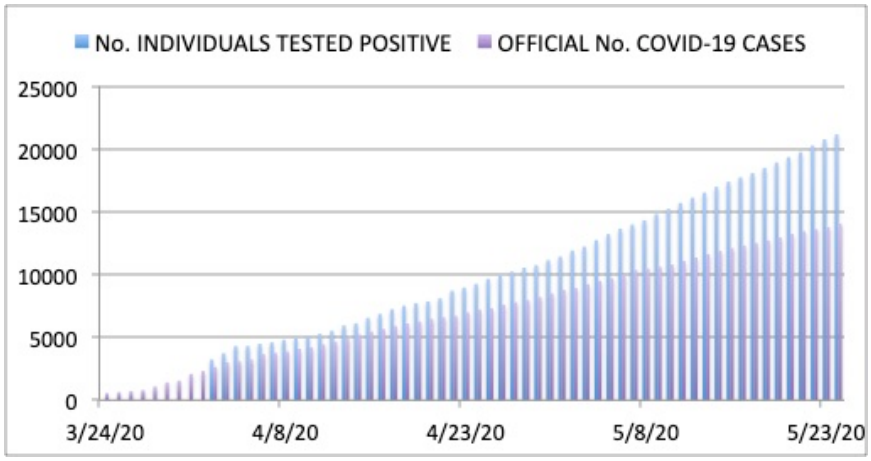

Figure 5. Official number of Covid-19 cases in the Philippines vs number of unique individuals who have tested positive for Covid-19. As of May 24, the gap is 7,119 and increasing.

Figure 5 shows a plot of the official number of Covid-19 cases in the Philippines reported by the Department of Health, plotted against the number of unique individuals who have tested positive for Covid-19, as reported by the 36 testing centers to the Department of Health. The gap in the two figures have been steadily increasing, and as of May 24, the gap is 7,119 Covid-19 cases. This means that if the backlog in data has been processed, the actual number of Covid-19 cases in the Philippines could increase from 14,035 to more than 21,000, a 50% increase.

V. TESTING

Figure 6 shows the total number of tests administered, aggregated, for the entire Philippines. There are currently 36 testing centers all over the Philippines, majority of which are located in NCR. The highest number of tests administered in a day was on May 14, with 11,151 tests conducted. Over the past week, from May 18 to 24, an average of 7,600 tests were conducted each day. As of May 24, there have been a total of 271,000 tests conducted. Of these, 21,000 individuals tested positive for Covid-19 (see previous section on Department of Health Gaps).

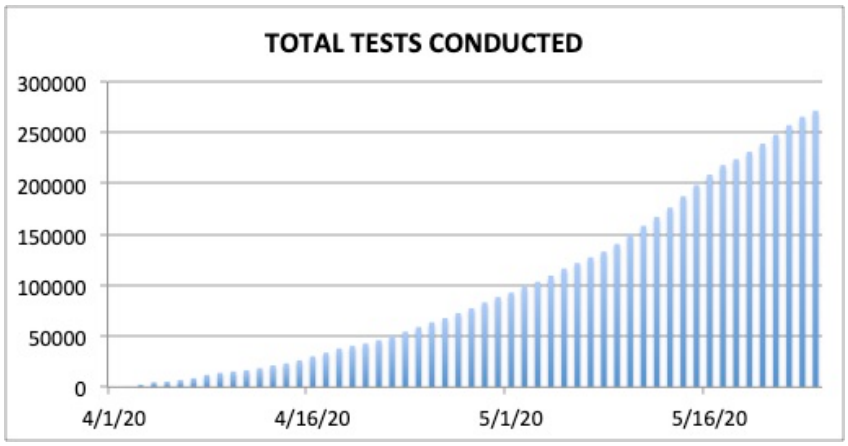

Figure 6. Total number of tests administered, aggregated for the entire country.

Malaysia had been lauded for its handling of the Covid-19 pandemic. In a report on April 16 in the Asean Post ("How Malaysia Is Winning The War Against COVID-19"), it targeted 16,500 tests a day. Considering that the population of Malaysia is around 31 Million, then if we prioritize testing on the Medium and High Risk areas, namely NCR, Cebu City and Davao City (with a total population about half of Malaysia's population), then the 8,400 tests per day would be about on par with Malaysia's previous target levels. On the other hand, with the move to MECQ and the opening up of certain business sectors, every employee who travels to work is essentially a frontliner. Even with a testing rate of just 10% for workers in NCR, Calabarzon, Central Luzon, Cebu City and Davao, this corresponds to about 2.4 Million tests that need to be administered. Spread out over 60 days, this averages to 40,000 tests per day.

VI. REPATRIATES

As of May 25, the number of repatriates who tested positive for Covid-19 is 134, with 1 death and 3 persons who recovered. None of the active cases of repatriates are in critical or severe condition.

VII. RECOMMENDATIONS

Given the above findings, we recommend the following:

1. The national government made great strides in controlling the spread of the virus in high-risk areas due to the community quarantine restrictions in place. But if quarantine decisions are solely based on disease transmission and other epidemiological risk factors, then based on the available data**, we recommend that the national government continue the MECQ in NCR and consider the same in other high-risk areas.**

   The reproduction number *R* of NCR, which is oscillating at around 1.0 rather than showing a discernable decrease is a sign that **it might be premature to relax the MECQ to GCQ**. Given that the data received from DOH appears to have a lag, **NCR remains a 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* and in the rise and fall of new cases reveals a data reporting problem. The processing of cases that are for validation and the lagged reports will likely reveal the real relationship of *R* and decreasing cases which should be correlative with each other, a decrease of *R* and new cases go together.

   Additionally, during the first week of MECQ, **the number of new Covid-19 cases in Makati, Las Pinas and Pasay increased substantially, by 170%, 60% and 58% respectively.** There were also increases in the number of new Covid-19 cases in Manila, Taguig, Muntinlupa, Caloocan and Pateros. While such increases cannot be attributed to MECQ at this time, there remains the possibility that a transition from MECQ to GCQ could exacerbate the increase in new Covid-19 cases in these LGUs further undermining the government's efforts to control the transmission of Covid-19.

   Given the dramatic increase in the number of cases in the NCR and in other high-risk areas, a review of the minimum health safeguards and quarantine mechanisms in high-risk areas is also recommended. Balancing the health risks and the economy should be done only with these mechanisms in check.

   It is against this backdrop, that we further **caution** the government on the premature relaxation of the MECQ without substantial data and without the minimum health safeguards in place in affected areas regardless of the historical number of cases.

2. With the increase in the number of individuals who have tested positive for Covid-19 but have not yet been logged in the official count of Covid-19 cases in the Philippines since March 25, there is an **urgent need to enhance official Covid-19 data from the Department of Health (DOH)**. As is well

known, data quality and its timely release determine the quality of forecast and analysis. Our ability to use data to make decisions will be hampered if the DOH does not improve data access and quality.

The significant discrepancy in the reproduction number *R* when including cases that are "for validation" warrants an increase in manpower at the DOH to process data more swiftly and accurately to catch up with the current situation. Testing must still be ramped up to match the Malaysian experience. Both instances indicate the challenges we have in the number of testing facilities and in manpower (for RT-PCR testing, surveillance, and data verification). We recommend the mobilization of volunteers to do verification work provided proper protective equipment and support are provided. The Philippine National Volunteer Service Coordinating Agency could be tapped for this purpose.

3. We commend the government for the significant **increase in testing capacity**, which is now at 32,000 tests per day. Consistent with our previous recommendation, increased testing capability is important if we are to loosen restrictions. With these gains, it is equally important to **improve the turnaround time of Covid-19 test results** by fast tracking the accreditation of more laboratories, investing in training of more human resource, and ensuring timely and sufficient laboratory supplies. We also need to ensure that we do not rest on our laurels and continue to work with more stakeholders to expand further our testing capability.

   In previous reports we have pointed to the **important role of effective contact tracing** in containing the pandemic. We understand that implementing an effective contact tracing system poses significant challenges. But we must confront and overcome these challenges. It is time for government to seriously consider mobilizing volunteers for contact tracing.

   While it can be argued that the national health system has not been overwhelmed as a result of the ECQ, we emphasize that **mass targeted testing and contact tracing have to be vastly improved by the time NCR and other high risk -areas transition to GCQ.** We believe that this challenge falls largely on the local government units (LGUS) which are the key the implementing institutions for these endeavors.

4. We reiterate our earlier proposal for government to adopt more widely the use of serological surveys, especially in high risk areas. A serological survey involves testing the blood of people not diagnosed with Covid-19 and is used to quantify the proportion of the population infected by the virus. However, to have a representative sample, those who must be tested should come randomly from the population that reflects the community's socioeconomic,

geographic, age, and ethnic diversity. Given the limitations of testing capability of the country, the serological survey becomes a cost-efficient tool to determine to what extent the population is infected by Covid-19 and to visualize the severity of its effect on a community. The information culled from the survey will further refine governments targeting strategy against Covid-19 at the LGU level.

5. Once we see a discernable and consistent decrease in cases, restrictions maybe eased. The expectation in this context is that more economic activities will be allowed at different levels of the economy. There is a need for work place risk assessment to facilitate the calibrated phasing of the various job types to reduce the health risk in workplaces. We recommend that the government adopt the recommendations of the policy study of the UP Covid-19 Pandemic Team in their Policy Note No. 7 (https://www.up.edu.ph/post-ecq-job-risks-analysis-and-recommendations/) as there is a real need for clear and science-based guidelines to prevent new outbreaks especially in the workplace.

6. Risk communication is important in times of uncertainty. Effective risk communication strategies must be employed to convey the government's policy or program in response to the pandemic. Information must be delivered with consistency and compassion, taking into consideration potential psychological effects on the family, community, and the workforce. The desired behavior of the citizenry concerning various quarantine stages must also be communicated and understood clearly.

   Government communicators must work with other communication stakeholders including the academe, civil society, and people's organizations to rapidly develop risk communication plans for immediate implementation. The goal is to state in clear and effective terms the parameters and desired behavior of the citizenry up to the household level on various community quarantine stages. Further, enforcement mechanisms that involve the citizenry are encouraged. Social media account where violations of quarantine regulations could be set up to facilitate reporting of non-compliant businesses and entities.

   We further suggest that in terms of scientific and/or technical information on Covid-19, an expert on epidemiology or public health must be tapped in order to better explain difficult scientific concepts and complex big data. The expert will be able to help the government to articulate information better for public consumption. At the same time, the official government spokesperson can continue his task of making pronouncements in terms of administrative and legal concerns. This should be done to avoid the burden to the official spokesperson to explain concepts that can be explained better by experts on public health issues, and vice versa.

We further suggest that the role of this science spokesperson is as a member of a proposed **science advisory group for emergencies (SAGE)**. The SAGE is composed of scientists whose function is to synthesize scientific information which shall be the reported by the science spokesperson and transmitted to the government. This SAGE may be institutionalized following the model of the United Kingdom (UK) Prime Minister's office. In the UK, the science spokesperson speaks on science issues with the relevant government minister/spokesperson or the Prime Minister who speaks on policy decisions and interventions.

7. Also, it is important that Congress, through its forthcoming stimulus package, allocate funds to government and other higher education institutions to do research on Covid-19. The best minds in the country from all institutions should come together instead of working in silos and exchange and test ideas.

   The strategic areas of research could include the development of effective treatment methods and cheaper platforms of testing. Government should also consider funding capability building in data science as big data is critical for decision support. It should also look at the academe and the private sector as partners in big data especially those involved in model simulations, mobility tracking, in geospatial analysis, and media content analysis. Also, government must continue to make its big data findings accessible to the citizenry. The creation of a coordinating group for the sharing and analysis of data even on an ad hoc capacity would go a long way in terms of pooling expertise to process, analyze, and interpret data.

   Another important study that government could fund and undertake is to examine **excess mortality** in the country based on reported deaths. Mortality rate is usually stable year on year. Excess mortality (more deaths than usual) could better capture the possible effect of the pandemic not just in terms of death caused by the virus but also deaths caused by sick people being crowded out from the healthcare system because of the need to respond to the pandemic. This is an indicator to determine when it is safe to re-open. Excess mortality does not depend on the number of tests done, those who turned out positive, or those deaths officially attributed to Covid-19. It simply observes how many people are dying in a particular area and tells us whether this is high or with excess compared with historical trends.

Further opening the economy is a major decision that should be made with a clearer picture of the pandemic based on complete data. Once we open and suspend restrictions on mobility, all bets are off. We need to be prepared not just in terms of resources but in terms of systems that are working and are in place thus our recommendations on expanded testing and effective tracing. These systems must be in place before we ease restrictions especially in high risk areas.

As government contemplates a calibrated and gradual reopening of the economy, ever greater cooperation and collaboration of government, business, civil society, and each and every Filipino will be required to overcome the next wave of pandemic challenges.

As we reopen, it will also be incumbent among individuals to exercise their citizenship and leadership to ensure that health guidelines are implemented such as safe workplaces, social distancing and proper safety and hygiene. These everyday acts of citizenship will become the cornerstone of our forward approach in the fight against Covid-19. In this new normal, everyone becomes a front liner in the cause of managing the pandemic.

Moving forward, what we do as individuals will be as important as any effort the government undertakes in the fight against Covid-19. Let us not forget that the pandemic is still here and it still remains a threat to public health. We still have a lot of work to do.