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Working Paper

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UPSE Discussion Paper, No. 2020-07

Provided in Cooperation with:
University of the Philippines School of Economics (UPSE)

Suggested Citation: Quimbo, Stella Luz A.; Latinazo, CT; Peabody, John (2020) : A risk assessment on the COVID-19 situation in the Philippines: Implications on the ECQ policy, UPSE Discussion Paper, No. 2020-07, University of the Philippines, School of Economics (UPSE), Quezon City

This Version is available at:
https://hdl.handle.net/10419/243065

UP School of Economics
Discussion Papers

Discussion Paper No. 2020-07 April 2020

A Risk Assessment on the COVID-19 Situation in the Philippines: Implications on the ECQ Policy

by

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A Risk Assessment on the COVID-19 Situation in the Philippines: Implications on the ECQ Policy

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27 April 2020

COVID-19 risk assessment is multi-faceted. The highly infectious nature of the virus in a naïve population, the high case fatality rate and health system over-burdening each need to be considered in developing a strategy to control the spread of the virus and mitigate its health and economic consequences. This note provides a framework for classifying LGUs by degree of risk and identifies policy options for each risk scenario. It urges the Department of Health (DOH) to: (i) re-assess risk levels of local government units (LGUs), (ii) undertake a 100 percent identification of place of residence of all COVID-19 confirmed cases and 100 percent reporting of number of isolation beds and ventilators by all hospitals, and (iii) develop and immediately implement a COVID-specific disease surveillance protocol, including mass testing, contact tracing, and quarantine. Careful and diligent implementation of these protocols will allow a gradual yet cautious and informed re-opening of the economy.

1. ECQ Policy

On 25 April 2020, it was announced that the Enhanced Community Quarantine (ECQ) will be extended until 15 May 2020 in NCR, Region 3 (excluding Aurora), Region 4-A, and the following provinces: Pangasinan, Benguet, the Island of Mindoro, Albay, Catanduanes, Antique, Iloilo, Cebu, and Davao del Norte.

All other areas will be under General Community Quarantine, but will be classified as under review, low risk area, or moderate risk area.

This note provides technical inputs on guidelines for implementing the various types of quarantine.

2. Estimates of COVID-19 Incidence

Current testing is limited in the Philippines; that is, the number of actual cases and deaths from COVID-19 are unknown. Without more testing of every symptomatic patient and conducting estimates of infection in the population, the true number of infections is difficult to know and harder to project. Experience from other countries may be helpful. In one analysis, 88 percent of all deaths were in patients with two co-morbidities. In another analysis, which accounts for the

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large number of asymptomatic patients who are infected, the overall death rate is 0.5 percent. These data not only underscore the importance of rapidly scaling up testing, they highlight why we use prevalence and hospital readiness for these quarantine guidelines.

3. Risk assessment

Following Cadena et al. (2020), two types of risk assessment are needed the LGU level: the risk of virus spread and the risk of over-burdening the health system in the provision of needed medical care for those found to be infected as they continue caring for other non-COVID-19 patients.

Risk of virus spread is measured by: (i) the number of confirmed cases per 10,000 population, and (ii) the average land area per confirmed case, as a measure of the ability to practice social distancing.

Risk of health system over-burdening is measured by: (i) the number of isolation rooms per active case (defined as total number of symptomatic cases less recoveries less deaths), and (ii) the number of ventilators per active case. Local and global standards are adopted to define what constitutes a minimum requirement for isolation beds and ventilators per active case.

The choice of indicators per type of risk is determined partly by data availability. This note uses data on confirmed COVID-19 cases from 30 January to 25 April 2020 and the latest reported capacity of health facilities, sourced from the online COVID-19 Data Drop of the DOH.

LGUs will be ranked on the basis of the risk indicators above. The rankings will form a score for each type of risk, with equal weights assigned to each indicator for each type of risk. By classifying each score as either Low, Medium, or High, each LGU will be assigned a specific cell in a 3 x 3 matrix of risks.

For example, an LGU that ranks poorly in terms of *both* a high number of confirmed cases per 10,000 population and a low average land area per confirmed case will be considered as “high risk” for virus spread. If this LGU has more than 1 isolation room and 1 ventilator per active case, it is classified as “low risk” for health system over-burdening. Hence, this LGU shall be in the cell for “high risk of virus spread”/ “low risk of health system over-burdening.”

For COVID-free provinces, risk of virus spread is assessed on the basis of (i) proportion of population aged 60 years old and above, and (ii) population density.

In cases where the risk classification may be ambiguous due to other important considerations, the higher risk classification holds, but will be subject to disease surveillance (DS) and possible eventual re-classification into the higher or lower risk category, whichever is warranted by the results of DS.

Key elements of DS include reporting to the DOH on the basis of (i) contact tracing, (ii) area-based mass testing, and (iii) work-based mass testing.

This matrix will be regularly updated. When provinces become COVID-free on a sustained basis (14 days of no reported new cases), they will no longer be included in the risk assessment matrix, but will still subject to the health protocols for COVID-free provinces (largely, for DS).

Policy recommendations will be identified for each cell.

4. Risk of Virus Spread

The total number of COVID-19 cases as of 25 April 2020 has reached 7,294 (see Table 1). NCR accounts for close to 60 percent of all cases, followed by Region 4-A (9.8 percent), Region 3 (8.7 percent), and Region 7 (5.4 percent). Relative to population, these same 4 regions have the highest number of infections. Moreover, the average land area per case is lowest for the same regions. Hence, at the regional level, these 4 regions – NCR, 3, 4-A, and 7 – appear to be at the highest risk level. In the case of Region 7, however, since 98 percent of the cases are in a single province (Cebu), Region 7 can be downgraded in terms of risk level, but subject to DS. With an increased number of provinces with infections, Region 7 can be reclassified as "high risk."

At the region level, for risk of virus spread:

- NCR, Regions 3, and 4-A are high-risk areas

It is noteworthy that 791 (11 percent) of all confirmed cases have unknown places of residence. This means that contact tracing cannot be properly implemented. As a result, COVID-19 suspects cannot be properly identified, forestalling the conduct of testing and quarantine protocols.

Table 1. Number of COVID-19 cases and other indicators, by region

Region	Number of cases	2020 Population (estimated)	Land Area (sq km)	Number of cases per 10,000 population	Land area per number of cases	Number of provinces accounting for at least 90 percent of cases (total with cases)
NCR	4,359	14,020,962	619.54	3.109	0.14	13
CAR	26	1,874,948	19,818.12	0.139	762.24	1
Region 1	48	5,472,530	12,964.62	0.088	270.10	2
Region 2	28	3,757,951	29,836.88	0.075	1,065.60	3
Region 3	638	12,214,533	21,906.19	0.522	34.34	5
Region 4-A	714	15,695,039	16,576.26	0.455	23.22	3
Region 4-B	17	3,226,554	29,606.25	0.053	1,741.54	3
Region 5	37	6,311,855	18,114.47	0.059	489.58	2
Region 6	61	8,205,736	20,778.29	0.074	340.63	4
Region 7	399	8,053,862	15,872.58	0.495	39.78	1
Region 8	8	4,834,507	23,234.78	0.017	2,904.35	2
Region 9	11	3,952,166	16,904.03	0.028	1,536.73	1
Region 10	12	5,105,788	20,458.51	0.024	1,704.88	3
Region 11	116	5,327,924	20,433.38	0.218	176.15	2
Region 12	16	4,948,970	22,786.08	0.032	1,424.13	3
BARMM	10	4,117,235	36,650.95	0.024	3,665.10	1
CARAGA	3	2,827,339	21,120.56	0.011	7,040.19	1
Residence not yet identified	791					
TOTAL	**7,294**					

Table 2 shows the: (i) 20 provinces with the highest number of cases, (ii) provinces not among the top 20 but were included by the Inter-agency Task Force (IATF) as candidates for extended ECQ, and (iii) all other provinces with at least one confirmed case. All but 3 of the 25 provinces in (i) and (ii) were classified as "high risk" by the IATF, with 8 of these "high risk" provinces as being subject to evaluation or government rechecking. The remaining 3 of these 25 provinces were classified as "moderate risk," with 2 being subject to evaluation.

The 20 provinces with the highest number of cases account for about 87 percent of all cases. Among provinces, Metro Manila has the highest number of cases, followed by Cebu and Rizal, with 4359, 391, and 339 cases, respectively. In terms of number of cases per 10,000 population and average land area per case, the top 4 provinces at highest risk of virus spread are Metro Manila, Cebu, Rizal, and Laguna. Bataan has a relatively high number of cases relative to population size, although its larger land area somehow mitigates the risk of COVID-19 transmission. On the other hand, while Cavite does not have the highest number of cases per 10,000 population, its relatively small land area increases its risk of COVID-19 transmission.

Provinces including Pangasinan, Benguet, the Island of Mindoro, Catanduanes, Antique, Iloilo, and Davao del Norte have been identified as candidates for extended ECQ. As Table 2 indicates, these provinces may not be “high risk” for virus spread areas based on the chosen metrics.

To illustrate, at the province level, for risk of virus spread:

- Metro Manila, Cebu, Rizal, Laguna and Cavite are high-risk areas

The risk classification of each province with confirmed COVID-19 cases will be shown in section 6.

Table 2. Number of COVID-19 cases and other indicators, by province

Region	Province	IATF Status	Cases	Estimated 2020 Population	Land area (square km)	Number of cases/10k population	Land area/number of cases
Top 20 Provinces							
NCR	Metro Manila	High risk	4359	13,280,900	619.54	3.28	0.14
7	Cebu	High risk, subject to evaluation	391	4,916,300	5,342.00	0.80	13.66
4-A	Rizal	High risk	339	3,152,000	1,182.65	1.08	3.49
4-A	Laguna	High risk	296	3,266,500	1,928.23	0.91	6.49
4-A	Cavite	High risk	236	3,894,200	1,526.28	0.61	6.47
3	Bulacan	High risk	107	3,579,500	2,783.69	0.30	26.02
11	Davao del Sur	Moderate risk, subject to evaluation	100	2,834,700	4,607.59	0.35	46.08
4-A	Batangas	High risk	85	2,795,600	3,115.05	0.30	36.65
3	Bataan	High risk	75	799,000	1,372.98	0.94	18.31
3	Pampanga	High risk	58	2,700,900	2,064.59	0.21	35.60
4-A	Quezon	High risk	54	2,334,200	8,824.05	0.23	163.41
3	Nueva Ecija	High risk	48	2,234,900	5,689.69	0.21	118.54
1	Pangasinan	High risk, subject to evaluation	32	3,293,100	5,450.59	0.10	170.33
3	Tarlac	High risk, subject to evaluation	27	1,450,400	3,046.49	0.19	112.83
6	Iloilo	High risk, subject to evaluation	26	2,554,800	5,075.98	0.10	195.23

Table 2. Number of COVID-19 cases and other indicators, by province (continued)

Region	Province	IATF Status	Cases	Estimated 2020 Population	Land area (square km)	Number of cases/10k population	Land area/number of cases
3	Zambales	High risk, subject to evaluation	26	883,000	3,815.35	0.29	146.74
5	Albay	High risk	25	1,476,700	2,574.91	0.17	103.00
CAR	Benguet	High risk, subject to evaluation	23	868,100	5,387.09	0.26	234.22
6	Negros Occidental	Moderate risk	15	3,394,100	8,004.83	0.04	533.66
2	Cagayan	Moderate risk, subject to evaluation	14	1,281,400	9,398.07	0.11	671.29
Other provinces considered for ECQ							
6	Antique	High risk, subject to evaluation	8	672,000	2,730.67	0.12	341.33
5	Catanduanes	High risk	2	306,500	1,492.16	0.07	746.08
4-B	Occidental Mindoro	High risk	6	566,300	5,851.09	0.11	975.18
4-B	Oriental Mindoro	High risk	6	972,200	4,238.38	0.06	706.40
11	Davao del Norte	High risk, subject to evaluation	11	1,135,200	3,422.61	0.10	311.15
Other provinces with COVID-19 cases							
1	La Union	Moderate risk, subject to evaluation	11	827,900	1,499.28	0.16	115.33
9	Zamboanga del Sur	Moderate risk, subject to evaluation	11	2,122,400	4,484.21	0.05	407.66
5	Camarines Sur	Moderate risk, subject to evaluation	10	2,248,800	5,511.90	0.04	551.19
BARMM	Lanao del Sur	Moderate risk	9	1,216,600	15,055.51	0.07	1672.83
12	North Cotabato	Moderate risk, subject to evaluation	9	1,519,600	9,317.30	0.06	1035.26
2	Isabela	Moderate risk, subject to evaluation	8	385,900	13,102.05	0.21	1637.76
6	Aklan	Moderate risk, subject to evaluation	7	627,400	1,760.30	0.11	251.47
7	Negros Oriental	Moderate risk	7	1,511,000	5,420.57	0.05	774.37
2	Nueva Vizcaya	Moderate risk, subject to evaluation	6	498,900	4,813.88	0.12	802.31
6	Capiz	Moderate risk, subject to evaluation	5	810,700	2,594.64	0.06	518.93
10	Lanao del Norte	Moderate risk, subject to eval	5	1,125,700	4,167.53	0.04	833.51

Table 2. Number of COVID-19 cases and other indicators, by province (continued)

Region	Province	IATF Status	Cases	Estimated 2020 Population	Land area (square km)	Number of cases/10k population	Land area/number of cases
1	Ilocos Norte	Moderate risk, subject to evaluation	4	602,600	3,418.75	0.07	854.69
4-B	Marinduque	Moderate risk, subject to evaluation	4	273,100	952.58	0.15	238.15
12	South Cotabato	Moderate risk, subject to eval	4	1,667,300	4,285.90	0.02	1071.48
8	Samar (Western Samar)	Moderate risk, subject to evaluation	4	894,500	6,048.03	0.04	1512.01
CAR	Abra	Moderate risk, subject to evaluation	3	264,700	4,199.72	0.11	1399.91
CARAGA	Agusan del Norte	Low risk	3	791,900	3,427.63	0.04	1142.54
11	Davao Oriental	Moderate risk	3	1,135,200	5,679.64	0.03	1893.21
8	Leyte	Low risk	3	2,132,800	6,536.44	0.01	2178.81
10	Misamis Oriental	Moderate risk, subject to evaluation	3	1,677,300	3,543.52	0.02	1181.17
12	Sultan Kudarat	Moderate risk	3	918,200	5,363.86	0.03	1787.95
11	Compostela Valley	Moderate risk, subject to evaluation	2	836,700	4,560.09	0.02	2280.05
10	Misamis Occidental	Moderate risk, subject to evaluation	2	665,200	2,006.63	0.03	1003.32
7	Bohol	Low risk	1	1,516,800	4,772.52	0.01	4772.52
10	Bukidnon	Low risk	1	1,513,600	10,498.59	0.01	10498.59
10	Camiguin	Low risk	1	100,300	241.44	0.10	241.44
1	Ilocos Sur	Low risk	1	722,000	2,596.00	0.01	2596.00
BARMM	Maguindanao	Moderate risk, subject to evaluation	1	1,204,900	9,968.31	0.01	9968.31
8	Northern Samar	Low risk	1	734,600	3,694.96	0.01	3694.96
4-B	Palawan	Low risk	1	1,253,200	17,030.75	0.01	17030.75
4-B	Romblon	Low risk	1	345,200	1,533.45	0.03	1533.45
	Total		**6,503***	**32,145,000**	**168,086**	**2.02**	**25.85**

*Excluding the 791 cases with unidentified places of residence

Within NCR, Quezon City and the city of Manila account for the highest number of cases, accounting for 25.5 and 13.4 percent of all cases, respectively (see Table 3). However, San Juan, Mandaluyong, Makati, and Paranaque have the highest number of cases per 10 thousand population. These cities – particularly, San Juan, Mandaluyong, and Makati – have the smallest land area per case.

At the city level in the NCR, for risk of virus spread:

- San Juan, Mandaluyong, Makati are high-risk areas

Table 3. Number of COVID-19 cases and other indicators, by city/municipality in NCR

City/Municipality	Cases	2020 Population (estimated)	Land area (square km)	Number of cases/10k population	Land area/number of cases
Quezon City	1,110	3,028,151	171.71	3.67	0.15
City of Manila	591	1,835,948	24.98	3.22	0.04
City of Paranaque	375	686,693	46.57	5.46	0.12
City of Makati	371	600,864	21.57	6.17	0.06
City of Mandaluyong	323	398,384	9.29	8.11	0.03
City of Pasig	261	778,975	48.46	3.35	0.19
Taguig City	225	830,146	45.21	2.71	0.20
City of San Juan	213	126,010	5.95	16.90	0.03
Caloocan City	186	1,633,629	55.80	1.14	0.30
Pasay City	155	429,578	13.97	3.61	0.09
City of Las Pinas	151	607,353	32.69	2.49	0.22
City of Muntinlupa	138	520,323	39.75	2.65	0.29
City of Marikina	114	464,870	21.52	2.45	0.19
City of Valenzuela	66	639,870	47.02	1.03	0.71
City of Malabon	30	376,983	15.71	0.80	0.52
City of Navotas	28	257,283	8.94	1.09	0.32
Pateros	22	65,841	10.40	3.34	0.47
Total	**4,359**	**13,280,900**	**619.54**	**68**	**4**

5. Risk of health system over-burdening

Based on DOH data, 65 percent of all confirmed COVID-19 cases have been admitted to a hospital. Moreover, according to the WHO (2020), about 5 percent of COVID-19 cases will require critical care and ventilation. These correspond to a 0.65 isolation bed to active case ratio and a 0.05 ventilator to active case ratio, respectively. Accounting for an additional buffer for capacity, an isolation bed to active case ratio of 0.80 and a ventilator to active case ratio of 0.10, together, are adopted as minimum standards. Among the provinces with the highest number of total cases, namely, Metro Manila, Cebu, Laguna, Rizal and Cavite, only Cebu meets the minimum standards for isolation beds and ventilators per number of active cases (see Table 4).

At the province level, for risk of health system over-burdening:

- Metro Manila, Laguna, Rizal, and Cavite are high-risk areas

Table 4. Health sector capacity indicators, by province

Province	Active symptomatic cases	Isolation beds per active symptomatic case	Ventilators per active symptomatic case
Metro Manila	2,973	0.45	0.18
Cebu	293	0.82	0.22
Laguna	265	0.20	0.05
Rizal	251	0.31	0.07
Cavite	179	0.37	0.13
Bulacan	77	1.91	0.26
Quezon	47	0.62	0.06
Pampanga	46	3.48	1.89
Nueva Ecija	43	1.63	0.47
Batangas	40	1.18	1.05
Bataan	34	3.79	0.44
Davao del Sur	30	6.97	1.63
Pangasinan	25	6.44	1.24
Tarlac	24	3.42	0.92
Zambales	20	1.85	0.70
Albay	13	3.00	0.31
La Union	8	13.63	3.00
Benguet	7	13.43	3.00
Camarines Sur	7	9.29	0.86
Iloilo	7	34.57	5.14
Negros Occidental	6	26.17	6.17
Aklan	5	4.80	1.20
Davao del Norte	5	19.00	0.60
Zamboanga del Sur	5	40.40	4.20
Cagayan	2	59.00	8.00
Catanduanes	2	9.50	1.50
Ilocos Norte	2	51.00	2.50
Lanao del Sur	2	7.50	1.50
Leyte	2	74.00	3.00
Nueva Vizcaya	2	41.50	2.00
Oriental Mindoro	2	36.50	4.00
Western Samar	2	11.00	0.50
Agusan del Norte	1	56.00	3.00
Antique	1	10.00	2.00
Bukidnon	1	106.00	10.00
Capiz	1	99.00	8.00
Compostela Valley	1	7.00	0.00
Ilocos Sur	1	70.00	5.00
Isabela	1	117.00	16.00
Lanao del Norte	1	49.00	11.00
Negros Oriental	1	69.00	3.00
Occidental Mindoro	1	36.00	6.00
Romblon	1	52.00	2.00
South Cotabato	1	82.00	25.00

*Data is based on self-reported data from health care facilities

Within NCR, not all the cities have sufficient numbers of isolation beds and ventilators per active case, as reported to DOH (see Table 5). Since the NCR population is fairly mobile, however, COVID-19 patients who reside in Metro Manila can choose to be admitted to hospitals outside their place of residence. Mandaluyong and Navotas appear to be at highest risk of health system over-burdening. Overall, NCR has fewer than the required 0.8 isolation beds per case. The DOH must endeavor to complete data on isolation beds and ventilators (especially from San Juan and Pateros) in order for a more accurate assessment on risk of health system over-burdening to be done.

Table 5. Health sector capacity indicators, by city/municipality in NCR

City/Municipality	Active Symptomatic Cases	Isolation beds per active symptomatic case	Total COVID-19 beds per active symptomatic case	Ventilators per active symptomatic case
Quezon City	765	0.70	1.12	0.27
City of Manila	398	0.70	1.15	0.31
City of Paranaque	248	0.06	0.14	0.06
City of Makati	243	0.29	0.35	0.12
City of Mandaluyong	238	0.04	0.12	0.00
City of Pasig	156	0.85	1.78	0.29
Taguig City	163	0.71	1.06	0.21
City of San Juan	132	*no data*	*no data*	*no data*
Caloocan City	132	0.88	2.58	0.40
Pasay City	118	0.20	0.28	0.05
City of Las Pinas	114	0.64	0.76	0.22
City of Muntinlupa	105	0.60	1.48	0.71
City of Marikina	66	0.44	0.53	0.11
City of Valenzuela	41	0.78	1.02	0.37
City of Malabon	20	0.75	0.75	0.10
City of Navotas	19	0.05	0.32	0.00
Pateros	15	*no data*	*no data*	*no data*
Total	**2,973**	**0.51**	**0.88**	**0.21**

6. COVID-19 Risk Matrix

The risk classification of each province with at least 1 active COVID-19 case is found in the matrix below (see Figure 1).

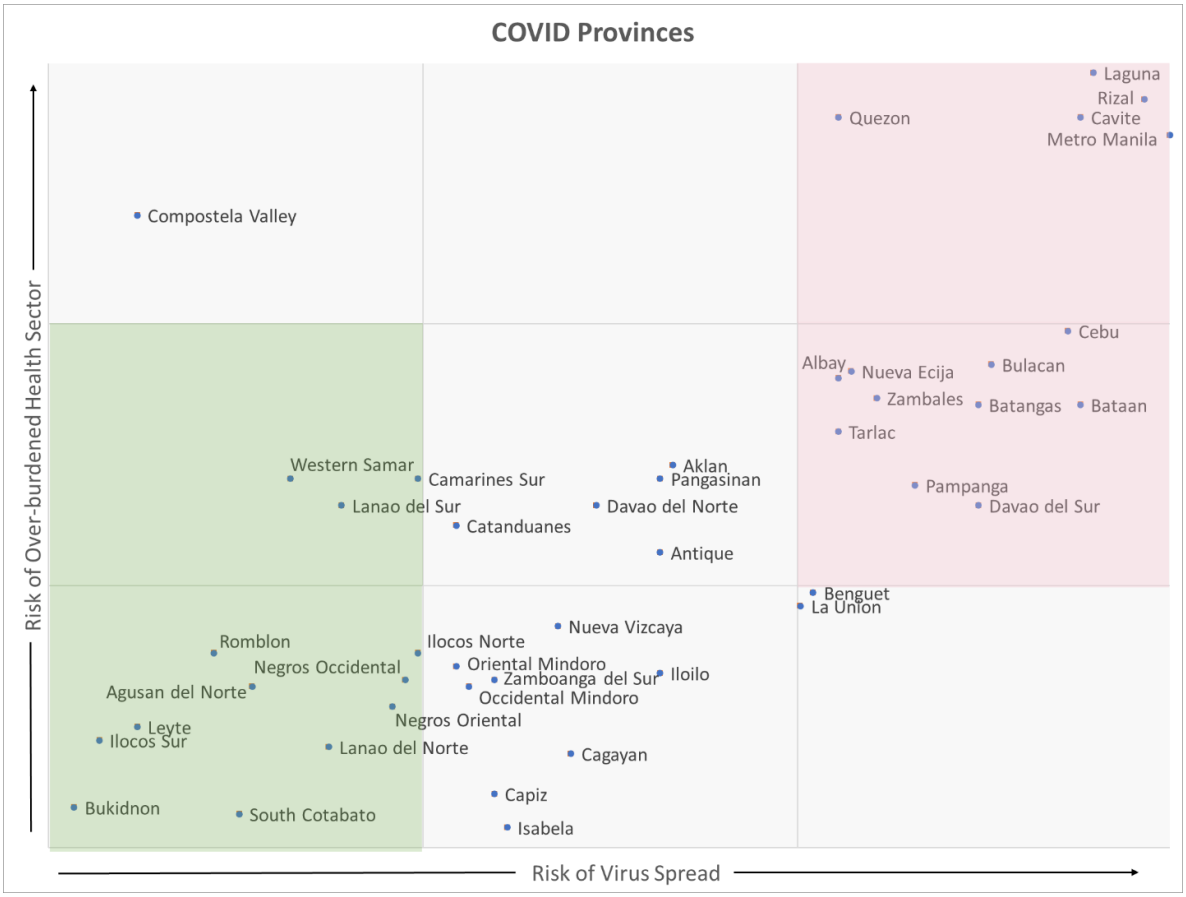

Figure 1. Risk classification among provinces with active COVID-19 cases

Among the provinces which are COVID-free, a risk of virus spread may still arise, depending on the degree of effectiveness of border control and level of testing to detect cases. Such risk will still vary across localities, depending on their population characteristics and health sector capacity. Risk of virus spread is measured by population density and share of population aged 60 years and older.[4] In more population dense areas, social distancing will be more difficult to achieve. In areas where the share of the elderly to total population is higher, the risk of virus spread is higher. The same measures of the risk of health system over-burdening are utilized. The risk classification among provinces with no active COVID-19 cases is found in the matrix below (see Figure 2). The reader is cautioned that while we use the same labels for degrees of risk (low, medium, and high), these are to be interpreted differently from the degrees of risk for non-COVID-free provinces. Here, "risk of virus spread" means "risk of first detecting a case, and then spreading."

[4] Age is used as a proxy for co-morbidities

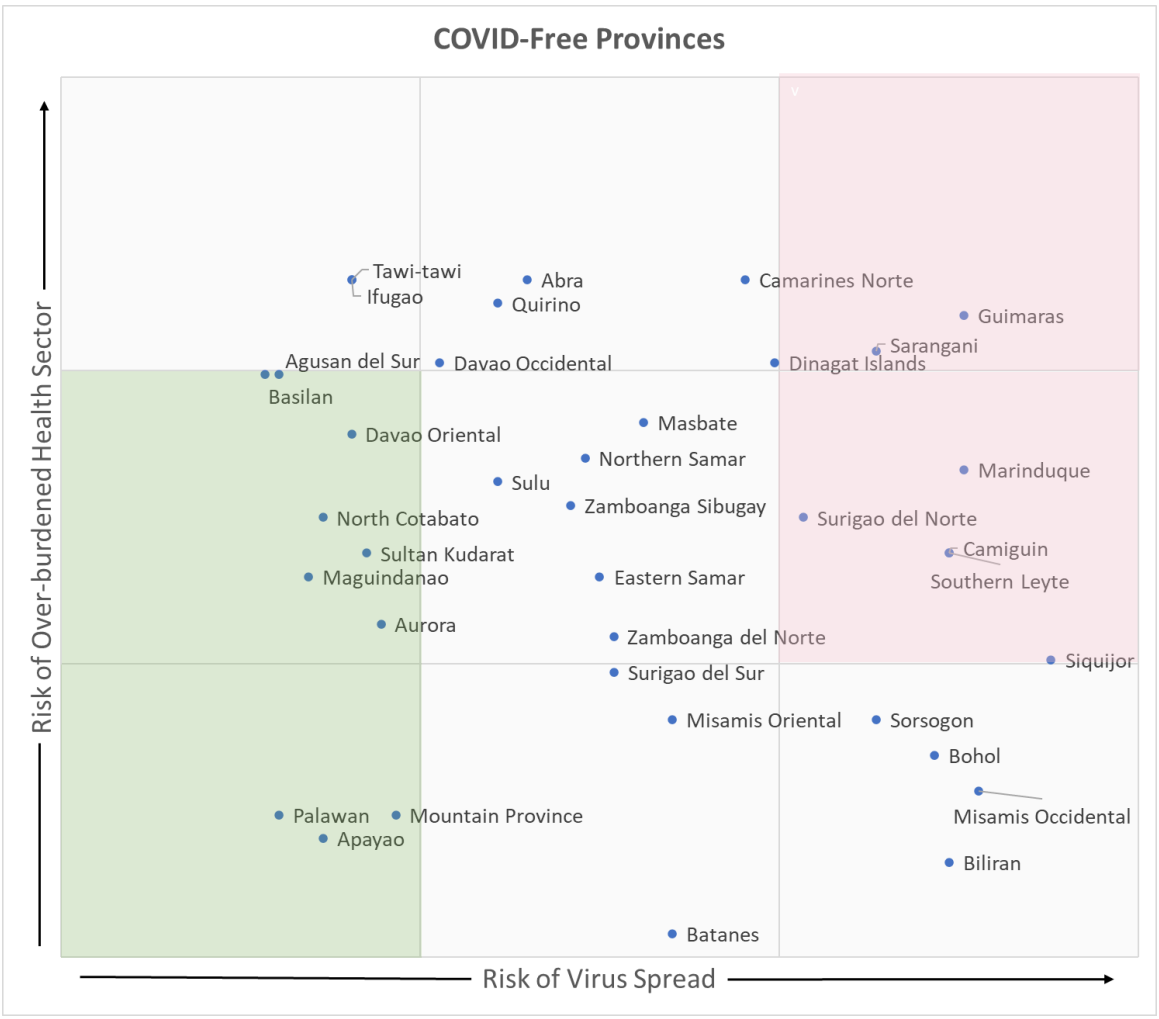

Figure 2. Risk classification among COVID-free provinces

This type of analysis can be performed at any LGU level, e.g., cities or barangays, especially if there are indicators of disease transmission in sub-provincial clusters.

7. Policy Recommendations

COVID-19 risks are multi-faceted. Both risk of virus spread and risk of health system over-burdening need to be considered. As IATF conducts its final evaluation for ECQ-related decisions, it may wish to undertake further re-assessments of its initial risk classification of provinces, with guidance from the indicators below (see Table 6).

Table 6. Comparison of risk assessment,
by IATF and Quimbo-Latinazo-Peabody (QLP) risk indicators

Region	Province	IATF STATUS	QLP		Recommendation
			Risk of virus spread	Risk of health system over-burdening	
NCR*	Metro Manila	High risk	High	High	
7	Cebu	High risk, subject to evaluation	High	Medium	Re-assess
4-A*	Rizal	High risk	High	High	
4-A*	Laguna	High risk	High	High	
4-A*	Cavite	High risk	High	High	
3*	Bulacan	High risk	High	Medium	Re-assess
11	Davao del Sur	Moderate risk, subject to evaluation	High	Medium	Re-assess
4-A*	Batangas	High risk	High	Medium	Re-assess
3*	Bataan	High risk	High	Medium	Re-assess
3*	Pampanga	High risk	High	Medium	Re-assess
4-A*	Quezon	High risk	High	High	
3*	Nueva Ecija	High risk	High	Medium	Re-assess
1	Pangasinan	High risk, subject to evaluation	Medium	Medium	Re-assess
3*	Tarlac	High risk, subject to evaluation	High	Medium	Re-assess
6	Iloilo	High risk, subject to evaluation	Medium	Low	Re-assess
3*	Zambales	High risk, subject to evaluation	High	Medium	Re-assess
5	Albay	High risk	High	Medium	Re-assess
CAR	Benguet	High risk, subject to evaluation	High	Low	Re-assess
6	Negros Occidental	Moderate risk	Low	Low	Re-assess
2	Cagayan	Moderate risk, subject to evaluation	Medium	Low	Re-assess
6	Antique	High risk, subject to evaluation	Medium	Medium	Re-assess

Table 6. Comparison of risk assessment,
by IATF and Quimbo-Latinazo-Peabody (QLP) risk indicators (continued)

Region	Province	IATF STATUS	QLP		Recommendation
			Risk of virus spread	Risk of health system over-burdening	
5	Catanduanes	High risk	Medium	Medium	Re-assess
4-B	Occidental Mindoro	High risk	Medium	Low	Re-assess
4-B	Oriental Mindoro	High risk	Medium	Low	Re-assess
11	Davao del Norte	High risk, subject to evaluation	Medium	Medium	Re-assess
1	La Union	Moderate risk, subject to evaluation	High/Medium	Low	Re-assess
9	Zamboanga del Sur	Moderate risk, subject to evaluation	Medium	Low	Re-assess
5	Camarines Sur	Moderate risk, subject to evaluation	Low/Medium	Medium	
BARMM	Lanao del Sur	Moderate risk	Low	Medium	Re-assess
2	Isabela	Moderate risk, subject to evaluation	Medium	Low	Re-assess
6	Aklan	Moderate risk, subject to evaluation	Medium	Medium	
7	Negros Oriental	Moderate risk	Low	Low	Re-assess
2	Nueva Vizcaya	Moderate risk, subject to evaluation	Medium	Medium	
6	Capiz	Moderate risk, subject to evaluation	Medium	Low	Re-assess
10	Lanao del Norte	Moderate risk, subject to evaluation	Low	Low	Re-assess
1	Ilocos Norte	Moderate risk, subject to evaluation	Low	Low	Re-assess
12	South Cotabato	Moderate risk, subject to evaluation	Low	Low	Re-assess
8	Western Samar	Moderate risk, subject to evaluation	Medium	Low	Re-assess
CARAGA	Agusan del Norte	Low risk	Low	Low	
8	Leyte	Low risk	Low	Low	
11	Compostela Valley	Moderate risk, subject to evaluation	Low	High	Re-assess
10	Bukidnon	Low risk	Low	Low	
1	Ilocos Sur	Low risk	Low	Low	
4-B	Romblon	Low risk	Low	Low	
12	North Cotabato	Moderate risk, subject to evaluation	NO ACTIVE CASES		Re-assess

Table 6. Comparison of risk assessment,
by IATF and Quimbo-Latinazo-Peabody (QLP) risk indicators (continued)

Region	Province	IATF STATUS	QLP		Recommendation
			Risk of virus spread	Risk of health system over-burdening	
14	Marinduque	Moderate risk, subject to evaluation	NO ACTIVE CASES		Re-assess
CAR	Abra	Moderate risk, subject to evaluation	NO ACTIVE CASES		Re-assess
11	Davao Oriental	Moderate risk	NO ACTIVE CASES		Re-assess
10	Misamis Occidental	Moderate risk, subject to evaluation	NO ACTIVE CASES		Re-assess
10	Misamis Oriental	Moderate risk, subject to evaluation	NO ACTIVE CASES		Re-assess
12	Sultan Kudarat	Moderate risk	NO ACTIVE CASES		Re-assess
7	Bohol	Low risk	NO ACTIVE CASES		
10	Camiguin	Low risk	NO ACTIVE CASES		
BARMM	Maguindanao	Moderate risk, subject to evaluation	NO ACTIVE CASES		Re-assess
8	Northern Samar	Low risk	NO ACTIVE CASES		
4-B	Palawan	Low risk	NO ACTIVE CASES		
3*	Aurora	Low risk	COVID-FREE		Re-assess
CAR	Ifugao	Low risk	COVID-FREE		Re-assess
5	Sorsogon	Low risk	COVID-FREE		Re-assess
CARAGA	Surigao del Norte	Low risk	COVID-FREE		Re-assess
8	Southern Leyte	Low risk	COVID-FREE		Re-assess
5	Camarines Norte	Low risk	COVID-FREE		Re-assess
9	Zamboanga del Norte	Low risk	COVID-FREE		Re-assess
8	Biliran	Low risk	COVID-FREE		Re-assess
CARAGA	Agusan del Sur	Low risk	COVID-FREE		Re-assess
2	Batanes	Low risk	COVID-FREE		Re-assess
CARAGA	Surigao del Sur	Low risk	COVID-FREE		Re-assess
CAR	Mountain Province	Low risk	COVID-FREE		Re-assess
BARMM	Sulu	Low risk	COVID-FREE		Re-assess
CAR	Apayao	Low risk	COVID-FREE		Re-assess

Table 6. Comparison of risk assessment,
by IATF and Quimbo-Latinazo-Peabody (QLP) risk indicators (continued)

Region	Province	IATF STATUS	QLP		Recommendation
			Risk of virus spread	Risk of health system over-burdening	
5	Masbate	Low risk	COVID-FREE		Re-assess
11	Davao Occidental	Low risk	COVID-FREE		Re-assess
7	Siquijor	Moderate risk	COVID-FREE		Re-assess
6	Guimaras	Low risk	COVID-FREE		Re-assess
CARAGA	Dinagat Islands	Low risk	COVID-FREE		Re-assess
8	Eastern Samar	Low risk	COVID-FREE		Re-assess
9	Zamboanga Sibugay	Low risk	COVID-FREE		Re-assess
12	Sarangani	Low risk	COVID-FREE		Re-assess
2	Quirino	Low risk	COVID-FREE		Re-assess
BARMM	Tawi-tawi	Low risk	COVID-FREE		Re-assess
BARMM	Basilan	Low risk	COVID-FREE		Re-assess

*For this table, "COVID-free" refers to provinces that have not ever reported COVID-19 cases. "No active cases" refers to provinces where all COVID-19 patients previously reported have either recovered or died.

Table 7 summarizes policy recommendations for each COVID-19 risk type of LGU. The general approach to the re-opening of the economy should be at the province-level, gradual, and supported by evidence from disease surveillance. Under all risk scenarios, the following are imperative:

(i) social distancing protocol,
(ii) contact tracing and quarantine (i.e., mandatory isolation of all COVID-19 suspects, to be defined by DOH for varying risk levels of virus spread),
(iii) (provincial) border control, and
(iv) area-based and work-based mass-testing.

Social distancing, to date, is the most effective policy to control the rate of rise in COVID-19 incidence and to decrease the number of cases.

Contact tracing mitigates the risk of new outbreaks and allows for social distancing to be more targeted and quarantine requirements to be strictly implemented. Contact tracing thus decreases the demands of an already over-burdened health system. Based on various news reports, the Philippines has established 10 quarantine facilities, with 3,299 beds in total. Ten more facilities are awaiting completion.

The presence of 791 confirmed cases with unknown residence behooves us to take a cautious stance with respect to lifting of the CQ, even in COVID-free provinces. This indicates that contact tracing needs significant improvement. The first step of contact tracing - identification of the place of residence – has to be completed (100%). The second step in contact tracing is to identify all close contacts and test these individuals as well. All those that test positive need to be quarantined for 14 days after recovery. DOH must therefore review its contact tracing protocol and demand its strict implementation by the local health offices.

The importance of border control is critical. The purpose of border control is to ensure that the population that is being protected is not exposed from in-migration. For a COVID-free province to remain such, it must ensure that there are no new entrants into the province, or if they do enter a province, these entrants are properly screened and quarantined as necessary.

Mass testing is key to any economy re-opening strategy. All infected individuals, whether symptomatic or not, need to be properly diagnosed. For symptomatic individuals, proper diagnosis is required for treatment. For the asymptomatic individuals, proper diagnosis is needed to ensure that the virus does not spread when such could have been easily prevented through contact tracing and quarantine. Mass testing is of utmost importance in identifying the asymptomatic cases. With this in place, COVID-free communities and workplaces become relatively safe and economic liberalization is feasible.

For COVID-free provinces, the lifting of the ECQ can be done in phases (2 one-week phases), beginning with those that are low or medium risk with respect to both virus spread and health system over-burdening. The next phase will include the remaining provinces. By 15 May, results from disease surveillance will inform whether or not it is safe for provinces that are not COVID-free to reduce restrictions. Regardless, lifting restrictions needs to be gradual, in select areas of the economy such as schools, farming, and construction with social distancing practiced diligently. As we proceed with the gradual re-opening of our economy and improve our knowledge on how to control virus spread, liberalizing work-related policies can be achieved in stages. With the lifting of the ECQ, all economic activity can resume.

For non-COVID-free provinces, the various risk scenarios will differ largely in terms of policies with respect to allowing individuals to go to the workplace. For non-COVID-free provinces, only selected economic activities can resume, in phases. For this purpose, mass-testing should be undertaken in geographic areas and workplaces so that hot spots are rapidly identified and contained. In high risk areas, such as NCR, some increased economic activity can be tolerated provided that a protocol to ensure COVID-free workplaces, including COVID-free transport of workers to workplaces, is in place and can be properly enforced. This will require regular testing and strict hygiene and social distancing measures. Adopting the same strict protocol for lower risk areas allows the resumption of all economic activities, in phases.

In sum, three types of work-related policies are identified, depending on the risk category: allow work in (i) selected workplaces in selected sectors, (ii) all workplaces in selected sectors, and (iii) all work in all sectors.

Table 7. Summary of Policy Recommendations, by QLP risk scenario

Province-level classification	Community Quarantine (CQ) Status	Social Distancing	Contact Tracing and Quarantine	Border Control	Mass testing (area-based)	Mass testing (work-based)	Allow work only in COVID-free Work Sites
Not COVID-free; High risk of virus spread + Medium/High risk of health system over-burdening	Extended Enhanced CQ	√	√√*	√	√	General rule: No work in ECQ "non-essential" businesses** Exception: Allow work in COVID-free workplaces with COVID-free worker transport, in select sectors	
Not COVID-free; High risk of virus spread + Low risk of health system over-burdening	General CQ***	√	√√	√	√	√	Allow work by sector, in 4 phases****
Not COVID-free; Medium risk of virus spread + Medium/High risk of health system over-burdening	General CQ	√	√√	√	√	√	Allow work by sector, in 4 phases
Not COVID-free; Medium risk of virus spread + Low risk of health system over-burdening	General CQ	√	√√	√	√	√	Allow work by sector, in 3 phases
Not COVID-free; Low risk of virus spread + High risk of health system over-burdening	General CQ	√	√	√	√	√	Allow work by sector, in 2 phases
Not COVID-free; Low risk of virus spread + Low/Medium risk of health system over-burdening	Lifted (Phase 2, depending on Phase 1 results)	√	√	√	√	√	Allow all work
All COVID-free (including those with no active cases)	Lifted (Phase 1, in 2 phases)	√	√	√	√	√	Allow all work

* Expanded contact tracing, in terms of levels of contact

**Exception is for worksites that are certified COVID-free: where workers are housed on site, with strict 14-day quarantine prior to start of work and mass testing of workers, or an equivalent protocol, subject to clearance from the DOH.

***Under a General CQ, workers are allowed to leave their homes, subject to company compliance with health standards imposed by the DOH; "essential businesses" will be expanded to include additional retail activity.

**** Each phase shall last for one week.

A statistical analysis (see Annex) suggests that the lockdown appears to have effectively contained the spread of the virus within the household. With any degree of re-opening of the economy, we must ensure that we maintain such manageable spread of the virus. This can be done most effectively by mass testing. With mass testing, we are able to ensure that as individuals leave their households, their physical presence in transportation networks and workplaces will not cause the further spread of the virus.

Given the foregoing, DOH must develop and immediately implement a regional and national disease surveillance protocol for COVID-19.

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ANNEX

INTERPRET WITH CAUTION,
ESTIMATES ADJUSTED AND VALIDATED DAILY,
DO NOT CITE WITHOUT AUTHORS' PERMISSION

This Annex presents results of regression analysis performed on time series data on total COVID-19 cases in the Philippines, beginning 11 March to 24 April 2020.

The analysis was conducted for purposes of predicting the total number of reported COVID-19 cases outside the period covered by the sample.

The dependent variable is total COVID-19 cases (ever infected), as reported by the DOH. Given the protocol adopted by the DOH for testing, the number of cases can be presumed to be the number of symptomatic cases (which required testing, and possibly hospital admission).

The independent variables include a time trend (cubic form), a dummy variable for the lockdown period, a variable that proxies for detection of severe cases (total cases as a proportion of deaths divided by a mortality rate of 0.04), a variable that proxies for rate of transmission (defined as number of cases divided by number of cases 14 days prior), and a proxy for health system capacity (defined as number of recoveries divided by number of deaths) including its interaction with detection.

The model fits actual data very well (r-squared of 99 percent).

The parameters are used to predict out-of-sample, with the following assumptions:

- Detection rate gradually increases from 60 percent to 80 percent

- The ratio of number of cases to number of cases 14 days prior increases from the current level of 1.5 during the lockdown to 16 after the lockdown (after May 15)

The results indicate that the peak of total serious cases is at about 11,000, with the growth of cases stabilizing at around the third week of May.

The regression results also suggest that the R0, without the lockdown, is between 2 to 2.5. (The regression coefficient of the rate of transmission proxy variable is about 20). That is, within 14 days, every case will predict another 20 cases. With an R0 of 2, every new case will produce a total of 16 cases through 4 levels of transmission (Level 1: individual to 2 family members; Level 2: family members to other household members; Level 3: household members to community members; Level 4: community members to the workplace).

Moreover, with the lockdown, the R0 is vastly diminished, with every new case predicting a total of only about 5 cases. The lockdown appears to have effectively limited transmission to within the household only.

In the approach to lifting the lockdown, it is important that community and workplace transmission is controlled via disease surveillance through mass testing and contact tracing.

Regression Results: Total Number of Reported Cases

Variable	Definition	Coef.	P>t
Time	t=1,2, …	-1469.7	0.000
Time squared		20.46182	0.000
Time cubed		-0.08092	0.000
Spread	Number of cases at time t/number of cases at time t-14	20.26006	0.033
Spread X Lockdown	Spread x Indicator variable for lockdown period	-14.8802	0.084
Detection	Cases/ (Deaths/Global Mortality Rate)	1084.756	0.000
Detection x (Recovery to death ratio)		-395.807	0.002
Constant		31634.7	0.000
Number of observations	55		
R-squared	0.9953		

Figure 1. Actual vs. Predicted Number of COVID-19 Cases in the Philippines