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An Empirical Argument for Mass Testing: Crude Estimates of Unreported COVID19 Cases in the Philippines vis-à-vis Others in the ASEAN-5

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An Empirical Argument for Mass Testing: Crude Estimates of Unreported COVID19 Cases in the Philippines vis-à-vis Others in the ASEAN-5

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Abstract

Introduction. International media has considered the Philippines as the country with the longest and strictest quarantine measures in the world. At the same time, the government has not pursued aggressive mass testing due to perceived resource constraints. This study presents an empirical support for a mass testing policy.

Method. Crude estimates for "true" COVID19 prevalence are made using adjusted case fatality ratios and reported COVID19 cases for the Philippines, Indonesia, Malaysia, and Thailand. Singapore figures are utilized as baseline in the computations because of the island-nation's widespread testing strategy.

Results. The analysis reveals that 96-99% of COVID19 cases in the ASEAN-5 were undetected during April-June 2020. Roughly three million Filipinos (2.6% of the national population) may have been infected by the virus in the same period—the worst record in the ASEAN-5 group in percentage terms.

Discussion. The findings reinforce the WHO recommendation of "test, trace, and isolate." Broad-base testing is urgently needed to reduce the magnitude of undetected COVID19 cases. The Philippine government must devote necessary resources to do this; the economic and social costs of not doing so are greater.

KEYWORDS: COVID19; case fatality ratio; epidemic; pandemic

JEL: H51; I18

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1: INTRODUCTION

Philippine President Rodrigo Roa Duterte has once again imposed a lockdown over the entire national capital and its neighboring provinces starting August this year.[1] This was a response to the surge in reported cases of COVID-19, after the government relaxed quarantine restrictions from June to July 2020.[2]

The goal of easing quarantine restrictions in Metro Manila (the Philippine capital) and nearby localities was to initiate economic recovery. This was meant to address the concerns raised by the national government's economic advisers, governors and mayors of the affected local governments, and respected industry leaders who argued that prolonging the lockdown—that started in the middle of March this year—would have deleterious effects on the Philippine economy.[3-5] Thus, starting June 1, 2020, internal travel restrictions were lifted, several businesses were allowed to operate, and restaurants were permitted to offer dine-in options to customers. Most of the Philippines was still placed under some form of quarantine, but the legal limitations were more liberal.

Unfortunately, the temporary loosening of the quarantine has brought a two-fold setback to both public and private sectors. Firstly, the premature lifting of the lockdown has seen hospitals overwhelmed by COVID-19-infected patients, causing undue stress on Filipino healthcare workers and pushing the capacity of medical facilities to the limit.[6] It has reached a point where several medical associations, nurses' groups, and other coalitions of healthcare workers issued statements directed at the national government, urging President Duterte to reimpose previous quarantine restrictions.[7]

Secondly, the two-month relaxation of the lockdown has not stimulated economic expansion. In fact, official statistics reveal that the Philippine economy shrunk by double digits in the second quarter of 2020, plunging the country in the worst recession it has experienced since the dictatorship of President Ferdinand Marcos in the 1980s.[8]

This grim picture on the economic and public health fronts is compounded by the credible concern of medical experts that the national government's reported statistics on COVID-19 cases are unreliable. As of August 7, 2020, the COVID-19 tracker on the Department of Health website reports that the Philippines has 53,734 "active" cases, where active is defined as persons who have tested positive for the virus and have yet to recover.[9] These figures are relatively low for a country with a population of 100 million, which cause some analysts and public officials to suspect the likely underreporting of actual cases. The problem of underreporting may have been exacerbated by the inequity in healthcare access, while those with grave illness may have likely died without undergoing or finishing the confirmatory tests.[10] Furthermore, the Philippines has faced testing capability constraints for months and, as late as May 21, 2020, there has been a lack of clarity on the testing policy of the government. [11-12]

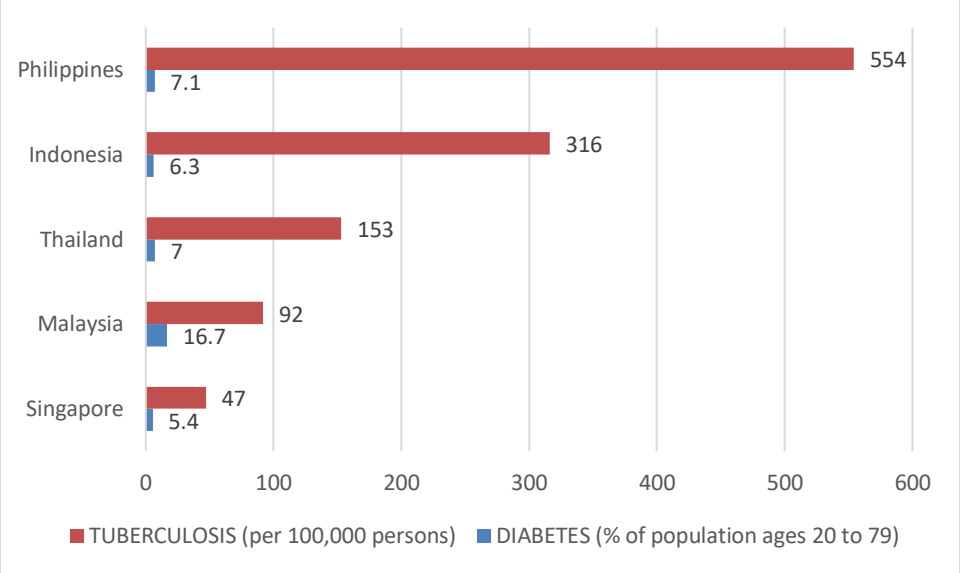
An inaccurate assessment of the COVID-19 situation is harmful to the Philippines on multiple levels. Underreported statistics on the impact of viral transmission may reduce the urgency to act among public and private stakeholders and key decision-makers. Moreover, low detection rates undermine government efforts to formulate effective, comprehensive, and credible public health and economic policies. The conservative figures also create a false sense of complacency within the community with regards to the risk of viral transmission. Finally, an

improved estimate of COVID-19 cases would allow the healthcare sector to prepare better for the admission of prospective patients and confidently and safely contain the spread of the virus.

It is known that the existence of chronic conditions increases the probability of fatality for an infected person.[13] Figure 1.1. proves that the Philippines has a relatively substantial at-risk population for whom COVID-19 can be terminal. Finding the undetected COVID-19 cases and making sure that these individuals do not contribute to further viral transmission is crucial in protecting the vulnerable segments of this archipelago of 100 million.

Figure 1.1.

Tuberculosis* and Diabetes Incidence† in the ASEAN-5, 2019.



* World Bank Development Indicators [Internet]. Washinton, DC: World Bank. [Table], Incidence of tuberculosis (per 100,000 people); [cited 2020 August 8]. Available from: https://data.worldbank.org/indicator/SH.TBS.INCD?view=chart.

†World Bank Development Indicators [Internet]. Washinton, DC: World Bank. [Table], Diabetes prevalence (& of population ages 20 to 79); [cited 2020 August 8]. Available from: https://data.worldbank.org/indicator/SH.STA.DIAB.ZS?view=chart.

With the preceding matters in mind, this study deploys a crude empirical strategy to determine the number of undetected COVID19-positive persons. It recomputes the fatality rate, estimates the likely magnitude of COVID-19 cases, and indicates the degree of underreporting in the Philippines. (For purposes of discussion, "undetected" and "underreported" are interchangeably used. Both labels refer to individuals who are possibly infected with the COVID19 virus, but are not recognized as such in either government or medical record.)

The paper applies the same empirical methodology to assess the epidemic situation in the other founding states of the Association of Southeast Asian Nations (ASEAN): Indonesia, Malaysia, Singapore, and Thailand. (These countries, along with the Philippines, are collectively called "ASEAN-5" in this research.) The crude estimates for the ASEAN-5 nations are then

compared, so that the standing of the Philippines in terms of COVID19 control and mitigation is properly contextualized.

The aforesaid estimations are back-of-the-envelope calculations. The overarching goal of this research is to use the ballpark figures to dramatize the urgency of a mass testing policy in the Philippines.

2: METHODS

This study first determines the case fatality rate (CFR). The CFR offers a snapshot of the severity of a particular disease.[14] It is computed as follows:

$$(2.1)\ simple\ CFR = \frac{confirmed\ deaths_t}{confirmed\ cases_t}$$

Equation 2.1 is a "naive" formula for the CFR. This crude computation exhibits a downward bias in reporting the number of deaths. [15(p479),16(p1)] It is not unusual that a considerable time lapses between the onset of illness or diagnosis of the disease and the resulting death of the patient. As such, a person who contracted the disease at time *t* may die at time *t+d*. This person is excluded in the numerator of Equation 2.1.

To correct for this lag in reported death, Atkins and others [16(pp2-3)] recommend the following adjustment:

$$(2.2)\ adjusted\ CFR = \frac{\sum_{i=t}^{t+d} confirmed\ deaths_i}{confirmed\ cases_t}$$

In Equation 2.2, the numerator covers the sum of confirmed deaths from time *t* up until time *d*, where *d* represents the delay in knowing the death of a person whose disease was confirmed at time *t.*

For the present study, the relevant *t* is the second quarter of 2020 (April to June). Since the first wave of the pandemic happened around December 2019, it is pragmatic to presume that the testing capabilities of the countries under study were still limited, if not non-existent, in the early weeks of the first quarter of 2020. The technology to identify COVID19-positive persons is assumed to be better established in the second quarter.

The quarter statistics avoid the fluctuations in data that manifest in daily reports. The quarter is preferred over the month as basis of time to diminish the likelihood of a zero CFR, which is important for the estimation of Equations 2.3. and 2.4.

For the adjusted CFR, this paper follows Lau and others in using d=14 days, so that persons reported or confirmed to be infected on the last day of June who subsequently died within the first fourteen days of July are captured in the numerator of Equation 2.2.[17] The assumption of a 14-day gap between symptom onset and death is similarly employed in the analysis of Baud and others on China.[18]

This paper then computes for both the simple and adjusted CFR of the ASEAN-5. The adjusted CFR is preferred in the next level of statistical analyses.

The state with the lowest CFR is used as the baseline for Equation 2.3. This equation makes a crude estimation of COVID19 prevalence in country *n*:

$$(2.3)\ Estimated\ true\ cases_n = (reported\ cases_n)x\ (\frac{CFR_n}{CFR_{baseline}})$$

Equation 2.3 is adopted from the work of Lau and others in gauging the "true" number of cases in China, South Korea, Japan, Italy, France, Spain, Germany, Iran, and the United States.[17] The intuition behind the ratio $\frac{CFR_n}{CFR_{baseline}}$ is that the CFR of country *n* is likely high when it excludes those who did not undergo medical diagnosis because of either immediate recovery or non-showing of serious symptoms that would necessitate formal treatment. Given this assumption, the product of said ratio and the reported cases in country *n* is a ballpark estimate of the true extent of viral infection in that country, inclusive of underreported cases.

Likewise, the inverse of the aforementioned ratio, or $(2.4)\frac{CFR_{baseline}}{CFR_n}$, is a rough indicator of undetected disease prevalence. The closer the estimated figure in Equation 2.4 is to zero, the greater the degree of underreporting of the infection. This point can be proven algebraically by rearranging Equation 2.3 such that:

$$(2.5)\frac{Reported\ cases_n}{Estimated\ true\ cases_n} = \frac{CFR_{baseline}}{CFR_n}$$

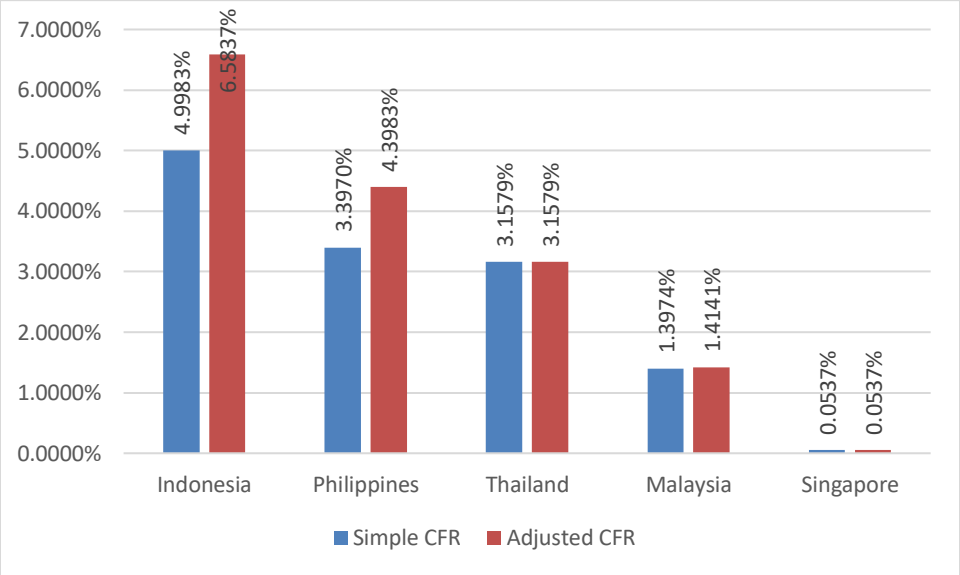
Finally, the empirical analyses undertaken herein use the dataset of the European Center for Disease Prevention and Control on COVID-19 cases, fatalities, and population.[19]

3: RESULTS

Figure 3.1 compares the "naive" CFR and the CFR adjusted for delayed reporting of fatalities. It appears that taking into consideration the possibility of lagged mortality merely revises the CFR upward by at most 2 percentage-points. From a percentage perspective, the difference between the crude CFR and the delay-adjusted CFR is negligible.

Figure 3.1.

Simple- versus Adjusted-CFR of the ASEAN-5, April-June 2020.*



* *Author's computations. Data on reported deaths and COVID19 cases from:* European Centre for Disease Prevention and Control: An agency of the European Union [Internet]. Solna: European Centre for Disease Prevention and Control. [Table], COVID19 geographic distribution worldwide; [cited 2020 August 7]; 1.91 MB. Available from: https://www.ecdc.europa.eu/en/publications-data/download-todays-data-geographic-distribution-covid-19-cases-worldwide.

Singapore exhibits the lowest adjusted CFI, as illustrated in Figure 3.1. Also, the island-nation is one of the most aggressive in mass-testing among the ASEAN economies, so Singapore meets the criteria for baseline in the next round of estimations (i.e., the succeeding discussion on Table 3.1).[20-21]

Table 3.1 presents the rough prevalence of COVID-19 (in levels and percentages) in the ASEAN-5, as opposed to the official and reported cases. The estimates in Table 3.1 indicate serious underreporting of COVID-19 infections. The results mirror the findings of Lau and others that only 1-2% of true COVID-19 infections are officially detected in major "epicenters" of COVID-19.[17]

Table 3.1.

Reported and Estimated Total Cases of Philippines vis-à-vis Neighbor-States, April-June 2020.*

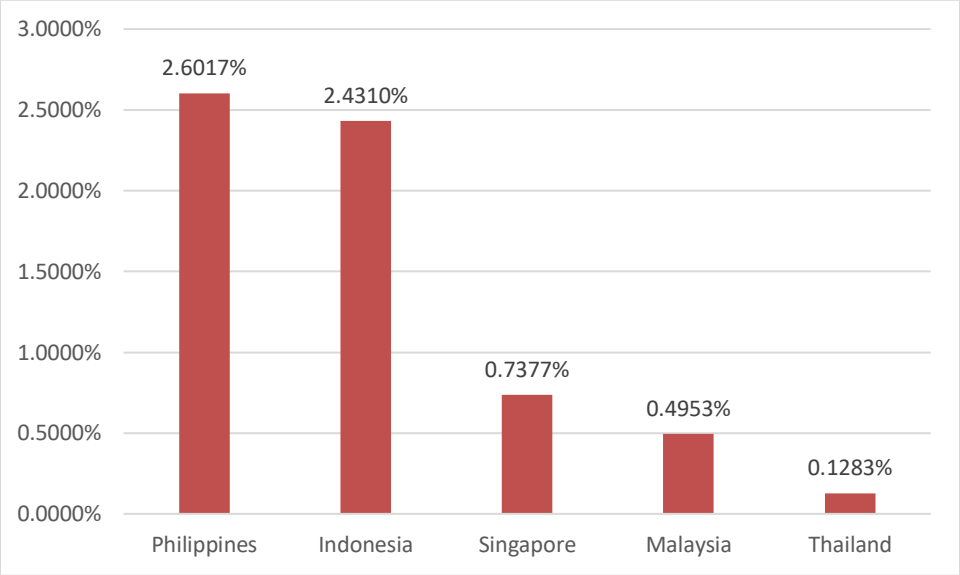
A	B	C	D
COUNTRY	REPORTED CASES	ESTIMATED TOTAL CASES	REPORTED CASES AS SHARE OF ESTIMATED TOTAL CASES
Indonesia	53,678	6,578,925	0.82%
Philippines	34,354	2,812,891	1.22%
Thailand	1,520	89,357	1.70%
Malaysia	6,011	158,237	3.80%

**Author's computations. Singapore is used as baseline for computing Equations 2.3 (results in Column C) and 2.4 (results in Column D). Raw data from:* European Centre for Disease Prevention and Control: An agency of the European Union [Internet]. Solna: European Centre for Disease Prevention and Control. [Table], COVID19 geographic distribution worldwide; [cited 2020 August 7]; 1.91 MB. Available from: https://www.ecdc.europa.eu/en/publications-data/download-todays-data-geographic-distribution-covid-19-cases-worldwide.

The statistical analysis suggests that roughly 98% of COVID-19 cases in the Philippines have gone undetected during the second quarter of 2020. To underscore how worrisome this is, the estimated COVID-19 prevalence level represents an approximately 8,000% increase of the confirmed cases during the relevant period. The country's performance in COVID-19 testing and tracing is hardly better than Indonesia and Thailand, and Malaysia is an improvement only in the sense that testing from April to June managed to count four out of every 100 cases.

Figure 3.2.

Estimated COVID-19 Cases (as Share of Population) in the ASEAN-5, April-June 2020.*



**Author's computations. Population data from:* European Centre for Disease Prevention and Control: An agency of the European Union [Internet]. Solna: European Centre for Disease Prevention and Control. [Table], COVID19 geographic distribution worldwide; [cited 2020 August 7]; 1.91 MB. Available from: https://www.ecdc.europa.eu/en/publications-data/download-todays-data-geographic-distribution-covid-19-cases-worldwide.

Table 3.1 implies that Indonesia has more estimated COVID-19 cases than the Philippines. But this observation disregards the population differences between the two countries. All other factors held constant; a higher population equates to a higher likelihood of COVID-19 cases. Figure 3.2, which discounts the effect of population size on estimating the actual number of infected persons, highlights the Philippines as the worst performer among the ASEAN-5 in controlling the spread of COVID-19. This is a troubling finding for the country, especially as the Philippines has been subjected to the longest and most stringent quarantine measures in the world, according to international mass media.[22-23]

4: DISCUSSION

This paper computes for the CFR of the Philippines, adjusting for the lag in fatality reports. The CFR for other ASEAN-5 states are also estimated using the same methodology. These CFRs are then used to make back-of-the-envelope computations on the total COVID-19 cases of each country.

Statistical analysis finds that the magnitude of disease prevalence is massively underreported for most ASEAN-5 countries. The study at hand discloses that 49 out of every 50

COVID-19-positive persons in the Philippines have gone undetected during the second quarter of this year. A comparison of estimated disease prevalence as percentage of national population across the ASEAN-5 similarly indicates that the Philippines has the severest degree of underreported infections in the group.

The implications of these findings are serious. Many Filipinos are plausibly unaware that they have COVID-19, and are likely exposing their household, immediate community, and workplace to risk of infection. The same set of Filipinos is not receiving the proper treatment because of the absence of diagnosis.

On the policy front, the empirical estimates buttress the argument that the mere extension of the lockdown without complementary mass testing is impractical. Once the quarantine is lifted, undetected COVID19-positive persons will simply resuscitate viral transmission, voiding any previous progress.

The analysis covers the second quarter of 2020, when the Philippines is not yet the Southeast Asian country with the biggest magnitude of confirmed cases. However, the first week of August has seen the country overtake Indonesia as the ASEAN nation with the highest tally of COVID19-positive persons. It becomes more pressing now for the Philippine government to pursue mass testing.

In sum, the inevitable policy direction for the Philippines is to aggressively implement the WHO recommendation of “test, trace, and isolate” to avoid long-term health and economic distress.

This study also tangentially impacts fiscal policy and the legislative agenda-setting of the Philippine government.

The Duterte administration recently unveiled a proposed package of tax incentives and reductions in corporate taxation as a form of economic stimulus. However, the prioritization of mass testing and much needed capacity-building for the healthcare sector entail significant government expenditure. Economic measures that will certainly lower public sector revenue appear to be counterproductive considering the need for greater social spending.[24-25]

President Duterte has only two years left before he steps down due to term limits. Given the time constraints in implementing a new political and legislative agenda, the current administration must put its full and undivided attention into solving the COVID19 crisis.

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