Social Interactions and Post-ECQ School Opening and Mobility of Older People: Analysis and Recommendations

UP COVID-19 Pandemic Response Team

Problem Situation

The novel coronavirus (SARS-COV-2) feeds on social interaction. It spreads from one person to another through droplets that may remain contagious for hours or days, depending on the setting of transmission. This is why the government's core response to the evolving pandemic is anchored on social distancing and community quarantine. The idea is simple enough: limit people's social and physical interactions to slow down, if not eliminate, COVID-19 spread, and at the same time, protect vulnerable groups.

Following the government decision to extend the ECQ in selected areas and identify GCQ areas with attendant regulations, how can we ease up restrictions on people's mobility while minimizing risk? Particularly, how do we respond to the needs of two sectors on both ends of the population spectrum, namely, children and older people? It must be noted that the State is obligated to provide continued learning for the former, and ensure fundamental rights and freedoms of the latter at all times.

The outcome of the analysis is only as good as the quality of available data. For questions or clarifications related to the technical or other aspects of this policy note, please send an email to upri.covid19@up.edu.ph. Scientific reports related to this statement will be posted in the endcov.ph site.

To shed light on the matter, the UP COVID-19 Pandemic Response Team looked into the country-wide total age-group interactions per day and its implications on school opening and the mobility of older people. The results from our models complement existing knowledge on the probability of outbreak for cities and municipalities of the country[1] and the situation in nearby cities and municipalities (i.e. transport links; border control policies) to help the IATF and LGUs make science-based decisions. Overall, when combined with knowledge on identified areas with a chance of outbreak, testing and isolation capacity, provincial health care capacity, quarantine policy, and capability to detect without delay COVID-19 symptomatics and asymptomatics, the analysis and recommendations we made here can be used for government strategy as we transition from ECQ to GCQ.

Age-Group Interactions

The Philippines has a generally young population. In light of this, we simulated how children and teenagers interact with older adults who are 65 years old and above, cognizant of the reality that older Filipinos usually live with their children and grandchildren under one roof. Our models show that 56% of interaction with all age groups are amongst the 0-20 years of age, compared to only 1% among those aged 65 and over. Moreover, 49% of the interaction of seniors 65 years and above happens with the age group of 0-20 (Figure 1). This essentially means two things: 1) social interaction is highest among the young; and 2) the same group accounts for the greatest amount of interaction with older people.

Relaxing restrictions on physical interactions of children does not bode well if matched with empirical data from DOH. As of 1 May 2020, more than 97% of those who tested positive for COVID-19 among those aged 5-20 years old are asymptomatic, have mild symptoms or have recovered indicating that this age group may be more resilient to COVID-19 compared to older groups (Figure 2). The number of deaths from COVID-19 generally increases with age, rising noticeably starting at age 50-54 and steadily increasing rather steeply thereafter. In all, 70% of the total deaths are from cases age 60 and over. Putting together what we know about interactions by age group, the relative resilience of the young and the likelihood of severe disease among the old, the conclusion is that the young aged 0-20 who have the most interactions with all age groups, and

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[1] See UP Pandemic Response Team Policy Note No. 2

especially with the old, have a high likelihood of bringing home the infection from school and from their other social contacts, being mostly asymptomatic or only showing mild symptoms, to the more vulnerable members of their households.
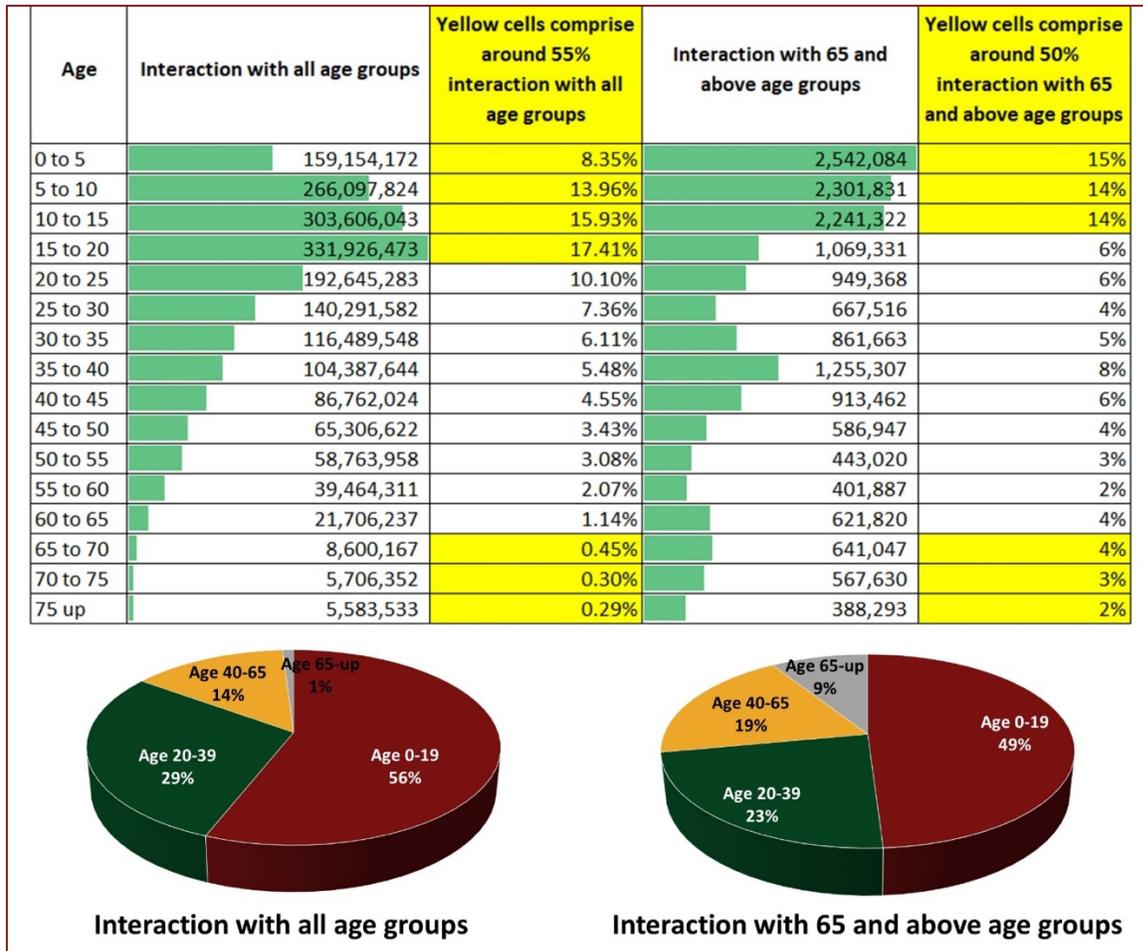
Age	Interaction with all age groups	Yellow cells comprise around 55% interaction with all age groups	Interaction with 65 and above age groups	Yellow cells comprise around 50% interaction with 65 and above age groups
0 to 5	159,154,172	8.35%	2,542,084	15%
5 to 10	266,097,824	13.96%	2,301,831	14%
10 to 15	303,606,043	15.93%	2,241,322	14%
15 to 20	331,926,473	17.41%	1,069,331	6%
20 to 25	192,645,283	10.10%	949,368	6%
25 to 30	140,291,582	7.36%	667,516	4%
30 to 35	116,489,548	6.11%	861,663	5%
35 to 40	104,387,644	5.48%	1,255,307	8%
40 to 45	86,762,024	4.55%	913,462	6%
45 to 50	65,306,622	3.43%	586,947	4%
50 to 55	58,763,958	3.08%	443,020	3%
55 to 60	39,464,311	2.07%	401,887	2%
60 to 65	21,706,237	1.14%	621,820	4%
65 to 70	8,600,167	0.45%	641,047	4%
70 to 75	5,706,352	0.30%	567,630	3%
75 up	5,583,533	0.29%	388,293	2%

Interaction with all age groups

Age 0-19 56%
Age 20-39 29%
Age 40-65 14%
Age 65-up 1%

Interaction with 65 and above age groups

Age 0-19 49%
Age 20-39 23%
Age 40-65 19%
Age 65-up 9%

Figure 1. *Results of interaction models on age interaction amongst all age groups and interaction with age group 65 years and above* (https://psa.gov.ph; https://journals.plos.org/ploscompbiol/article?id=10.1371/journal.pcbi.1005697).
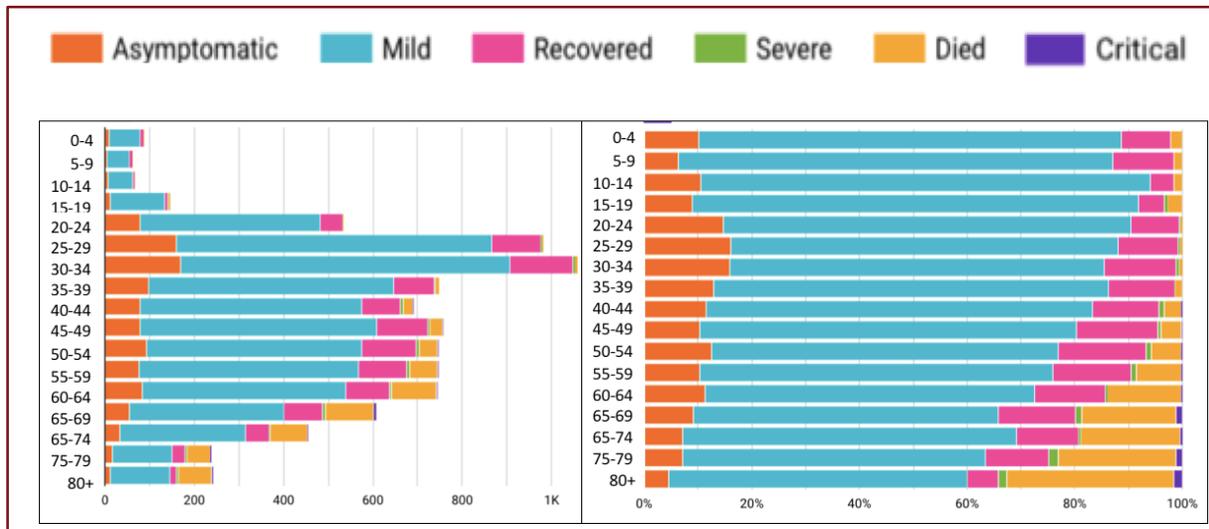
Figure 2. COVID-19 data per age group for mild, recovered, asymptomatic, severe and critical cases included the deceased.

Implications on School Opening

To estimate the effects of school opening, we tested different scenarios for the National Capital Region (NCR). Assuming 90% of businesses open on 15 May, higher education institutions (HEIs) physically open on 15 August, and elementary and secondary schools physically open on 1 September, all in 2020, the following were modeled: 1) All schools physically open; 2) 50% HEIs, elementary and high schools physically open; 3) all schools physically open and there is increased detection of COVID-19 cases with about 30,000 tests per day; 4) 50% HEIs physically open but all elementary and high schools closed; and 5) all schools at all levels physically closed (Figure 3).
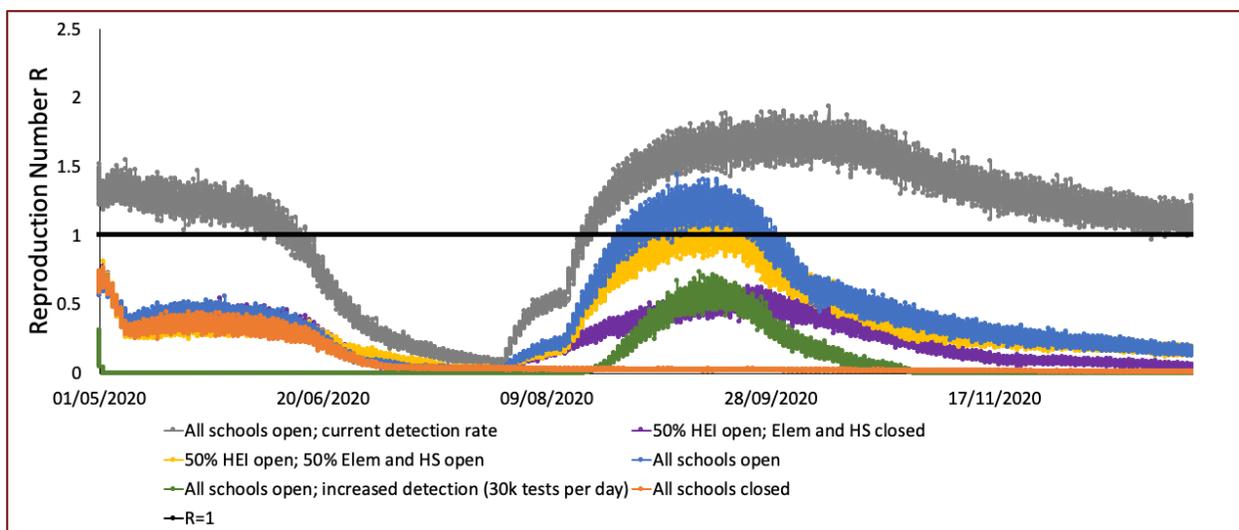
Figure 3. Mean result of simulations for different scenarios of physical school opening in NCR using default protection level of 10%; 10k tests per day and effective surveillance to find 30-50% of the infected individuals; prevalence in the environment and nearby communities of 1/10,000; and assumption that individuals with mild and asymptotic condition are 20-50% less infectious than symptomatic cases (https://science.sciencemag.org/content/early/2020/04/09/science.abb6936).

The models reveal that with the current testing detection rate and the scenario with 10,000 tests per day, physically opening all schools in NCR may increase the transmission of COVID-19 to R values greater than 1 (gray, blue and yellow curves, respectively). On the other hand, continued physical closure of all schools up to the end of the year, considering the model assumptions, may continue to lower the R value to near, but not necessarily equal to zero values by the end of 2020 (orange curve). The two other scenarios show varying rates of decline in R value, but all close to or below 1. As we have explained in Policy Note No. 2, the ultimate goal of the government is to bring the reproduction number R_t value to less than 1 or closest to 0 until a vaccine is discovered.

Implications on Mobility of Older People

The transmission potential of senior citizens, defined as age 60 and above, was analyzed and compared with people of age below 60 using the time-varying reproduction number or R_t. With respect to the transmission potential, older adults were relatively less transmissive of the disease within their group than the younger individuals. However, senior citizens had been highly transmissive before the March 15 enhanced community quarantine with R_t greater than 1. During the quarantine period, older persons were less transmissive to other `younger counterparts (Figure 4).
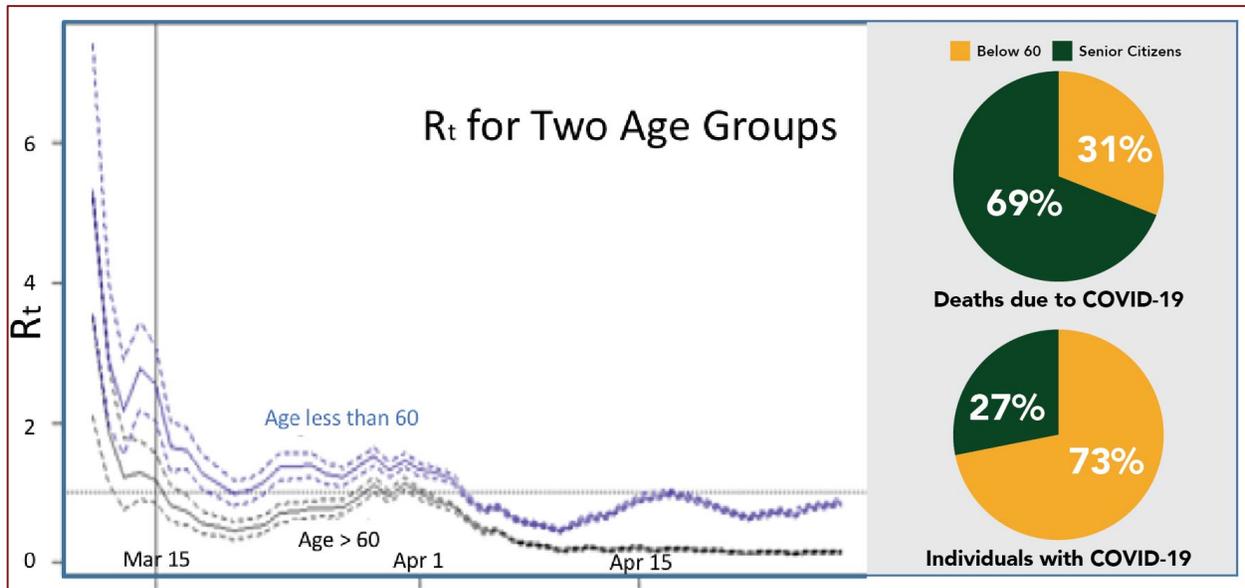
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Figure 4. *COVID-19 infection, death, and reproductive number for older adults and younger population (as of 30 April 2020). The computation assumed that younger individuals, as imported cases, transmit the disease to the senior citizens for the Rt of age 60 and up, and vice-versa for Rt of age less than 60. The reproduction number for senior citizens would describe their transmission potential within their group after subtracting the effect of transmission from the younger group, while the Rt for age less than 60 would be vice-versa.*

Figure 4 above also shows that as of 30 April 2020, older people account for about three-fourths of total COVID-19 fatalities. However, there is also evidence that it is not just advanced age per se that is associated with the higher risk of dying from COVID-19 but also the presence of comorbidities such as hypertension, heart disease, chronic respiratory illness, and other diseases that compromise the immune system. Since older people are more likely to have these comorbidities, they have the highest case fatality rates of all ages.

The Philippine data shows that comorbidities, such as hypertension, diabetes and asthma, raises COVID-19 total mortality by as much as 30%. The increase in mortality is evident at all ages. Children (age 0 to 19) with co-morbidities are also very vulnerable to dying from COVID-19 (Figure 5)[2].

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[2] The mortality rates mentioned here refer to the probability of dying once infected with COVID-19. COVID-19 mortality rates are compared to the Philippine-specific WHO 2016 (from government data), SSS 2012 (mostly from employees of private companies) and Philippine Intercompany Mortality Table 2017 (PICT; from insured population) mortality rates to provide an idea on how much COVID-19 raises regular mortality.
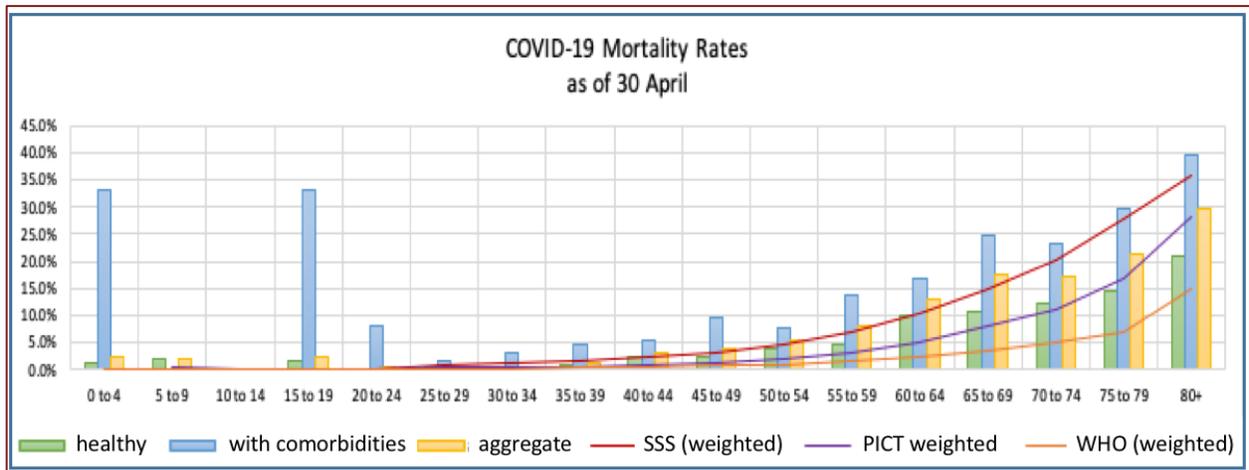
Figure 5. *COVID-19 mortality with and without co-morbidities by age-group*

The New Normal beyond the ECQ

Results from our models support the plan of the government to carefully study the reopening of schools. Now, more than ever, we need to adapt to a new normal of delivering learning with limited physical interaction. The right to education should not stop simply because schools are closed.

Schools under ECQ must remain closed, while areas under GCQ should consider a flexible schedule that limits physical interaction of children. School activities that entail a gathering of crowds must be postponed. To ensure continuity, various forms of distance learning must be explored, and in areas where such is not possible, low-cost technologies (e.g. IoT-based systems) can be put in place to facilitate connectivity.

The foregoing analysis also lends support to the IATF's Resolution No. 30, which takes into account the issue of co-morbidity and specific vulnerabilities in the enforcement of the stay-at-home rule. Under the new guidelines, pregnant women, those who have co-morbidities and senior citizens are required to stay at home. Cognizant of the heterogeneity of the senior citizen population, exemptions to the stay at home order has been made for older people who need to go out "[to obtain] essential goods and services or [to] work in permitted industries and offices," including those who are living alone. This sends the message that senior citizens should limit their mobility and do their part to help contain the spread of COVID-19. The IATF needs to issue clear operational guidelines as to how these stay at home orders are to be implemented on the ground.