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**Title**

Society coexisting with COVID-19

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**Disclaimer:** The views expressed in this letter are my own personal opinion, written in my private capacity, and do not necessarily reflect the views of my employer.

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Following the first case reports of coronavirus disease 2019 (COVID-19) in Wuhan, China in December 2019, the cumulative number of cases reported sky-rocketed to 800,000 by the beginning of April 2020 [1]. This pandemic has brought us an accurate and global epidemiological record we have never had previously, which includes the correct number of cases and deaths reported in over 200 countries. This record provides clues as to how we address this invisible enemy.

We calculated spreading speed (SS1000) of COVID-19 in 15 countries using figures provided by WHO [1]. SS1000 is defined as the period taken for the total number of cases to increase from 100 to 1,000. In Italy, the total number of cases reached 100 on February 24, and subsequently reached 1,000 on March 1, therefore we recorded Italy's SS1000 as 6 days. On observing the SS1000 of the 15 countries (Figure 1), it is apparent that Japan's SS1000 stands out because it is distinctly larger than those of the other 14 countries. Despite SS1000 of most countries being <12 days, Japan had a SS1000 of 28 days.

The reasons for Japan's relatively long SS1000 have been a source of debate. Some people have attributed it to the Japanese government's rapid and appropriate response, such as the closure of all schools on March 2, at a time when fewer than 300 cases had been confirmed within the country. Others have attributed it to the high level of discipline exhibited by Japanese people, e.g. full-time wearing of facemasks, frequent hand-washing, and not talking in crowded trains.

However, considering Japan's high population density and its super-aging population, we will not be surprised if the COVID-19 situation in Japan turns out to be more serious than it appears currently. Among various opinions that have been expressed, we are of the opinion that the limited number of tests (total 26,607 tests conducted by March 30) [2] compared to

the other countries (e.g. South Korea: 395,194) [3] will be attributed to that slow SS1000 and the low number of confirmed cases.

Why is number of tests conducted so small in Japan? First answer is immature private practice system in Japan, which requires a person to have a doctor's diagnosis in order to access testing. Second is the strict government policy announced on Feb.17 2020, which requires people to visit a doctor only if they have 4 days of continuous fever ( $>37.5^{\circ}\text{C}$ ). This criterion constitutes a major barrier, which prevents people with mildly symptomatic COVID-19 from accessing testing. Therefore, whether intentional or not, the number of confirmed COVID-19 cases in Japan is more greatly underestimated than that of the other countries.

On the other hand, one question arises as to whether there are a large number of asymptomatic carriers in Japan and, if so, why the reported number of COVID-19-related deaths (59 as of March 31 2020) [1] has remained so low compared to those in other countries, e.g. Italy (11,591) [1], Spain (7,340) [1], and France (3,024) [1]. We can prepare two answers for the question: The first is that by limiting the number of patients, Japanese medical staff could concentrate on only patients with severe symptoms, and this could also reduce the risk of infection to medical staff themselves. The second is that the number of deaths may also be underestimated. If we hypothetically assume that there have been 500 COVID-related deaths in Japan to date (i.e., more than 10 times the confirmed number of deaths), doctors may not notice the increase because the deaths are hidden among the 100,000 pneumonia-related deaths that occur every year in Japan [4].

We should appreciate that Japanese have not faced any social panic or medical collapse due to the COVID-19 epidemic, and that Japanese society is functioning relatively normally despite partially limited e.g. one-month school closures. Moreover, some functions of society

have started to recover. Whether intentional or not, Japan's choice to limit the opportunity of testing has so far helped to prevent social disruption.

“How should we face COVID-19?” This is the main topic of this letter. To answer this question, we have to ascertain the true case fatality rate (CFR), and to do this, we have to determine the true number of cases, including not only severe symptomatic cases, but also asymptomatic and mildly symptomatic cases. In Japan, the government conducted screening of passengers on the Diamond Princess cruise ship, and these figures can be used as “real” confirmed cases. According to Japan's Ministry of Health, Labor and Welfare, the total numbers of cases and deaths are 712 and 10 respectively [5], and the CFR can be calculated as 1.4 %. Considering the elderly passenger population, and their long-term confinement in the ship under poor conditions, the actual CFR may be less than the calculated value; however, it is currently the most reliable estimate of the COVID-19 CFR.

Admittedly, 1.4% CFR is too high to ignore, but in our opinion, it is at an acceptable level at which we can coexist. Japanese choice was involuntarily of help to avoid chaos, which tell us that excessive responses do not always have expected results. Limiting society functions such as lockdown is accompanied by major adverse effects among the socially vulnerable, including elderly people or the patients suffering from the other diseases, and it may result in deaths from other causes. Therefore, our choice when we face an unprecedented fear should be well-considered.

1. World Health Organization, Coronavirus disease (COVID-19) Pandemic, April 2, 2020 (<https://www.who.int/emergencies/diseases/novel-coronavirus-2019>)
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4. Ministry of Health, Labour and Welfare, Japan, Population Survey Report, March 21, 2020 (<https://www.mhlw.go.jp/toukei/saikin/hw/jinkou/suii09/deth8.html>).
5. Ministry of Health, Labour and Welfare, Japan, About Coronavirus Disease 2019 (COVID-19) March 26, 2020 ([https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/newpage\\_00032.html](https://www.mhlw.go.jp/stf/seisakunitsuite/bunya/newpage_00032.html)).

## Figure Legend

Figure 1. Spread speed of COVID-19 (SS1000) in 15 countries

The figures were provided by WHO [1]. SS1000 is defined as the period taken for the total number of cases to increase from 100 to 1,000.

