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*Sakuraba A, Sato T*

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## COVID-19 mortality and gross domestic product loss: A wake-up call for government leaders

Atsushi Sakuraba, Toshiro Sato

**ORCID number:** Atsushi Sakuraba 0000-0003-2519-6129; Toshiro Sato 0000-0001-8353-8137.

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**Atsushi Sakuraba**, Department of Medicine, University of Chicago, Chicago, IL 60637, United States

**Toshiro Sato**, Department of Organoid Medicine, Keio University School of Medicine, Tokyo 108-8345, Japan

**Corresponding author:** Atsushi Sakuraba, MD, PhD, Associate Professor, Department of Medicine, University of Chicago, 5841 S Maryland Ave, Chicago, IL 60637, United States. [asakurab@medicine.bsd.uchicago.edu](mailto:asakurab@medicine.bsd.uchicago.edu)

### Abstract

Government leaders have struggled to reduce the infection and deaths due to coronavirus disease 2019 (COVID-19) as well as to keep the economy and businesses open. There is a large variation of mortality and damage to economy among countries. One possible cause leading to the large variation is the manner in which countries have dealt with COVID-19. Some countries or regions such as China, New Zealand, and Taiwan, acted quickly and aggressively by implementing border closures, lockdown, school closures, mass testing, *etc.* On the other hand, many European countries, United States, and Brazil delayed their decisions to implement these restrictions and measures. No study has assessed the correlation between gross domestic product (GDP) and COVID-19 mortality. In the present study, there was a negative correlation between GDP and COVID-19 mortality suggesting that countries that failed to control the virus (larger COVID-19 mortality) would see a larger decline in GDP. Governmental leaders should act fast and aggressively when making decisions because data shows that countries who have run after two hares have caught neither. Furthermore, citizens of each country need to do their own part by following guidelines and practicing social distancing and mask wearing, which are considered the most effective, easiest, and cheapest measures that can be taken, so that repeated lockdowns can be avoided.

**Key Words:** Coronavirus; COVID-19; Mortality; Gross domestic product; Economy; Global

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**Core Tip:** There is a large variation of mortality and damage to economy due to coronavirus disease 2019 (COVID-19) among countries. In the present study, we demonstrated that there was a negative correlation between gross domestic product (GDP) and COVID-19 mortality suggesting that countries that failed to control the virus would see a larger decline in GDP. Some countries or regions (China, New Zealand, and Taiwan) have acted quickly and aggressively to prevent the spread of COVID-19, which resulted in relatively small damage to the economy. Governmental leaders should act fast and aggressively when making decisions because data shows that countries who have run after two hares have caught neither.

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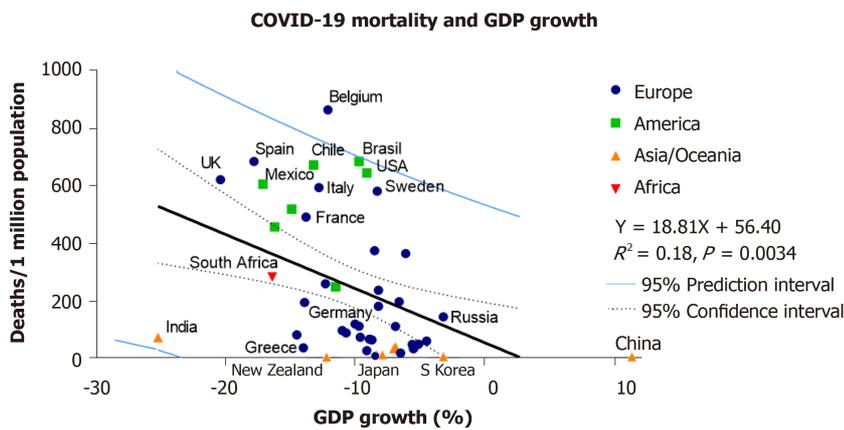
## TO THE EDITOR

Coronavirus disease 2019 (COVID-19) has caused varying degree of infections and deaths among countries worldwide. Governmental leaderships have taken various measures, including border closure, lockdowns, and school closures, to mitigate the spread of COVID-19 infection<sup>[1]</sup>. A majority of these government implemented measures have a large impact on the daily life of the people and the economy causing dilemma and controversies. China and New Zealand rapidly implemented extremely strict measures and successfully contained the infection whereas some countries took minimum or delayed measures and decided COVID-19 to run its course<sup>[1,2]</sup>. While healthcare system, structural inequality, population characteristics, *etc.* may also influence COVID-19 infection and mortality, governmental leaders take various factors into consideration when making decisions, so that they can maintain a balance between the casualty caused by COVID-19 and the economy<sup>[3]</sup>. One of the rationales to keep social activities intact is that restrictions would cause more economic crisis, societal damage, and ultimately loss of lives.

Strict restrictions on economic activity including lockdowns are effective in flattening the surge of infections, however, there is limited data regarding the relationship between the degree of COVID-19 tragedy and economic damage. In order to gain knowledge about these two dichotomous outcomes, we analyzed the association between COVID-19 mortality and gross domestic product (GDP) among countries in the Organisation for Economic Co-operation and Development (OECD) and partnering countries. Data of mortality was obtained from worldometers.info and that of GDP of the second quarter (Q2) 2020 were obtained from OECD.org. on October 2, 2020.

Among 46 countries, we found that there was a statistically significant negative association between COVID-19 mortality and GDP growth (Figure 1,  $R^2 = 0.18$ ,  $P = 0.0034$ ). The association suggested that with every 10 deaths/million increase, the GDP decreased by 0.53%. China, which took aggressive measures after experiencing the outbreak in Wuhan and kept the mortality low at 3/million population was the only country that had a positive GDP growth. Other countries had a negative GDP growth ranging from 0-5% in Russia, South Korea, and Finland, 5%-10% in Japan, United States, *etc.*, and over 10% in France, Spain, *etc.* There was a significant trend for increasing loss of GDP among countries that had mortality in the range of 0-50/million, 50-250/million, and  $\geq 250$ /million (Jonckheere-Terpstra test for trend,  $P = 0.00033$ ) confirming that countries with greater mortality had larger loss of GDP.

A limitation of this analysis is that we only included countries included or partnered with OECD. Each country has a different portfolio of personal consumption, business investment, and net exports, thus, it remains to be determined whether our results are generalizable to other countries. Furthermore, the COVID-19 pandemic is still ongoing, so the mortality and economic damage are dynamically changing, especially during the third wave of winter 2020 happening right now. Case fatality rate is often used as between country comparison, but we chose mortality as there is less variation in identifying cases of death between countries. It should also be noted that some countries have different criteria when reporting deaths due to COVID-19



**Figure 1 Association between coronavirus disease 2019 mortality and gross domestic product growth.** Data of coronavirus disease 2019 (COVID-19) mortality was obtained from Worldometer and that of 2020 Q2 gross domestic product (GDP) was obtained from OECD.org. on October 2, 2020. Among 46 countries, there was a strong negative association between COVID-19 mortality and GDP growth ( $R^2 = 0.18, P = 0.0034$ ). COVID-19: Coronavirus disease 2019; GDP: Gross domestic product.

and possibility of underreporting of cases/deaths have also been mentioned. Furthermore, we showed an association, but it does not mean that there is a causal relationship and other environmental and economic factors likely play a role<sup>[4]</sup>.

The current pandemic has caused enormous damages to human lives and economy. Our data demonstrated an association between COVID-19 mortality and economic loss suggesting that keeping the mortality low by various measures may result in smaller economic loss. Governmental leaders should take this fact into consideration and must act fast and aggressively when making decisions because data shows that countries who have run after two hares have caught neither. Furthermore, citizens of each country need to do their own part by following guidelines and practicing social distancing and mask wearing, which are considered the most effective, easiest, and cheapest measures that can be taken<sup>[5]</sup>, so that repeated lockdowns can be avoided.

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