

Denominator matters in estimating COVID-19 mortality rates

The novel coronavirus disease 2019 (COVID-19) continues to spread internationally. Worldwide, almost 700 000 cases of coronavirus disease 2019 (COVID-19) (697 2744 'confirmed cases' from Situation Dashboard WHO 30 March 2020), more than 33 000 deaths, and more than 100 000 recovered patients have been reported. The death rate estimated globally at 3.4% by the World Health Organization (WHO) varies between countries and across ages.^{1,2}

Estimates of COVID-19 mortality rate per country rely on the number of deaths scaled to the number of confirmed COVID-19 cases. Since the denominator of the mortality rate should be the total number of patients diagnosed with the virus in a country, it will be nearly impossible to capture an accurate mortality rate for the time being. Therefore, the current mortality rate of COVID-19 might be skewed and may not allow for a direct comparison between countries.

Furthermore, the WHO, the National Data, and other sources have provided a lot of data on the cumulative number of cases being placed as the denominator while estimating mortality rates.²⁻⁴ This may not be appropriate since testing strategies across countries vary. Some countries used the strategy of testing symptomatic individuals with probably a high viral shedding, while other countries also tested many asymptomatic people, leading to an increase in the number of cases.

We would be tempted to accept the number of COVID-19 patients who require admission to hospitals as the denominator while estimating the current mortality rates of COVID-19. However, here again, caution is needed as the differences in rates may reflect the heterogeneity in: (i) the clinical management and care of COVID-19 patients which may vary across countries or (ii) the guideline of admission to hospital for patients with confirmed COVID-19.

Overall, the final denominator to calculate the COVID-19 mortality rate may not be available or may be unknown for now. Therefore, comparison between countries should require other metrics such as: (i) the comparability between healthcare systems; (ii) the population size; (iii) the number of days since the date of the first diagnosed COVID-19 case; (iv) the heterogeneity in testing strategies across countries, for example testing symptomatic individuals in France with mostly a high viral shedding vs. testing asymptomatic individuals in South Korea or Germany; (v) the guidelines of admission to hospital

for patients with confirmed COVID-19; and (vi) the variability in assessing the number of deaths per day, for example the number of deaths mentioned in France corresponds to the number of deaths in hospital. When a person not screened, in a EHPAD (collective retirement homes for dependent residents providing permanent medical services) or at home, dies she/he is not counted.

Gathering information and recommendations, from researchers, physicians, other healthcare professionals, and administrators in hospitals and other clinical settings could help to alleviate this issue. (i) Guidelines of admission to hospital for patients with confirmed COVID-19. (ii) Clinical management and care of COVID-19 patients. (iii) Test kits used to detect COVID-19 and the number of tests per day.

We are therefore pleased to invite sharing such information from around the world. This can be added as online comments to this article.

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References

References are available as [supplementary material](#) at *European Heart Journal* online.