



# Analysis of Reported Case Fatality Rate and Characteristics of COVID-19 Patients in Italy

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## INTRODUCTION

In a recent viewpoint publication in the Journal of American Medical Association (JAMA), Onder, et al. provided insight into the coronavirus disease 2019 (COVID-19) outbreak in Italy along with an explanation of the Italian National Institute of Health (Istituto Superiore di Sanita [ISS]) surveillance system [1]. Onder calculated the overall attributed COVID-19 fatality rate of 7.2% in the Italian population, based on the data up to March 17<sup>th</sup>, 2020 (1625 deaths/22 512 cases) [1]. Onder and colleagues proposed the demographic characteristics of the Italian population (higher older age distribution in the population compared to some other nations) and the associated comorbidities, lack of clearly defined COVID-19 related deaths and the differences in calculation methods in Italy and internationally along with country-specific differences in testing strategies as possible explanations for the higher Italian case-fatality rate compared with some other nations (i.e. China) [1]. There are claims that the mortality rate estimates based on the number of deaths relative to the number of confirmed cases of infection at a given time and place is not a true representative of the actual death rate [2].

While we agree with Baud, et al. that all current mortality rate estimates are in reality an underestimation of the potential mortality of the COVID-19 patients [2], we believe during the exponential phase of the COVID-19 pandemic (i.e. in the current case on 17<sup>th</sup> of March 2020, and when the COVID-19 has already entered its exponential phase in Italy) calculation of the COVID-19 case fatality rate is extremely challenging and almost impossible. Baud et al. attempted to correct the calculations with the introduction of a “lag time” concept in their calculations, although some other authors have argued against this innovative calculation concept [3]. Baud re-estimated the COVID-19 mortality rates by dividing the number of deaths on a given date by the number of patients with a confirmed infection at the same place some days earlier (14 days of “lag time” for COVID-19 was considered in Baud, et al. calculations). They argued that since patients dying at a given time were infected at an earlier time (lag period) then the denominator of the mortality rate should be the total number of patients infected at the same time as those who died [2]. Their argument stem from the fact that patients with very mild symptoms or asymptomatic patients might not be tested and will not be identified. As a result, those cases

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(untested) cannot be included in the estimation of actual fatality/mortality rates, as those estimates are based purely on clinically apparent COVID-19 (positive tested) cases.

In addition to the factors already discussed by Onder, et al. [1] we would like to add variations in medical advice-seeking habits of the society, political stance of some countries to underreport the number of cases or deaths, failing to test the symptomatic but less critical cases during the exponential phase (due to lack of adequate resources) and potential para-analytic / analytic pitfalls of COVID-19 tests [4] as some of the other influencing factors affecting the COVID-19 case fatality rates. Onder, et al. overlooked another important factor when exploring the underlying cause of the higher case fatality rate in Italy compared to some other countries. During the peak of the spread, and during the so called “collapse of the health care system”, there were reports from Italy that health-care providers had to choose between resuscitating the elderly or the young patients which could have potentially increased Italian case fatality rates even further [5].

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