

The death rate for COVID-19 is positively associated with gross domestic products

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As the coronavirus disease 2019 (COVID-19) pandemic continues to spread (1), causing hundreds thousands of deaths around the world, the identification of demographical, biological, clinical and even environmental predictors of disease severity and deaths is vitally needed to optimize the allocation of human and technical resources, as well as for filling potential gaps in the diagnosis and care of infected patients (2). While it has been recently highlighted that mortality for COVID-19 was correlated with health-care burden in China, further evidence from other regions is required to support this observation (3).

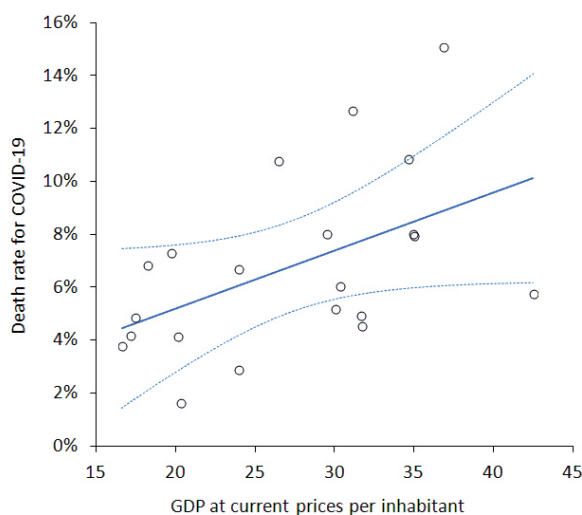


Figure 1. Spearman's correlation between gross domestic product (GDP) at current prices per inhabitant and death rate for coronavirus disease 2019 (COVID-19) in the 21 Italian regions and provinces.

In order to evaluate the mortality for COVID-19 according to economic resource availability, we used official economic data from the Italian National Institute of Statistics, combined with data from the Italian Ministry of Health (last update, March 29, 2020), to correlate the gross domestic product (GDP) at current prices per inhabitant (in euro) with the death rate for COVID-19 in the 21 Italian regions and provinces.

The result of the Spearman's correlation (with 95% confidence limits; 95% CI) is shown in Figure 1, which demonstrates the existence of a significant, positive association between these two variables (adjusted $r=0.53$; 95% CI, 0.12 to 0.78; $p=0.014$).

In conclusion, the results of our analysis demonstrate that regional heterogeneity in economic resources may be a factor for influencing the clinical outcome of COVID-19 and, more specifically, that, mortality for this infectious disease may be higher in areas with higher GDP per inhabitant, perhaps reflecting the impact of adverse environment (i.e., higher industrial pollution) or more prevalent risk factors (i.e., obesity, hypertension, etc.).

Conflict of interest: Each author declares that he or she has no commercial associations (e.g. consultancies, stock ownership, equity interest, patent/licensing arrangement etc.) that might pose a conflict of interest in connection with the submitted article

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