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Cc: (10)(2e) [(10)(2e)@hsph.harvard.edu]
From: (10)(2e)
Sent: Sun 10/4/2020 8:29:00 AM
Subject: SARS-CoV-2 detectability/COVID-19 mortality in the Netherlands
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neth_detect_mort.docx

Dear (10)(2e) (10)(2e)

I am writing regarding the new paper on SARS-COV-2 epidemiology in the Netherlands (attached), based on the RIVM data (Table 17 in https://www.rivm.nl/sites/default/files/2020-09/COVID-19_WebSite_rapport_wekelijks_20200929_1159_0.pdf).

Laboratory diagnosis of the SARS-CoV-2 infection combined with tracing/quarantine for contacts of infected individuals affects the spread of SARS-CoV-2 and the rates of related mortality. Moreover, testing practices vary by the different regions of the Netherlands. For example, in Groningen, each death for COVID-19 recorded by Sep. 29, 2020 corresponds to 86.45 detected COVID-19 cases, while in Brabant-Noord, each death for COVID-19 corresponds to 7.93 detected COVID-19 cases, suggesting relatively low detection of mild/moderate SARS-CoV-2 infections in Brabant-Noord. Moreover, the rate of mortality for COVID-19 in Brabant-Noord is 27.7 times higher compared to Groningen.

In this paper, I examined the relation between detectability of SARS-CoV-2 infection (i.e. the proportion of detected COVID-19 cases among all cases of SARS-CoV-2 infection in the population) and levels of mortality for COVID-19 for the 25 different regions of the Netherlands. While the detectability for SARS-CoV-2 infections in different regions of the Netherlands is not easy to estimate directly, under more active testing for SARS-CoV-2 in the population, detectability of SARS-CoV-2 infection increases and the case-fatality rate (i.e. the proportion of deaths among reported COVID-19 cases in the population) generally decreases (more mild/moderate cases are found). For the RIVM data,
the correlation between case-fatality rates for cases/deaths reported by Sep. 29, 2020 and rates of mortality for COVID-19 per 100,000 for deaths reported by Sep. 29, 2020 in different regions of the Netherlands is 0.84 (0.66,0.94); the correlation between case-fatality rates and rates of hospitalization for COVID-19 per 100,000 for hospitalization reported by Sep. 29, 2020 is 0.81 (0.60,0.91). The regions with both the highest COVID-19 mortality rates, hospitalizations rates and case fatality rates (which are associated with lower detectability of SARS-CoV-2 infections) are Brabant-Noord, Limburg-Zuid and Limburg-Noord. Additionally, in an earlier work, we used analogous methodology to show strong correlation between CFRs and rates of COVID-19 mortality in the different regions of the Russian Federation: https://www.medrxiv.org/content/10.1101/2020.09.18.20197194v2.article-info

The associations between CFRs and rates of mortality and hospitalization for COVID-19 that we found might be confounded by factors such as population density. However, regions like such as Amsterdam-Amstelland and Haaglanden have higher population density compared to Brabant-Noord, Limburg-Zuid and Limburg-Noord. Mortality rates for COVID-19 in Amsterdam-Amstelland and Haaglanden are somewhat below the national average; moreover, each COVID-19 death corresponds to 40.27 detected COVID-19 cases in Amsterdam-Amstelland and 27.96 detected COVID-19 cases in Haaglanden, compared to 7.93 cases in Brabant-Noord, 8.92 cases in Limburg-Zuid and 8.37 cases in Limburg-Noord. I also am not aware of demographic factors related to

infection fatality rates that can explain the differences in case-fatality rates in the former regions compared to the latter in terms of differences in infection-fatality rates, suggesting higher detectability of SARS-CoV-2 infection in the former regions compared to the latter regions.

I am writing to see if you or (10)(2e) have any suggestions/wish to be co-authors. We could potentially conduct multivariable regression to express mortality/hospitalization counts as a function of detectability and other covariates such as population density. However, given that there are only 25 data points, and it is not clear which covariate to pick and whether a model is reasonably well-specified. The univarite correlations are very high, suggesting that detectability of SARS-CoV-2 infection is one of the factors that affects the rates of mortality and hospitalization for COVID-19 in the Netherlands -- I don't know if any model can quite gauge the scope of the contribution of detectability.

Thanks a lot,
(10)(2e)