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SYNOPSIS

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# Review of "Estimating clinical severity of COVID-19 from the transmission dynamics in Wuhan, China"

**Article citation:** Wu JT, Leung K, Bushman M, Kishore N, Niehus R, de Salazar PM, et al. Estimating clinical severity of COVID-19 from the transmission dynamics in Wuhan, China. Nat Med. 2020 Mar 19 [Epub ahead of print]. Available from: https://doi.org/10.1038/s41591-020-0822-7

## One-Minute Summary

- The authors estimated the symptomatic case fatality risk (sCFR; the probability of death after developing symptoms) of coronavirus disease 2019 (COVID-19) accounting for transmission dynamics in 48,557 cases and 2,169 deaths as of February 29, 2020 in Wuhan, China.
- Their findings indicate a considerable age dependency for both symptomatic infection (susceptibility) and outcome (fatality) risk.
- The baseline model scenario estimated:
    - **Overall sCFR**: 1.4% (95% confidence intervals (CI) 0.9, 2.1%).
    - **Age-specific sCFRs**: 0.3% (95%CI 0.1, 0.7%) for <30 years, 0.5% (95%CI 0.3, 0.8%) for 30-59 years, and 2.6% (95%CI 1.7, 3.9%) for >59 years.
    - **Relative sCFRs:** <30 and >59 years were 0.6 (95%CI 0.3, 1.1) and 5.1 (95%CI 4.2, 6.1) times more likely to die after developing symptoms compared to those aged 30-59 years.
    - **Susceptibility to symptomatic infection:** increased with age, increasing by 0.16 (95%CI 0.15, 0.17) and 2.0 (95%CI 1.95, 2.08) times in those aged <30 years and >59 years compared to those aged 30-59 years.

## Additional Information

- The study extends a previously published transmission dynamics model (Wu et al. 2020. Lancet) which is parameterized using publicly available and recently published data sources in Wuhan, China, by adjusting for the case ascertainment rate and the delay between symptom onset and death.
- The sCFR is substantially lower than either the crude or naïve confirmed case fatality risk (i.e., deaths/cases) and the risk estimated based on deaths/(deaths+recovered cases), as of February 29, 2020.
- Model baseline parameters included: probability of developing symptoms after infection (0.5), basic reproductive number (1.9, 95%CI 1.8, 2.1), serial interval (mean 7.0 days, 95%CI 5.8, 8.1; standard deviation (SD) 4.5 days, 95%CI 3.5, 5.5 days), time from onset to death (mean: 20 days, 95%CI 17, 24 days; SD: 10 days, 95%CI 7, 14), the time it takes for daily incidence to double before Wuhan was quarantined (epidemic doubling time = 5.2 days, 95%CI 4.6, 6.1 days) and after public health interventions were implemented within Wuhan (reduced transmissibility by

48%, 95%CI 24, 71%), symptomatic cases ascertained between December 10, 2019 and January 3, 2020 (1.8%, 95%CI 0.9, 3.3%).

- **Sensitivity analyses increasing** probability of developing symptoms:
    - Decreased overall sCFRs; age-specific susceptibility estimates were insensitive.
    - Basic reproductive number, mean generation time and intervention effectiveness would be slightly lower, whereas other epidemiological parameters were largely insensitive.
- Prevalence of infection in travelers (both on commercial flights before January 19, 2020 and on charter flights from January 29 - February 4, 2020) was used to estimate the true prevalence of infection in Wuhan, as milder cases were unlikely to have been tested in Wuhan due to the healthcare system being overwhelmed.

## PHO Reviewer's Comments

- **Study Limitations:**
    - The authors note that the precise fatality risk estimates may not be generalizable to populations outside Wuhan, especially during subsequent phases of the epidemic.
    - The study finding that risk of symptomatic infection increases with age may be in part due to preferential ascertainment of older and thus more severe cases.
    - sCFRs are affected by the under-ascertainment of cases and deaths of COVID-19.

## Citation

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