

SYNOPSIS

04/07/2020

Review of “Estimates of the severity of coronavirus disease 2019: a model-based analysis”

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One-Minute Summary

- This study estimated age-stratified case fatality ratios (CFRs) and infection fatality ratios (IFRs) for coronavirus disease 2019 (COVID-19) cases inside and outside mainland China using data from a range of surveillance settings.
- In China, the **overall best estimate CFR (adjusted for censoring, demography and under-ascertainment) was 1.4%** (credible interval [CrI]: 1.2-1.5), compared to a crude CFR of 2.3% (95% CrI: 2.2-2.4). The **best estimate CFR increased with age** (<60 years = 0.3% vs. ≥60 years = 6.4%) with the highest best estimate CFR in those 80 years or older (13.4%).
- From cases outside of China, the estimated CFR (adjusted for under-ascertainment, using parametric method) was 2.7% (95% CrI: 1.4-4.7). The best estimate CFR outside of China also increased with age (parametric estimates: <60 years = 1.4% vs. ≥60 years = 4.5%).
- The overall **estimated IFR in China was 0.7%** (95% CrI: 0.4-1.3) and **increased with age** (<60 years = 0.1% vs. ≥60 years = 3.3%).
- Adjusting for under-ascertainment and demography, **the proportion of infected patients requiring hospitalization increased with age** from 1.0% (20-29 years) to 18.4% (≥80 years).
- The overall best estimate CFR for China in this study (**1.4%**) is lower than CFRs previously reported for China (time-delayed adjusted = **0.9-12.2%**, [Mizumoto and Chowell 2020](#); time-delayed adjusted = **0.8-3.5%**, [Wilson et al. 2020](#); crude = **2.3%**, [Onder et al. 2020](#)). In addition, the best estimate CFR for outside China in this study (**2.7%**) is lower than reported CFRs for Italy (crude = **7.2%**, [Onder et al. 2020](#)) and 82 countries outside China (time-delayed adjusted = **4.2%**, [Wilson et al. 2020](#)).

Additional Information

- For estimating CFRs in China, the authors used aggregated data on cases up to Feb 11, 2020 (n=1,023 deaths; n=44,672 cases). When making estimates, the authors assumed a constant attack rate by age, adjusted for demography, and adjusted for under-ascertainment by age and location.
- For estimating CFRs outside China, the authors used data from 37 countries reported up to Feb 25, 2020 (parametric: n=585 cases; non-parametric: n=1,334).

- For estimating the proportion of patients hospitalized in China, the authors used data on severe cases reported up to January 26, 2020 (n=3,665).
- To estimate the duration from symptom onset to death or recovery, the authors used Bayesian methods to fit the data to gamma distributions, accounting for exponential growth. The **mean duration from symptom onset to:**
 - **Death** (n=24 cases from Hubei, China, up to Feb 8, 2020): 17.8 days (CrI: 16.9-19.2)
 - **Hospital discharge** (n=169 cases from outside China, up to Feb): 24.7 days (CrI: 22.9-28.1)
- The authors acknowledge that the CFR for any country will depend on the underlying health of the population, the quality of health care and health care system capacity.

PHO Reviewer’s Comments

- None

Citation

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