The Lived Experience of COVID-19 Mortality
Quantifying the Relationship between Excess Mortality and Family Bereavement

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In many countries, COVID-19 has been associated with increases in mortality above expected levels.

Most of these excess deaths are concentrated at older ages.

Excess mortality will lead to more individuals experiencing the loss of a relative.

- Verdery et al. (2020) find in the US that every death directly attributable to COVID-19 is associated with nine close kin experiencing bereavement.
- Losing kin is associated with potentially significant impacts on mental and physical health, some long-term (e.g. Raker et al, 2020), as well as on other measures of well-being.
Our question: how is the experience of these excess deaths distributed from the perspective of those who survive the period, but may experience the loss of relatives?

Which age groups/sex are most likely to be affected?

How does this vary by country?

Understanding the survivor’s perspective is vital for better understanding the long-term consequences of the pandemic on individuals and their kin networks.
Two Quantities of Interest

1. Probability of losing a relative for those who have one at the start of the period
   - Useful for thinking about the distribution of bereavement

2. The number of relatives lost during a period
   - Useful for thinking about the magnitude of bereavement

- Both measured compared to a counterfactual scenario without COVID-19 excess mortality
- Measured for the average person who survives the period (referred to as ego)
Methods

- We use SOCSIM to generate population genealogies for a COVID-19 scenario and a counterfactual scenario.
- We run 100 simulations per country and scenario to account for the stochastic nature of these simulation results.
- Today I will be reporting results for 16 European countries and the United States.
- SOCSIM requires blocks of monthly vital rates:
  - Fertility rates and non-COVID-19 mortality from 5-year UN World Population Prospects 2019 lifetable (medium variants).
Excess Mortality

- Adjustment factor: ratios of observed to expected mortality rates calculated from the Human Mortality Database’s Short-Term Mortality Fluctuations Dataset
- Currently using a four year average for expected mortality
The Distribution of Kin by Age

% Individuals with Kin by Age

% with at least one relative in Feb 2020

% with at least one relative in Feb 2020

Age Group

- 0-14
- 15-29
- 30-44
- 45-64
- 65+

Type of Kin

- Grandparents
- Parents
- Siblings
- Children
Excess Probability of Loss in the COVID-19 Scenario

Excess Probability of Losing Kin

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\text{Excess Probability of Loss} = (P(\text{Loss})_{COVID} - P(\text{Loss})_{\text{Counterfactual}}) \times (\% \text{ with Kin})
\]
Excess Kin Loss = \((\text{KinLost}_{COVID} - \text{KinLost}_{Counterfactual}) \times (\% \text{ with Kin})\)
Excess Mortality = \frac{\text{Observed Deaths} - \text{Expected Deaths}}{\text{Expected Deaths}}
Limitations and Future Work

- Small sample of countries
- Even though COVID-19 cases are often clustered, we assume a uniform distribution of excess mortality across the population
- These results are for survivors, and excess mortality may alter the distribution of who survives
- Going forward, we intend to work on
  - Expanding the list of countries/months/types of kin covered
  - Disentangling the effects of mortality and age structure on bereavement through decomposition modeling
  - Robustness checks using Caswell’s matrix approach to the Goodman-Keyfitz-Pullum kinship equations to calculate expected kin under various mortality scenarios, using a different data source (HMD and HFD)
Conclusions

- These results give us a sense of the relationship between excess mortality and the experience of bereavement.
- They also provide information on the distribution of such loss.
- They also point to the importance of both age structure and excess mortality level in shaping this relationship.
- Understanding these effects may help us also consider how excess mortality may affect the experience of bereavement in other countries and contexts, and predict some of the long-term consequences of the pandemic.
- Questions/comments/feedback appreciated:
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