Letters

RESEARCH LETTER

Excess Deaths From COVID-19 and Other Causes, March-April 2020

The number of publicly reported deaths from coronavirus disease 2019 (COVID-19) may underestimate the pandemic’s death toll. Such estimates rely on provisional data that are often incomplete and may omit undocumented deaths from COVID-19. Moreover, restrictions imposed by the pandemic (eg, stay-at-home orders) could claim lives indirectly through delayed care for acute emergencies, exacerbations of chronic diseases, and psychological distress (eg, drug overdoses). This study estimated excess deaths in the early weeks of the pandemic and the relative contribution of COVID-19 and other causes.

Methods | Weekly death data for the 50 US states and the District of Columbia were obtained from the National Center for Health Statistics for January through April 2020 and the preceding 6 years (2014-2019). US totals excluded Connecticut and North Carolina because of missing data. The analysis included total deaths and deaths from COVID-19, influenza/pneumonia, heart disease, diabetes, and 10 other grouped causes (Supplement). Mortality rates for causes other than COVID-19 were available only for underlying causes. Death data with any mention of COVID-19 on the death certificate (as an underlying or contributing cause) could claim lives indirectly through delayed care for acute emergencies, exacerbations of chronic diseases, and psychological distress (eg, drug overdoses). This study estimated excess deaths in the early weeks of the pandemic and the relative contribution of COVID-19 and other causes.

Results | Between March 1, 2020, and April 25, 2020, a total of 505 059 deaths were reported in the US; 87 001 (95% CI, 86 578-87 423) were excess deaths, of which 56 246 (65%) were attributed to COVID-19. In 14 states, more than 50% of excess deaths were attributed to underlying causes other than COVID-19; these included California (55% of excess deaths) and Texas (64% of excess deaths) (Table). The 5 states with the most COVID-19 deaths experienced large proportional increases in deaths from nonrespiratory underlying causes, including diabetes (96%), heart diseases (89%), Alzheimer disease (64%), and cerebrovascular diseases (35%) (Figure). New York City experienced the largest increases in nonrespiratory deaths, notably from heart disease (398%) and diabetes (356%).

Table. Excess Deaths From March 1, 2020, to April 25, 2020, Attributed and Not Attributed to Coronavirus Disease 2019 (COVID-19)*

<table>
<thead>
<tr>
<th>Jurisdiction</th>
<th>Expected deaths, No. (95% CI)</th>
<th>Observed deaths, No.</th>
<th>Excess deaths, No. (95% CI)</th>
<th>COVID-19 deathsa, Reported deaths, No.</th>
<th>Excess deaths, %</th>
<th>COVID-19 deathsa, Excess deaths, No. (95% CI)</th>
<th>Excess deaths, %</th>
</tr>
</thead>
<tbody>
<tr>
<td>United States</td>
<td>419 058 (418 636 to 419 481)</td>
<td>505 059</td>
<td>87 001 (86 578 to 87 423)</td>
<td>56 246</td>
<td>65%</td>
<td>30 755 (30 332 to 31 177)</td>
<td>35%</td>
</tr>
<tr>
<td>Jurisdictions with highest COVID-19 death counts*</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>New York City</td>
<td>8369 (8310 to 8427)</td>
<td>29 703</td>
<td>21 334 (21 276 to 21 393)</td>
<td>14 952</td>
<td>70%</td>
<td>6382 (6324 to 6441)</td>
<td>30%</td>
</tr>
<tr>
<td>New Jersey</td>
<td>11 458 (11 388 to 11 528)</td>
<td>23 174</td>
<td>11 716 (11 646 to 11 786)</td>
<td>8037</td>
<td>69%</td>
<td>3679 (3609 to 3749)</td>
<td>31%</td>
</tr>
<tr>
<td>New York (excluding New York City)</td>
<td>15 603 (15 519 to 15 686)</td>
<td>24 611</td>
<td>9008 (8925 to 9092)</td>
<td>6569</td>
<td>73%</td>
<td>2439 (2356 to 2523)</td>
<td>27%</td>
</tr>
<tr>
<td>Massachusetts</td>
<td>15 217 (15 134 to 15 300)</td>
<td>20 232</td>
<td>5015 (4932 to 5098)</td>
<td>3372</td>
<td>67%</td>
<td>1643 (1560 to 1726)</td>
<td>33%</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>9316 (9253 to 9378)</td>
<td>13 412</td>
<td>4096 (4034 to 4159)</td>
<td>3122</td>
<td>76%</td>
<td>974 (912 to 1037)</td>
<td>24%</td>
</tr>
<tr>
<td>Pennsylvania</td>
<td>17 178 (17 089 to 17 268)</td>
<td>22 304</td>
<td>5126 (5036 to 5215)</td>
<td>2752</td>
<td>54%</td>
<td>2374 (2284 to 2463)</td>
<td>46%</td>
</tr>
</tbody>
</table>

(continued)
These estimates suggest that the number of COVID-19 deaths reported in the first weeks of the pandemic captured only two-thirds of excess deaths in the US. Potential explanations include delayed reporting of COVID-19 deaths and misattribution of COVID-19 deaths to other respiratory illnesses (eg, pneumonia) or to nonrespiratory causes reflecting complications of COVID-19 (eg, coagulopathy, myocarditis). Few excess deaths involved pneumonia or influenza as underlying causes.

This study has limitations, including the reliance on provisional data, potentially inaccurate death certificates, and delays in reporting. The US total was calculated as the sum of results for 48 states and the District of Columbia. Data for Connecticut and North Carolina were omitted because of delays in reporting.
modeling assumptions. For example, modeling epidemiologic, instead of calendar, years would reduce the excess deaths estimate to 73,524.

Large increases in mortality from heart disease, diabetes, and other diseases were observed. Further investigation is required to determine the extent to which these trends represent nonrespiratory manifestations of COVID-19 or secondary pandemic mortality caused by disruptions in society that diminished or delayed access to health care and the social determinants of health (eg, jobs, income, food security).

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Concept and design: Woolf, Chapman, Sabo, Weinberger.
Acquisition, analysis, or interpretation of data: Chapman, Sabo, Hill.
Drafting of the manuscript: Woolf, Chapman, Sabo, Weinberger.
Critical revision of the manuscript for important intellectual content: All authors.
Statistical analysis: Chapman, Sabo, Weinberger, Hill.
Administrative, technical, or material support: Woolf, Chapman.
Supervision: Woolf.

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Data refer only to underlying causes of death; COVID-19 may have been a contributing cause in an unknown number of deaths. New Jersey and New York City experienced the largest relative increases.