RESEARCH LETTER

Methamphetamine Overdose Deaths in the US by Sex and Race and Ethnicity

US age-adjusted rates of drug overdose deaths involving methamphetamine increased nearly 5-fold during 2012-2018. Although addiction outcomes can be improved with sex-specific and culturally tailored prevention and treatment interventions, the extent to which fatalities differ as functions of sex and race and ethnicity has not been analyzed, to our knowledge.

Methods | This study used existing deidentified public health surveillance data and was exempt from institutional review board review in accordance with the Common Rule. Data were from National Vital Statistics System files for multiple causes of death. Drug overdose deaths were those assigned an underlying cause of death with International Statistical Classification of Diseases and Related Health Problems, 10th Revision (ICD-10) codes (X40-X44 [unintentional], X60-X64 [suicide], X85 [homicide], and Y10-Y14 [undetermined intent]). Overdose deaths involving psychostimulants with abuse potential (predominantly corresponding to methamphetamine) were those with ICD-10 code T43.6.2

Results | During 2011-2018 (Figure), age-adjusted rates for methamphetamine-involved deaths increased from 1.8 to 10.1 per 100 000 among men (average annual percentage change [AAPC], 29.1; 95% CI, 25.5-32.8; P < .001) and from 0.8 to 4.5 per 100 000 among women (AAPC, 28.1; 95% CI, 25.1-31.2; P < .001) (Table). Within each sex, non-Hispanic American Indian or Alaska Native individuals had the highest rates, increasing from 5.6 to 26.4 per 100 000 among men during 2011-2018 (AAPC, 24.2; 95% CI, 23.0-25.5; P < .001) and from 3.6 to 15.6 per 100 000 among women during 2012-2018 (AAPC, 26.4; 95% CI, 15.9-37.7; P < .001). During 2011-2018, non-Hispanic White individuals had the second highest rates, increasing from 2.2 to 12.6 per 100 000 among men (AAPC, 29.8; 95% CI, 24.3-35.4; P < .001) and from 1.1 to 6.2 per 100 000 among women (AAPC, 29.1; 95% CI, 25.2-33.2; P < .001); rates among Hispanic individuals increased from...
### Table. Trends in Age-Adjusted Overdose Death Rates per 100,000 (95% CI) Involving Methamphetamine* Among Adults Aged 25-54 Years by Sex and Race and Ethnicity

<table>
<thead>
<tr>
<th></th>
<th>2011-2015: APC (95% CI)</th>
<th>2011-2018: AAPC (95% CI)</th>
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<tbody>
<tr>
<td><strong>Men</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Overall US men</td>
<td>1.8 (1.7 to 1.9)</td>
<td>10.1 (9.9 to 10.4)</td>
</tr>
<tr>
<td>Non-Hispanic American Indian or Alaska Native</td>
<td>5.6 (3.7 to 8.1)</td>
<td>2011-2018: AAPC = 24.2 (23.0 to 25.5); P &lt; .001</td>
</tr>
<tr>
<td>Non-Hispanic White</td>
<td>2.2 (2.1 to 2.4)</td>
<td>12.6 (12.3 to 13.0)</td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
<td>0.6 (0.5 to 0.8)</td>
<td>6.4 (5.9 to 7.0)</td>
</tr>
<tr>
<td>Hispanic</td>
<td>1.4 (1.2 to 1.6)</td>
<td>6.6 (6.1 to 7.0)</td>
</tr>
<tr>
<td><strong>Women</strong></td>
<td></td>
<td></td>
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<tr>
<td>Overall US women</td>
<td>0.8 (0.8 to 0.9)</td>
<td>4.5 (4.3 to 4.7)</td>
</tr>
<tr>
<td>Non-Hispanic American Indian or Alaska Native</td>
<td>NA</td>
<td>2011-2018: AAPC = 28.1 (25.1 to 31.2); P &lt; .001</td>
</tr>
<tr>
<td>Non-Hispanic White</td>
<td>1.1 (1.0 to 1.2)</td>
<td>6.2 (6.0 to 6.5)</td>
</tr>
<tr>
<td>Non-Hispanic Black</td>
<td>NA</td>
<td>2012-2018: AAPC = 26.4 (23.3 to 29.6); P &lt; .001</td>
</tr>
<tr>
<td>Hispanic</td>
<td>0.5 (0.4 to 0.7)</td>
<td>1.0 (0.8 to 1.2)</td>
</tr>
</tbody>
</table>

**Abbreviations:** AAPC, average APC; APC, annual percentage change; NA, not applicable because there were too few cases to report reliable estimates.

*Psychostimulants with abuse potential (predominantly responding to methamphetamine).

**b** Jointpoint, which is identified in this year indicating significant changes in nonlinear trends using a bayesian information criterion.
1.4 to 6.6 per 100 000 for men and from 0.5 to 2.0 per 100 000 for women. Among non-Hispanic Asian individuals in 2018, rates increased to 3.4 per 100 000 for men and to 1.1 per 100 000 for women. Non-Hispanic Black individuals had low rates. However, among men during 2011-2018, rates for non-Hispanic Black individuals increased from 0.6 to 6.4 per 100 000 with the highest AAPC (AAPC, 41.4; 95% CI, 39.5-43.2; P < .001); among women during 2012-2018, rates for non-Hispanic Black individuals increased from 0.2 to 1.7 per 100 000 with an AAPC (AAPC, 35.5; 95% CI, 28.6-42.8; P < .001), similar to non-Hispanic White and American Indian and Alaska Native women.

**Discussion** Increased age-adjusted rates for methamphetamine-involved deaths for all examined racial/ethnic groups of men and women with acceleration during 2014/2015 to 2018 for many subgroups are consistent with the flourishing methamphetamine market and suggest the urgent need for effective interventions. Within each sex, American Indian and Alaska Native individuals had the highest death rates, with acceleration during 2015-2018 for women and consistent increases during 2011-2018 for men. Within each racial/ethnic group, rates were higher among men than women. However, American Indian and Alaska Native women had higher rates than non-Hispanic Black and Asian men and Hispanic men during 2012-2018. Non-Hispanic Black individuals had the fastest increases in death rates among men during 2011-2018.

Although the category used to estimate death rates from methamphetamine was based on psychostimulants, approximately 85% to 90% of psychostimulant-involved death certificates mentioned methamphetamine. Methamphetamine death rates may be underestimated because some overdose death certificates did not report specific drugs involved (eg, 12%-15% in 2016-2017). Racial misclassification suggests that even these high rates may underestimate American Indian and Alaska Native mortality.

Methamphetamine is highly toxic. Its use is associated with pulmonary and cardiovascular pathology and frequently co-occurs with other substance use and mental disorders. Our results highlight the urgency to support prevention and treatment interventions for methamphetamine-related harms, especially among American Indian and Alaska Native individuals who experience sociostructural disadvantages, but whose cultural strengths can be leveraged to improve addiction outcomes.

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**Author Contributions:** Dr Han had full access to all the data in the study and takes responsibility for the integrity of the data and the accuracy of the data analysis.

**Concept and design:** All authors.

**Acquisition, analysis, or interpretation of data:** Han, Cotto, Etz, Compton, Volkow.

**Drafting of the manuscript:** Han, Cotto, Volkow.

**Critical revision of the manuscript for important intellectual content:** All authors.

**Statistical analysis:** Han, Cotto.

**Administrative, technical, or material support:** Han.

**Supervision:** Einstein, Volkow.

**Review/editing for cultural context:** Etz.

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**Disclaimer:** The findings and conclusions of this study are those of the authors and do not necessarily reflect the views of the National Institute on Drug Abuse of the National Institutes of Health and the US Department of Health and Human Services.