Introduction

Cocaine use and methamphetamine use during pregnancy have potential short- and long-term health consequences. Rates of self-reported prenatal stimulant use have increased globally, but epidemiologic studies have not included biochemical verification. We examined trends in cocaine and methamphetamine use at prenatal care entrance from 2011 to 2019 using data from the Kaiser Permanente Northern California (KPNC) health care system with universal screening via self-report and urine toxicology.

Methods

In this cross-sectional study using time-series analysis, pregnant individuals universally screened for cocaine and methamphetamine use by (1) self-report, defined as any “use since pregnancy,” and (2) urine toxicology testing at entrance to prenatal care (median gestation, 8 [IQR, 7-10] weeks) in KPNC from January 1, 2011, to December 31, 2019, were considered for inclusion. For individuals with multiple pregnancies, all pregnancies meeting eligibility criteria were included. The KPNC institutional review board approved this study and waived consent because research involved no more than minimal risk to participants and could not practicably be performed without a waiver. This study followed the STROBE reporting guideline.

Statistical analysis was conducted from August 9 to September 8, 2022. We separately estimated the adjusted prevalence of cocaine and methamphetamine use via self-report and/or toxicology annually using Poisson regression with a log-link function, accounting for overdispersion, using SAS, version 9.4 (SAS Institute Inc). Prevalence estimates were adjusted for age, race and ethnicity (reported by patients supplemented with administrative records), and census-tract neighborhood deprivation index (NDI) using mean covariate distributions. Linear trends were modeled with a calendar year term. We also estimated the relative rate for each year compared with the previous year (eg, 2012 vs 2011). All P values were from 2-sided tests, and results were deemed statistically significant at P < .05.

Results

Of 364,284 eligible pregnancies, 38,233 without toxicology test results were excluded. The sample (N = 326,051) was 26.2% Asian or Pacific Islander, 6.3% Black, 25.8% Hispanic, 37.1% non-Hispanic White, and 4.6% other, multiracial, or unknown (the “other” category includes Native Americans; multiracial includes any person with ≥1 of the following reported categories: Asian or Pacific Islander, Black, White, or Native American). A total of 0.9% the sample were aged 12 to 17 years, 14.1% were aged 18 to 24 years, 62.8% were aged 25 to 34 years, and 22.2% were older than 34 years; the median NDI was −0.272 (IQR, −0.733 to 0.393).

From 2011 to 2019, the adjusted prevalence of any prenatal cocaine use increased from 0.10% (95% CI, 0.07%-0.13%) to 0.15% (95% CI, 0.12%-0.18%) at an annual relative rate of 1.09 (95% CI,
Annual relative rate increases for cocaine use were estimated to be greater by toxicology tests (1.13, 95% CI, 1.09-1.18) than by self-report (1.06, 95% CI, 1.02-1.10).

From 2011 to 2019, the adjusted prevalence of any prenatal methamphetamine use changed from 0.19% (95% CI, 0.14%-0.23%) to 0.17% (95% CI, 0.14%-0.21%) at an annual relative rate of 0.97 (95% CI, 0.95-1.00) (Figure, B; Table). Annual relative rates did not change for methamphetamine use measured by toxicology tests (0.99 [95% CI, 0.96-1.03]) and decreased when measured by self-report (0.96 [95% CI, 0.93-0.99]).

Discussion

This study found that, consistent with population-level increases in the prevalence of cocaine and methamphetamine use in the general US population, rates of cocaine use increased modestly among pregnant individuals in KPNC. Although the adjusted prevalence was higher across years by self-report vs toxicology tests, likely reflecting screening for any use since pregnancy vs current use, rates increased faster via toxicology tests. In contrast, rates of prenatal methamphetamine use decreased slightly over time via self-report and did not change via toxicology tests. Although prenatal methamphetamine use was nearly twice as prevalent as prenatal cocaine use in 2011, prevalence rates were similar by 2019. Across years, the adjusted prevalence of cocaine and methamphetamine use was roughly twice as high when including data from self-report and toxicology tests vs either measure on its own, indicating that the combination of both methods may lead to the best identification.

This study was limited to insured patients in Northern California screened for stimulant use during pregnancy. Results do not capture the amount or frequency of use, continued prenatal use, or stimulant use disorders. We are not able to differentiate prenatal use that occurred before vs after...
<table>
<thead>
<tr>
<th>Stimulant use</th>
<th>Adjusted prevalence of stimulant use during pregnancy, % (95% CI)</th>
<th>Linear trend estimation</th>
<th>Annual relative rate of change estimate (95% CI)</th>
<th>P value</th>
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<tbody>
<tr>
<td><strong>Cocaine use</strong></td>
<td></td>
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<tr>
<td>Self-report or toxicology</td>
<td>0.10 (0.07-0.13)</td>
<td>0.10 (0.07-0.13)</td>
<td>0.13 (0.09-0.16)</td>
<td>0.13 (0.10-0.17)</td>
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<td><strong>Annual relative rate</strong></td>
<td></td>
<td>0.96 (0.63-1.48)</td>
<td>1.30 (0.89-1.90)</td>
<td>1.06 (0.75-1.50)</td>
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<tr>
<td>Toxicology</td>
<td>0.04 (0.02-0.05)</td>
<td>0.04 (0.03-0.05)</td>
<td>0.04 (0.02-0.05)</td>
<td>0.03 (0.02-0.05)</td>
</tr>
<tr>
<td><strong>Annual relative rate</strong></td>
<td></td>
<td>1.06 (0.61-1.86)</td>
<td>0.96 (0.57-1.61)</td>
<td>0.87 (0.51-1.50)</td>
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<tr>
<td>Self-report</td>
<td>0.06 (0.04-0.09)</td>
<td>0.06 (0.04-0.08)</td>
<td>0.09 (0.07-0.12)</td>
<td>0.10 (0.07-0.13)</td>
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<td><strong>Annual relative rate</strong></td>
<td></td>
<td>0.95 (0.57-1.59)</td>
<td>1.52 (0.97-2.37)</td>
<td>1.10 (0.75-1.62)</td>
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<tr>
<td>Methamphetamine use</td>
<td></td>
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<tr>
<td>Self-report or toxicology</td>
<td>0.19 (0.14-0.23)</td>
<td>0.21 (0.17-0.25)</td>
<td>0.19 (0.15-0.24)</td>
<td>0.24 (0.19-0.28)</td>
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<tr>
<td><strong>Annual relative rate</strong></td>
<td></td>
<td>1.13 (0.82-1.56)</td>
<td>0.92 (0.68-1.23)</td>
<td>1.22 (0.91-1.62)</td>
</tr>
<tr>
<td>Toxicology</td>
<td>0.08 (0.05-0.11)</td>
<td>0.11 (0.08-0.14)</td>
<td>0.11 (0.08-0.14)</td>
<td>0.14 (0.11-0.17)</td>
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<tr>
<td><strong>Annual relative rate</strong></td>
<td></td>
<td>1.38 (0.91-2.09)</td>
<td>1.02 (0.72-1.45)</td>
<td>1.22 (0.79-1.69)</td>
</tr>
<tr>
<td>Self-report</td>
<td>0.13 (0.09-0.16)</td>
<td>0.12 (0.09-0.15)</td>
<td>0.12 (0.09-0.15)</td>
<td>0.11 (0.09-0.14)</td>
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<tr>
<td><strong>Annual relative rate</strong></td>
<td></td>
<td>0.97 (0.67-1.40)</td>
<td>0.98 (0.69-1.40)</td>
<td>0.95 (0.67-1.35)</td>
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</table>

Abbreviations: KPNC, Kaiser Permanente Northern California; NA, not applicable.

* Adjusted prevalence estimates and 95% CIs were estimated from Poisson regression models controlling for age group, race and ethnicity, and neighborhood deprivation index (extracted from the electronic health record).
pregnancy recognition. Stimulants are detectable via urine 2 to 4 days after a single use but can be detectable longer with long-term use, and some individuals may be misclassified as nonusers. Results may not be generalizable to other states or individuals without health care.

Rates of cocaine use during early pregnancy increased modestly from 2011 to 2019 and likely reflect changes in continuation of prepregnancy use into pregnancy. Differing trends in prenatal cocaine and methamphetamine use highlight the importance of early screening for different types of prenatal illicit stimulant use, assessment of substance use disorder, and linkage to nonpunitive treatment, as needed. Research indicates that stopping stimulant use during pregnancy improves birth outcomes, and continued research is needed to understand factors associated with different types of prenatal stimulant use over time.

ARTICLE INFORMATION
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REFERENCES


SUPPLEMENT.

Data Sharing Statement