HHS Public Access

Author manuscript

Matern Child Health J. Author manuscript; available in PMC 2024 June 01.

Published in final edited form as:

Matern Child Health J. 2024 June ; 28(6): 1121–1131. doi:10.1007/s10995-024-03914-6.

A Comparison of Two Statewide Datasets to Understand Population Prevalence of Substance Use in Pregnancy: Findings and Considerations for Policy & Research

Margaret Lloyd Sieger, PhD[1], **Jennifer C. Morin, MPH**[2], **Lisa M. Budris, MS, MPH**[2], **Melissa Sienna, MPA**[3], **Sharon Ostfeld-Johns, MD**[4], **Lou Hart, MD**[4], **Christopher Morosky, MD, MS**[5]

[1]University of Connecticut, School of Social Work, Hartford, CT

[2]Connecticut Department of Public Health

[3]UCONN Health, CT Department of Children & Families

[4]Yale School of Medicine, Department of Pediatrics, Section of Hospital Medicine

[5]University of Connecticut, School of Medicine, Farmington, CT

Introduction

Substance use in pregnancy is a growing public health concern. In 2019, 5.8% of U.S. pregnant mothers reported using illicit drugs, 9.5% reported using alcohol, and 9.6% reported using tobacco products (Substance Abuse and Mental Health Services Administration, 2020). Infants with prenatal substance exposure (PSE) are at increased risk of child maltreatment reporting and foster care placement (Rebbe et al., 2019a). Moreover, mental health conditions including substance use disorder are the leading cause of pregnancy-related deaths in the U.S. (Trost et al., 2022). One way to improve outcomes for infants with PSE and mothers with substance use in pregnancy is through prompt identification of the exposure and connection to services that enhance protective factors and support early development (Bada et al., 2012).

To aid in early identification and postnatal support for this population, the Child Abuse Prevention and Treatment Act (CAPTA), a primary U.S. child welfare law, added a mandate in 2003 that hospital personnel notify child protective services (CPS) of infants “born with and identified as being affected by illegal substance abuse or withdrawal symptoms resulting from prenatal drug exposure”. In 2010, CAPTA added fetal alcohol spectrum disorder (FASD) and in 2016, removed the term “illegal” (Lloyd et al., 2019). Despite inclusion in a child welfare law, these provisions do not establish a federal definition of child abuse

Corresponding Author:Margaret Lloyd Sieger, Ph.D., MS, Associate Professor, University of Connecticut, School of Social Work, 38 Prospect Street, Room 310, Hartford, CT 06105, margaret.lloydsieger@uconn.edu.

Compliance with Ethical Standards

Conflict of Interest: None.

Ethical Approval: This article contains research using administrative data. All research activities were approved by the University of Connecticut Institutional Review Board (CAPTA data) and the UCONN Health Institutional Review Board (PRAMS data). All study procedures in this study were in accordance with the ethical standards of the respective IRB.

Informed Consent: N/A

or neglect that includes PSE. That said, CAPTA's implications include that state child welfare agencies are tasked with 1) ensuring that hospitals identify infants with PSE and 2) coordinating multisystem responses to identified infants and mothers through a Plan of Safe Care (called a "Family Care Plan" in Connecticut [CT], the setting for the current study, and used for the remainder of this manuscript). Accurate, early, and equitable identification of infants with PSE and their mothers, coupled with non-stigmatized, non-punitive intervention is central to any public health response, including with this population.

Before an infant is born, the primary means for identifying substance use in pregnancy include self-report (either spontaneously or in response to screening questions), other report/medical record review, or toxicology test (Behnke & Smith, 2013). After delivery, infant withdrawal symptoms may indicate exposure, but are often corroborated with toxicology (Behnke & Smith, 2013). Each approach to detection has limitations. Objective methods such as toxicology and withdrawal symptoms differ in accuracy depending on substance type, while self-report may be unreliable, particularly if the person perceives risk of criminal or civil penalties (Ondersma et al., 2019). Additionally, thirty years of research has documented disproportionality in hospital providers' detection of, and response to, substance use in pregnancy (e.g., Chasnoff et al., 1990). More recently, Rebbe et al. (2019a, 2019b) linked hospital birth records with child welfare records in Washington State to understand rates of diagnosed prenatal substance exposure and the association between diagnosis and child welfare reporting. Native American infants were diagnosed at four times the rate of white infants and Black infants at 1.5 times the rate of white infants. These rates further varied by substance type. Given these challenges, providers and policymakers continue to seek effective, reliable, and equitable means of identifying prenatal substance exposure.

In March 2019, Connecticut implemented a statewide CAPTA response that relies on hospitals to identify infants exposed in utero to a range of legal and illegal substances (including alcohol), infants showing withdrawal symptoms, or those diagnosed with FASD. Upon identification, the Department of Children and Families requires providers to submit a "notification" via an online submission portal that alerts the Department of the infant's birth but withholds any identifying information to prevent CPS surveillance (hereafter, the policy as implemented in Connecticut is referred to as "CT CAPTA" and the process created under CT CAPTA is referred to as a "CAPTA notification"). This approach aims to address certain barriers to accurately measuring population prevalence of substance use in pregnancy including those related to punitive responses by the child welfare system.

Of relevance to the current study, CT CAPTA does not clarify how the identification of PSE is made. Across the state, providers use a variety of methods to identify these infants including, in order of reported frequency, maternal urine toxicology, infant urine toxicology, maternal self-report, indication in the medical record, infant meconium analysis, neonatal withdrawal symptoms, behavioral disturbance, and growth/developmental disturbance (Hasan, 2019). Thus, the notification approach remains vulnerable to most common challenges to accurate identification. Although beyond the scope of this paper, but perhaps of interest to the reader, the CAPTA notification form also asks three questions to providers pertaining to safety concerns and maternal substance use: (a) Has the child tested positive because of maternal substance misuse? (b) Is there a concern that mother's

substance use will impact parental functioning? and (c) Does the family present with suspicions of abuse or neglect? If a provider answers affirmatively to any of these questions or indicates that no Family Care Plan is in place, the individual making the notification is instructed to use a separate system to report suspected maltreatment. If the provider answers no to these items and the dyad has a Family Care Plan, the system does not prompt the user to make a CPS report and the anonymous information is submitted to the state.

Although CT CAPTA aims to leverage its notification approach to increase identification and reduce unnecessary CPS intervention, it is unknown whether population prevalence of substance use in pregnancy as detected by CAPTA notifications aligns with prevalence of self-reported substance use in pregnancy. To begin understanding the alignment between the mother-infant dyads identified via CAPTA notifications and population-level self-report data on substance use in pregnancy, we aimed to compare CAPTA notifications against a special supplement to the Pregnancy Risk Assessment Monitoring System (PRAMS) survey that measured retrospective self-reported substance use during pregnancy (hereafter, this specific survey as implemented in Connecticut is referred to as “CT PRAMS”; the national survey mechanism is referred to as “PRAMS”). Although retrospective self-report presents its own validity issues (Ramos et al., 2020), the fact that the CT PRAMS survey was a population-level public health instrument, administered outside of the hospital within two to six months of the infant’s birth, and with no real or perceived involvement by CPS, it offers a unique and important method for capturing population-level prevalence of substance use in pregnancy.

Methods

Data Sources

Data for this analysis come from three unlinked data sources: (1) CT Department of Public Health (DPH) vital (birth) records, (2) the CT PRAMS survey supplement that measured maternal behaviors and experiences related to the use of prescription pain relievers, other opioids, and other intoxicants, and (3) CAPTA notifications.

PRAMS is an ongoing jurisdiction-based surveillance system that collects information on maternal behaviors, attitudes, and experiences before, during, and shortly after pregnancy from a sample of recent postpartum individuals. In CT, each month, approximately 200 records are randomly selected from DPH’s birth certificate file, for a total of roughly 2,400 per year. Sampled individuals are contacted first by mail, and then by telephone if there is no response to mail, to complete the PRAMS survey. Oversampling by maternal race/ethnicity is done to help ensure that an adequate number of responses are attained to allow for meaningful analyses to investigate disparities in perinatal indicators. Population estimates are generated using analytic weights. The analysis performed in this paper includes data that was obtained from a special survey supplement collected during the 2019 surveillance year as part of a national CDC rapid surveillance effort on opioid use in pregnancy. A copy of the CT PRAMS questionnaire used in this analysis is included in the Supplemental Materials. The CT PRAMS opioid supplement data collection began in April 2019 and continued through the entire 2019 surveillance year.

CAPTA notifications are entered online in a data collection web system engineered specifically for this policy ("the CAPTA portal"). CAPTA notifications capture 29 data elements including the date and location of notification, type of substance exposure from a list of 11 substance types, toxicology test (if used) and finding, and race/ethnicity data on the mother and infant. None of the 18 HIPAA identifiers described in 45CFR §164.514(b)(2) is collected. A copy of the notification questions is included in the Supplemental Materials.

Sample

To ensure alignment between CT PRAMS and CAPTA notification datasets, the analysis was limited to babies born March 15, 2019 (launch of the CAPTA portal) to December 31, 2019 (conclusion of the birth year sampled for the CT PRAMS data supplement). We chose to begin the study on the same day that the CAPTA portal launched for two reasons: (1) to maximize sample size, and (2) because significant implementation training and support was delivered prior to its launch with measurably consistent notification rates beginning immediately. During the study timeframe, DPH vital records recorded that 26,774 babies were born in CT to 26,297 state residents ("mothers"). During the same timeframe, the CAPTA portal received 1,854 notifications. Of these, 244 (13.2%) were erroneously submitted to the portal and therefore dropped from the dataset. These erroneous notifications included the date of notification and only three variables: (1) the reporting hospital, (2) indication that the infant was tested for substances, and (3) indication that the infant did not have uterine exposure. CT CAPTA policy does not require a notification for every infant who is tested for substances. Therefore, these notifications should not have been submitted in the first place. No other information (i.e., demographics) was available for these cases. Notably, these erroneous submissions were present throughout the surveillance time period, not just at the beginning of the portal's implementation. Additionally, 18 notifications were made for infants who reside in a state other than CT and were therefore ineligible to be included in the CT PRAMS sampling frame. The remaining CAPTA notification sample size was 1,592.

In 2019, the CT PRAMS weighted response rate was 56% (n =1,203). For this study, the CT PRAMS analytic sample was limited to mothers whose babies were born during the study timeframe (n=935).

Variables

Vital Records Variables—As noted, CT PRAMS uses vital records for its sample frame and therefore demographic information for CT PRAMS' respondents (e.g., maternal race/ethnicity and maternal age) was obtained from the associated birth certificate.

Additionally, three state population data points were extracted from DPH birth certificates during the study timeframe: (1) the number of CT mothers who delivered infants in CT during the study timeframe, (2) the average age of these mothers, and (3) the number of these mothers across four-category race/ethnicity categories: non-Hispanic White ("White"), non-Hispanic Black/African American ("Black"), non-Hispanic Other race/Multiple races ("Other/Multi-race"), and Hispanic, any race ("Hispanic"). These three data points were used to create CAPTA population parameters only. For example, the proportion of white

mothers who received CAPTA notifications was calculated by dividing the number of white mothers among CAPTA notifications from the number of white mothers from CT who gave birth in CT during the study timeframe per DPH birth certificate data.

CT PRAMS Variables—Alcohol use in pregnancy was measured in the annual PRAMS survey and drug use in pregnancy was measured in the CT PRAMS data supplement (see Supplemental Materials). Respondents were asked to check "yes" if they used any of the substances identified in Table 1 during their most recent pregnancy. These data were recoded into dummy variables reflecting five single substances and polysubstance as noted in Table 1. Because PRAMS asks about any alcohol use and, based on previous research with the CAPTA notification data (Lloyd Sieger et al., 2022), we anticipated that providers did not submit CAPTA notifications for mothers with very infrequent alcohol use, an additional single substance variable "4+ alcohol drinks/week" was created with CT PRAMS data capturing mothers who indicated alcohol use greater than 4 drinks per week. This variable was then used to create three non-mutually exclusive CT PRAMS sub-samples: (1) mothers with any substance use self-reported in CT PRAMS (n=155; "PRAMS- Any"), (2) mothers with 4+ alcohol drinks/week or any drug use self-reported in CT PRAMS (n=95; "PRAMS-4+"), and (3) mothers with only drug use self-reported in CT PRAMS (n =91; "PRAMS-Drug").

As described, maternal demographic characteristics were derived from the associated birth record. Maternal race/ethnicity was recoded into the same four categories as described above.

CAPTA Variables—The level of measurement for a CAPTA notification is dyadic: one mother and one infant. Thus the same mother may be connected to more than one notification in the case of twins, triplets, etc.

Infant substance exposure type was recorded in the notification. Personnel could indicate any number of 11 substance types (alcohol, buprenorphine, cocaine, cannabis, methadone, prescription opioids, PCP, prescription benzodiazepine, non-prescription opioids, other illegal/non-prescribed medication, and the misuse of prescription/over the counter [OTC] medications) and over 140 different combinations appeared in our dataset. These data were first recoded into dummy variables reflecting five single substances: alcohol, cannabis, medication for opioid use disorder (MOUD), "non-MOUD" opioids (any opioid including prescribed and non-prescribed excluding medications for opioid use disorder), and other illegal drugs (Table 1). Polysubstance use was determined by the presence of more than one substance type in the notification.

Maternal demographic information in the notifications included age in whole number and race/ethnicity. Maternal race/ethnicity was recoded into the same four categories as the other datasets.

Analytic Approach—Population parameters were calculated for CAPTA notifications and CT PRAMS respondents based on vital records information. The CAPTA notification data was not linked to any other datasets. Rather, CAPTA notification numerators for this

study were from the CAPTA portal and CAPTA notification denominators were from DPH vital records to calculate the percent of mothers. Simple arithmetic was used to calculate population proportions (e.g., number of white mothers who received CAPTA notifications divided by number of white mothers from CT who gave birth in CT per vital records). The decision was made to calculate the number of mothers in DPH records who delivered one or more infants during that timeframe to enable us to compare to PRAMS data, since PRAMS data samples mothers. CAPTA notification analyses were completed in StataSE 16.

CT PRAMS analyses were completed using SAS 9.4 survey analysis procedures which adjust for sampling design and analysis weight. The final PRAMS analysis weight is calculated by the CDC based on the sampling, nonresponse, and non-coverage weights. The SAS survey procedures include a “domain” estimation feature that permits accurate analysis of subgroups, including the partial year subsamples. Domain analysis (i.e., subgroup analysis) refers to the computation of statistics for domains (subpopulations) in addition to the computation of statistics for the entire study population. The issue with sub-group analysis is that the formation of subpopulations can be unrelated to the sample design and thus the domain sample sizes can be random variables. Domain analysis takes this variability into account by using the entire sample to estimate the variance of domain estimates.

Although differences in descriptive percentages may appear meaningful, we sought to account for sample size relative to population size to better gauge the extent of difference between percentages. Because the CT PRAMS proportions were calculated by the CDC using sampling weights, and therefore the noted sample size is not a reflection of the true sample size, we could not conduct standard statistical tests (e.g., Z-tests or chi square comparison of proportions). Instead, we chose to calculate 95% confidence intervals for the CAPTA estimates and make comparisons based on the non-overlap across subsamples. Although two groups with overlapping confidence intervals may be significantly different at $p < .05$, two groups with non-overlapping confidence intervals will always be significantly different at $p < .05$ (Greenland et al., 2016). This approach, while limited, provided the best estimates given the non-linked, weighted dataset.

Maternal race/ethnicity was the only variable missing data in either dataset. Very few records were missing race/ethnicity in the vital records and CT PRAMS data (n=12, 0.05% and n=1, 0.11%, respectively). However, almost 10% of CAPTA notifications did not record maternal race/ethnicity (n=156, 9.8%). These cases were retained for calculating the overall prevalence rate, average maternal age, and prevalence of different substances but were excluded from the prevalence estimates across race/ethnicity.

For the inquisitive reader, the relationship between the datasets for the purposes of creating each population parameter is outlined in Supplemental Table 1.

Results

Sample Characteristics

Table 2 describes the percentages in grayed columns of all CT mothers who delivered during the study timeframe included in the CAPTA notification data (6% of all mothers) and all

three subsamples of CT PRAMS respondents: (1) PRAMS-Any (18.1% of all mothers); (2) PRAMS-4+ (10.7% of all mothers); and (3) PRAMS-Drug (10.0% of all mothers).

Table 2 also describes the average maternal age as well as the percentage of all mothers across race/ethnic categories included in each dataset. In terms of demographic differences, CAPTA notification mothers were younger on average compared to all CT PRAMS subsamples. Several race/ethnicity differences were noted (see Table 2 and Figure 1). CAPTA notifications were made for proportionally different percentages across race/ethnic categories, while all CT PRAMS subsamples reflected proportionally similar percentages across race/ethnic categories. Specifically, CAPTA notifications were made for more Black mothers, compared to White, Hispanic, and Other/Multi-race mothers notifications (in Table 2, comparisons among CAPTA notifications with non-overlapping confidence intervals are indicated with different alphabetical superscripts, e.g., CAPTA notifications were made for 5.2% of white mothers compared to 10.3% of Black mothers).

Additionally, race/ethnicity rates *across* subsamples were different (in Table 2, comparisons across datasets with non-overlapping confidence intervals are indicated with differing numerical superscripts, e.g., CAPTA notifications were made for 5.2% of white mothers vs. 20% of white mothers who self-reported any substance use in PRAMS). CAPTA notifications were made for fewer White, Hispanic, and Other/Multi-race mothers, compared to rates in all three CT PRAMS sub-samples. On the other hand, CAPTA notifications were made for fewer Black mothers compared to the rates in PRAMS-Any, but not PRAMS-4+ or PRAMS-Drug (see Table 2 and Figure 1).

Substances Identified

Given the similarities between the PRAMS-4+ and PRAMS-Drug prevalence, Table 3 summarizes rates of any, single, and polysubstance use among CAPTA notifications, PRAMS-Any, and PRAMS-4+. CAPTA notifications were made for 6% of mothers; fewer than rates of self-reported substance use in both PRAMS-Any and PRAMS-4+. The largest difference between datasets was the rate of alcohol use. CAPTA notifications were made for 1% the rate of self-reported alcohol only users in PRAMS-Any. Additionally, CAPTA notifications were made for fewer mothers using non-MOUD opioids compared to rates in both PRAMS-Any and PRAMS-4+. CAPTA notifications involving polysubstance use were made for more mothers than rates of self-reported polysubstance use in the PRAMS-4+ subsample.

Discussion

Current federal CAPTA policy requires states to identify infants born affected by prenatal substance exposure. In 2019, CT implemented a statewide CAPTA response that relies on individual hospital policy or practices to identify these infants. To begin understanding the alignment between the mother-infant dyads identified via CT CAPTA and population-level self-report data on substance use in pregnancy, we aimed to compare CAPTA notifications against a special supplement to the PRAMS survey that measured retrospective self-reported substance use during pregnancy.

Our study contributes three key findings to research on policy-driven identification of substance use in pregnancy: (1) hospital approaches to detection dramatically under-identify alcohol use in pregnancy compared to self-report, (2) racial disproportionality persists, but may be the result of under-identification of white and Hispanic mothers, rather than over-identification of Black mothers, (3) hospital approaches to detection identify more cannabis and polysubstance use versus self-report.

Regarding our first key finding, CT PRAMS documented alcohol consumption at over 800 times the rate compared to CAPTA notifications (8.1% of mothers vs. 0.1% of mothers). These findings are consistent with previous research documenting much lower rates of alcohol exposure identified in hospital records (Rebbe et al., 2019a, 2019b) compared to self-reported alcohol use in pregnancy (Gosdin et al., 2022). This observed under-reporting of low levels of alcohol exposure begs the question as to whether hospital personnel are identifying the use and not completing a notification, or whether the use goes undetected. Previous research documents discrepancies between provider responses to alcohol use compared to drug use, suggesting that the practice gap involves failure to document, not failure to detect. A survey of health care and legal system professionals in Iowa found that providers were significantly more likely to take several actions including consulting social work and reporting to CPS for drug use compared to alcohol use (Chasnoff et al., 2018).

The CAPTA notification and PRAMS datasets aligned more closely when three or fewer drinks per week categories were excluded from analysis via the PRAMS-4+ subsample, suggesting that providers submitted CAPTA notifications for heavier drinkers only. This may indicate that providers used the notification system in instances of suspected alcohol use disorder; perceiving the notification as an apparatus of child welfare or substance use concern rather than public health surveillance. Alternatively, it may point to the fact that routine toxicology tests in healthcare settings exclude alcohol and, unless a provider is alarmed by the level of alcohol use and orders a separate test, the use will go undetected. In the first scenario, providers are making an implicit risk assessment and acting based on that assessment. In the second, established practices systematically limit alcohol identification and response. Both scenarios, however, illuminate the need for continued emphasis on the importance of monitoring alcohol use in pregnancy and implementing non-punitive interventions to minimize harm to the mother and infant.

Our second key finding documented racial disproportionality among CAPTA notifications compared to self-reported substance use. According to CT PRAMS data, there were no differences in any substance use between race/ethnicity groups, and this did not change when low alcohol use was excluded. On the other hand, CAPTA notifications were made for twice as many Black mothers compared to White (10.4% vs. 5.2%) and more than twice as many compared to Hispanic mothers (4.6%). These findings align with a long history of research documenting racial disparities in hospital provider behaviors despite equivalent rates of substance use in pregnancy (Chasnoff et al., 1990; Patel et al., 2021; Perlman et al., 2021). Although we do not have data on each hospital's approach to toxicology testing, previous research on hospital policies suggests that selective screening/testing is common practice in CT (Hasan, 2020) and other states (Rebbe et al., 2019b). Our findings suggest

the current approach disproportionately identifies substance use in pregnancy across racial/ethnic identities.

The mechanisms that explain this disproportionality are unclear from the current study, although the different substances identified across each dataset may contribute. The PRAMS sample is too small to conduct a race/ethnicity-based subgroup analysis of self-reported substance use. Prior research does point to racial/ethnic differences in type, magnitude, and timing of substances used (Roberts & Nuru-Jeter, 2011). For example, Rebbe et al. (2019a), using a Washington state birth cohort, found that Native American and Black infants were significantly more likely to have cannabis exposure compared to white and Hispanic infants. In this study, Hispanic infants had the lowest rates of prenatal substance exposure of any type. In our study, the high rates of cannabis notifications (close to 80% of the notifications included single or polysubstance cannabis; Lloyd Sieger et al., 2021) may partly contribute to the observed race disparity. Like our discussion of under-identifying alcohol exposure, cannabis may be more readily identified due to systemic factors such as common toxicology test types used during prenatal care or practices among providers serving lower income mothers.

Of note, the only substance category more frequently identified among CAPTA notifications compared to self-report in the PRAMS-4+ subsample was polysubstance use. One percent of mothers were included in CAPTA notifications involving polysubstance use compared to .3% of mothers in the PRAMS 4+ sub-sample. Despite differing prevalence rates, three substance types were involved in most polysubstance exposures: cannabis, MOUD, and other illegal drugs. The fact that CAPTA notifications identified higher rates of polysubstance use compared to CT PRAMS may reflect that mothers who used illegal drugs failed to self-disclose in the CT PRAMS survey due to inaccurate recall, stigma, or social desirability bias. Because hospitals would not have to rely on self-report to detect polysubstance use, hospital approaches likely identified a more accurate prevalence rate.

Implications for Practice

Each of these findings speak to the same broad set of challenges when implementing a policy like CAPTA: (1) engaging in public health surveillance of a stigmatized health status, (2) conducting this surveillance in taxed healthcare settings, and (3) leveraging an historically punitive system to manage this effort. The fact of racial/ethnic health disparities in the U.S. means that most health conditions, including stigmatized conditions, are more prevalent among populations “weathered” by racial discrimination and socioeconomic disadvantage (Forde et al., 2019). Compounding this is the long history of racism in healthcare settings (Green et al., 2021), as well as larger societal policies that result in racially disproportionate contact with punitive systems, including policing, courts, and child protection systems. It is within this context that frontline healthcare providers must gather information on substance use in pregnancy from mothers and then submit a deidentified notification to the state’s child welfare agency. Simply put, this is a tough ask.

What can policymakers and administrators do to support frontline providers in this effort? We make two recommendations. First, in order to ensure that the CAPTA notification system

is used for public health surveillance, additional and ongoing training of frontline staff to differentiate between public health surveillance and child maltreatment risk assessment is needed. Achieving a public health response to substance use in pregnancy is undermined by a pervasive belief that certain types of drug use in the prenatal period *is* child abuse. While substance use in pregnancy may indicate, depending on perspective, a questionable health choice or a symptom of a behavioral health disorder, neither proposition is limited to people who use illicit drugs, as many long-term health and developmental consequences to children stem from alcohol or tobacco use in pregnancy (Behnke & Smith, 2013). And while untreated SUD is a risk for child maltreatment, it is not a condition of child maltreatment. Minimizing the social and legal consequences of disclosing substance use during pregnancy must be viewed as the most evidence-based strategy to increase self-report by pregnant individuals (Nguemeni Tiako & Sweeney, 2021).

Second, both the American College of Obstetricians and Gynecologists and American Academy of Pediatrics have long recommended universal substance use screening in pregnancy. Mental health concerns frequently co-occur with substance use and co-occurring disorders present much higher maltreatment risk than either substance use or mental health disorder alone (Deutsch et al., 2020). Therefore, screening for both substance use and mental health throughout women's healthcare encounters, including during pregnancy and at delivery, is crucial. Combining verbal screening with calendar recall may provide more reliable assessment than any single tool on its own (Donohue et al., 2014; Ondersma et al., 2019). Given our findings that Black mothers are part of CAPTA notifications at different rates than White and Hispanic mothers, ensuring that universal screening achieves equitable identification of substance use will require concomitant and ongoing systems-level monitoring and revising of hospital practices (e.g., toxicology testing practices) that result in racial disproportionality (Green et al., 2021).

Limitations

Several limitations to our study must be noted. One, CT PRAMS was based on self-reported information that may be subject to recall and/or reporting bias towards socially desirable answers. This undoubtedly resulted in the underestimation of substance use in pregnancy captured by CT PRAMS data and therefore impacted our ability to measure the extent of inaccurate identification in CAPTA. Two, heavier substance use in pregnancy is a low frequency event and thus more difficult to measure using a partial year of CT PRAMS data. Three, CAPTA notifications and CT PRAMS measured substance use in pregnancy differently. We attempted to align the substance categories, but different measurement approaches could have influenced our results. Four, missing race/ethnicity for 10% of CAPTA notification may not be missing at random. Finally, because the datasets used in this analysis were unlinked, we could not conduct standard statistical tests to compare rates across subsamples. We used a simplistic approach to compare rates based on confidence intervals, but future research is needed to address these limitations.

Conclusion

Despite these limitations, our study contributed to knowledge by documenting racial/ethnic disparities between self-reported substance use in pregnancy and hospital-identified substance use in pregnancy submitted to the State's notification system. Although the notifications withheld personally identifying information for dyads without safety concerns, the observed racial/ethnic disparities raise concerns regarding provider approaches to identifying substance use in pregnancy. Additional effort is needed to support pregnant mothers' disclosure of substance use status with care providers and providers utilization of the CAPTA notification system for public health surveillance.

Supplementary Material

Refer to Web version on PubMed Central for supplementary material.

Acknowledgements:

CAPTA data were provided by the Connecticut Department of Children & Families (DCF) Information Systems from the DCF's data system(s). DCF specifically disclaims responsibility for any analyses, interpretations or conclusions.

PRAMS and Vital Records data were provided by the DPH. We also thank Katharyn Baca from the Maternal and Child Health Epidemiology Program, Field Support Branch, Division of Reproductive Health, National Center for Chronic Disease Prevention and Public Health Promotion, Centers for Disease Control and Prevention for assisting with analyses on this project. The PRAMS Working Group membership list can be found here: https://www.cdc.gov/prams/prams-data/PRAMS-working-group.htm. The contents of this publication are solely the responsibility of the authors and do not necessarily represent the views of the CDC or HRSA.

Funding Information:

This work was supported by the Connecticut Department of Children and Families with flowthrough funding from the Administration for Children, Youth, & Families CAPTA Grants (Grant # 20DCF2032). Funding for the research and manuscript writing was also provided by NIDA (K01DA058060; Lloyd Sieger, PI). The Connecticut Pregnancy Risk Assessment Monitoring System (PRAMS) is supported by funding from the Centers for Disease Control and Prevention (CDC) (Grant # 6U01DP006193) and the Health Resources and Services Administration (HRSA) (Grant # H18MC00007).

Data Availability Statement:

Data subject to third-party restrictions.

References

Bada HS, Bann CM, Whitaker TM, Bauer CR, Shankaran S, LaGasse L, . . . Higgins R. (2012). Protective Factors Can Mitigate Behavior Problems After Prenatal Cocaine and Other Drug Exposures. Pediatrics, 130(6), e1479–e1488. doi:10.1542/peds.2011-3306 [PubMed: 23184114]

Behnke M, & Smith VC (2013). Prenatal substance abuse: short-and long-term effects on the exposed fetus. Pediatrics, 131(3), e1009–e1024. [PubMed: 23439891]

Chasnoff IJ, Barber G, Brook J, & Akin BA (2018). The Child Abuse Prevention and Treatment Act: Knowledge of Health Care and Legal Professionals. Child Welfare, 96(3), 41–58.

Chasnoff IJ, Landress HJ, & Barrett ME (1990). The prevalence of illicit-drug or alcohol use during pregnancy and discrepancies in mandatory reporting in Pinellas County, Florida. New England Journal of Medicine, 322(17), 1202–1206. [PubMed: 2325711]

Chasnoff IJ, Wells AM, & King L (2015). Misdiagnosis and Missed Diagnoses in Foster and Adopted Children With Prenatal Alcohol Exposure. Pediatrics, 135 (2), 264–270. 10.1542/peds.2014-2171 [PubMed: 25583914]

Claussen AH, Scott KG, Mundy PC, & Katz LF (2004). Effects of Three Levels of Early Intervention Services on Children Prenatally Exposed to Cocaine. Journal of Early Intervention, 26(3), 204–220. doi:10.1177/105381510402600304

Deutsch SA, Donahue J, Parker T, Hossain J, & De Jong A (2020). Factors Associated with Child-Welfare Involvement among Prenatally Substance-Exposed Infants. The Journal of pediatrics, 222, 35–44.e31. doi:10.1016/j.jpeds.2020.03.036 [PubMed: 32418814]

Donohue B, Holland JM, Lopez K, Urgelles J, & Allen DN (2014). Examination of Illicit Drug Use Frequency Using Multiple Drug Assessment Methods in Mothers Referred to Treatment by Child Protective Services. Journal of Family Violence, 29(8), 911–919. doi:10.1007/s10896-014-9646-x

Fraser MW, Lombardi BM, Wu S, Zerden L. d. S., Richman EL, & Fraher EP. (2018). Integrated Primary Care and Social Work: A Systematic Review. Journal of the Society for Social Work and Research, 9(2), 175–215. doi:10.1086/697567

Gosdin LK, Deputy NP, Kim SY, Dang EP, & Denny CH (2022). Alcohol Consumption and Binge Drinking During Pregnancy Among Adults Aged 18–49 Years - United States, 2018–2020. MMWR. Morbidity and mortality weekly report, 71(1), 10–13. 10.15585/mmwr.mm7101a2 [PubMed: 34990444]

Green TL, Zapata JY, Brown HW, & Hagiwara N (2021). Rethinking Bias to Achieve Maternal Health Equity: Changing Organizations, Not Just Individuals. Obstetrics and gynecology, 137(5), 935–940. doi:10.1097/AOG.0000000000004363 [PubMed: 33831936]

Greenland S, Senn SJ, Rothman KJ, Carlin JB, Poole C, Goodman SN, & Altman DG (2016). Statistical tests, P values, confidence intervals, and power: a guide to misinterpretations. European journal of epidemiology, 31(4), 337–350. 10.1007/s10654-016-0149-3 [PubMed: 27209009]

Guttmacher Institute. (2022). Substance Use During Pregnancy: As of April 1, 2022. Retrieved from Washington, D.C.: https://www.guttmacher.org/state-policy/explore/substance-use-during-pregnancy

Hasan R (2020). Six Months into Child Abuse Prevention and Treatment Act (CAPTA): A Survey of CT Hosptial Based Women's Health. (Master of Public Health), Univeristy of CT, Farmington, CT.

Joseph R, Brady E, Hudson ME, & Moran MM (2020). Perinatal Substance Exposure and Long-Term Outcomes in Children: A Literature Review. Pediatric nursing, 46(4), 163–173.

Kable JA, & Jones KL (2023). Identifying Prenatal Alcohol Exposure and Children Affected by It: A Review of Biomarkers and Screening Tools. Alcohol research: current reviews, 43(1), 03. 10.35946/arcr.v43.1.03 [PubMed: 37260694]

Kataoka MC, Carvalheira APP, Ferrari AP, Malta MB, de Barros Leite Carvalhaes MA, & de Lima Parada CMG. (2018). Smoking during pregnancy and harm reduction in birth weight: a cross-sectional study. BMC Pregnancy and Childbirth, 18(1), 67. doi:10.1186/s12884-018-1694-4 [PubMed: 29530015]

Lees B, Mewton L, Jacobus J, Valadez EA, Stapinski LA, Teesson M, Tapert SF, & Squeglia LM (2020). Association of Prenatal Alcohol Exposure With Psychological, Behavioral, and Neurodevelopmental Outcomes in Children From the Adolescent Brain Cognitive Development Study. The American journal of psychiatry, 177(11), 1060–1072. 10.1176/appi.ajp.2020.20010086 [PubMed: 32972200]

Lester BM, Andreozzi L, & Appiah L (2004). Substance use during pregnancy: time for policy to catch up with research. Harm reduction journal, 1(1), 5. [PubMed: 15169566]

Lloyd MH, Luczak S, & Lew S (2019). Planning for safe care or widening the net?: A review and analysis of 51 states' CAPTA policies addressing substance-exposed infants. Children and Youth Services Review, 99, 343–354. doi:10.1016/j.childyouth.2019.01.042

Lloyd Sieger MH, Rebbe R, & Patrick SW (2021). The 2021 Reauthorization of CAPTA — Letting Public Health Lead. New England Journal of Medicine, 385(18), 1636–1639. doi:10.1056/NEJMp2111378 [PubMed: 34677917]

Milligan K, Niccols A, Sword W, Thabane L, Henderson J, & Smith A (2011). Birth outcomes for infants born to women participating in integrated substance abuse treatment programs: A Meta-analytic review. Addict Res Theory, 19. doi:10.3109/16066359.2010.545153

National Center on Substance Abuse and Child Welfare. (2021). How States Serve Infants and Their Families Affected by Prenatal Substance Exposure: Identification and Notification. In.

Nguemeni Tiako MJ, & Sweeney L (2021). The Government's Involvement in Prenatal Drug Testing May Be Toxic. Maternal and child health journal. doi:10.1007/s10995-020-03110-2

Ondersma SJ, Chang G, Blake-Lamb T, Gilstad-Hayden K, Orav J, Beatty JR, . . . Yonkers KA. (2019). Accuracy of five self-report screening instruments for substance use in pregnancy. Addiction, 114(9), 1683–1693. doi:10.1111/add.14651 [PubMed: 31216102]

Passey ME, Sanson-Fisher RW, D'Este CA, & Stirling JM (2014). Tobacco, alcohol and cannabis use during pregnancy: Clustering of risks. Drug and Alcohol Dependence, 134, 44–50. doi:10.1016/j.drugalcdep.2013.09.008 [PubMed: 24095245]

Patel E, Bandara S, Saloner B, Stuart EA, Goodman D, Terplan M, . . . McGinty EE. (2021). Heterogeneity in prenatal substance use screening despite universal screening recommendations: findings from the Pregnancy Risk Assessment Monitoring System, 2016–2018. American Journal of Obstetrics & Gynecology MFM, 3(5), 100419. doi:10.1016/j.ajogmf.2021.100419 [PubMed: 34116233]

Perlman NC, Cantonwine DE, & Smith NA (2021). Toxicology Testing in a Newborn ICU: Does Social Profiling Play a Role? Hospital Pediatrics, 11(9), e179–e183. doi:10.1542/hpeds.2020-005765 [PubMed: 34373267]

Rebbe R, Mienko JA, Brown E, & Rowhani-Rahbar A (2019a). Child protection reports and removals of infants diagnosed with prenatal substance exposure. Child Abuse Negl, 88, 28–36. doi:10.1016/j.chiabu.2018.11.001 [PubMed: 30445334]

Rebbe R, Mienko JA, Brown E, & Rowhani-Rahbar A (2019b). Hospital Variation in Child Protection Reports of Substance Exposed Infants. The Journal of pediatrics, 208, 141–147.e142. doi:10.1016/j.jpeds.2018.12.065 [PubMed: 30770194]

Roberts SC, Zahnd E, Sufrin C, & Armstrong MA (2015). Does adopting a prenatal substance use protocol reduce racial disparities in CPS reporting related to maternal drug use? A California case study. Journal of perinatology: official journal of the California Perinatal Association, 35(2), 146–150. 10.1038/jp.2014.168 [PubMed: 25233193]

Substance Abuse and Mental Health Services Administration. (2020). 2019 National Survey on Drug Use and Health: Women. In: Department of Health and Human Services.

Sundermann AC, Zhao S, Young CL, Lam L, Jones SH, Velez Edwards DR, & Hartmann KE (2019). Alcohol Use in Pregnancy and Miscarriage: A Systematic Review and Meta-Analysis. Alcoholism, clinical and experimental research, 43(8), 1606–1616. 10.1111/acer.14124 [PubMed: 31194258]

Trost S, Beauregard J, Chandra G, Njie F, Berry J Harvey A, & Goodman D. (2022). Pregnancy-related deaths: Data from maternal mortality review committees in 36 US states, 2017–2019. Atlanta, GA: Centers for Disease Control and Prevention, US Department of Health and Human Services; 2022.

Wright TE, Schuetter R, Fombonne E, Stephenson J, & Haning WF (2012). Implementation and evaluation of a harm-reduction model for clinical care of substance using pregnant women. Harm reduction journal, 9(1), 5. doi:10.1186/1477-7517-9-5 [PubMed: 22260315]

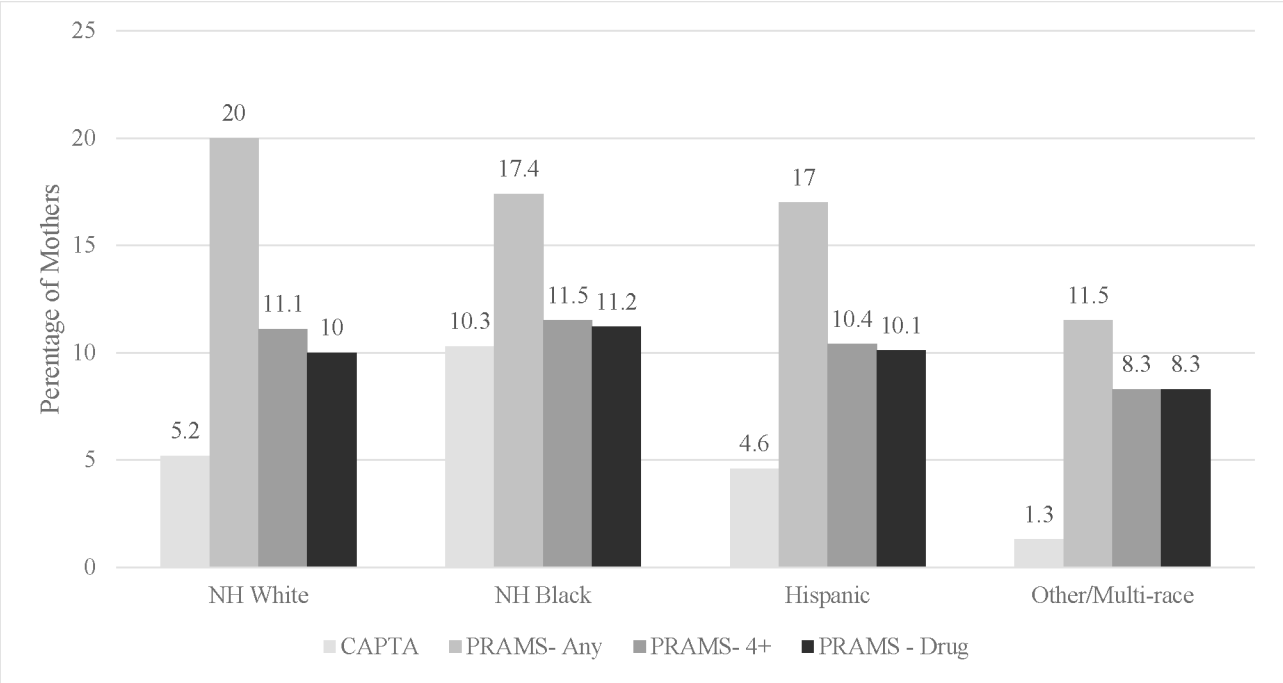

Figure 1.

Percentage of Mothers with Substance Use in Pregnancy Across Race/Ethnic Categories by Data Source – Connecticut, March 15, 2019 – December 31, 2019

Figure Notes. Sample sizes for each race group across subsamples are included in Table 1.

Table 1:

Substance Category Recoding

Substance Category	PRAMS	CAPTA
Alcohol	Less than 1 drink a week 1 to 3 drinks a week 4 to 7 drinks a week 8 to 13 drinks a week 14 drinks or more a week	Alcohol
Cannabis	Marijuana Hash	Marijuana
MOUD	Buprenorphine Methadone Subutex® Suboxone®	Buprenorphine Methadone
Non-MOUD opioids	Hydrocodone like Vicodin®, Norco®, or Lortab®; Codeine like Tylenol® 3 or 4; Oxycodone like Percocet®, Percodan®, OxyContin®, or Roxicodone®; Tramadol like Ultram® or Ultracet®; Hydromorphone or meperidine like Demorol®, Exalgo®, or Dilaudid®; Oxymorphone like Opana®; Morphine like MS Contin®, Avinza®, or Kadian ®; Fentanyl like Duragesic®, Fentora®, or Actiq®; Heroin	“Prescription opioids” “Non-prescription opioids”
Other illegal drugs	Amphetamines Synthetic marijuana Cocaine Tranquilizers Hallucinogens Sniffing gasoline, glue, aerosol spray cans, or paint to get high	Cocaine PCP “Other illegal/non-prescribed medication”

Table 2:

Maternal Characteristics by Statewide Data Sources – Connecticut, March 15, 2019 – December 31, 2019.

	Mothers with Any Alcohol or Drug Use Reported in CAPTA (n = 1,592)				Mothers with Any Alcohol or Drug Use Self-Reported in PRAMS (n = 155)				Mothers with 4+ Alcohol*/Any Drug Use Self-Reported in PRAMS (n = 95)				Mothers with Any Drug Use Self-Reported in PRAMS (n = 91)			
	N or M(SD)	%	95% CI		N or M(SD)	%+	95% CI		N or M(SD)	%+	95% CI		N or M(SD)	%+	95% CI	
			LL	UL			LL	UL			LL	UL			LL	UL
	1,592	6.0	5.8	6.3	155	18.1	155	18.1	95	10.7	8.1	13.3	91	10.0	7.5	12.5
Maternal Age	27.8 (5.7)		16.4	39.2	31.2 (0.52)		30.2	32.2	30.5 (.7)		29.1	31.9	30.1 (.7)		28.7	31.5
Maternal Race/ Ethnicity																
White	740	5.2[1a]	4.8	5.6	42	20.0[2]	14.5	25.5	22	11.1[2]	6.7	15.6	20	10.0[2]	5.8	14.3
Black	356	10.3[1b]	9.4	11.5	37	17.4[2]	12.4	22.4	25	11.5	7.3	15.7	24	11.2	7.0	15.3
Hispanic	316	4.6[1a]	4.1	5.1	52	17.0[2]	12.8	21.3	31	10.4[2]	6.9	13.8	30	10.1[2]	6.7	13.5
Other/ Multi-race	23	1.3[1c]	.8	1.8	24	11.5[2]	7.3	15.7	17	8.3[2]	4.6	12.0	17	8.3[2]	4.6	12.0

*4+ alcohol drinks per week

+Percentages of mothers in this column were calculated by using PRAMS survey weights.

1, 2 Different numerical superscripts indicate non-overlapping confidence intervals ***comparing CAPTA to each PRAMS subsample*** of mothers for each demographic characteristic, e.g., 5.2% (rate of white mothers in CAPTA) is significantly different from 20.0%, 11.1%, and 10.0% (rate of white mothers in each PRAMS subsample, respectively).

a, b, c Different alphabetical superscripts indicate non-overlapping confidence intervals across % of race/ethnicity category rates ***within the CAPTA dataset*** at $p < .05$, e.g. 5.2% (rate of white mothers in CAPTA) is significantly different from 10.3% (rate of Black mothers in CAPTA).

Table 3:

Percentage of Single vs. Polysubstance Use Among Each Substance Type by Data Source – Connecticut, March 15, 2019-December 31, 2019

	Mothers with Any Alcohol or Drug Use Reported in CAPTA (n = 1,592)				Mothers with Any Alcohol or Drug Use Self-Reported in PRAMS (n = 155)				Mothers with 4+ Alcohol*/Any Drug Use Self-Reported in PRAMS (n = 95)			
	N	%^	95% CI		N	%#	95% CI		N	%#	95% CI	
			LL	UL			LL	UL			LL	UL
Any substance	1592	6.1[1]	5.8	6.3	155	18.1[2]	14.9	21.4	95	10.7[3]	8.1	13.3
Single substance	1334	5.1[1]	4.8	5.3	140	17.2[2]	14.0	20.4	89	10.3[3]	7.7	12.9
Alcohol only	18	0.1[1]	0.0	0.1	64	8.1[2]	5.8	10.5	<5	--		
Cannabis only	1068	4.1	3.8	4.3	22	2.7	1.3	4.1	26	2.9	1.5	4.4
MOUD only	113	0.4	0.4	0.5	5	1.2	0.0	2.3	5	1.2	0.0	2.3
Non-MOUD opioid only	61	0.2[1]	0.2	0.3	46	4.9[2]	3.1	6.6	51	5.2[2]	3.5	7.0
Other illegal drug only	48	0.2	0.1	0.2	0	--			0	--		
Polysubstance	258	1.0[1]	0.9	1.1	15	1.0	0.5	1.5	6	0.3[2]	0.1	0.6
Alcohol	29	0.1[1]	0.1	0.2	10	0.7[2]	0.2	1.1	0	--		
Cannabis	160	0.6	0.5	0.7	7	0.4	0.1	0.7	<5	--		
MOUD	131	0.5	0.4	0.6	<5	--			<5	--		
Non-MOUD opioid	89	0.3	0.3	0.4	10	0.7	0.3	1.1	5	0.3	0.0	0.6
Other illegal drug	141	0.5	0.4	0.6	<5	--			<5	--		

*4+ alcohol drinks per week

^Percentages based on 26,297 mothers who gave birth during study timeframe.

#Percentages of mothers in this column were calculated by using PRAMS survey weights. PRAMS does not calculate percentages for counts below 5.

1, 2, 3 Different superscripts across row indicate non-overlapping confidence intervals across subsamples.