

# Evaluating the Effect of the Opioid Epidemic on Pregnant Women and Newborns in America

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## ABSTRACT

The opioid epidemic in America has emerged as a critical public health challenge, affecting various parts of the population. Among the vulnerable groups impacted, pregnant women and newborns bear a significant burden of the crisis. This literature review aims to evaluate the effects of the opioid epidemic on pregnant women and newborns in America, by investigating the prevalence of opioid use during pregnancy, existing healthcare interventions, and socioeconomic and psychological factors that play a role in this crisis. Adverse maternal outcomes, such as mortality and morbidity, and neonatal challenges, including Neonatal Abstinence Syndrome, are also examined. Based on the findings, the best strategies to combat these issues are improving access to treatment and support services, integrating mental health care with prenatal services, and enhancing medical education and training for healthcare providers involved in the care of pregnant opioid users. This study seeks to highlight the urgent need for collaborative efforts from policymakers, healthcare providers, community organizations, and the public to address the impact of the opioid epidemic on pregnant women and newborns effectively.

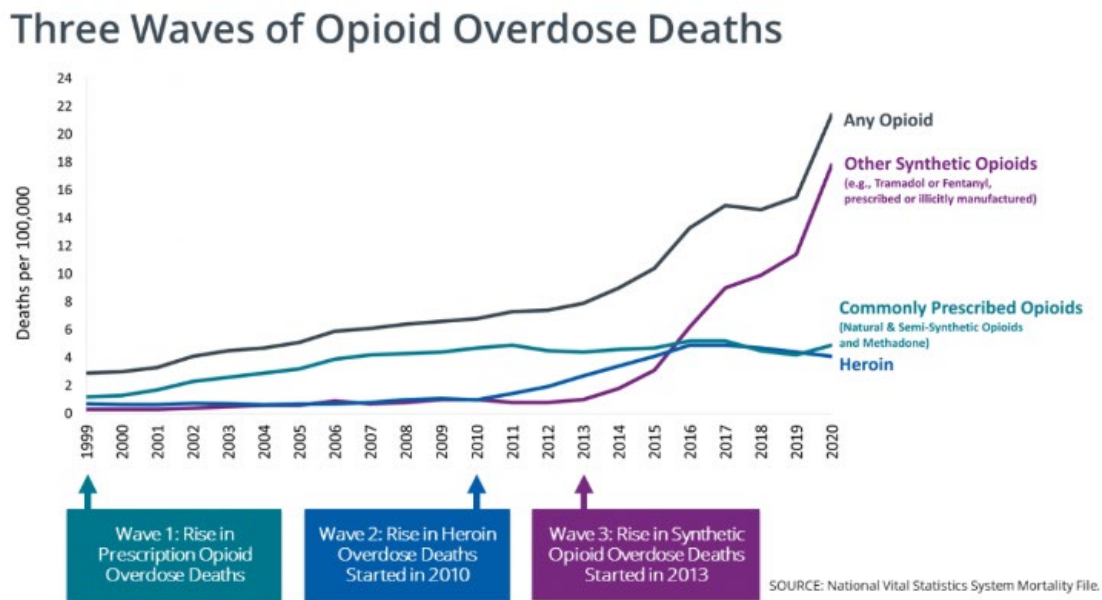
## **Introduction**

Over the past decades, the opioid epidemic has emerged as a severe, multifaceted public health crisis in the United States, affecting individuals from all walks of life. U.S. drug overdose deaths totaled 98268 in 2021, a 17.6% increase from 2020 and an all-time high for the nation and the world (Centers for Disease Control and Prevention 2022). However, one demographic has been impacted particularly heavily: pregnant women and their newborns. The abuse of opiates and opioids has many negative effects on these populations, leading to rising numbers of maternal and neonatal disorders, such as Neonatal Abstinence Syndrome and placental abruption. Likewise, the increasing prevalence of opioid use during pregnancy has raised concerns among healthcare professionals, policymakers, and the public. This study aims to evaluate the effect of the opioid epidemic on pregnant women and newborns in America, aiming to shed light on the extent of the problem, the underlying factors contributing to its persistence, and potential strategies to mitigate its impact on this vulnerable population.

## **Background on the Opioid Crisis**

The opioid epidemic in the United States has been seen in “waves”. Wave 1, having started in the 1990s, saw the growing abuse of natural and semi-synthetic opioid options like morphine, codeine, and oxycodone (Ciccarone, 2019). In just 10 years, deaths caused by these forms of opioids skyrocketed: 3,533 deaths in 1999 vs. 14,431 in 2009, a jump of 10898 deaths (Ghosh, 2020). It was caused by drastic overprescribing by medical professionals as well as aggressive marketing tactics by pharmaceutical companies. One example is Purdue Pharma, a company that pleaded guilty twice in 2007 and 2020, to federal criminal charges for drastically downplaying OxyContin’s addictive properties and for soliciting high-volume prescribers. Eventually, the misuse of natural opioids slowed in 2009, only for heroin to

become the new leading cause of overdose. This marked the beginning of Wave 2 which would grow to claim 15,469 lives in just 1 year at its peak. Three years later, Wave 3 began to be characterized by synthetic opioid-related deaths, particularly fentanyl and tramadol. The roots of this influx are drug traffickers spiking illicit drugs with fentanyl. Its high potency allows dealers to traffic smaller quantities but maintains the “high” that buyers expect. As a result, it became much more profitable to produce an ounce of fentanyl compared to an ounce of heroin. A fourth wave has been predicted due to the increasing use of cocaine and methamphetamine, yet opioids are still expected to be a burgeoning issue.



**Figure 1.** Three Waves of Opioid Overdose Deaths over the span of 1999 through 2020, from: *Centers for Disease Control and Prevention, 2022*

### Etiology of Opioid Use Disorder (OUD) and Addiction:

At its core, OUD is rooted in the pharmacological effects of opioids on the brain's reward system. Opioids, whether prescribed for pain management or obtained illicitly, bind to specific receptors in the brain, triggering a surge of dopamine, leading to intense feelings of satisfaction and euphoria. Repeated exposure to opioids can lead to neuroadaptive changes, gradually rewiring the brain's circuitry and fostering a compulsive desire to seek and use these substances (Kosten and George, 2002). Genetic factors also play a significant role in determining an individual's susceptibility to developing OUD. Some people may possess genetic variations that alter their sensitivity to opioid-induced reactions or increase their risk of becoming dependent on opioids. The list of impacted genes includes the mu-opioid receptor (OPRM1), the delta-opioid receptor (OPRD1), the dopamine D2 receptor (DRD2), and the brain-derived neurotrophic factor (BDNF) (Crist et al., 2019). To self-correct this deficit, they may turn to opioids, seeking an external source for these endorphins (Dydyk et al., 2023).

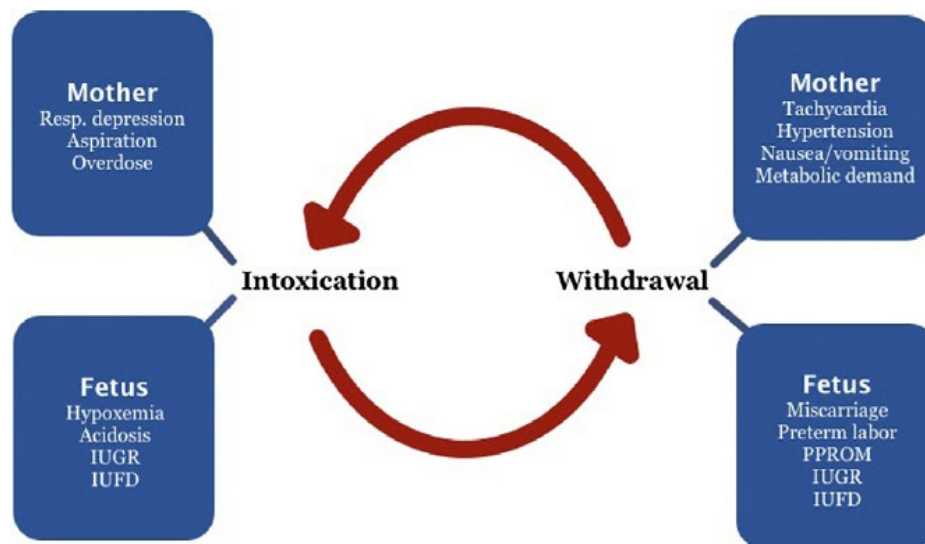
Environmental influences contribute to the development of OUD as well. Early exposure to opioids, whether through legitimate medical prescriptions or diversion, can increase the likelihood of future opioid misuse. According to the CDC, the use of prescribed opioid pain medication before high school graduation is associated with a 33% increase in the risk of later opioid misuse (Dowdell et al, 2016). Additionally, a history of trauma, adverse childhood experiences, and a lack of social support are known risk factors for OUD. Concerning opioid use, adverse experiences during childhood (e.g., parental substance use, emotional neglect, physical and sexual abuse) have been linked to opioid dependence (Afifi et al., 2012) and earlier age of injection drug use (IDU) initiation (Taplin et al., 2014).

Furthermore, co-occurring mental health disorders like depression, anxiety, or post-traumatic stress disorder often coexist with OUD, leading some individuals to self-medicate with opioids, further reinforcing the addictive cycle. In one study, among 102 patients with OUD, approximately 59.8% reported a prior mental health diagnosis, with 31 (30.3%) currently on medications for their diagnoses (Bakos-Block et al., 2020).

### Intersection of Drug Addiction and Pregnancy

During pregnancy, persistent untreated addiction is linked to various adverse outcomes, including inadequate prenatal care, heightened risks of fetal growth restriction, abruptio placentae, fetal death, and preterm labor. Furthermore, untreated addiction is associated with engaging in high-risk activities, such as involvement in prostitution, trading sex for drugs, and criminal behaviors. These risky behaviors subject women to the dangers of sexually transmitted infections (STIs), violence, and potential legal repercussions, such as the loss of child custody, criminal charges, or incarceration. (ACOG, 2021).

Among pregnant women registered in substance use treatment programs, over 30% exhibited positive screenings for moderate to severe depression, while more than 40% reported experiencing symptoms of postpartum depression (Holbrook & Kaltenbach, 2012) Furthermore, these women are at an elevated risk of using other substances, such as tobacco, marijuana, and cocaine. Poor nutrition is also prevalent among this group, and many of them face challenges with disrupted support systems, leading to increased social service needs.



**Figure 2.** Cyclical effects of opioid intoxication and withdrawal in pregnancy, from: *Young, Jessica & Martin, Peter. (2012). Treatment of Opioid Dependence in the Setting of Pregnancy. The Psychiatric clinics of North America*

### Methodology and Research Process

To begin my research, I conducted an extensive search of previously done studies using multiple databases, including PubMed and Google Scholar. The search was limited to articles published in English and between specific years (from 2000 to the present) to ensure the relevance and currency of the literature. The search terms and keywords used included "opioid use during pregnancy," "neonatal abstinence syndrome," "maternal health outcomes," and "effects of opioid epidemic". I had to include a clear definition of Opioid Use Disorder (OUD) in the context of pregnancy, as pregnant women might inadvertently abuse opioids before realizing their pregnancy status or continue using opioids properly obtained through prescriptions during gestation. In this review, OUD is a medical condition characterized by the problematic and persistent misuse of prescription opioids or the use of any illicit opioids (i.e., heroin, fentanyl,

oxycodone, etc.) during the 40-week course of pregnancy (American Psychiatric Association, 2022). After collecting the relevant articles, I extracted the needed data to gather key information from each study, including study objectives, participant characteristics, statistics, methodology, and main findings. This data then helped me highlight the prevalence of opioid use during pregnancy, the impact on maternal and neonatal health outcomes, and identify any demographic trends and geographic variations. It was also necessary to acquire knowledge about healthcare law surrounding the topic of maternal and neonatal care. I did this primarily using the American College of Obstetricians and Gynecologists (ACOG), Department of Health & Human Services, CDC, and Centers for Medicare and Medicaid Services. Lastly, I used articles from news sources like BBC and CNN to further correlate the findings and theories presented in past literature to current issues caused by the opioid epidemic in the current world.

## Literature Review

### Prevalence of Opioid Use among Pregnant Women

As mentioned before, opioid use among pregnant women in the United States has witnessed a concerning rise over the past few decades. Based on self-reported data from 2019, approximately 7% of women disclosed using prescription opioid pain relievers while pregnant. Among this group, one in five women admitted to misusing these prescription opioids, which, as defined by the survey, involved obtaining them from non-healthcare sources or using them for purposes other than pain relief (Ko et al., 2020). 21.2% also acknowledged engaging in the misuse of opioids, obtaining them from sources other than healthcare providers, or using them for non-pain-related reasons. Furthermore, 27.1% expressed a desire to reduce or discontinue opioid usage, while 31.9% reported not receiving counseling from healthcare providers regarding the potential impact of their opioid use on their infants.

### Maternal and Neonatal Health Outcomes

Maternal mortality rates are higher among pregnant women with opioid use disorders, primarily due to overdose and associated complications. From the years 2007 to 2016, opioid-related mortality during pregnancy increased by over 200%, and drug-overdose deaths made up 10% of all pregnancy-associated mortality in 2016 in the US. (Bryan et al., 2020) As for neonatal risks, the biggest is neonatal abstinence syndrome (NAS) which is a set of conditions arising when a baby experiences withdrawal from specific drugs they were exposed to in the womb before birth. Based on data from 2020, the incidence of NAS was approximately six cases per 1,000 newborn hospital stays in the United States. This translates to one baby being diagnosed with NAS every 24 minutes, amounting to over 59 newborns diagnosed daily. (HCUP, 2018)

### Existing Healthcare Interventions and Policies

Healthcare interventions and policies play a crucial role in managing opioid use disorders during pregnancy. Medication-Assisted Treatment (MAT) with methadone or buprenorphine is effective in reducing opioid use, improving maternal and neonatal outcomes, and reducing the severity of NAS (Winkelman et al., 2018). Federal regulations, such as the Drug Addiction Treatment Act of 2000, have also expanded access to buprenorphine by permitting qualified physicians to prescribe it for opioid use disorder during pregnancy. Prenatal screening and early detection of substance use disorders enable timely intervention and support for pregnant women struggling with opioid addiction. One such example is, the NIDA Quick Screen, to identify pregnant women who may be at risk for opioid use disorder (“Committee Opinion No. 524,” 2012). Federal and state governments have also expanded regulations to combat this issue:

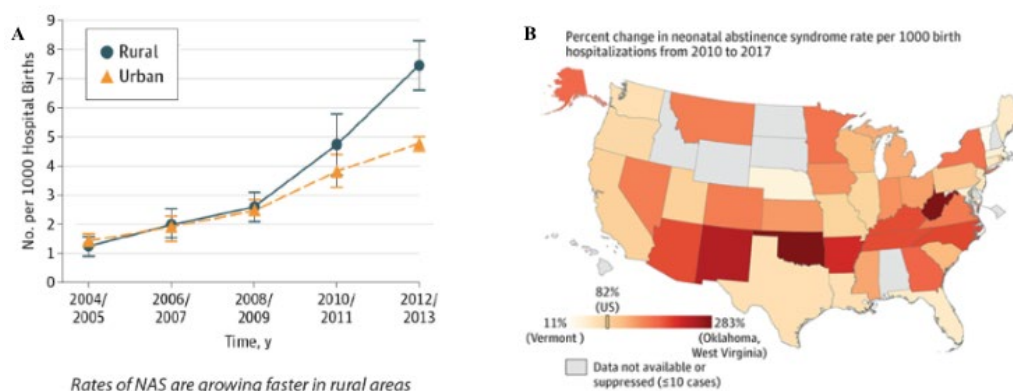
- a. **Federal Maternal Opioid Misuse (MOM) Model:** Introduced by the Centers for Medicare and Medicaid Services (CMS) this is a program that can help pregnant women who have Medicaid get treatment for opioid use disorder (OUD) during and after their pregnancy. It tests the effectiveness of integrated care models, where healthcare providers work collaboratively to address the complex needs of pregnant women with opioid use disorder (CMS Innovation Center, 2019).
- b. **The Protecting Our Infants Act (POIA):** Enacted in 2015, this act aimed to address the rise of NAS and improve maternal and infant outcomes related to opioid use during pregnancy. Under this legislation, the Department of Health, and Human Services (HHS) is mandated to assess its initiatives concerning prenatal opioid use, neonatal abstinence syndrome, and related areas, and devise a comprehensive strategy aimed at addressing gaps in research and overlap in programs (Botticelli, 2015).

## Discussion of Data

According to data from the Centers for Disease Control and Prevention (CDC), the prevalence of opioid use during pregnancy has seen a concerning increase over the past decade. From 1999 to 2014, the occurrence of OUD among pregnant individuals exhibited a significant surge, increasing over fourfold, from 1.5 to 6.5 cases per 1000 deliveries (Crawford et al., 2022).

### Demographics and Other Factors of OUD

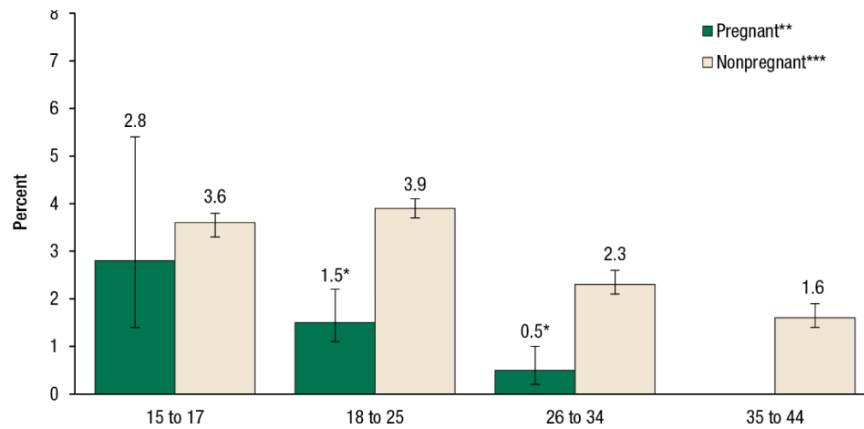
**Geographic Variations:** Differences in the prevalence of opioid use during pregnancy are evident across different states and regions in the United States. A study published in 2019 found that some states in the Appalachian region, including West Virginia, Kentucky, and Tennessee, experienced particularly high rates of opioid use among pregnant women (Schalkoff et al., 2020). In West Virginia, for instance, the rate of opioid use disorder during pregnancy reached a staggering 32.4 cases per 1,000 hospital births in 2019, far exceeding the national average. Conversely, states in the Midwest, such as Minnesota and Missouri, showed lower rates of opioid use disorder during pregnancy but still represented a significant public health concern. This is mainly because states with higher rates of poverty, unemployment, and lack of access to quality healthcare and social services (all qualities of rural areas), tend to experience higher rates of opioid use disorder during pregnancy.



**Figure 3.** NAS and OUD prevalence across different regions of America. As seen in 3A, rates of NAS have historically grown faster in rural areas, from: Villapiano NLG, Winkelman TNA, Kozhimannil KB, Davis MM, Patrick SW. *Rural and Urban Differences in Neonatal Abstinence Syndrome and Maternal Opioid Use, 2004 to 2013. JAMA Pediatrics.* In 3B, certain states show higher rates of NAS over a span of 7 years, from: Hirai AH, Ko JY, Owens PL, Stocks C, Patrick SW. *Neonatal Abstinence Syndrome and Maternal Opioid-Related Diagnoses in the US, 2010-2017. JAMA*

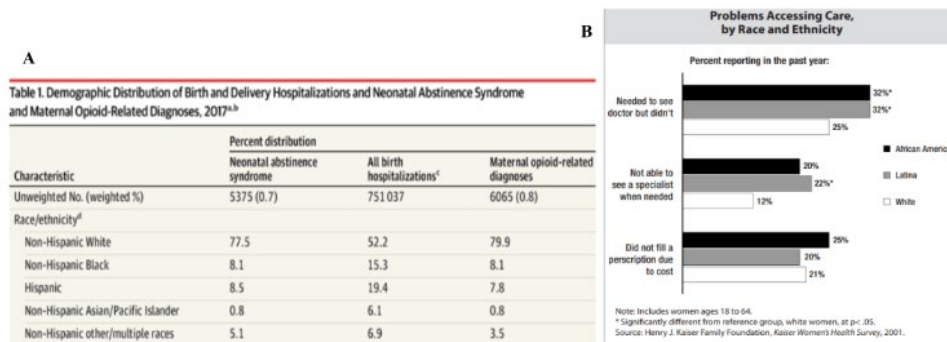


**Age and Gender:** Younger pregnant women are more susceptible to opioid use disorders during pregnancy. Aggregated data from the 2007 to 2012 NSDUHs reveals an average of approximately 21,000 pregnant women aged 15 to 44 misusing opioids within the past month. The highest percentage of pregnant women misusing opioids during this period was observed in the age group of 15 to 17 years, surpassing all other groups (Smith and Lipari, 2017). Gender also plays a role in opioid use disorder. While men are more likely to die from prescription overdose than women, overdoses related to opioids have increased in women compared to men; plus, women are twice as likely to be prescribed prescription opioids compared to men leading to higher risks of addiction (Serdarevic et al., 2017).



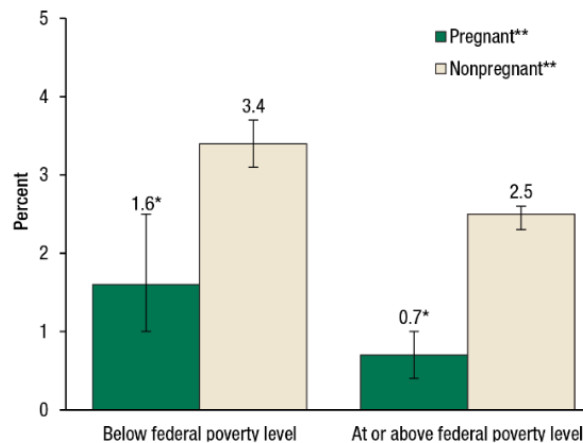
**Figure 4.** Past month opioid misuse among women aged 15 to 44, by pregnancy status and age: 2007 to 2012, from: SAMHSA, Center for Behavioral Health Statistics and Quality, National Surveys on Drug Use and Health (NSDUHs), 2007 to 2012

**Race and Ethnicity:** Research has shown that non-Hispanic white pregnant women have higher rates of opioid use disorders compared to other racial and ethnic groups. In 2019, the percentage of maternal opioid-related diagnoses made up of non-Hispanic white pregnant women was near 80%, meaning that in any 100 cases, 80 of them were of this ethnicity. On the other hand, rates among non-Hispanic Black and Hispanic pregnant women were 8.1% and 7.9%, respectively, with Asian women at 0.8%. (Hirai et al., 2021) One point to remember is that Black and Hispanic women have historically faced added barriers in accessing healthcare, which could impact their ability to seek treatment for opioid use disorders. A quarter (24%) of Latina women have not had a physician visit, compared to 14% of African American and 11% of white women (Kaiser Family Foundation, 2004). Consequently, pregnant women from these ethnic groups may have limited opportunities to receive appropriate care for opioid use disorders, resulting in lower reported rates.



**Figure 5.** Racial disparities in maternal OUD rates, NAS rates, and healthcare access. As seen in 5A, NAS and OUD are most prevalent in Non-Hispanic White women, from: Hirai AH, Ko JY, Owens PL, Stocks C, Patrick SW. Neonatal Abstinence Syndrome and Maternal Opioid-Related Diagnoses in the US, 2010-201. JAMA. In 5B, Black and Latina women have had more problems accessing care than White women, from: Kaiser Family Foundation, 2004

**Socioeconomic Status:** The opioid epidemic disproportionately affects individuals from lower socioeconomic backgrounds. For example, West Virginia had an increase of 283% in NAS hospitalizations from 2010 to 2017 (Hirai et al., 2021). In this state, there is also an abnormally high poverty rate of 17.07%, the fourth highest in the nation (World Population Review, 2023). Furthermore, 77.1% of maternal opioid-related diagnoses are paid for by Medicaid, where the qualifications are determined by annual family income: \$14,580 for a single adult person, \$30,000 for a family of four, and \$50,560 for a family of eight. This shows a clear trend in the data, where women who fall under the poverty level are automatically more at-risk for OUD and opioid addiction while pregnant.



**Figure 6.** Past month opioid misuse among women aged 15 to 44, by pregnancy status and federal poverty level: 2007 to 2012, from: SAMHSA, *Center for Behavioral Health Statistics and Quality, National Surveys on Drug Use and Health (NSDUHs), 2007 to 2012*

**Stigma:** Stigma and discrimination against pregnant women with substance use disorders also deter them from seeking appropriate medical care, resulting in delayed or inadequate treatment (Cleveland et al., 2016). In 2013, Alabama became the second state to permit the charging of pregnant women using drugs with criminal child abuse. This decision was reached when the Supreme Court of Alabama ruled that a viable fetus should be considered a "child" within the context of the state's criminal statute, which addresses the endangerment of a child through chemical substances. More recently, in April 2014, Tennessee explicitly criminalized drug use during pregnancy through the enactment of SB1391, which former Governor Bill Haslam passed into law. This amended Tennessee's fetal homicide law to allow women to be prosecuted for the use of narcotics while pregnant. The law allows women to be charged with aggravated assault, which carries a penalty of up to 15 years in prison (Murphy, 2014). By enforcing such drastic measures, we are stopping pregnant women suffering from opioid use disorder from finding proper rehabilitation, and instead allowing the cycle of drug abuse to continue.

## Strategies for Mitigation

### Improving Access to Treatment

One of the most significant factors that are causing the rise of OUD prevalence in pregnant women is a lack of access to rehabilitation treatments and opioid withdrawal support services. The two biggest barriers to this care are geography and income level, and it is important to keep in mind that most pregnant women with OUD are from low-income backgrounds and live in rural areas. Creating dedicated clinics that focus on providing comprehensive care for pregnant women with opioid use disorder is one way we can combat this issue. These clinics can offer prenatal care, addiction treatment, mental health support, and neonatal care under one roof, ensuring a holistic approach to managing

patients' health. Implementing telemedicine and teletherapy programs to reach pregnant women in rural or underserved areas is another approach. Considering the growing popularity of this technology after the COVID-19 pandemic, it can facilitate access to healthcare providers, addiction specialists, and mental health professionals, thereby increasing the availability of support services for pregnant women struggling with opioid use.

### Integrating Mental Health Care with Prenatal Services

This is what a basic prenatal checkup routine with an OB/GYN looks like. During the first prenatal visit, the provider will confirm pregnancy, record vital signs, review family and medical history, perform a physical and pelvic exam, conduct tests for cervical cancer and infections, and check blood for Rh factors. Later visits will involve tracking weight gain, blood pressure, belly measurement, and conducting ultrasounds. Throughout the pregnancy, additional tests will also be done for conditions like Down syndrome, spina bifida, gestational diabetes, and Group B strep based on individual medical history (NICHD, 2017). Yes, the physical health checkup might give normal results, but what about the patient's mental health? The key to fighting opioid use during pregnancy is incorporating routine mental health screening into prenatal care visits to identify and address any mental health challenges early on since it is a significant risk factor for addiction.

Furthermore, some health professionals may not have had proper training in managing OUD in pregnant patients in a thorough and empathetic manner. One participant in a 2022 study, described how she perceived her doctor as ill-informed about evidence-based care specific to individuals with OUD, "My doctor that delivered the baby, she didn't know anything about Suboxone, and she was very iffy. And the doctor that was giving the Suboxone didn't know anything about pregnancy either... when I had the child, the Fentanyl that they gave me didn't work because I couldn't get off the Suboxone ... I just felt like no one knew what they were doing." (Crawford et al., 2016). We can see that it is necessary to educate healthcare providers on recognizing mental health issues during pregnancy with an emphasis on the importance of sensitivity, so every patient can get proper quality of care.

### Public Health Awareness and Prevention Campaigns

Ensuring that women are aware of the risks concerning opioid use and have access to resources to get help, is one of the best ways to combat the increasing OUD rates among this demographic. Developing and disseminating easily accessible resources is essential to provide accurate and up-to-date information to those affected by opioid use disorder during pregnancy. Creating brochures, pamphlets, and websites that are available in multiple languages ensures that the information reaches diverse populations. Additionally, establishing toll-free hotlines staffed by trained professionals can offer immediate assistance and support to pregnant women seeking help or concerned family members.

Since, statistically, young women between the ages of 15 and 17 have had the highest rates of opioid use while pregnant, incorporating opioid and substance use education into school curricula will have a positive long-term impact. Educational programs can be tailored to different age groups to increase awareness about the risks of drug use and emphasize the importance of making healthy choices. These types of programs have already worked, as shown by a study from the American Addiction Centers where approximately 47% of respondents indicated that their drug education instilled a strong desire to completely avoid drugs, while 35% expressed that it "somewhat" influenced them to avoid drugs (Sengmany, 2023). By targeting young individuals, these programs aim to prevent substance use disorders from developing and empower future generations to make informed decisions about their health.



## Gaps and Future Potential in Research

### Lack of Longitudinal Studies

Many studies and past literature concerning the topic of the opioid epidemic and pregnant women and newborns have been cross-sectional, providing snapshots of the issue. In simple terms, cross-sectional studies interview a fresh sample of people each time they are carried out, whereas longitudinal studies involve the collection of data from the same participants over an extended period, allowing researchers to observe changes and outcomes over time (Caruana, 2015). Unfortunately, such studies have been scarce in this area, which hinders a comprehensive understanding of the long-term consequences of opioid use during pregnancy. This could be due to high attrition rates, meaning that participants may drop out of the study before its completion. Pregnant women with OUD may especially face challenges with this, due to legal involvement, child custody issues, or relapse.

### Ethical Standards in Opioid Use Research

Conducting research within subject populations facing active and ongoing drug addictions presents distinct ethical considerations and challenges. Sponsors, researchers, and institutional review board members must have a comprehensive understanding of these unique ethical and medical complexities while devising, evaluating, and implementing research plans involving this demographic. This includes informed consent and the decision-making capacity of research participants, appropriate compensation to avoid undue inducement, potential threats to the voluntary nature of participation due to limited access to drug treatment programs, and ensuring that participants are fully informed about enduring risks, such as an elevated risk of overdose following research-required drug abstinence (Anderson and McNair, 2018). For informed consent to be considered valid, potential participants must possess the competence to make decisions independently. Additionally, researchers must present crucial information clearly and understandably, and potential participants must grasp this information and willingly choose to participate. The decision-making capacity (DMC) of individuals who abuse opioids has been subject to scrutiny due to the immediate effects of intoxication and withdrawal, as well as the potential cognitive implications of prolonged drug use. Furthermore, as seen in demographics data, many opioid users also suffer from mental health disorders that also complicate their DMC.

### Areas for Future Research

While my study provides valuable insights into the impact of the opioid epidemic on pregnant women and newborns, there are still several areas that require further investigation. Future research efforts should focus on understanding the long-term implications of prenatal opioid exposure on the neurodevelopment of children. This could be done by performing longitudinal studies over a set of infants with NAS over a certain span of years, etc. Additionally, studies exploring the effectiveness of emerging technologies, such as telemedicine and mobile health applications, in supporting pregnant women with OUD and improving treatment accessibility would be beneficial in refining existing practices. There also needs to be more research done on the genetic factors that play into OUD, so we can learn how to best combat this issue at its root.

## Conclusion

Through this literature review, I examined the effect of the opioid epidemic on pregnant women and newborns in America, and it revealed the prevalence of opioid use among pregnant women remains a concerning issue, with geographic disparities and certain demographic groups being disproportionately affected. Maternal health outcomes have

also shown an increased risk of mortality and morbidity, while newborns exposed to opioids in utero are at a higher risk of developing Neonatal Abstinence Syndrome and facing long-term neurodevelopmental challenges.

The implications of my findings underscore the urgency of reforming practice and policy to address the opioid epidemic's impact on pregnant women and newborns. Legislators and healthcare professionals should prioritize mental health integration to improve access to prenatal care and addiction treatment services for pregnant women struggling with OUD. Moreover, it is imperative to ensure that physicians receive training to provide consistent, evidence-based care for affected mothers and newborns, to reduce stigma and misconceptions surrounding opioid use during pregnancy.

Right now, collective action is necessary to confront this crisis effectively, and all of us, from healthcare workers and policymakers to the public, must work together to find and implement solutions to this ever-evolving problem.

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