

The Relationship Between Socioeconomic Status and Opioid Usage During Pregnancy in the United States

Mahshid A. Karimi^{1*}, Brittany A. Kemp^{1*}, Esosa E. Kest^{1*}, and Anna P. Kleopoulos^{1*}

¹Geisinger Commonwealth School of Medicine, Scranton, PA 18509

*Master of Biomedical Sciences Program

Correspondence: akarimi314@gmail.com, britkemp9@gmail.com, esosakest@gmail.com, annakleop@gmail.com

Abstract

Opioid usage in the United States (U.S.) is an intensifying issue. There is limited research on the effects of opioid use in pregnant individuals. Opioids are commonly prescribed to treat moderate to severe pain, but many individuals misuse opioids due to their addictive euphoric nature. Common opioids include fentanyl and heroin as well as prescription opioids such as oxycodone and hydrocodone. Side effects of opioid use include shallow breathing, slurred speech, nausea, and constipation. Opioids produce similar effects to morphine, a powerful and highly addictive prescription narcotic administered for pain relief. Many negative effects arise when opioids are misused. Opioid use during pregnancy can cause problems to the mother and neonate that include maternal death, premature births, neonatal abstinence syndrome, and neonatal deaths. Lower-income individuals are more likely to misuse opioids than the general U.S. population. We examined the relationship between opioid usage and poverty level during pregnancy in the U.S. on individuals 12–44 years of age using data from the 2019 National Survey on Drug Use and Health. A chi-square test was used to determine whether there was a statistically significant difference in opioid usage between income groups. Our findings demonstrate that opioid misuse during pregnancy is related to poverty level, and that women in 200%+ poverty levels are less likely to misuse opioids when compared with those in 100% poverty level. The findings from this study indicate the need for better prevention measures before and during pregnancy to decrease the misuse of opioids during pregnancy in individuals living at the federal poverty level to create better health outcomes for mothers and their neonates.

Introduction

Opioid use is at an all-time high in the United States (U.S.); 3 million U.S. citizens currently have an opioid use disorder (OUD) (1). Opioid use during pregnancy is a growing problem in society. According to 2019 self-reported data, 7% of women reported using opioids during pregnancy (2). Of the women who self-reported, 1 in 5 reported that they abused opioids (3). An increase in prescribing opioid medications has led to an increase in misuse since opioids are highly addictive. Opioid usage impacts both neonatal and maternal health outcomes. The use of opioids by the mother may lead to stillbirth, specific birth defects, neonatal abstinence syndrome (NAS), or poor fetal growth (4). NAS occurs when newborns experience withdrawal from the opioids that they were exposed to while in the womb (2). The short-term withdrawal signs in the newborn include seizures, sleep problems, irritability, tremors, hyperactive reflexes, vomiting, and loose stool (5). Infants that were exposed to opioids during gestation are more prone to birth defects (5). These infants may also be born prior to full term (6). The

chances of these babies being re-hospitalized within 30 days of being born are heightened (5). There are also long-term developmental effects that occur to babies exposed to opioids during gestation. These developmental effects include speech delays or language disability. Centers for Disease Control and Prevention (CDC) research has found an increase in withdrawal symptoms of babies with opioid-related diagnoses. Over the time period from 2010 to 2017, withdrawal symptoms in babies born to mothers that used opioids during pregnancy increased by 82% (7).

The American College of Obstetricians and Gynecologists (ACOG) recommendations indicate a multidisciplinary approach with no criminal sanctions in assisting women and infants through the pregnancy opioid crisis (8). However, this may be inadequate based on the recent rapid rise in cases. Previous literature reviews have identified two potential contributors to the growing rate of opioid use in pregnant women aged 12–44: gaps in knowledge and the application of non-pharmaceutical methods for management (6). Addressing the social, behavioral, and cognitive requirements of pregnant women with OUD could be an important component of an appropriate strategy for closing the gap and reducing harmful effects on mothers and their children. (6). Current screening methods for opioid use in pregnant women could be underestimating the actual usage rates, making the OUD problem seem less prevalent in communities that are suffering (9). There is a need for more evidence to support guidelines of substance use disorder management, as it is the most effective treatment and screening in women of reproductive age (9). Our research aims to establish an association between opioid use and poverty status by measuring the demand for action in the enhancement over overall health of disadvantaged pregnant women ages 12–44 in the U.S. Women who are at highest risk will be more readily identified, benefiting the mother and fetus. Women are unlikely to honestly report opioid use during pregnancy to physicians, so while self-reported data is unreliable, it could be more accurate. Several years of data from the NSDUH have been used in the observation of opioid abuse and treatment options. Results were used in an analysis of trends in opioid use during pregnancy between 2006 and 2014 (8). As advised by the ACOG, there needs to be more evaluation of negative outcomes of opioid usage during pregnancy (8).

Emerging data suggests that there has been an increase in opioid usage during pregnancy (3). A review in 2018 identified that 7.5% of pregnancies were associated with significant opioid misuse (10). This was derived from a data set that included 11,656 deliveries among 9,690 unique women (10). ACOG illustrated the dramatic escalation of OUD during pregnancy, paralleling the pandemic through definition and the subsequent role of OB-GYN and other obstetric care providers. They

shared an evaluation regarding the safety of opioid use during pregnancy in women across all racial, ethnic, and socioeconomic groups, and the importance of screening for substance use as part of primary comprehensive care. ACOG concluded and recommended universal screening and demanded for differentiation between opioid use in the context of medical care, opioid misuse, and untreated OUD with an emphasis on NAS (8). However, in a more recent study, it was suggested that the current screening for opioid usage in pregnant women could be underestimating the actual usage rates (9). Despite this, another study in 2014 found a substantial increase in both NAS and maternal OUD (11). Across all of these findings, it was demonstrated that opioid-using pregnant women were more likely to experience higher rates of depression, anxiety, and other chronic medical conditions (4). Usage of opioids was also correlated to increased chances of threatened preterm labor, early-onset delivery, poor fetal growth, and stillbirth (12). Many gaps exist within knowledge, application of non-pharmaceutical methods for management, and data collection, which has led to inconclusive evidence regarding opioid use in pregnant women (4). Our study seeks to examine the impact of poverty level on opioid use for pregnant women in the U.S. This would allow us to elucidate the importance of continued knowledge regarding overall health outcomes within our given population set. These findings could shed light on socioeconomic groups of pregnant individuals at increased risk of OUD, and thus at increased need of screening and treatment during pregnancy and postpartum.

Methods

Study design and participants

We examined data from the 2019 NSDUH (13). This survey is conducted yearly in all 50 U.S. states as well as the District of Columbia to provide information on health-related issues in the U.S. including drug use (13). NSDUH data was acquired for all participants and then separated into pregnant and non-pregnant individuals between the ages of 12–44 years across the U.S. Our inclusion criteria required women who were pregnant and between the ages 12–44 years. Males, transgender individuals, females outside of the 12- to 44-year-old age range, and non-pregnant individuals were excluded. Opioid usage among the participants was stratified based on poverty level. We examined the measured rates of occurrence of opioid use by pregnant women ages 12–44 years and compared opioid usage of pregnant women at different poverty levels. The three poverty levels were categorized as income at the federal poverty level (100%), income up to two times the federal poverty level (100–200%), or income greater than two times the federal poverty level (200%+). The exposure was measured as poverty level and the outcome was determined as opioid use.

Statistical analysis

Chi-square tests of homogeneity were performed using IBM Statistical Package for Social Sciences Statistics version 28.0.0.0 for Windows 10. These tests were performed to determine statistically significant differences between the three poverty level groups. Statistical differences were reported if p was < 0.05 . The chi-square test is advantageous to use because it makes no assumptions about the population distribution and is best used for large datasets.

Results

Of the 56,136 survey participants, there were a total of 649 pregnant women, and 33 of them had used opioids within the past month (5.08%). An estimated 1 out of 20 pregnant women admitted to opioid misuse. Table 1 shows opioid usage by poverty levels with usage expressed based on the total number of pregnant women. Opioid misuse occurred in 12 (8.2%) of 146 pregnant women at 100% poverty level, 9 (5.1%) of 176 pregnant women at 100–200%, and 12 (3.7%) of 327 pregnant women at 200%+ poverty level. Those at 100% poverty level were 1.6 and 2.2 times more likely to use opioids than those at 100–200 and 200%+ levels respectively. Comparatively, those at $\geq 200\%$ poverty level were 55% less likely to use opioids than those at $\leq 200\%$ poverty level. Figure 1 shows the percentage distribution of participants that misused opioids among the different poverty levels.

We used 2-by-2 chi-square tests of homogeneity ($\alpha=0.05$) to determine whether there was a difference between the 100% and 100–200% groups, the 100–200% and 200%+ groups, and the 100% and 200%+ groups. Comparison between the 100% and 200%+ groups resulted in a statistically significant difference (4.337, 0.037). Thus, our analysis showed that opioid misuse during pregnancy is related to poverty level and that women in 200%+ poverty levels are less likely to misuse opioids compared with those at 100% poverty level.

Poverty level	No opioid misuse	Opioid misuse
100%	134 (91.8%)	12 (8.2%)
100-200%	167 (94.9%)	9 (5.1%)
200%+	315 (96.3%)	12 (3.7%)

Table 1. Opioid usage by poverty level for pregnant individuals

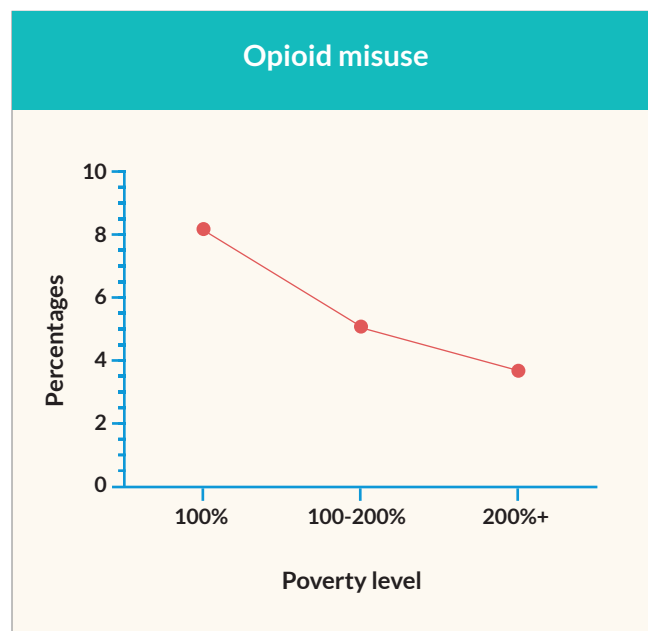


Figure 1. Percentage distribution of participants that used opioids

Discussion

Our study provides insight into the relationship between poverty and opioid use in pregnancy. We noted a trend for decreasing use with individuals whose income was farther above the federal poverty level and a statistically significant difference between women at 100% and 200%+ poverty levels.

Poverty and OUDs can each profoundly impact health outcomes concerning the pregnant mother and child: together they create a much greater detrimental effect. Poverty alone during pregnancy can affect women's ability to receive proper nutrition and access to social and other resources to promote her health and well-being, therefore, creating "exposure to stressful conditions with fewer resources to cope" (14). This high-level stress occurs when there is exposure to an overwhelming situation that exceeds the individual's ability to cope (15). This may partly explain the relationship between poverty during pregnancy and opioid use.

Addressing the opioid crisis should include addressing poverty in pregnancy. Providing support systems that include housing, food, community outreach, reproductive services, mentoring programs, counseling, and referral to health services can help break this cycle. This should also include referral and connections with medication-assisted treatment and rehabilitative programs that promote a better understanding of underlying behavior (16).

The screening methods used by the 2019 NSDUH survey may have underestimated the actual opioid usage rates in pregnant women. We recommend empowering communities with the development of easy-to-use validated assessment tools that target vulnerable women living in poverty to break the trend. This should be followed by a referral for services. Additionally, newborns and children carry the burden of pregnant women's addiction. We also propose that early intervention services be implemented and directed at newborns to optimize their growth and development.

Our study was limited by how the data was organized by the survey. The data could have been separated in the initial survey by only "below" and "above" poverty level, thus separating the 100–200% group into the 100% (below) and 200% (above). Another limitation is that the data source relied on self-reporting opioid use. This may indicate the report was underestimated and could have included sampling bias. Sampling neighborhoods based on socioeconomic status could have provided a more accurate picture. Therefore, more research is needed in areas that address multiple contributing factors which lead to the continuing cycle of drug use among pregnant women to strengthen existing programs.

Opioid use during pregnancy carries a high price tag such as maternal deaths, fetal deaths, prematurity, and poor growth and development in the child. Strategic programs aimed at breaking the cycle will better protect mothers and potentially save the lives of more babies. Our study could lead to mandatory screenings, the development of new campaigns to indicate the prevalence of the OUD in pregnant women and show the demand for action on this public health concern. New programs of intervention, feedback, advice, and referral to treatment have the potential to improve maternal and fetal outcomes (8).

Conclusion

We examined the relationship between socioeconomic status, as defined by poverty level, and opioid misuse in pregnant women aged 12–44 in the U.S. We determined that there was a statistically significant correlation between socioeconomic status and opioid misuse among pregnant women at 100% and 200%+ poverty levels. This finding demonstrates the need to create tailored solutions aimed at eliminating or reducing poverty during pregnancy as well as providing resources for maternal and fetal wellbeing. Future research could focus on comparing various areas stratified by socioeconomic status. Our findings suggest that more primary prevention, evidence-based treatment, recovery support, and harm reduction is necessary for pregnant women, specifically in areas where residents live at or below the federal poverty level.

Acknowledgments

We would like to express our gratitude to our faculty member mentor Dr. Brian Piper. We would also like to express our acknowledgments to Lauren Stuart and Catherine Klein for contributing to the initial versions of our paper.

Disclosure

The authors declare that there were no relevant or material financial interests that relate to the research described in this paper. There were no conflicts of interest.

References

1. Ecker J, Abuhamad A, Hill W, Bailit J, Bateman BT, Berghella V, et al. Substance use disorders in pregnancy: Clinical, ethical, and research imperatives of the opioid epidemic: a report of a joint workshop of the Society for Maternal-Fetal Medicine, American College of Obstetricians and Gynecologists, and American Society of Addiction Medicine. *Am J Obstet Gynecol*. 2019;221(1):B5–28.
2. Terplan M. Opioid use, misuse, and addiction in pregnancy and postpartum. *Protocols for high-risk pregnancies. An evidence-based approach*. 2020:15–20.
3. Hensley L, Sulo S, Kozmic S, Parilla BV. Opioid addiction in pregnancy: Does depression negatively impact adherence with prenatal care? *J Addict Med*. 2018;12(1):61–4.
4. Whiteman VE, Salemi JL, Mogos MF, Cain MA, Aliyu MH, Salihu HM. Maternal opioid drug use during pregnancy and its impact on perinatal morbidity, mortality, and the costs of medical care in the United States. *J Pregnancy*. 2014;2014:906723.
5. Zaoutis LB, Chiang VW, Hoffman RJ, Sharma AN. *Comprehensive Pediatric Hospital Medicine*. Elsevier. 2007:1140–3.
6. Tobon AL, Habecker E, Forray A. Opioid Use in Pregnancy. *Curr Psychiatry Rep*. 2019;21(12):118–28.
7. Keough L, Fantasia HC. Pharmacologic Treatment of Opioid Addiction During Pregnancy. *Nurs Womens Health*. 2017;21(34–44).

8. Opioid Use and Opioid Use Disorder in Pregnancy. [Available from: <https://www.acog.org/clinical/clinical-guidance/committee-opinion/articles/2017/08/opioid-use-and-opioid-use-disorder-in-pregnancy>]
9. Rausgaard NLK, Ibsen IO, Jørgensen JS, Lamont RF, Ravn P. Management and monitoring of opioid use in pregnancy. *Acta Obstet Gynecol Scand*. 2020;99(1):7–15.
10. Elliott TE, Frail CK, Pawloski PA, Thomas AJ, Werner AM, Rossom RC. Opioid use during pregnancy, observations of opioid use, and secular trend from 2006 to 2014 at HealthPartners medical group. *Clin J Pain*. 2018;34(8):707–12.
11. Hirai AH, Ko JY, Owens PL, Stocks C, Patrick SW. Neonatal abstinence syndrome and maternal opioid-related diagnoses in the US, 2010-2017. *JAMA*. 2021;325(2):146–55.
12. Wei R, Curtin LR, Arias E, Anderson RN. U.S. decennial life tables for 1999-2001: Methodology of the United States life tables. *Natl Vital Stat Rep*. 2008;57(4):1–9.
13. National survey on drug use and health 2019. [Available from: <https://www.datafiles.samhsa.gov/dataset/national-survey-drug-use-and-health-2019-nsduh-2019-ds0001>]
14. Braveman P, Marchi K, Egerter S, Kim S, Metzler M, Stancil T, et al. Poverty, near-poverty, and hardship around the time of pregnancy. *Matern Child Health J*. 2010;14(1):20–35.
15. MacLean RR, Armstrong JL, Sofuoglu M. Stress and opioid use disorder: A systematic review. *Addict Behav*. 2019;98:106010.
16. Ghertner R, Groves L. The opioid crisis and economic opportunity: Geographic and economic trends. [Available from: <https://aspe.hhs.gov/sites/default/files/private/pdf/259261/ASPEEconomicOpportunityOpioidCrisis.pdf>]