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Role of Pregnancy Intention and Substance Use in Postpartum Depression Among Black Women

Asaye Birhanu Mekonnen
Walden University

Walden University

College of Health Sciences and Public Policy

This is to certify that the doctoral dissertation by

Asaye Mekonnen

has been found to be complete and satisfactory in all respects,
and that any and all revisions required by
the review committee have been made.

Review Committee
Dr. Loretta Shields, Committee Chairperson, Public Health Faculty
Dr. James Rohrer, Committee Member, Public Health Faculty

Chief Academic Officer and Provost
Sue Subocz, Ph.D.

Walden University
2024

Abstract

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by

Asaye Mekonnen

MSc, Addis Ababa University, 2008

BSc, Jimma University, 2004

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

Doctor of Philosophy

Public Health

Walden University

May 2024

Abstract

Despite increased access to pregnancy-related care in the United States, racial disparities have remained involving preconception, prenatal, and postpartum services. Research is lacking regarding how pregnancy intention and substance use are associated with postpartum depression (PPD) in Black women. The purpose of this quantitative study was to describe these associations in this population. The social ecological model grounded the study. To address research questions, Phase 8 (2016-2020) data from the Pregnancy Risk Assessment Monitoring System (PRAMS) were used. This included data for 206,080 mothers. Among those who disclosed racial information, 42,797 (21.2%) were Black. Variables included age, race, educational level, family income, marital status, depression history, healthcare visits, intention to become pregnant, prenatal care visits, cigarette and alcohol use, survival of the baby, and presence of PPD symptoms. Bivariate crosstab and multiple logistic regression analyses were used to examine relationships. 52.7% of Black mothers reported PPD. Rates of substance use (71.5%) and unintended pregnancy (61%) were high. A strong and statistically significant association was found between depression history and PPD as well living status of the baby and PPD. Associations were found between PPD and pregnancy intention ($p < .001$) and PPD and substance use in the last 2 years ($p < .001$). Implications for social change include strengthening of programs targeting ethnic minorities to improve identification of social determinants of health that have negative impacts on maternal health and eliminate existing racial disparities. Targeted health promotion and education is recommended for mothers whose baby is not alive or those mothers with a history of depression.

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Dedication

I express my gratitude to the almighty God for making this achievement possible.

I dedicate this to my late father, Birhanu Mekonnen (Abaye), whose actions set a standard for me, instilling in me the belief in myself and the drive to reach my full potential. Abaye, I wish you could witness this moment. You are deeply missed, and your legacy lives on in me.

My mom Dinkayehu Temsgen (Etalem), who devoted her entire life to nurturing me and my siblings towards success.

My beloved wife, Hiwot, I am profoundly grateful for your unwavering understanding, encouragement, and support in realizing my lifelong aspiration. Words cannot adequately express my gratitude. I love you dearly.

My children, Mary, Amron, and Aaron, whom I had to spend time away from during this journey, I am grateful for your patience and understanding. Though it was challenging to be apart from you, your love and support propelled me forward. You have been instrumental in helping me achieve my dreams, and I hope this accomplishment serves as a testament to the importance of perseverance and determination in pursuing one's goals. Thank you for being my inspiration.

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Last but certainly not least, I wish to express my sincere thanks to the PRAMS Working Group and the Centers for Disease Control and Prevention (CDC) for granting me access to the PRAMS dataset. Additionally, I extend my gratitude to the study participants who contributed to this research endeavor.

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Chapter 1: Introduction to the Study

Mothers play a fundamental role in the health and quality of life of their children. A healthy pregnancy is one of the best ways to promote a healthy birth. Mothers often achieve healthy pregnancies through advanced pregnancy planning, cultivation of healthy habits, and use of spacing to allow their bodies to recover fully from pregnancy and childbirth (National Institute of Child Health and Human Development, 2019). Maternal health before, during, and after pregnancy is critical to a mother's physical and mental wellbeing. A mother's health is also important because it influences her ability to provide love and proper care to her newborn child at birth and in the years after (World Health Organization, 2022). A variety of factors can affect pregnancy-related maternal health; such factors can put the health of a mother and her baby at risk. Obtaining preconception care, choosing a healthy lifestyle and healthy behavior before and throughout pregnancy, and planning before and between pregnancies are essential to the health of mothers and their babies (Centers for Disease Control and Prevention [CDC], 2022a).

Chapter 1 begins with background information and an introduction to the main problem and gaps in existing literature . The chapter also includes the purpose of the study as well as research questions and hypotheses. The conceptual framework and nature of the study, as well as definitions of terms, are also addressed in the chapter. The chapter continues with a description of the study's assumptions, scope and delimitations, limitations, and significance and concludes with a summary that highlights the main points of the chapter and leads to the literature review in Chapter 2.

Background

Unintended pregnancy is associated with an increased risk of problems for mothers and their babies. Increased risk derives from delays involving obtaining prenatal care and making healthy lifestyle and behavioral choices (CDC, 2022a). In the United States (U.S.), the number of unintended pregnancies has remained high, particularly among adolescents and young adults, those with low incomes, those with low levels of education, and Blacks (CDC, 2021). Inconsistent and ineffective use of contraception has been the main reason for unintended pregnancies in the U.S. (CDC, 2021).

A relationship exists between unintended pregnancy and poor mental health outcomes. Unwanted and mistimed pregnancies are associated with depression and can adversely affect mothers and their unborn children. Postpartum depression (PPD) can similarly cause adverse outcomes for children, women, and families (Robbins et al., 2021). PPD can negatively affect the ability and availability of women to adequately care for their children, which in turn hurts mother-infant interactions, children's growth, and breastfeeding (Mughal et al., 2022). Furthermore, children of depressed mothers tend to establish insecure attachment bonds and are at heightened risk of developing social difficulties with peers (Smorti et al., 2019).

Prenatal substance use has remained a significant public health problem and poses substantial health risks for developing fetuses. Such substance use is also associated with poor maternal mental health, maternal health behavior, and birth outcomes. Substance use during early pregnancy is associated with having unintended pregnancies (Young-Wolff et al., 2022). Prenatal substance use is also associated with increased PPD (Nidey et al.,

2022). Research is lacking regarding the role of pregnancy intention and substance use in PPD among Black women.

Problem Statement

In the U.S., PPD has been one of the most common nonobstetric complications that can have a series of unfavorable effects on maternal health and child development outcomes (Smorti et al., 2019; Webber & Benedict, 2019). Ethnic differences have persisted with regard to PPD, with greatest risks occurring among Black women. Lack of access to quality care or health coverage, low income, low education level, exposure to trauma, high-stress living environments, and food insecurity are among the common social factors that can place Black women at increased risk for PPD (Cannon & Nasrallah, 2019). Ko et al. (2015) reported a high prevalence of substance use in pregnant and nonpregnant non-Hispanic Black women. Disparities in healthcare affect racial and ethnic minorities (Creedon & Cook, 2016; Healthy People, 2020).

Unintended pregnancy has become a global public health problem. Nearly half of pregnancies occurring worldwide were unintended (United Nations Population Fund, 2022). In the U.S., the percentage of unintended pregnancies declined from 51% in 2008 to 45% in 2011 (Finer & Zolna, 2016). Racial differences have persisted regarding unintended pregnancy, with higher rates among non-Hispanic Black women compared to Hispanic and European American women, even for those with similar economic resources and healthcare access (Holliday et al., 2018). Few researchers have examined the cooccurrence of unintended pregnancy, prenatal substance use, and maternal mental health problems.

Purpose of the Study

Researchers have discovered little regarding associations between pregnancy intent, substance use, and PPD among Black women. The purpose of this quantitative study was to describe roles of pregnancy intention and substance use in PPD among Black women.

Research Questions and Hypotheses

RQ1: Is there an association between pregnancy intention and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care, substance use, and whether the baby survives?

$H_0$1: There is no association between pregnancy intention and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care, substance use in the last 2 years, and whether the baby survives.

H_a1: There is an association between pregnancy intention and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care, substance use in the last 2 years, and whether the baby survives.

RQ2: Is there an association between substance use and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care, pregnancy intention, and whether the baby survives?

$H_0$2: There is no association between substance use and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care, substance use, and whether the baby survives.

H_a2: There is an association between substance use and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care, substance use, and whether the baby survives.

Conceptual Framework

The theory grounding this study is the four-level social ecological model adapted from Bronfenbrenner's ecological systems theory, which involves predicting how behaviors form based on characteristics of individuals, communities, nations, and levels of organizations. Because prevention of behaviors requires understanding factors that influence those behaviors, this model can aid understanding of how pregnancy intent relates to PPD and future pregnancy planning. This model also helped to address possible effects of substance use on postpartum mental health of mothers . Such strategies can help women plan for pregnancy, prevent substance use, and thereby reduce their PPD.

Nature of the Study

Pregnancy Risk Assessment Monitoring System (PRAMS) surveillance is conducted by the CDC and state health departments. The proposed study involved analysis of the PRAMS Phase 8 2016-2020 data set. Variables of interest were age, race, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, intention to become pregnant, prenatal care visits, cigarette and alcohol use in the last 12 months, survival of the baby, and presence of PPD symptoms.

Definitions

Age: Maternal age in years.

Alive baby: Infant living at the time of report.

Healthcare visit: Maternal visit to a healthcare setting for diagnostic, therapeutic, or consultative services that are provided by a healthcare professional.

Postpartum depression (PPD): Depressive symptoms occurring after delivery. These symptoms include feeling down, depressed, or hopeless and having little interest or pleasure in doing things that are usually enjoyed.

Pregnancy intention: The desire to become pregnant before conception occurs.

Prenatal care visit: Health are visit by mothers while they are pregnant.

Substance use: Use of cigarettes or alcohol in the last 2 years.

Unintended pregnancy: Any pregnancy that is mistimed, misplanned, or unwanted at the time of conception.

Assumptions

In this study, I assumed all participants answered the PRAMS survey honestly, and the survey was reliable and self-reported and contained accurate data before, during, and after pregnancy.

Scope and Delimitations

I used a quantitative statistical model that was capable of detecting correlations between variables rather than causation.

Limitations

Because PRAMS surveillance data were self-reported, mothers may not have wanted to self-identify as experiencing depression during pregnancy or using substances before and during pregnancy because of stigma associated with these situations.

Significance

Results of the proposed study were used to characterize magnitudes and relationships between unintended pregnancies, substance use, and PPD among Black women. Study will also guide the design and strengthening of programs targeting maternal and child health, particularly for Black women.

Summary

Not many researchers have attempted to assess relationships between PPD, pregnancy intention, and substance abuse. A gap in existing literature relates to assessment of associations between these variables for Black women. Existing studies relied on data other than the most recent PRAMS data. I intend to fill the gap in literature by assessing relationships between pregnancy intention, substance use, and PPD in Black women. Chapter 2 includes a review of existing literature.

Chapter 2: Literature Review

The purpose of this quantitative study was to describe the role of pregnancy intention and substance use in PPD among Black women. PPD, or postnatal depression, is a type of depression parents experience after the birth of a child; the disorder causes intense feelings of sadness, anxiety, or despair (CDC, 2020). PPD is a significant public health problem worldwide and usually occurs within 6 weeks of childbirth (Batt et al., 2020; Mughal et al., 2022). PPD has negative consequences for the health of mothers and their children and impacts on their physical and psychological health, as well as quality of life and leads to risky behaviors. The disorder also leads to negative outcomes for growth and development of children in terms of affecting their physical health, sleep, and motor, cognitive, language, emotional, social, and behavioral development skills. PPD also affects maternal roles and mother-child interactions involving bonding and breastfeeding (Slomian et al., 2019). Various risk factors which involve race and ethnicity are associated with PPD. Researchers have not explored the role of the pregnancy intention and substance use among Black women. In the proposed study, I used PRAMS data via a population-based surveillance system.

Chapter 2 begins with a description of search strategies that were used to identify literature. I address challenges of PPD, epidemiology and risk factors, and the social ecological model. The chapter concludes with a summary of results of the literature review as well as significant themes, the gap in literature, and how the proposed study bridged the gap.

Literature Search Strategy

Online academic databases were used to search for literature for review. I used the following databases: Thoreau, CINAHL Plus with Full Text, ProQuest Health & Medical Collection, Medline with Full Text, PubMed, Cochrane Database of Systematic Reviews, Social Sciences Citation Index, Science Citation Index, PsycInfo, and Google Scholar. I searched web sites of credible health care organizations, such as the World Health Organization and CDC. Only sources that were published in peer-reviewed journals and reputable sources were selected for inclusion in the literature review. I used the following keywords: *pregnancy intention*, *substance use*, *alcohol use*, *smoking*, *postpartum depression*, *PRAMS data*, *Black women*, and *African American women*. However, the literature search yielded relatively few papers regarding this study's topic that were published within the last 5 years. As a result, I expanded my search of historical and current peer-reviewed research articles to include those published between 2010 and 2021, emphasizing those published between 2016 and 2023.

Challenges of PPD

PPD is one of the most common medical complications after childbirth. It is treatable but can be disabling, with potential negative effects on health-related quality of life of mothers, their children, and partners (Moore Simas et al., 2019). Effects of PPD are most intense for mothers because of simultaneous side effects they experience in relation to their mental conditions due to emotional stress and the physical experience of pregnancy and giving birth (Abdollahi & Zarghami, 2018).

Women are affected by PPD differently. Mood swings, sadness, anxiety, loss of appetite, lack of sleep or excess sleep, excessive crying, overwhelming fatigue, and diminished ability to think clearly, concentrate, or make decisions are some of the short-term effects of PPD (Slomian et al., 2019). These short-term side effects can make caring for a newborn difficult for a mother with PPD and can grow into long-term problems if not treated (Mughal et al., 2022). Outcomes are worse for new mothers because they find it difficult to bond with their children, which causes them to withdraw from social life. PPD also reduces enjoyment of activities and hobbies, causes anxiety and panic attacks, makes mothers feel like bad mothers, and makes them want to harm themselves or their babies (Holopainen & Hakulinen, 2019; Smorti et al., 2019). It is thus critical to treat PPD effectively as early as possible. Left untreated, women who experience PPD are more likely than other women to struggle with depression later in life (Holopainen & Hakulinen, 2019; Slomian et al., 2019).

PPD also negatively affects the babies of affected mothers, fathers of those babies, and older children of affected mothers. If a mother suffers from PPD, their baby may not receive the care and affection that is needed to grow during the first few months of life when they depend on their parents to provide everything they need (Slomian et al., 2019). Researchers have documented associations between PPD and both delayed cognitive and language development and disorganized or insecure attachment.

Netsi et al. (2018) found children of mothers with PPD had long-term behavioral problems and were more likely to suffer from depression themselves between the ages of 16 and 18. According to Barook-Kiakalaee et al. (2022), 10% of new fathers experience

depression during pregnancy and after birth, which has a negative effect on their quality of life and family. Paternal PPD is associated with maternal PPD.

Epidemiology and Risk Factors

PPD has become a significant public health problem worldwide. According to Wang et al. (2021), the global prevalence of PPD was approximately 17.22%; the rate was lower in high-income countries compared to low-income countries. Southern Africa had the highest prevalence (39.96%, 95% CI [27.81, 53.48]). The CDC (2019) reported that about one eighth of women in the U.S. who had recent live births experienced symptoms of PPD.

Factors related to development of PPD include marital status, education level, social support, spouse care, violence, gestational age, breastfeeding, child mortality, pregnancy planning, financial difficulties, partnership, life stress, smoking, alcohol intake, living conditions, abuse (including current, past, and child sexual abuse), prenatal depression, and marital or partner satisfaction (Hutchens & Kearney, 2020; Wang et al., 2021). Level of prenatal attachment to her child was the most important predictor of PPD (Smorti et al., 2019).

PPD occurs more commonly among adolescent mothers, mothers who deliver premature infants, and those living in urban areas (Mughal et al., 2022). Prevalence of PPD is also correlated with having multiple children, being unemployed, and participating in postpartum rituals, including a 40 day rest periods, restriction of activities, and dieting (Wang et al., 2021). Past history of depression significantly enhances the chance of PPD (Guintivano et al., 2018). Low socioeconomic status,

unwanted pregnancy, and stressful life events during pregnancy are associated with PPD. Unplanned pregnancy and lack of family care are important correlates of PPD (Wang et al., 2021).

Racial differences with regard to postpartum depression include a high burden among African American women (Cannon & Nasrallah, 2019) and differences in reporting of the onset of depressive symptoms. Black and Hispanic mothers reported onset of symptoms within 2 weeks of delivery, unlike European American mothers, who reported onset of symptoms later (Mughal et al., 2022). Because of a lack of social support, access, trust, past depression, and other factors, African American and Hispanic women have a higher odds ratio of reported postpartum depression (Cannon & Nasrallah, 2019).

Unintended Pregnancy and PPD

Researchers have documented unintended pregnancy as a factor influencing postpartum depression. Alshikh Ahmad et al. (2021) identified unplanned pregnancy as a significant risk factor for postpartum depression. Relative to mothers who had a planned pregnancy, mothers who had a history of unplanned pregnancy were about 3 times more likely to have depression (*OR* = 2.84, 85% CI [2.04, 3.97]; Zeleke, Getinet, et al., 2021). The findings of another study indicated that the prevalence of postpartum depression was 25%, and unplanned pregnancy was associated with development of postpartum depression. The odds of developing postpartum depression were 2 times higher among women who had unplanned pregnancies than among women who had planned pregnancies (adjusted *OR* = 2.02, 95% CI [1.24, 3.31]; Asaye et al., 2020). The data for

these studies derived from countries in the Middle East (Alshikh Ahmad et al., 2021) and Ethiopia (Asaye et al., 2020; Zeleke, Alemu, et al., 2021).

Unplanned pregnancy is a risk factor for poor maternal health that can lead to parenting stress and increase the risk of maternal depression (Bahk et al., 2015). The results of several studies indicate that those with unintended pregnancies have a greater likelihood of exhibiting postpartum depression symptoms than those with intended pregnancies. Kerie et al. (2018) found that nearly 30% of their study subjects had unplanned pregnancies, and 127 (31.1%) had unwanted pregnancies. Those mothers who had unplanned pregnancies were 4.49 times more likely to develop postpartum depression than those who had planned pregnancies (adjusted *OR* = 4.49, 95% CI [2.31, 8.71]; Kerie et al., 2018). The overall effect of an unintended pregnancy on maternal depression and parenting stress is statistically significant (Bahk et al., 2015). Psychological preparedness is crucial for mothers before and during conception; otherwise, mental health problems occur. Unplanned pregnancy makes a mother feel unhappy and have negative thoughts, which poses a risk of depression.These studies were conducted on a general population and thus did not provide specific information about the burden and the role of pregnancy intention in contributing to postpartum depression in Black Women.

Substance Use and PPD

Use of substances during pregnancy is common and leads to substantial complications. Substance use during pregnancy has become a significant public health issue in the United States and worldwide. In the United States, 40% those with lifetime

drug use disorders and 26% of those with combined alcohol and drug use disorder are women. Women are at the highest risk for substance use disorder during their reproductive years, including during pregnancy. Tobacco, alcohol, and marijuana are the substances used most frequently during pregnancy, followed by cocaine and opioids (Cook et al., 2017; Prince et al., 2023).

Substance use during pregnancy is associated with multiple adverse outcomes for mothers and their children (Jasthi et al., 2021). These outcomes include increased risk of preterm labor and low birth weight (Shi et al., 2021). Illicit drug use during pregnancy can cause miscarriage, preterm labor, congenital disabilities, stillbirth, neonatal withdrawal symptoms, elevated risk of sudden infant death syndrome, poor fetal growth rate, and cognitive and behavioral problems. Women who inject drugs are at a higher risk than other women of contracting HIV, which mothers can transmit to their babies (Forray, 2016). The literature reviewed did not show the magnitude of substance use in Black women during pregnancy. Information also lacks on the role of substance use in postpartum depression among Black women.

Conceptual Framework

The social ecological model was the theory grounding the proposed study. Developed in the late 1970s and formalized in the 1980s, the theory consists of nested systems, with the individual in the center surrounded by various other systems. This theory takes into consideration that individuals affect and are affected by a complex range of social influences and nested environmental interactions (Kilanowski, 2017).

The key aspect of the social ecological model is the notion that multiple aspects of an individual's life significantly impact their life. Bronfenbrenner (1977) modeled an individual's general environment as concentric circles, with the individual at the center. The closest layer to the individual is the microsystem, which contains the strongest influences and encompasses the interactions and relationships of the immediate surroundings. The mesosystem is the next layer; it extends beyond immediate interactions and includes those with whom the individual has direct contact, such as at work, at school, at church, and in the neighborhood. Community contexts and social networks contribute to the exosystem, which encompasses the environmental context that the individual does not directly experience; this context still influences, both negatively and positively, the individual's life and development. The macrosystem includes cultural values and norms that influence the individual's life. The chronosystem, the outermost layer, pertains to changes that occur through time, such as personal growth, maturity, and significant life events (Kilanowski, 2017). According to the social ecological model, factors can cross between different levels. In addition, individuals' cumulative and intersectional experiences affect the impacts on individuals (University of Minnesota School of Public Health, 2015).

The social ecological model is a multilevel public health approach to prevention that takes into consideration broad social and political factors, not just individual factors (Karger et al., 2022). The social ecological model has guided understanding and identification of targets for general and specific health behavior interventions. Because changes in broader levels are likely to impact the narrower levels nested within, obtaining

the most significant impact from public health interventions requires application of those interventions at all model levels (Sallis et al., 2008; Stokols, 1996).

The social ecological model characterizes interactions among individuals, groups and communities, and physical, social, and political environments. The model allows understanding of the range of factors that increase or decrease their risk for certain behaviors. These factors can be at individual, relationship, community, societal, and culturally distinct levels, and factors at one level can influence factors at another level.

Snijder et al. (2021) identified risk factors for substance use at all four levels of the social ecological model. Individual-level factors were low socioeconomic status, high psychological distress, polydrug use, and being male. Peer pressure and partner/family substance use were relationship-level factors. Availability of substances was a community-level risk factor. Culturally distinct factors were cultural connection, as a protective factor, and cultural obligation regarding sharing, as a risk factor. Societal risk factors were intergenerational trauma caused by government policies (Snijder et al., 2021).

Buzi et al. (2015) identified correlates for depression among pregnant adolescents using the social ecological model. Individual correlates included self-reported race/ethnicity, limited economic resources, unplanned pregnancy, lifetime use of licit and illicit substances, and having repeated one or more grades in school. Prior physical or sexual assault, prior verbal abuse, lack of support from the baby's father, and limited contact with the baby's father were interpersonal correlates. Family correlates included criticism received from family members. On the other hand, the researchers assessed

community correlates with a series of items asking the number of times during each pregnant adolescent's life that she had seen someone attacked with a weapon, carried a weapon for protection, or been afraid of being hurt by other adolescents (Buzi et al., 2015).

The social ecological model underscores the importance of various interactions, such as those connecting pregnancy intention and substance with postpartum depression among Black women. Because prevention of behaviors requires understanding the factors that influence those behaviors, this model can aid understanding of how pregnancy intention relates to postpartum depression and future pregnancy planning. The model can also aid understanding of the possible effects of substance use on the postpartum mental health of mothers and contraceptive uptake. The overlap among the four levels of the model guides the design of effective public health strategies that encompass and target a wide range of perspectives. In the context of the proposed study, such strategies can help women plan for pregnancy, prevent substance use during pregnancy, and thereby reduce postpartum depression.

Gap

Postpartum depression is a significant public health problem worldwide, including in the US, and in addition to the affected mother, it can negatively affect babies, older children, and their partners. My literature review shows various risk factors are involved, and the magnitude differs among different populations. Literature documented that the burden of postpartum depression is high among Black Women. Black women are at

higher than average risk and less likely than other women to seek treatment (Cannon & Nasrallah, 2019).

My review of existing literature revealed a significant lack of research on the association between pregnancy intention, substance use, and postpartum depression in Black women. Most pertinent to the proposed study is a lack of research on the above variables in Black women using PRAMS data. This study filled this gap in the existing literature by assessing the relationships among pregnancy intention, substance use, and postpartum depression in Black women. This helped to understand the role of pregnancy intention and substance use as risk factors for postpartum depression among Black women and design a targeted intervention against postpartum depression.

Summary and Conclusions

PPD develops at a critical moment in the lives of women and babies, and symptoms can remain long term (CDC, 2020; Slomian et al., 2019). This public health problem is prevalent worldwide. The likelihood of women having depressive episodes can be twice as high during the postpartum period compared to other periods of their lives. These episodes often remain undetected and untreated, seriously affecting their partners and emotional and cognitive growth of their children during infancy and adolescence (Holopainen & Hakulinen, 2019; Moore Simas et al., 2019). Common signs of PPD include desperation, sadness, nausea, changes in sleep and eating habits, decreased libido, crying spells, anxiety, irritability, feelings of isolation, mental liability, and thinking of hurting themselves or their infants. PPD can start at any time within 1 year after delivery and continue for several years (Smorti et al., 2019). The social

ecological model is a multilevel public health approach to understanding risk and preventive factors in terms of individual, interpersonal, organizational, community, and policy levels. I used this model to understand how pregnancy intention relates to PPD and future pregnancy planning. This study involved describing the burden of unintended pregnancies, substance use, and PPD on Black women. Results aided understanding of magnitudes of relationships between risk factors and design and strengthening of maternal and child health programs to make them more effective for Black women. Chapter 3 includes information regarding the design and methodology of my study.

Chapter 3: Research Method

The purpose of this quantitative study was to describe the role of pregnancy intention and substance use in PPD among Black women. The social ecological model guided examination of individual, interpersonal, family, and community correlates associated with PPD. Results are vital to the design and maintenance of potential intervention strategies. I used a cross-sectional quantitative design and archival data obtained through PRAMS surveillance by the CDC and state health departments. This chapter includes the choice of research design, target population, sampling procedures, procedures for recruitment, participation, and data collection, variables and their operationalization, data analysis plan, and ethical considerations in terms of data protection and confidentiality.

Research Design and Rationale

This study had one dependent variable and two main independent variables. PPD was the dependent variable, and pregnancy intention and substance use were the main independent variables. PPD was measured using a nominal measure. Covariates included age, race, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care visits, and survival of the baby.

PRAMS data necessitated use of a cross-sectional design. Data were collected using surveys that were conducted either by mailed questionnaire or telephone. Although the cross-sectional design aids the study of relationships between variables in a time- and cost-effective way, it cannot establish causality. My aim was to explore relationships but not causality. PRAMS data were collected from delivered mothers in 46 states, the

District of Columbia, New York City, the Northern Mariana Islands, and Puerto Rico using a cross-sectional design and represent approximately 81% of all U.S. live births during the collection period.

Methodology

Population

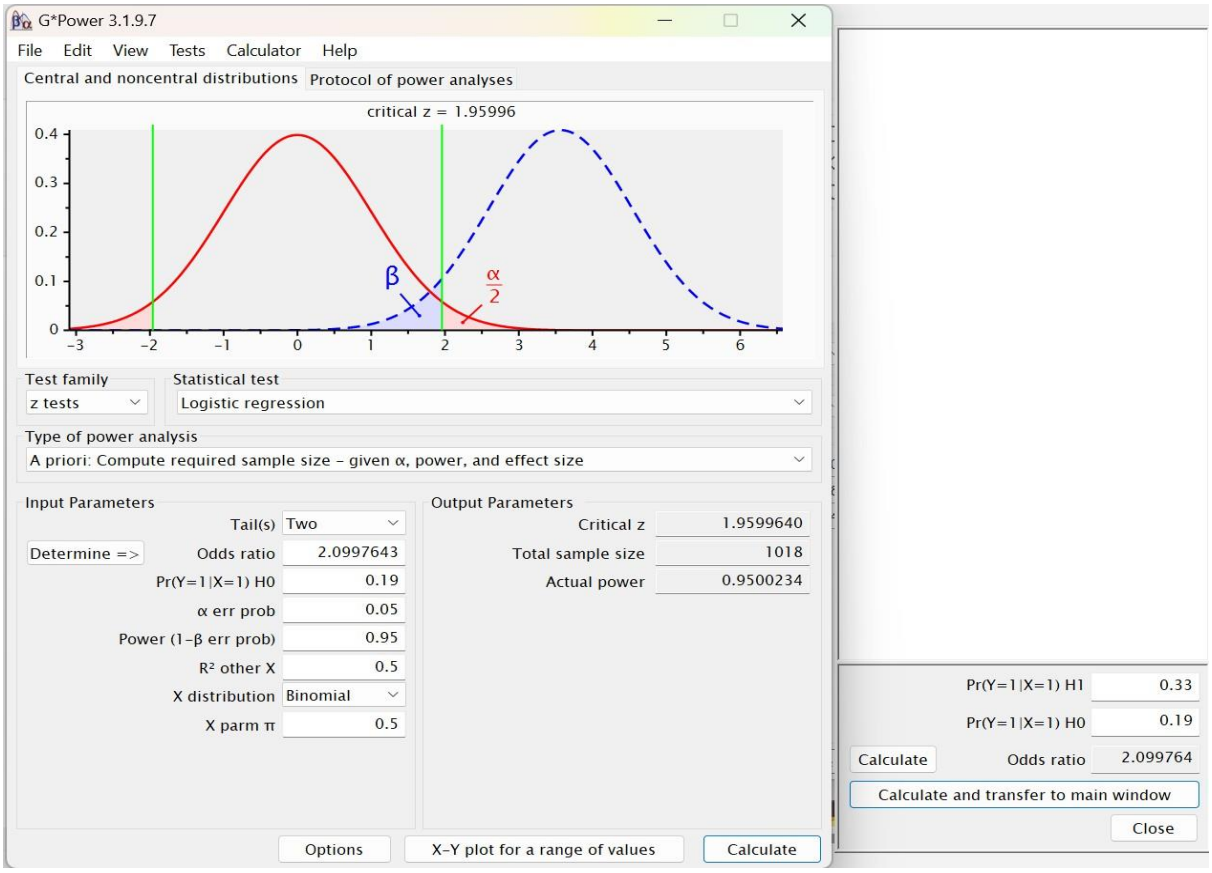
The target population for the proposed study was Black women who delivered live children in the U.S. and responded to the Phase 8 2016-2020 PRAMS survey.

Sampling and Sampling Procedures

I used the Phase 8 2016-2020 PRAMS survey dateset. A priori power analysis via G*Power version 3.1.9.7 was used to calculate the sample size. A minimum of 1,018 was needed for this study. Since the dependent or outcome variable was categorical, I calculated the power analysis using a logistic regression statistical test with a two-tailed z-test. The confidence interval (CI) was 95%. I placed the boundary due to standard acceptability in research. The alpha level was a p value of less than or equal to 0.05, with a beta level of 0.95. The effect size (f2) was 0.15. These levels and values were common in research in terms of statistical significance and error protection rate. I performed the z-test using logistic regression. I chose a large sample z-test with variance correlation for options.

Figure 1

*Priori Power analysis using G*Power*



Procedures for Recruitment, Participation, and Data Collection

Collection of PRAMS data involved two data collection methods: a mailed questionnaire with multiple followup attempts and survey conducted via telephone. The sequence was as follows. A preletter introduced the PRAMS to each participant and informed them that questionnaires would soon arrive. Initial mail questionnaire packets were sent to every sampled mother 3-7 days after the preletter. A thank you and reminder note was sent 7-10 after the initial questionnaire packet. A second mail questionnaire packet was sent to every sampled mother who had yet to respond after the reminder note. A third mail questionnaire packet was sent to every remaining nonrespondent 7–14 days after the second questionnaire packet. A telephone followup call was initiated for every

sampled mother who did not respond to mailed questionnaires 7–14 days after mailing of the last questionnaire.

Access to Archival Data

An application was submitted to the CDC PRAMS requesting access to data. Submission of the application included completing an application form, submitting an abstract of the project, and signing a data sharing agreement. Access was granted to download the data set once the application was reviewed and approved.

Instrumentation and Operationalization of Constructs

Each site's PRAMS questionnaire was unique, but the questionnaires generally had two parts. Core questions were asked at all sites using a pretested list of standard questions developed by the CDC or developed at the sites. The core portion of the questionnaire included questions on attitudes and feelings about the respondent's most recent pregnancy; preconception care; content of prenatal care; participation in Medicaid and the Special Supplemental Nutrition Program for Women, Infants, and Children; breastfeeding; cigarette smoking and alcohol use; health insurance coverage; physical abuse; infant health care; and contraceptive use (CDC, 2022a).

PRAMS data collection involved a mixed-mode methodology; two types of questionnaires were thus available: self-administered and interviewer administered. The questions on both questionnaires were the same; however, some questions on the interviewer-administered questionnaires were formatted differently to facilitate that mode of administration (CDC, 2022a).

The PRAMS questionnaire, available in English and Spanish, has undergone periodic revision. Although most indicators are comparable across phases, it typically easier to analyze data within a single phase. The latest PRAMS data available at the time of writing is for Phase 8, collected during 2016–2020. Tables 1 and 2 characterize the variables relevant to the proposed study and the questions used to measure the variables, respectively.

Table 1

Operationalization of Variables

Study variable	Definition	PRAMS variables
PPD	Mothers who developed depression or felt down, had anxiety, or had little interest/pleasure in doing things after delivery were taken to have had postpartum depression.	Pre-preg—Feeling down/depressed Health care type—Visit for depression or anxiety Health prob during preg—Depression Since your new baby was born, how often have you felt down, depressed, or hopeless? Since your new baby was born, how often have you had little

		interest or little pleasure in doing things you usually enjoyed?
Substance use	Any use of alcohol or cigarettes in the last 2 years were considered substance use.	SMK—>=1 cigs last 2 yrs DRK—Last 2 years
Pregnancy intention	Mothers who chose "wanted then" or "wanted sooner" were taken as having had an intentional pregnancy. Those who responded "wanted later," "did not want then or at any time in the future," and "was not sure" were be taken to have had an unintentional pregnancy.	Pre-preg—Want to have kids Preg—Intention
Age	As in PRAMS	Maternal age grouped
Race/ethnicity	As in PRAMS	Maternal race grouped
State of residence	As in PRAMS	Mother's residence grouped by state
Number of	As in PRAMS	Number of prenatal care visits

prenatal care visits		grouped
Baby alive	As in PRAMS	Infant living at time of report

Table 2

PRAM Questions Used to Collect Data

Variable	Question	Possible values
Pre-preg—Feeling down/depressed	During the 3 months before you got pregnant with your new baby, did you have any of the following health conditions? Depression?	1=NO 2=Yes
Health care type—Visit for depression or anxiety	What type of health care visit did you have in the 12 months before you got pregnant with your new baby? Visit for depression or anxiety?	1=NO 2=Yes
SMK—>=1 cigs last 2 yrs	Have you smoked any cigarettes in the past 2 years?	1=NO 2=Yes
DRK—Last 2 years	Have you had any alcoholic drinks in the past 2 years? (A drink is 1 glass of wine, wine cooler, can or bottle of beer, shot of liquor, or mixed	1=NO 2=Yes

Variable	Question	Possible values
	drink)	
Preg—Intention	Thinking back to just before you got pregnant with your new baby, how did you feel about becoming pregnant? Check ONE answer.	I wanted to be pregnant later; I wanted to be pregnant sooner; I wanted to be pregnant then; I didn't want to be pregnant then or at any time in the future; I wasn't sure what I wanted
Maternal age grouped		Unknown; ≤17; 18–19; 20–24; 25–29; 30–34; 35–39; ≥40
Maternal race grouped		Unknown; other Asian; White; Black; American Indian; Chinese; Japanese; Filipino; Hawaiian; Other Non-White; Alaska Native; Mixed race

Variable	Question	Possible values
Number of prenatal care visits grouped		Unknown; None; ≤8; 9–11; ≥12
Infant living at time of report		Unknown; yes; no

Note. Questions from *PRAMS*, by Centers for Disease Control and Prevention, 2022 (https://www.cdc.gov/prams/index.htm). In the public domain.

Data Analysis Plan

Research Questions and Hypotheses

RQ1: Is there an association between pregnancy intention and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care, substance use, and whether the baby survives?

$H_0$1: There is no association between pregnancy intention and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care, substance use in the last 2 years, and whether the baby survives.

H_a1: There is an association between pregnancy intention and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12

months before pregnancy, prenatal care, substance use in the last 2 years, and whether the baby survives.

RQ2: Is there an association between substance use and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care, pregnancy intention, and whether the baby survives?

$H_0$2: There is no association between substance use and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care, substance use, and whether the baby survives.

H_a2: There is an association between substance use and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care, substance use, and whether the baby survives.

Data Analysis

After obtaining approval to conduct the study from the institutional review board (IRB), I submitted the proposal to the CDC to obtain access to Phase 8 PRAMS data. After the request for data access is approved, the data was available as a SAS file to download. The SAS data was imported into IBM SPSS Statistics (Version 28.0), and statistical analysis was performed there. Descriptive statistics—frequencies and percentages—were used to summarize the sociodemographic data. Bivariate crosstab multiple logistic regression analyses were used to examine the relationships connecting pregnancy intention, substance use, and postpartum depression.

Ethical Procedures

An electronic request to access secondary/archival data was submitted to the CDC after receipt of IRB approval to collect data. No physical contact with the study participants occured. CDC PRAMS officials require a data use agreement and IRB approval to grant access to PRAMS survey data. An agreement specifying the conditions for gaining access, the data elements requested, the explicit purpose of use, and expiration (requiring destruction of data files) was filed with the request for access. PRAMS participants were selected through random stratified sampling. To protect study participants' confidentiality and anonymity, the CDC removed all participants' identifiers from the data set before handing data over to me. I storeed the PRAMS data set on a password-protected computer . I intend to delete the data set from my password-protected computer within 1 year of the conclusion of the study. Data sharing may be accomplished through publication of the results of the study in an academic journal.

Summary

This study involved exploration of relationships between the dependent variable PPD and independent variables pregnancy intention and substance use. A quantitative cross-sectional design and PRAMS data obtained from the CDC after receipt of IRB approval were used in the study. The sample represented women who gave birth to live children between 2016 and 2020. Threats to validity were minimized via the survey design and data collection procedures used by the CDC. I used logistic regression to construct models to evaluate relationships between pregnancy intention, substance use, and PPD. Ethical aspects of the study were considered.

Chapter 4: Results

Chapter 4 includes a description of the data collection and statistical data analysis, demographics of the study sample, and results of statistical analysis.

The purpose of this retrospective cross-sectional study was to describe effects of pregnancy intention and substance use on PPD among Black women. The independent variables were pregnancy intention and substance use, and the dependent variable was PPD. Covariates were age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care visits, and survival of the baby.

Two research questions guided the study:

RQ1: Is there an association between pregnancy intention and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care, substance use, and whether the baby survives?

$H_0$1: There is no association between pregnancy intention and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care, substance use in the last 2 years, and whether the baby survives.

H_a1: There is an association between pregnancy intention and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care, substance use in the last 2 years, and whether the baby survives.

RQ2: Is there an association between substance use and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care, pregnancy intention, and whether the baby survives?

$H_0$2: There is no association between substance use and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care, substance use, and whether the baby survives.

H_a2: There is an association between substance use and PPD when controlling for age, depression history at 3 months before pregnancy, healthcare visits 12 months before pregnancy, prenatal care, substance use, and whether the baby survives.

Data Collection

Upon receiving approval from the Walden University IRB (#09-08-23-0899547), I submitted a request to access Phase 8 2016-2020 PRAMS data to the CDC's PRAMS team by completing an application form and including a brief proposal. After they reviewed and approved the proposal, it was sent to PRAMS sites for review to identify any questions, concerns, or requests for exclusion of data. The PRAMS Analytic Research File was provided as a downloadable file. Data were downloaded as an SAS file along with the *Questionnaire Analytic Code Book* and *Research Dataset Code Book*. Data were then imported into SPSS, recoded, and labeled for statistical testing. Participants were from 46 states, the District of Columbia, and U.S. territories.

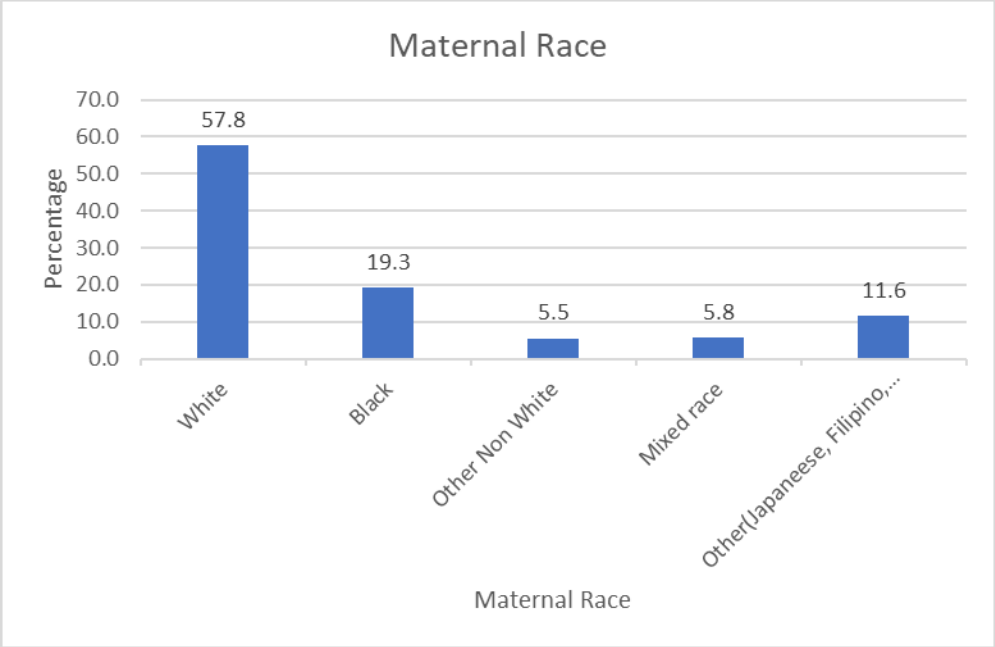
Descriptive Statistics

Race

Phase 8 PRAMS data included 206,080 participants of all races, of whom 200,036 (97.1%) disclosed racial information. Each survey respondent was asked to choose their race from a list. 115,672 respondents (57.8%) identified themselves as White, and 38,578 (19.3%) identified themselves as Black (see Figure 2).

Figure 2

Race of Mothers Who Participated in Phase 8 of the PRAMS



When asked whether they were Black or not, 42,797(21.2%) of participants identified themselves as Black, and the remaining 159,031 (78.8%) responded they were not. Data were filtered to include only Black mothers in the sample based on responses to this question.

Sociodemographic Characteristics of Black Respondents

Age

The majority of those in the sample, 29.5%, were aged 25–29 years. Almost three fourths (76.9%) were aged 20–34 years. Subjects younger than 18 years and older than 39 years made up 1.9% and 3.5% of the sample, respectively. More than half of those in each age category reported PPD.

Family Income

Each mother was asked about her total annual household income before tax during the 12 months before the baby was born. About 36% of those in the sample had family income of $16,000 or less. More than half of the mothers in each income category reported PPD, with the highest rate of PPD (62.3%) among mothers with total household income of $57,000–$60,000. The second highest rate of PPD was among those with income of $85,001 or more (60.6%).

Table 3

Sociodemographic Characteristics of Black Mothers in Phase 8 of the PRAMS

Variable and category	Mother has postpartum depression					
	Yes		No		Total	
	n	% [a]	*n*	% [a]	*n*	% [b]
Age (years)						
≤17	412	54.1	350	45.9	762	1.8
18–19	1,135	58.1	817	41.9	1,952	4.8
20–24	5,480	56.9	4,155	43.1	9,635	23.5
25–29	6,708	55.5	5,372	44.5	12,080	29.5
30–34	5,243	53.5	4,560	46.5	9,803	23.9
35–39	2,852	53.6	2,469	46.4	5,321	13.0
≥40	731	50.3	721	49.7	1,452	3.5
Family income ($)						
0–16,000	7,152	56.8	5,442	43.2	12,594	35.8

Variable and category	Mother has postpartum depression					
	Yes		No		Total	
	n	% [a]	*n*	% [a]	*n*	% [b]
16,001–20,000	2,322	54.7	1,922	45.3	4,244	12.0
20,001–24,000	1,567	54.2	1,326	45.8	2,893	8.2
24,001–28,000	1,140	55.6	909	44.4	2,049	5.8
28,001–32,000	1,262	54.7	1,045	45.3	2,307	6.5
32,000–40,000	1,395	54.4	1,167	45.6	2,562	7.3
40,001–48,000	903	56.4	699	43.6	1,602	4.5
48,001–57,000	865	58.4	617	41.6	1,482	4.2
57,000–60,000	482	62.3	292	37.7	774	2.1
60,001–73,000	689	60.2	456	39.8	1,145	3.2
73,001–85,000	583	58.9	406	41.1	989	2.8
≥85,001	1,606	60.6	1,044	39.4	2,650	7.5
Maternal education (years)						
0–8	215	40.0	323	60.0	538	1.3
9–11	2,307	52.3	2,106	47.7	4,413	10.8
12	6,962	51.1	6,670	48.9	13,632	33.5
13–15	8,367	57.7	6,133	42.3	14,500	35.7
≥16	4,535	59.7	3,067	40.3	7,602	18.7
Marital status						
Married	7,020	53.0	6,236	47.0	13,256	32.3
Other	15,525	56.0	12,197	44.0	27,722	67.7

[a] Percentage relative to single category. [b] Percentage relative to all categories of variable.

Maternal Education Level

Of 42,797 Black mothers, 40,685 (95%) answered the questions asking their educational level. About 87.9% had completed high school or above, and only 1.3% had completed education no higher than the middle school level. More than half of the respondents who had completed high school or above reported PPD.

Marital Status

The mothers were asked whether they were currently married or not. A majority of the mothers (67.7%) responded that they were not married at the time of the survey.

More than half of the subjects in the married and unmarried categories reported PPD, with 53% of married mothers reporting PPD, compared with 56% of other mothers.

Prevalence of PPD

Of all Black mothers who responded to the survey, 41,007 (96%) responded to the question asking about PPD. Of those, 22,561 (55%) reported PPD.

To understand the association between PPD and the independent variables (pregnancy intention and substance use) while controlling for other variables (maternal age, prenatal care visits, depression history 3 months before pregnancy, health care visits 12 months before pregnancy, and whether the baby survives) among Black mothers, a bivariate and multivariate logistic regression model was used.

Logistic Regression Assumptions

Logistic regression was the appropriate statistical test to use to determine the predictors of PPD. Four assumptions were tested to assess the validity of applying multivariate logistic regression. Assumption 1 was that the dependent variable is binary. PPD is binary: The response is either "yes" or "no." Therefore, this assumption was met. Assumption 2 was that the observations are independent. Because a cross-sectional study was conducted, the observations were independent. Therefore, this assumption was met. Assumption 3 was that the sample size is sufficiently large. Use of a small sample with a large number of predictors reduces power. The sample size should be at least 10 times the number of independent variables. This study had two independent variables and therefore required a sample size of at least 20. The data set used reflected thousands of respondents, and the sample thus met the assumption. Assumption 4 was that there is no

multicollinearity among explanatory variables. I checked for high intercorrelations between predictors using Spearman correlations, which should be less than .70. In the collinearity diagnostics, the tolerance value should exceed 0.1, and the variance inflation factor should be less than 10. The diagnostics met these conditions, indicating that the assumption was met. A scatterplot verified that this assumption was met.

To address the research questions by controlling other variables, the data analysis was performed in two steps: bivariate analysis and multivariate analysis.

Bivariate Analysis

Bivariate analysis was performed as a filtering stage to determine whether a significant association existed between PPD and potential predictor variables—pregnancy intention and substance use in the last 12 months. Bivariate analysis was also performed between PPD and other potential predictor variables: maternal age, prenatal care visits, health care visits 12 months before pregnancy, depression history 3 months before pregnancy, and whether the baby survived.

The binary logistic regression indicated that weak statistically significant associations existed between PPD and each of the variables, pregnancy intention ($p < .001$) , substance use in the last 12 months ($p < .001$), health care visits 12 months before pregnancy ($p < .001$), depression history 3 months before pregnancy ($p < .001$), and whether the baby survived ($p < .001$). PPD was also significantly associated with maternal age ($p < .05$) for those in all age groups except those aged 17 years or younger. For those aged 17 years or younger, PPD was not significantly associated with maternal age ($p = .096$). Prenatal care visits were also not significantly associated with PPD. Thus,

these variables incorporated in the bivariate logistic regression were also selected as candidate variables for the multivariate logistic regression model. The predictors with significant results were considered potential predictors of PPD. Factors for which *p* was less than .25 in the bivariate analysis were candidate variables for the multivariable analysis. Table 4 summarizes the bivariate analysis.

Multivariate Analysis

The candidate variables (those with associations in the bivariate analysis) were analyzed using multivariate logistic regression to understand the extent to which these variables significantly predicted PPD among Black mothers (Table 5). All variables with bivariate associations had statistically significant associations with PPD in the multivariate analysis. Based on the multivariate logistic regression, pregnancy intention, substance use in the last 2 years, maternal age, prenatal care visits, depression history 3 months before pregnancy, health care visits 12 months before pregnancy, and whether the baby survived were significant predictors of PPD among Black mothers. Strong association was found between PPD and depression history before three months of pregnancy as well PPD and the living status of the baby.

Model fitness was checked using the Hosmer–Lemeshow test. Because *p* was .914 (Table 6), greater than .050, the data set was the best fit to the model.

Table 4

Bivariate Logistic Regression Analysis Showing Predictors of PPD Among Black Mothers in Phase 8 of the PRAMS

Category	Depression	Crude *OR*

	Yes	No	*OR*	95% CI	*p*
Pregnancy intention					
Yes	7,826	7,996	1.000		
No	14,388	10,098	1.456	[1.398, 1.516]	<.001
Substance use last 2 years					
Yes	15,734	8,866	1.172	[1.116, 1.232]	<.001
No	6,623	3,183	1.000		
Maternal age (years)					
≤17	412	350	1.161	[0.974, 1.384]	.096
18–19	1,135	817	1.370	[1.195, 1.571]	<.001
20–24	5,480	4,155	1.301	[1.165, 1.453]	<.001
25–29	6,708	5,372	1.232	[1.104, 1.373]	<.001
30–34	5,243	4,560	1.134	[1.016, 1.266]	<.025
35–39	2,852	2,469	1.139	[1.014, 1.280]	<.028
≥40	731	721	1.000		
Prenatal care visit					
Yes	21,689	17,508	1.000		
No	234	225	1.191	[0.991, 1.432]	.063
Healthcare visit 12 months prepregnancy					
Yes	14,361	10,108	1.000		
No	7,917	8,075	1.449	[1.392, 1.508]	<.001
Depression history 3 months prepregnancy					
Yes	5,236	828	6.453	[5.979, 6.965]	<.001
No	17,054	17,403	1.000		
Baby alive now					
Yes	22,298	18,413	1.000		
No	226	16	11.664	[7.022, 19.374]	<.001

Table 5

Multivariate Logistic Regression Analysis of Variables Which Significantly Predicted PPD Among Black Mothers in Phase 8 of the PRAMS

Category	PPD		Crude *OR*			Adjusted *OR*		
	Yes	No	*OR*	95% CI	*p*	*OR*	95% CI	*p*

Category	PPD		Crude *OR*			Adjusted *OR*		
	Yes	No	*OR*	95% CI	*p*	*OR*	95% CI	*p*
Pregnancy intention								
Yes	7,826	7,996	1.000			1.000		
No	14,388	10,098	1.456	[1.398, 1.516	<.001	1.276	[1.215, 1.340]	<.001
Substance use in the last 2 years								
Yes	15,734	8,866	1.172	[1.116, 1.232]	<.001	1.331	[1.261, 1.405]	<.001
No	6,623	3,183	1.000			1.000		
Maternal age (years)								
≤17	412	350	1.161	[0.974, 1.384]	.096	0.918	[0.731, 1.153]	.463
18–19	1,135	817	1.370	[1.195, 1.571]	<.001	1.237	[1.040, 1.472]	.016
20–24	5,480	4,155	1.301	[1.165, 1.453]	<.001	1.066	[0.930, 1.222]	.361
25–29	6,708	5,372	1.232	[1.104, 1.373]	<.001	1.004	[0.878, 1.148]	.949
30–34	5,243	4,560	1.134	[1.016, 1.266]	.025	0.988	[0.863, 1.131]	.856
35–39	2,852	2,469	1.139	[1.014, 1.280]	.028	1.018	[0.883, 1.174]	.806
≥40	731	721	1.000			1.000		
Health care visit 12 months prepregnancy								
Yes	14,361	10,108	1.000			1.000		
No	7,917	8,075	1.449	[1.392, 1.508]	<.001	1.311	[1.248, 1.376]	<.001
Depression history 3 months prepregnancy								
Yes	5,236	828	1.264	[1.201, 1.329] -	<.001	5.816	[5.312, 6.318]	[<.001
No	17,054	17,403	1.000			1.000		
Baby alive now								
Yes	22,298	18,413	1.000			1.000		
No	226	16	11.664	[7.022, 19.374]	<.001	11.563	[6.289, 21.262]	<.001
						1.000		

Table 6

Model Fitness Assessment Using the Hosmer-Lemeshow Test

Statistic	Value
Step	1
χ^2	3.298
df	8
p	.914

PPD and Pregnancy Intention

Of the 40,308 mothers who responded to the questions addressing pregnancy intention, about 39% had pregnancy intentions. Most of the pregnancies (61%) were unintended. A weak statistically significant association was found between pregnancy intention and PPD ($p < .001$). Black mothers who had no intention to become pregnant were 1.276 times more likely to have PPD than mothers who intended to become pregnant (adjusted *OR* = 1.276, 95% CI [1.215, 1.340]; Table 7). Pregnancy intention was thus significantly associated with PPD when controlling for maternal age, prenatal care visits, depression history 3 months before pregnancy, health care visits 12 months before pregnancy, and whether the baby survived.

PPD and Substance Use

Mothers were asked about the use of alcohol or cigarettes in the previous 2 years . About 71.5% of the subjects reported substance use in the previous 2 years. A weak statistically significant association was found between substance use and PPD ($p < .001$). Black mothers who had used substances in the last 2 years were 1.331 times more likely

to have PPD as mothers who had not used substances in the last 2 years (adjusted *OR* = 1.331, 95% CI [1.261, 1.405]; Table 8).

Table 7

Multivariate Logistic Regression Analysis of Associations Between Pregnancy Intention and PPD Among Black Mothers in Phase 8 of the PRAMS

Pregnancy intention	Postpartum depression		Crude *OR*			Adjusted *OR*		
	Yes	No	OR	95% CI	*p*	*OR*	95% CI	*p*
Yes	7,826	7,996	1.000			1.000		
No	14,388	10,098	1.456	[1.398, 1.516]	<.001	1.276	[1.215, 1.340]	<.001

Note. Adjusted for age, depression history 3 months before pregnancy, health care visits 12 months before pregnancy, and substance use.

Table 8

Multivariate Logistic Regression Analysis Showing Association Between Substance Use and PPD Among Black Mothers in Phase 8 of the PRAMS

Substance use	Postpartum depression		Crude *OR*			Adjusted *OR*		
	Yes	No	*OR*	95% CI	*p*	*OR*	95% CI	*p*
Yes	15,734	8,866	1.172	[1.116, 1.232]	<.001	1.331	[1.261, 1.405]	<.001
No	6,623	3,183	1.000			1.000		

Note. Adjusted for age, depression history 3 months before pregnancy, health care visits 12 months before pregnancy, and pregnancy intention.

Summary

Phase 8 PRAMS data included information between 2016 and 2020 and 206,080 total participants. Participants were from 46 states, the District of Columbia, and U.S. territories. The 42,797 mothers who identified as Black were the focus of this study. The most respondents were between 25 and 29 (29.5%), had an income below $16,000 (35.7%), had 13 to 15 years of education (35.6%), and were unmarried (67.7%). More than half of participants reported PPD in each age, family income, and marital status category. More than half of participants also reported having PPD for all maternal education categories except for those with 0 to 8 years of education. Bivariate and multivariate logistic regression analyses were used to determine the role of pregnancy intention and substance use on PPD when controlling for other potential predictors.

Binary logistic regression analysis indicated statistically significant associations between PPD, and pregnancy intention, substance use, maternal age, prenatal care visits, depression history 3 months before pregnancy, healthcare visits 12 months before pregnancy, and whether the baby survived ($p < .05$), so I failed to reject the null hypotheses. Except for depression history and living status of the baby, I was not able to show these associations were strong enough to be meaningful, as with such a large data set, weak and trivial effects can become statistically significant. Analysis indicated no statistically significant associations between PPD and prenatal care.

This study indicated pregnancy intention and substance use were significantly associated with PPD among Black mothers ($p < .05$). Having no intention to become

pregnant and using substances were significantly associated with having PPD when controlling for maternal age, prenatal care visits, depression history 3 months before pregnancy, healthcare visits 12 months before pregnancy, and whether the baby survived.

Chapter 5 includes interpretations of findings, applications of findings to professional practice, implications for social change, and study limitations.

Chapter 5: Discussion, Conclusions, and Recommendations

Chapter 4 included results and major findings of this study, which included sociodemographic characteristics of respondents and results derived from the regression model. This quantitative cross-sectional study was designed to determine the role of pregnancy intention and substance use on PPD when controlling for other potential predictors using PRAMS Phase 8 data between 2016 and 2020 in the U.S.

In this study, pregnancy intention and substance use were the independent variables, and PPD was the dependent variable. Covariates in this study were maternal age, prenatal care visits, depression history 3 months before pregnancy, healthcare visits 12 months before pregnancy, and whether the baby survived. Results indicated that null hypotheses were rejected for both RQ1 and RQ2. This chapter includes interpretations and discussions of findings as well as study limitations, recommendations, implications, and conclusions.

Interpretation of the Findings

Unintended Pregnancy

This study found that about 61% of pregnancies were unintended. Unintended pregnancy is a worldwide public health problem associated with increased health risks for both mothers and their newborns. According to the United Nations Population Fund (2022), nearly half of pregnancies occurring worldwide were unintended. The rate of unintended pregnancy in the U.S. has also remained high, particularly among adolescents and young adults, those with low incomes, those with low levels of education, and Black women (CDC, 2021). Finer and Zolna (2016) reported the percentage of unintended

pregnancies declined from 51% in 2008 to 45% in 2011 in the U.S. However, prevalence of unintended pregnancy among Black women remained high. Racial differences in terms of unintended pregnancy have persisted, with rates remaining higher among non-Hispanic Black women than Hispanic and White women, even for those with similar economic resources and access to healthcare (Holliday et al., 2018).

Unintended Pregnancy and PPD

Unintended pregnancy has considerable public health importance worldwide because of its associations with increased risks of problems for mothers and their babies (Alshikh Ahmad et al., 2021; Asaye et al., 2020; Bahk et al., 2015; Kerie et al., 2018; T. A. Zeleke et al., 2021). Findings of this study also indicated a statistically significant though weak association between pregnancy intention and PPD ($p < .001$). The negative effects of PPD can also extend to other children and family members (Robbins et al., 2021). PPD can negatively affect the ability and availability of women to adequately care for their children (Mughal et al., 2022), mother-infant interactions, children's growth, and breastfeeding, which in turn lead children of such women developing insecure attachment bonds and poor social interactions with peers (Smorti et al., 2019).

Another finding of this study was that Black mothers who had no intention to become pregnant were 1.276 times more likely to have PPD than mothers who intended to become pregnant (adjusted *OR* = 1.276, 95% CI [1.215, 1.340]; see Table 6). However, the measure of the association (OR < 2.0) was not strong enough to show this to be meaningful.

Zeleke et al. (2021) reported mothers who had unplanned pregnancies were about three times more likely to have depression (*OR* = 2.84, 85% CI [2.04, 3.97]) compared to mothers who planned pregnancies. Odds of developing PPD were two times higher among women who had unplanned pregnancies compared to women who had planned pregnancies (adjusted *OR* = 2.02, 95% CI [1.24, 3.31]; Asaye et al., 2020). Those mothers who had unplanned pregnancies were 4.49 times more likely to develop PPD than those who had planned pregnancies (adjusted *OR* = 4.49, 95% CI [2.31, 8.71]; Kerie et al., 2018). Increased risk results from delays in obtaining prenatal care and making healthy lifestyle and behavioral choices (CDC, 2022a).

Substance Use

Substance use was prevalent among participants, with 71.5% of respondents reporting substance use in the previous 2 years. This was high relative to the prevalence of 8–11% for use of illicit drugs, tobacco products, or alcohol in the past month determined from results of the National Survey on Drug Use and Health for 2020 among pregnant women between 15 and 44.

One factor contributing to this substantial difference was that this study's sample was drawn from Black individuals only, but the national survey sample was drawn from the general population. Another contributing factor was differences in durations in terms of when they last used substances. In this study, respondents reported for the previous 24 months; for the national survey, respondents reported for the previous month.

Few researchers have studied the prevalence of substance use among Black women. Researchers have instead studied this phenomenon in the general population.

Use of substances during pregnancy has become a significant public health issue in the U.S. and worldwide (Cook et al., 2017; Prince et al., 2023). In the U.S., women accounted for 40% of those with lifetime drug use disorders and 26% of those with combined alcohol and drug use disorders (Prince et al., 2023).

Women are at the greatest risk for substance use disorders during their reproductive years. The most frequently used substances during pregnancy are tobacco, alcohol, and marijuana. The next most frequently used substances during pregnancy are cocaine and opioids (Cook et al., 2017; Prince et al., 2023). Findings regarding substance use among Black mothers could be used to attract attention and guide future research.

Substance Use and PPD

Findings of this study indicated that substance use was significantly associated with PPD ($p < .001$). Research has been lacking regarding substance use and PPD among Black women. Shi et al. (2021) documented unwanted outcomes of substance use in pregnancy such as increased risk of preterm labor and low birth weight. Forray (2016) documented further unwanted outcomes: miscarriage, preterm labor, congenital disabilities, stillbirth, neonatal withdrawal symptoms, elevated risk of sudden infant death syndrome, poor fetal growth rate, cognitive and behavioral problems, and elevated risk of contracting HIV, which mothers can transmit to their babies. Prenatal substance use is also associated with increased PPD (Nidey et al., 2022).

In this study, Black mothers who used substances in the last 2 years were 1.331 times more likely to have PPD than mothers who reported no substance use (adjusted *OR* = 1.331, 95% CI [1.261, 1.405]; see Table 7).However, similar to the association

between pregnancy intention and substance use, measure of the association was not strong enough to show associations between substance use and PPD to be meaningful.

Investigators undertaking national surveys have tested for this particular association, but according to the 2020 National Survey on Drug Use and Health, 17,200,000 women 18 years or older had a substance use disorder, and 9,500,000 had both a substance use disorder and mental illness (SAMHSA, 2022). These findings from the national survey are consistent with other findings in existing literature suggesting that depression and alcohol use disorder often cooccur. However, the national survey did not specifically include data on PPD.

Limitations of the Study

Limitations of this study arose in relation to the questionnaire, data collection techniques, and nature of the study design. All women who gave birth between 2016 and 2020 and responded to the PRAMS were considered to constitute the source population; the study sample consisted of Black women from among the source population. Respondents could identify as Black in two ways: by listing their race as Black or by answering “yes” to a question asking whether they were Black. The latter method was used to identify respondents as Black for the purposes of this study.

A second limitation was that the PRAMS data I analyzed related to substance use included only the use of alcohol and cigarettes and so did not indicate the role of drug abuse in PPD.A third limitation is that the analysis is not weighted to reflect sample biases which could limit the generalization of the study. A fourth limitation is that most of the OR’s in these associations were less than 2 and were not strong enough to be

meaningful but multivariate statistical analysis were conducted though the measure of the association is weak.

Another limitation was the difficulty of identifying causal relationships between pregnancy intention and PPD and between substance use and PPD. Some basic variables identified as potential covariates were controlled for during the multivariate analysis, but the variable list was not exhaustive, because depression relates to a number of variables not assessed in the survey. Because of survey was mainly conducted through the use of mailed questionnaires, respondents could have responded to questions the way they understood them rather than the way they were intended to be understood. Because mothers received the questionnaire 1–2 months after delivery but had to self-report data regarding prepregnancy, pregnancy, and postpregnancy, there was a potential for recall bias and misclassification errors. In addition, parents may have been wanting to dedicate their time to the care of the newborns and may thus have been rushed and not given due consideration to understanding and answering the questions properly.

Recommendations

More research is needed on the health consequences of social inequality to yield further insights on racial disparities and initiate targeted public health programs able to address real problems and provide evidence-based solutions to those problems. The link between racial patterns of health and disease and economic, educational, political, housing, and employment opportunities needs exploration. Members of ethnic minority groups and underprivileged communities deserve focus during assessment of health disparities that lead to racial variations in health. Evidence obtained through such a

scientific approach could improve public awareness and political commitment and inspire relevant policies that may lead to fundamental social change.

Implications

Evidence-based knowledge is needed to guide the development of social policies and practices. A gap in scientific literature exists with regard to assessment of the relationships among PPD, pregnancy intention, and substance abuse among Black women. An aim of this study was to add to the literature by investigating these relationships using Phase 8 PRAMS data from 2016 to 2020.

The study fills the identified gap and provides baseline information that researchers can use to continue investigation and that policymakers can use to design programs to alleviate this public health problem. This study's findings indicate high prevalence of unintended pregnancy, substance use, and PPD and the presence of weakly significant associations among these variables. The results can help to illustrate the magnitude of the associated important public health problems. This study's findings can also guide the design and strengthening of programs targeting maternal and child health, particularly for Black women. Interventions based on this evidence can contribute to a decline in substance use, unintended pregnancy, and PPD. Although this study could not identify causal relationships, and couldn't show the measure of the association is strong, it is likely that intervening to improve one variable would help the others.

Conclusion

The Phase 8 PRAMS data set included data for 206,080 mothers, of whom 42,797 (20.8%) were Black. Of those, 29.5% were aged 25–29 years, 36% had family income of

$16,000 or less, 87.8% had completed at least high school, and 67.7% were unmarried at the time of the survey. More than half of the mothers in each category of the age, income, and marital status variables reported PPD. More than half of mothers reported PPD in each education group, except the group consisting of those who had completed no education above middle school (1.3%).

In this study, 22,561 Black mothers (52.7%) reported PPD. Rates of substance use (71.5%) and unintended pregnancy (61%) were also high. Strong statsitically significant association was found between depression history and PPD. Weak statistically significant associations were found between PPD and pregnancy intention ($p < .001$) and between PPD and substance use in the last 2 years ($p < .001$) when controlling for maternal age, prenatal care visits, depression history 3 months before pregnancy, health care visits 12 months before pregnancy, and whether the baby survived. Because of the cross-sectional nature of this study, causal relationships among PPD, pregnancy intention, and substance use could not be established.

The findings of the study indicate that Black mothers are significantly affected by public health problems related to low pregnancy intention, substance use, and PPD. Strong political commitment to improve identification of the social determinants of health known to have negative impacts on maternal health and to implement programs targeting those in ethnic minority groups is needed to eliminate existing racial disparities. The presence of a strong association between PPD and a previous history of depression, as well as PPD and the living status of the baby, denotes the need for targeted health promotion and education for mothers with such conditions.

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