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Impact of Race and Socioeconomic Factors on Infant Mortality Between Non-Hispanic Black and White Women

Chukuma Clifton Chijioke
Walden University

Walden University

College of Health Sciences and Public Policy

This is to certify that the doctoral dissertation by

Chukuma C. Chijioke

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Review Committee
Dr. Joseph Robare, Committee Chairperson, Public Health Faculty
Dr. Chinaro Kennedy, Committee Member, Public Health Faculty
Dr. David Segal, University Reviewer, Public Health Faculty

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Sue Subocz, Ph.D.

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Abstract

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MPH, Walden University, 2018

MBBS, College of Medicine, University of Nigeria, Enugu, 1985

Dissertation Submitted in Partial Fulfillment

of the Requirements for the Degree of

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Abstract

This quantitative retrospective study with a correlational design examined the impact of race and socioeconomic factors on the high infant mortality (IM) among non-Hispanic Black women compared to non-Hispanic White women in one midwestern US state county. Though the IM in the U.S. has consistently decreased, a disparity exists between non-Hispanic Black and non-Hispanic White women. Non-Hispanic Black women are twice as likely to experience infant deaths as non-Hispanic White women.

This study utilized secondary data derived from vital records maintained by the county public health department. The research was grounded in the ecological model. Logistic regression was used to test the association between the risk factors and IM.

Findings showed that mother's race/ethnicity, educational level, and marital status were significant predictors of IM among non-Hispanic Black women, while the mother's residential zip codes and age during pregnancy were not. Infant birth weight, and gestational age had significant moderating effects on the association between the mother's race/ethnicity and IM. In contrast, the mother's prenatal care in the first trimester did not moderate the relationship. Low socioeconomic status was the overall determinant of high IM among non-Hispanic Black women compared to non-Hispanic White women. A social change intervention involving all stakeholders would target the above IM risk factors to reduce the disparity gap between non-Hispanic Black women and non-Hispanic White women in the community.

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Dedication

I dedicate this dissertation to my beloved and wonderful wife, Jemima Ngozi Chijioke; my father, late Mr. Charles Chijioke Nwoke; my mother, late Mrs. Rebecca Nwoke; and my five adorable children, Cynthia Chijioke-Kalonga, Emmanuel, Joshua, Chizorom, and Favour Chijioke. I also dedicate this dissertation to my siblings, Charity Chukwu, Chioma Odoemenam, Goodness Chinekwe, Onyebuchi Nwoke, and Udochukwu Nwoke. Lastly, to my son-in-law, Peter Kalonga, and granddaughter Brielle, Ida Adaeze Kalonga.

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Chapter 1: Introduction to the Study

Infant mortality (IM) is the death of an infant before their first birthday anniversary. On the other hand, the infant mortality rate (IMR) estimates the number of infant deaths per 1,000 live births. IM is the leading indicator of population health and well-being (Indiana State Department of Health Maternal and Child Health Epidemiology Division [ISDHMCHED], 2020) and social stability (Swigonski, 2019).

The numbers of infant deaths in Indiana in 2017 and 2018 were 602 and 559, respectively. These figures represented the death of one infant every 16 hours, resulting in more than 46 infant deaths monthly, approximating 11 infant deaths every week. The state of Indiana had an estimated 3,000 infant deaths in the past 5 years. The Indiana state IMR was remarkably greater than the U.S. average (ISDHMCHED, 2020).

The U.S. IMRs for 2017 and 2018 were 5.8 and 5.7 infant deaths per 1,000 live births, respectively. However, the IMR in 2017 was 10.97 infant deaths per 1,000 live births for non-Hispanic Black infants and 4.67 infant deaths per 1,000 live births for non-Hispanic White infants (Ely & Driscoll, 2019).

The Indiana IMRs for 2017 and 2018 were 7.3 and 6.8 infant deaths per 1,000 live births, respectively (ISDHMCHED, 2020). Therefore, Indiana ranked as the state with the eighth worst IMR in the United States (Swigonski, 2019). However, the IMR was 13.0 infant deaths per 1,000 live births for non-Hispanic Black infants and 6.0 infant deaths per 1,000 live births for non-Hispanic White infants (ISDHMCHED, 2020).

On the other hand, the Marion County IMRs in 2016 and 2017 were 10.0 and 8.3 infant deaths per 1,000 live births, respectively. However, the IMRs for non-Hispanic Black infants in Marion County in 2016 and 2017 were 15.8 and 12.6 infant deaths per 1,000 live births, respectively. Simultaneously, the IMRs for non-Hispanic White infants in Marion County were 6.6 and 5.5 infant deaths per 1,000 live births (Marion County Public Health Department of Epidemiology [MCPHDE], 2018).

Notwithstanding the fall in the overall IMR in the United States over the years, the disparity gap between infants born to non-Hispanic Black American women and those born to non-Hispanic White American women persists (Ely & Driscoll, 2019). Thus, non-Hispanic Black women are more than twice as likely to experience IM as their non-Hispanic White counterparts (Taylor et al., 2019).

Additionally, IM mainly affects non-Hispanic Black women who experience low social and economic factors, rather than their non-Hispanic White counterparts who experience higher social and economic factors. Social and economic factors such as income, education, and employment are usually protective for pregnant women by providing easy access to healthcare, quality prenatal care, and optimal conditions for fetal development. However, these factors are not protective for pregnant non-Hispanic Black women as they are for their non-Hispanic White counterparts (Smith et al., 2018; Taylor et al., 2019).

The low social and economic factors influencing IM in Marion County include low median household income. In 2016, approximately 20.5% of the Marion County population had a median household income below the Federal Poverty Guideline. Non-

Hispanic Blacks living below the Federal Poverty Guideline constituted 28.7% of the Marion County population. In comparison, non-Hispanic Whites living below the Federal Poverty Guideline constituted 15.3% of the Marion County population (MCPHDE, 2018). Additionally, poor educational attainment, low employment status, inadequate nutrition, food insecurity, and greater health spending contributed to the higher IM among non-Hispanic Black women compared to their non-Hispanic White counterparts (MCPHDE, 2018).

In 2016, percentages of the Marion County population below the Federal Poverty Guideline by educational attainment for persons 25 years and over were as follows: 15.4% for all Marion County; 34.4% for less than high school graduates; 17.7% for high school graduates, including equivalency; 14.3% for some college, associate's degree graduates; and 5.2% for bachelor's degree or higher graduates (MCPHDE, 2018).

Higher educational attainment guarantees higher social and economic status and lower IM for non-Hispanic White women. However, higher educational attainment and higher social and economic status for the non-Hispanic Black woman do not ensure a lower IM. Thus, a Black woman with a master's or professional degree will experience a higher IM than a White woman with a high school diploma (MCPHDE, 2018).

Other social and economic factors contributing to higher IM among non-Hispanic Black women include nonemployment or low employment, adolescent mothers, single parents, large families, poor housing, and marital status. These factors contribute significantly to non-Hispanic Black women living below the Federal Poverty Guideline and experiencing higher IM than their non-Hispanic White counterparts (MCPHDE, 2018).

The leading causes of non-Hispanic Black infants' higher IM in Marion County include preterm birth (PTB); birth before 37 weeks gestation; MCPHDE, 2018). The PTB rate in Marion County in 2016 among non-Hispanic Black women was 13.8%, compared to 11.8% for non-Hispanic White women and 12.0% for the Marion County population overall. Additionally, low birth weight (LBW); weight less than 2500 g or 5.5 lb) contributes to higher IM among non-Hispanic Black women (MCPHDE, 2018).

In 2017, the LBW rate was 14.40% for non-Hispanic Black women, 9.50% for non-Hispanic White women, and 10.70% for the Marion County population overall. Furthermore, very low birth weight (VLBW); birth weight less than 1500 g) contributes to higher IM among non-Hispanic Black women in Marion County (MCPHDE, 2018).

In 2016, the VLBW rate was 3.0% among non-Hispanic Black women, 1.8% for non-Hispanic White women, and 2.2% for the Marion County population overall.

Lastly, congenital disabilities, pregnancy complications, and sudden unexplained infant death (SUID) contribute to the higher IM among non-Hispanic Black women than among their non-Hispanic White counterparts (MCPHDE, 2018).

Thus, the high IM among infants born to non-Hispanic Black women in Marion County occurs from an interaction of biological, social, economic, psychological, educational, safety, and environmental factors (MCPHDE, 2018; U.S. Department of Health & Human Services [USDHHS] Office of Minority Health [OMH], 2019).

Research findings from the Indiana University School of Medicine indicated that one quarter of Indiana's overall high IM cases occurred in 3% of the state's zip codes. Many of these zip codes are located in historical "redlining" neighborhoods created by structural racism and occupied by the minority and marginalized Black population in Marion County (Swigonski, 2018).

Data from the Marion County infant birth and death certificate reports for 2015–2019 indicated that 15 zip codes in Marion County had IMRs above 10.00 infant deaths per 1,000 live births (MCPHDE, 2020). Thus, my aim in this study was to examine the relationship between maternal race, educational attainment, marital status, age, residential zip codes, infant birth weight, gestational age, prenatal care in the first trimester, and IM among non-Hispanic Black women in Marion County, Indiana.

Background

In this section, I discussed selected journal articles relating to IM. The keywords searched were *Black race; infant mortality; infant mortality rates; infant mortality disparity; Black women in Indiana; non-Hispanic Black women in Marion County, Indiana; socioeconomic factors, preterm birth, low birth weight, and IM disparity gap*. I used the Walden University databases, CINAHL, MEDLINE, and EBSCO. Additionally, I used ERIC, SAGE, PubMed Journals, Google Scholar, peer-reviewed journals, and online resources for the search.

Many researchers have conducted studies to determine the complex reasons why IM is persistently higher among non-Hispanic Black American women than among their non-Hispanic White American counterparts in the United States. The literature review indicated a relationship between the unfavorable socioeconomic factors experienced by non-Hispanic Black women and high IM in the United States (Alio et al., 2010; Bhatt & Beck-Sagué, 2018; Brown Speights et al., 2017; He et al., 2015; Kothari et al., 2017; Loggins et al., 2018; Pabayo et al., 2019; Salm Ward & Doering, 2014).

Additionally, persistent PTB, LBW, late trimester prenatal care, and SUID experienced by non-Hispanic Black women contributed to the high IM perceived among them (Cox et al., 2011; Gadson et al., 2017; Gross et al., 2019; Lhila & Long, 2012; Mendez et al., 2014; Taylor et al., 2019).

Furthermore, maternal age, marital status, social and economic factors encountered by these women, and the physical environment in their zip codes of residence influenced the IM of the non-Hispanic Black women in the United States (Ely & Driscoll, 2019; ISDHMCHED, 2020; MCPHDE, 2018; Swigonski, 2019; USDHHS OMH, 2019).

The high IM among non-Hispanic Black women in Marion County, Indiana, reflects the national direction in the racial IM disparity gap in the U.S. population (ISDHMCHED, 2020; MCPHDE, 2018; MCPHDE, 2020; USDHHS OMH, 2019). Thus, the IM disparity gap between the non-Hispanic Black women and their non-Hispanic White counterparts in Marion County is indicative of the national IM trend.

Problem Statement

The problem examined by this research was the disparity gap in IM between non-Hispanic Black American women and their non-Hispanic White American counterparts in Marion County, Indiana from 2016 to 2019. In 2017, the IMR for the United States was 5.8 infant deaths per 1,000 live births. However, the IMR for non-Hispanic Black women was 10.97 infant deaths per 1,000 live births, which was more than double the IMR of 4.67 infant deaths per 1,000 live births for non-Hispanic White women (Ely & Driscoll, 2019).

In 2018, the IMR for the state of Indiana was 6.8 infant deaths per 1,000 live births. However, the IMR for non-Hispanic Black infants was 13.0 infant deaths per 1,000 live births, 2.5 times more than the IMR of 6.0 infant deaths per 1,000 live births for non-Hispanic White infants (ISDHMCHED, 2020).

The primary causes of non-Hispanic Black infant deaths in Indiana include PTB, LBW, congenital disabilities, pregnancy complications, and SUID. The high IM among non-Hispanic Black infants occurs from an interplay of biological, social, economic, psychological, educational, safety, and environmental factors (Novoa & Taylor, 2018).

Risk factors related to PTB, LBW, and high IM include smoking, poor or limited access to prenatal care, poor maternal health status, obesity, pre-existing chronic health conditions, anxiety and depression, substance abuse, short interval between pregnancies, and unsafe sleep practices (Swigonski, 2019).

Research data from the Indiana University School of Medicine indicated that one quarter of Indiana's overall high IM cases occurred in 3% of the state’s zip codes. Most of these zip codes are located in neighborhoods of historical “redlining” and structural racism occupied by the minority and marginalized Black population in Marion County (Swigonski, 2018).

In 2017, the IMR for Marion County overall was 8.3 infant deaths per 1,000 live births. However, the IMR for non-Hispanic Black women was 12.6 infant deaths per 1,000 live births compared to the IMR of 5.5 infant deaths per 1,000 live births for non-Hispanic White women (MCPHDE, 2018; Swigonski, 2019).

Data from the Marion County infant birth and death certificate report for 2015–2019 indicated that 15 zip codes in Marion County had IMRs above 10.0 infant deaths per 1,000 live births (MCPHDE, 2020). Thus, there was a research gap concerning the complex causes of the higher IM in these Marion County zip codes among non-Hispanic Black women compared to their non-Hispanic White counterparts from 2016 to 2019.

Purpose of the Study

The purpose of this quantitative study was to examine the complex reasons for the higher IM among non-Hispanic Black women in Marion County, Indiana, compared to their non-Hispanic White counterparts using the correlational research design. The research populations comprised all non-Hispanic Black women and non-Hispanic White women in Marion County, Indiana, as well as their infants born between 2016 and 2019.

The dependent or outcome variable was IM (a combination of perinatal and postnatal mortality). The independent or predictor variables theorized as potential risk factors for IM were maternal race/ethnicity, maternal marital status, maternal age, maternal educational level, maternal prenatal care in the first trimester, maternal residential zip codes, infant's birth weight, and infant's gestational age.

I aimed to determine the relationship between the independent variables and the dependent variable, IM, to answer my research questions about the socioeconomic factors contributing to higher IM among non-Hispanic Black women in Marion County, Indiana.

Additionally, the study addressed how maternal geographic location, defined as residential zip codes in Marion County, is linked to IM. Furthermore, I examined the association between maternal race/ethnicity, maternal educational level, marital status, maternal age, prenatal care in the first trimester, infant birth weight, and gestational age and IM among non-Hispanic Black women in Marion County.

Significance of the Study

This study's significance resides in the effort to address the social problem of high IM among non-Hispanic Black women in Marion County, Indiana. I examined the relationship findings in socioeconomic and demographic risk factors among the non-Hispanic Black population.

The historical context indicated that the “redlined” neighborhoods of Marion County, Indiana, created about a century ago, were located close to the south of the White River. Industries were sited here and dumped their waste products—harmful chemicals, animal entrails, and gasoline—into the river (Bowman, 2020). The neighborhoods were continually assaulted by pollution. Additionally, authorities sent the Indianapolis city sewage to the White River (Bowman, 2020).

Minority and marginalized populations, particularly Blacks, constituted 79% of the Riverside community. They were forced to live in these most hazardous “redlined” zip code areas close to the White River sewage overflow because they could not obtain loans from mortgage banks to live elsewhere (Bowman, 2020).

These redlined neighborhoods had characteristics of minority populations—79% of the population was Black, and there was a lower median income level of $23,500, low property value of $25,000, low educational attainment, and employment status (Bowman, 2020).

Meanwhile, many of the wealthiest communities along the White River and in all of Marion County were located near the river's northern border. The median income here was approximately $133,000, and the property values averaged about $326,000 (Bowman, 2020).

Therefore, the Black communities located in the zip codes south of the White River where the industrial and sewage wastes were dumped experienced highly polluted, smelly waterways; poverty; poor health; and high IMRs due to historical "redlining" and structural racism (Bowman, 2020). Thus, zip codes located south of the White River in Marion County, Indiana, had the highest IMRs in Marion County.

In my discussion with Dr. Swigonski of the Indiana University School of Medicine, she stated that high IMR in Marion County occurred among non-Hispanic Black women living mainly in areas of historical redlining and structural racism. She further posited that living in economic, educational, safety, environmental, and resource-challenged areas gave rise to chronic stress, which led to a biological cascade that resulted in PTB, the leading cause of IM among non-Hispanic Black infants (Swigonski, 2019).

According to Marion County birth and death certificate data compiled from 2015–2019, the following 15 zip codes in Marion County had IMRs above 10.00 infant deaths per 1,000 live births: 46113—21.74 infant deaths per 1,000 live births; 46202—19.56 infant deaths per 1,000 live births; 46204—18.75 infant deaths per 1,000 live births; 46228-—14.64 infant deaths per 1,000 live births; 46218—13.38 infant deaths per 1,000 live births; 46260—13.24 infant deaths per 1,000 live births; 46278—12.82 infant deaths per 1,000 live births; 46203—12.23 infant deaths per 1,000 live births; 46235—12.23 infant deaths per 1,000 live births; 45226—11.17 infant deaths per 1,000 live births; 46205—10.96 infant deaths per 1,000 live births; 46204—10.84 infant deaths per 1,000 live births; 46229—10.75 infant deaths per 1,000 live births; 46222—10.21 infant deaths per 1,000 live births; and 46234—10.03 infant deaths per 1,000 live births (MCPHDE, 2020).

An improved understanding of the possible ways that maternal race, socioeconomic factors, and geographic locations impacted IM in Marion County would help in the development of intervention strategies to address/reduce the IM disparity gap between the non-Hispanic Black women and their non-Hispanic White counterparts in Marion County and the state of Indiana and bring about positive social change, social justice, and equity (Taylor et al., 2019).

Research Questions and Hypotheses

The research questions to examine the impact of mother's race/ethnicity and socioeconomic factors on IM among non-Hispanic Black infants in Marion County, Indiana, were as follows:

RQ1a: Is there an association between mother's educational level, marital status, age, and IM among non-Hispanic Black infants in Marion County, Indiana?

Ho1: There is no association between mother's educational level and IM among non-Hispanic Black infants in Marion County, Indiana.

Ha1: There is an association between mother's educational level and IM among non-Hispanic Black infants in Marion County, Indiana.

Ho2: There is no association between mother's marital status and IM among non-Hispanic Black infants in Marion County, Indiana.

Ha2: There is an association between mother's marital status and IM among non-Hispanic Black infants in Marion County, Indiana.

Ho3: There is no association between mother's age and IM among non-Hispanic Black infants in Marion County, Indiana.

Ha3: There is an association between mother's age and IM among non-Hispanic Black infants in Marion County, Indiana.

RQ1b: Is there an association between mother's educational level and IM after controlling for mother's marital status and age, among non-Hispanic Black infants in Marion County, Indiana?

Ho1: There is no association between mother's educational level and IM after controlling for mother's marital status and age, among non-Hispanic Black infants in Marion County, Indiana.

Ha1: There is an association between mother's educational level and IM after controlling for mother's marital status and age, among non-Hispanic Black infants in Marion County, Indiana

RQ2: Is there an association between mother's residential zip codes in Marion County, Indiana, and IM among non-Hispanic Black infants in Marion County, Indiana?

Ho2: There is no association between mother's residential zip codes in Marion County, Indiana, and IM among non-Hispanic Black infants in Marion County, Indiana.

Ha2: There is an association between mother's residential zip codes in Marion County, Indiana, and IM among non-Hispanic Black infants in Marion County, Indiana.

RQ3; Is the association between a mother's race/ethnicity and IM moderated by infant's birth weight, infant's gestational age, or mother's prenatal care in the first trimester among non-Hispanic Black infants in Marion County, Indiana?

Ho3: The association between mother's race/ethnicity and IM is not moderated by infant's birth weight, infant's gestational age, or mother's prenatal care in the first trimester among non-Hispanic Black infants in Marion County, Indiana

Ha3: The association between mother's race/ethnicity and IM is moderated by infant's birth weight, infant's gestational age, or mother's prenatal care in the first trimester among non-Hispanic Black infants in Marion County, Indiana

The independent socioeconomic factor variables that were analyzed were mother's race/ethnicity (categorical variable), mother's educational level (continuous variable), mother's marital status (categorical variable), mother's age (continuous variable), mother's residential zip code (categorical variable), infant's birth weight (continuous variable), infant's gestational age (continuous variable), and mother's prenatal care in the first trimester (categorical variable). The dependent variable was IM (categorical variable) (Frankfort-Nachmias & Leon-Guerrero (2018).

Theoretical Framework of the Study

The theoretical framework for my dissertation study for preventing IM was the social-ecological model (SEM). The SEM was initially recommended as a conceptual model for comprehending human development by Urie Bronfenbrenner in 1977 and later established as a theory in the 1980s (Bronfenbrenner, 1977; Kilanowski, 2017). The SEM postulated that a public health problem such as IM occurred due to an interplay of factors connecting all the problem levels. The SEM proposed two main concepts:

(1) that human behavior influenced and was influenced by the social environment and (2) that health behavior both shaped and was shaped by various levels of influence such as individual factors, interpersonal or relationship factors, institutional or organizational factors, community factors, and public policy or societal factors (Centers for Disease Control and Prevention [CDC], 2020).

The social ecological model indicated that the leading causes of high non-Hispanic Black IM were PTB, LBW, congenital abnormality, and SUID (Alio et al., 2010; CDC, 2015).

The individual factor level consisted of personal maternal characteristics such as income level, educational attainment, employment status, gender, age, knowledge, attitudes, behaviors, and health history, influencing the woman's decision-making ability regarding the fetus's health.

The interpersonal or relationship level comprised the non-Hispanic Black woman's family, friends, spouse or partner, and social network. These people who were closest to or had frequent contact with the individual could significantly impact how they coped with stress during pregnancy or even influenced their stress. The interactions at the relationship level could also affect a person's decisions.

The community level consisted of many environmental factors, including neighborhoods, schools, workplaces, and health care facilities. For instance, in the circumstance of prenatal care, the existence or lack of accessible and affordable quality healthcare options in a community could influence whether low-income Black women could receive the approved levels of prenatal or health care.

Finally, the SEM's societal level comprised cultural and social norms, economics, and policies that affected education and health. According to the CDC's framework, these policies assisted in maintaining economic or social inequalities between racial groups in society (CDC, 2015).

The IM disparity was complex and multifaceted and presented itself in various forms and environments. Thus, the sociocultural, economic, and environmental factors impacting IM among non-Hispanic Black women in Marion County were classified into these SEM levels to better understand the IM issue and prevent or reduce IM among non-Hispanic Black women in Marion County.

Nature of the Study/Data Analysis Method

This research was a retrospective analysis of secondary data obtained from the MCPHDE. I used SPSS 27 statistical software to conduct the quantitative statistical analysis (Creswell & Creswell, 2018) to compare IM between non-Hispanic Black women and non-Hispanic White women in Marion County, Indiana from 2016 to 2019.

Additionally, I examined the effects of infant characteristics such as PTB, LBW, maternal and family attributes, community characteristics, and historical conditions on IM among non-Hispanic Black women in Marion County.

A cross-sectional correlational research design was appropriate to construct empirical models to examine the significant statistical association between one dependent or outcome variable IM and multiple independent or predictor risk factor variables that might predict IM. The independent risk factor variables were maternal race/ethnicity, maternal education, maternal marital status, maternal age, mother's prenatal care in the first trimester, maternal residential zip codes, infant's birth weight, and infant's gestational age.

I employed the multiple logistic regression model with the SPSS 27 statistical software to conduct the quantitative analysis to determine the statistically significant relationship between the independent risk factor variables and the dependent variable, IM. IM was coded as a dichotomous outcome variable indicating whether an infant died in the first year of life (Statistics Solution, n.d.).

I selected the multiple logistic regression model for the study to determine the relationship between the independent risk factor variables and the dichotomous dependent variable and the odds ratio of a non-Hispanic Black infant dying in their first year of life (Statistics Solution, n.d.). Thus, the cross-sectional correlational research design and multiple logistic regression test model were the appropriate research tools for my study's quantitative statistical analysis of the retrospective secondary data.

Possible Types and Sources of Data

This study's primary data source was high-quality retrospective secondary data from the Marion County infant birth and death certificate report for 2016–2019 obtained from the 2020 MCPHDE report to answer my research questions. Thus, cost-effective, time-saving, and high-quality retrospective secondary data were used for this quantitative study.

Implications for Positive Social Change

Socioeconomic, environmental factors such as maternal race, maternal age, maternal ethnicity, maternal education, marital status, zip code, income, employment, and social determinants of health affected people's health and quality of life.

However, regarding IM, social determinants of health did not protect non-Hispanic Black Americans as they did non-Hispanic White Americans (Taylor et al., 2019). Non-Hispanic Black women with a college education were more likely to have

PTB and LBW infants and experience infant deaths than non-Hispanic White women who did not complete a high school education (Gross et al., 2019; MCPHDE, 2018).

My dissertation study focused on achieving positive social change, social justice, and equity among non-Hispanic Black women in Marion County by providing data that can help to reduce IM in Marion County, Indiana. Additionally, the research findings may provide information to manage health services for those most in need in the “redlining” zip codes. Thus, it may contribute to reducing the IM disparity gap between non-Hispanic Black women and their non-Hispanic White counterparts in Marion County and achieving impactful positive social change in the county's "redlined" Black communities (Taylor et al., 2019).

Definition of Terms

The keywords used in this dissertation were defined as follows:

Disparity gap is defined as dissimilarity in the quality of health and health care covering racial, ethnic, and socioeconomic groups. Additionally, disparity gaps referred to population-defined differences in disease, health outcomes, and healthcare accessibility (Riley, 2012).

Pregnancy describes the period of the fertilization and development of one or more fetuses in a woman’s womb. Pregnancy usually lasted approximately 40 weeks or 9 months, estimated from the last menstrual period to delivery. *Pregnancy* is divided into three segments called trimesters. The first trimester period is from Week 1 to Week 12; the second trimester period is from Week 13 to Week 28; and the third trimester period is from Week 28 to Week 40 (American College of Obstetricians and Gynecologists [ACOG], 2020)

Gestational age is defined as the number of weeks that had passed between the first day of the last normal menstrual period and the delivery date, regardless of whether the pregnancy resulted in a live birth or a fetal death (Gestational Age Specification Manual for Joint Commission, National Quality Measures, 2015).

Infant mortality (IM) is defined as the death of an infant before their first birthday (CDC, 2020).

Infant mortality rate (IMR) is defined as the number of infant deaths per 1,000 live births. IMR included neonatal deaths and post neonatal deaths (CDC, 2020).

Preterm birth (PTB) is defined as birth before 37 weeks gestation (CDC, 2020; March of Dimes, 2018).

Low birth weight (LBW) is defined as an infant born with a birth weight less than 2,500 g or 5.5 lb (March of Dimes, 2018).

Very low birth weight (VLBW) is defined as an infant born with a birth weight of less than 1,500 g (University of Rochester Medical Center, 2021).

Neonatal mortality is defined as the death of a neonate at less than 28 days of life (0–27 days; Andegiorgish et al., 2020).

Perinatal mortality is defined as death occurring from 28 weeks of gestation to less than 7 days after birth (Barfield et al., 2016).

Postnatal mortality is defined as the death of a newborn occurring between 28 days and 364 days (1 year) of age per 1,000 live births (Tripathy & Mishra, 2017).

Assumptions

I made the following assumptions regarding this study:

1.I assumed that accurate sample data were obtained from the MCPHDE concerning infant characteristics, maternal characteristics, societal and community characteristics, and historical context.

2. The MCPHDE collected the secondary archival data through the linked infant birth and death certificates report of all infants born to non-Hispanic Black women and non-Hispanic White women residing in Marion County between 2016 and 2019 MCPHDE, 2020).

3. Thus, I assumed that the collection of the secondary data was correct.

Scope and Delimitations

Only infants of non-Hispanic Black women (study group) and non-Hispanic White women (reference group) aged 20–45 years residing in Marion County between 2016 and 2019 were included in this study. The IM studied included neonatal and postnatal mortality that occurred among these two groups within this study period (MCPHDE, 2020).

Limitations, Challenges, and Barriers

The retrospective secondary data used for this study were limited because a researcher might seek permission from the authors to access some secondary databases. Additionally, the secondary data were gathered by other researchers for purposes other than the current research. Thus, I had no control over the data's validity and reliability.

However, my study's secondary data on IM obtained from the MCPHDE were reliable and valid. The Marion County Health Department meticulously collected the data through the linked infant birth and death certificate records of all infants born in Marion County, Indiana, between 2016 - 2019. Therefore, the data were reliable and valid (CDC, 2017; MCPHDE, 2020).

Furthermore, because this retrospective research was conducted using secondary archival data from MCPHDE, the findings may not have external validity, meaning that they may not be generalizable to the other counties in the state, or other communities, at other times and in other contexts.

Finally, the limitation of a correlational design is that correlation did not signify causation, meaning that it is not feasible to confirm the presence of cause and effect or causality relationships between variables through statistical analysis of secondary archival data (Wickham, 2019).

A controlled experiment must be conducted to show causation. However, when two variables gathered by using a nonexperimental research design correlate, one regularly precedes the other (for example, PTB regularly precedes IM). Therefore, the correlation provides indirect proof supporting causation (Curtis et al., 2016).

Conclusion

The significance of this study derives from the effort to address the social problem of higher IM among non-Hispanic Black women in Marion County, Indiana, compared to their non-Hispanic White counterparts. The higher IM results from the socioeconomic and demographic risk factor challenges among the Black population.

The study used the SEM as the theoretical or conceptual framework for preventing or reducing the high IM among non-Hispanic Black women in Marion County, Indiana. The research focused on achieving positive social change among non-Hispanic Black women in Marion County by providing data that can help to reduce IM in Marion County, Indiana.

Additionally, using the research findings to supply information to manage health services to those most in need in the “redlining” zip codes may reduce the IM disparity gap between the non-Hispanic Black women and their non-Hispanic White counterparts in Marion County, Indiana. Thus, the study findings may support positive social change, social justice, and equity in the county's affected zip codes and Black communities.

Chapter 2: Literature Review

It was important to review the literature to understand better the potential relationship between socioeconomic risk factors and high IM among non-Hispanic Black women in the United States and Marion County. This literature review is founded on published data regarding IM and the intervention for preventing IM. The literature review centers on studies that address the causes of IM disparities that disproportionately affected non-Hispanic Black women in the United States, particularly in Marion County, Indiana.

In order to obtain an overarching picture of the IM disparity gap, the literature review is grounded on the four components of the SEM (Alio et al., 2010; CDC, 2015). Therefore, this literature review comprises publications whose authors evaluated (a) infant features, (b) the maternal characteristics, including behavior before and during pregnancy, (c) societal, community, environmental circumstances, and (d) historical circumstances.

I obtained the literature review articles from various sources such as Walden University databases, CINAHL, EBSCO, MEDLINE, SAGE, and the Annual Reviews of Public Health. These sites supplied peer-reviewed and full-text journal articles on IM among non-Hispanic Black women. Approximately 50 articles were recovered.

PubMed, ERIC, ProQuest, Google Scholar, and the National Vital Statistics System Report were other search sites utilized. The Indiana University School of Medicine School of Public Health provided valuable articles on IM in Indiana.

Additionally, the Indiana Department of Health Maternal and Child Health Epidemiology supplied valuable data on IM in Indiana.

Furthermore, the following agencies kept and supported maternal child health websites; - CDC), USDHHS, Institute of Medicine (IOM), National Institute of Health (NIH), OMH, and March of Dimes.

Lastly, the MCPHDE maintained a website with useful IM information.

The search words used to retrieve the journal articles included *preterm birth, low birth weight, non-Hispanic Black women, African American women, IM disparity gap, adverse birth outcomes, infant mortality, and ecological model.*

Disparity Gap in Infant Mortality

The IM disparity gap between non-Hispanic Black women and their non-Hispanic White counterparts persists despite the decline in the IM over the years (Ely & Driscoll, 2019).

The US IMRs for 2017 and 2018 were 5.8 and 5.7 infant deaths per 1,000 live births. However, the IMRs in 2017 were 10.97 infant deaths per 1,000 live births for non-Hispanic Black women and 4.67 infant deaths per 1,000 live births for non-Hispanic White women (Ely & Driscoll, 2019).

The Indiana IMRs for 2017 and 2018 were 7.3 and 6.8 infant deaths per 1,000 live births (ISDHMCHED, 2020). Therefore, Indiana ranked as the state with the eight worst IMR in the United States (Swigonski, 2019). However, the IMR for non-Hispanic Black women was 13.0 infant deaths per 1,000 live births compared to 6.0 infant deaths per 1,000 live births for non-Hispanic White women (ISDHMCHED, 2020).

On the other hand, the Marion County IMRs in 2016 and 2017 were 10.0 and 8.3 infant deaths per 1,000 live births. However, the IMRs for non-Hispanic Black women in Marion County in 2016 and 2017 were 15.8 and 12.6 infant deaths per 1,000 live births. Simultaneously, the IMRs for non-Hispanic White women in Marion County were 6.6 and 5.5 infant deaths per 1,000 live births (MCPHDE, 2018).

In 2018, the IMR for non-Hispanic Black women was 14.0 infant deaths per 1,000 live births, while the overall IMR for all the races in Marion County was 9.2 infant deaths per 1,000 live births. However, in 2019, the IMR for non-Hispanic Black women reduced to 10.9 infant deaths per 1,000 live births, Simultaneously, the IMR for non-Hispanic White women was 7.5 infant deaths per 1,000 live births, and the IMR for Hispanic women was 7.6 infant deaths per 1,000 live births. Thus, in 2019, the overall IMR for all the races in Marion County was 8.8 infant deaths per 1,000 live births (MCPHDE, 2020; WTHR Staff 2020) (See Appendices A & B).

Ecological Model

The SEM was the theoretical framework grounding this research intervention for preventing high IM among non-Hispanic Black women. The model consists of individual factors, interpersonal or relationship factors, institutional or organizational factors, community factors, and public policy or societal factors (Alio et al., 2010; CDC 2015).

Infant Characteristics

The individual risk factor level affecting IM among non-Hispanic Black women includes infant characteristics and medical conditions that are more common among non-Hispanic Black infants than their non-Hispanic White counterparts. Such risk factors comprise PTB, LBW, congenital disabilities, SUID, respiratory distress syndrome, and preventable injuries (Swigonski, 2019).

These factors are the leading causes of the high IM among non-Hispanic Black women in the United States, Indiana, and Marion County. Aggravating risk factors associated with PTB, LBW, and high IM consist of smoking, limited or lack of access to prenatal care, poor maternal health status, obesity, pre-existing chronic health conditions, anxiety, depression, substance abuse, and short intervals between pregnancies (Swigonski, 2019).

Maternal Characteristics

Additionally, the SEM's individual risk factors level includes maternal characteristics- maternal race, ethnicity, knowledge, attitude, behavior, health history, age, income level, educational level, employment status, marital status, and prenatal care in the first trimester. These factors affect the woman's decision-making ability regarding fetal health and can more negatively affect IM among non-Hispanic Black women than among their non-Hispanic White counterparts (Alio et al., 2010; CDC, 2015).

The leading causes of non-Hispanic Black infants' higher IM in Marion County include PTB (birth before 37 weeks gestation). PTB in Marion County in 2016 was 13.8% among non-Hispanic Black Women compared to 11.8% among non-Hispanic White women and 12.0% in the entire Marion County population.

Additionally, LBW (Weight less than 2500 g or 5.5 lbs.) contributes to higher IM among non-Hispanic Black women. In 2017, LBW rates were 14.40% for non-Hispanic

Black women, 9.50% for non-Hispanic White women, and 10.70% for the overall Marion County population.

Furthermore, VLBW (birth weight less than 1500 g) contributes to higher IM among non-Hispanic Black women in Marion County. In 2016, VLBW rates were 3.0% among non-Hispanic Black women, 1.8% among non-Hispanic White women, and 2.2% for the overall Marion County population (MCPHD, 2020) (See Appendices C & D.

Lastly, congenital abnormalities, pregnancy complications/perinatal risks, and SUID contribute to the higher IM among non-Hispanic Black women compared to their non-Hispanic White counterparts. In 2017, congenital anomalies contributed 10.3% to the IM among Blacks, and 20.7% to the IM among Whites in Indiana.

Additionally, pregnancy complications/perinatal risks contributed 52.1% to the IM among Blacks, and 45.3% to the IM among Whites in Indiana. Furthermore, SUIDs contributed 24.8% to the IM among Blacks, and 14.6% to the IM among Whites in Indiana. Lastly, assaults/accidents contributed 4.2% to the IM among Blacks, and 4.1% to the IM among Whites in Indiana. Finally, other causes contributed 8.5% to the IM among Blacks, and 15.3% to the IM among Whites in Indiana (Indiana State Department of Health Natality Report, 2019) (See Appendices E & F).

Thus, the high IM among infants born to non-Hispanic Black women in Marion County, Indiana, occurred from an interaction of biological, social, economic, psychological, educational, safety, and environmental factors (MCPHDE, 2018, USDHHS OMH, 2019).

Moreover, IM mainly affects non-Hispanic Black women who experience low social and economic factors, in contrast to their non-Hispanic White counterparts who experienced higher social and economic factors. Social and economic factors such as higher levels of income, education, and employment are usually protective for pregnant women by providing easy access to healthcare, quality prenatal care, and optimal conditions for fetal development. However, these factors are not protective for pregnant non-Hispanic Black women as they do for their non-Hispanic White counterparts (Taylor et al., 2019).

The low social and economic factors influencing IM in Marion County include low median household income. In 2016, approximately 20.5% of the Marion County population had a median household income below the Federal Poverty Guideline. Non-Hispanic Blacks living below the Federal Poverty Guideline constituted 28.7 percent of the Marion County population. In comparison, non-Hispanic Whites living below the Federal Poverty Guideline constituted 15.3% of the Marion County population (MCPHDE, 2018) (See Appendix G).

Additionally, poor educational attainment, low employment status, inadequate nutrition, food insecurity, and greater health spending contribute to higher IM among non-Hispanic Black women compared to their non-Hispanic White counterparts (MCPHDE, 2018).

In 2016, percentage of the Marion County population below the Federal Poverty Guideline by Educational Attainment for persons 25 years and over were as follows; 15.4% for all Marion County; 34.4% for less than high school graduates; 17.7% for high school graduates, including equivalency; 14.3% for some college, associate degree graduates; and 5.2% for bachelor's degree or higher graduates (MCPHDE, 2018) (See Appendix H).

Higher educational attainment influences higher social and economic status and lower IM for non-Hispanic White women. However, higher educational attainment and higher social and economic status for the non-Hispanic Black woman do not ensure a lower IM. Thus, a non-Hispanic Black woman with a master's or professional degree will experience higher IM than a non-Hispanic White woman with a high school diploma (MCPHDE, 2018) (See Appendix I).

Other social and economic factors contributing to higher IM among non-Hispanic Black women include nonemployment or low employment, adolescent mothers, single parents, large families, poor housing, and marital status. These factors contribute significantly to non-Hispanic Black women living below the Federal Poverty Guideline and having higher IM than their non-Hispanic White counterparts (MCPHDE, 2018).

Maternal age is a crucial maternal characteristic related to LBW in determining IM in the United States. The risk of LBW heightens with older maternal age (Lhila & Long (2012) and very young maternal age under 20 years (Hamilton et al., 2015). LBW was also remarkably higher among infants born to very young mothers aged under 20 years (12.4%) and infants born to older mothers aged 40 - 54 years (11.8%). Mothers aged 25 - 29 years and 30 - 34 years (7.4% and 7.6%, respectively) had the lowest percentage of LBW (Hamilton et al., 2015).

At the same time, in 2017, infants born to non-Hispanic Black women under 20 years of age had higher IM (13.0) infant deaths per 1,000 live births than their non-Hispanic White counterparts (8.5) infant deaths per 1,000 live births giving a Non-Hispanic Black/Non-Hispanic White ratio of 1.5.

Additionally, infants born to older non-Hispanic Black women aged 40 - 54 years had higher IMR (13.6) infant deaths per 1,000 live births than their non-Hispanic White counterparts (5.3) infant deaths per 1,000 live births giving a Non-Hispanic Black/Non-Hispanic White ratio of 2.6 (CDC, 2019; Ely & Driscoll, 2019; USDHHS OMH, 2019).

Furthermore, infants born to non-Hispanic Black women aged 20 - 24 years had IMR of 11.4 infant deaths per 1,000 live births while infants born to their non-Hispanic White counterparts, aged 20 - 24 years had an IMR of 6.1 infant deaths per 1,000 live births, giving a Non-Hispanic Black/Non-Hispanic White ratio of 1.9.

Infants born to non-Hispanic Black women aged 25 - 29 years had an IMR of 10.4 infant deaths per 1,000 live births while infants born to their non-Hispanic White counterparts 25 - 29 years had an IMR of 4.6 infant deaths per 1,000 live births giving a Non-Hispanic Black/Non-Hispanic White ratio of 2.3.

Infants born to non-Hispanic Black women aged 30 - 34 years had an IMR of 10.6 infant deaths per 1,000 live births while infants born to their non-Hispanic White counterparts 30 - 34 years had an IMR of 3.8 infant deaths per 1,000 live births, giving a Non-Hispanic Black/Non-Hispanic White ratio of 2.8.

Infants born to non-Hispanic Black women aged 35 - 39 years had an IMR of 10.2 infant deaths per 1,000 live births while infants born to their non-Hispanic White counterparts 35 - 39 years had an IMR of 4.1 infant deaths per 1,000 live births giving a Non-Hispanic Black/Non-Hispanic White ratio of 2.5 (Ely & Driscoll, 2019; USDHHS OMH, 2019). This group of non-Hispanic Black women had lower IM than the two previous extremes of non-Hispanic Black maternal age groups (under 20 years and 40 – 54 years old (See Appendices J & K).

Thus, the individual factors level of the SEM contributes significantly to the disparity gap and higher IM for non-Hispanic Black women compared to their non-Hispanic White counterparts (Alio et al., 2010; CDC, 2015, 2019; Hamilton et al., 2015; Hamilton et al., 2010; Kisantas & Gaffrey, 2010; Matthews & MacDorman, 2010; Martin et al., 2010).

The interpersonal or relationship level comprises the non-Hispanic Black woman's family, friends, spouse or partner, and social network. These people who are closest to or have frequent contact with the individual can significantly impact how they cope with stress during pregnancy or even influence their stress. The interactions at the relationship level can also affect a person's decisions.

The community level consists of many environmental factors, including neighborhoods, schools, workplaces, and health care facilities. For instance, in the circumstance of prenatal care, the existence or lack of accessible and affordable quality healthcare options in a community can influence whether low-income non-Hispanic Black women can receive approved levels of prenatal or health care.

Limited or lack of prenatal care is a significant risk factor and is associated with PTB, LBW, and IM among non-Hispanic Black women. Non-Hispanic Black women are inclined to delay prenatal care and have fewer prenatal visits than non-Hispanic White women in the United States and Marion County.

Finally, SEM's societal level comprises cultural and social norms, economics, and policies that affect education and health. According to the CDC's framework, these policies assist in maintaining economic or social inequalities between racial groups in society (CDC, 2015).

The IM disparity is complex and multi-faceted and presents itself in various forms and environments. Thus, the socio-cultural, economic, and environmental factors that impact IM among non-Hispanic Black women in Marion County are classified into these SEM levels to understand the IM issue better and prevent or reduce IM among non-Hispanic Black women in Marion County.

Community and Society Characteristics

The community and society characteristics that affect IM include maternal access to quality healthcare, prenatal care, and socioeconomic status. The IM disparity gap between non-Hispanic Black women and their non-Hispanic White counterparts is related to the healthcare disparity gap in the United States (CDC, 2015).

Research findings indicate that the primary causes of LBW among non-Hispanic Black women are late or lack of prenatal care, (non-Hispanic Black women are inclined to begin prenatal care in the third trimester), a high teenage pregnancy rate, and limited or lack of quality healthcare accessibility (CDC, 2015; Osterman & Martin, 2018).

Low socioeconomic status is a critical risk factor for high IM among non-Hispanic Black women due to poverty. Non-Hispanic Black women are more than twice as likely as non-Hispanic White women to be poor and have a median family income below the Federal Poverty Guideline (MCPHDE, 2018).

The association between the non-Hispanic Black women's neighborhood poverty and low socioeconomic status results in adverse or unfavorable health outcomes (Baciu, Negussie, Gellen, et al., 2017; MCPHDE, 2018; Swigonski, 2018). The consequence of the low socioeconomic status of non-Hispanic Black women is a lack of health insurance or inadequate health insurance than their non-Hispanic White counterparts (Sohn, 2017). Therefore, non-Hispanic Black women are less likely to obtain routine preventive healthcare. Thus, they receive lower-quality health care than their non-Hispanic White counterparts (Bridges, 2020; Hostetter & Klein, 2018).

Additionally, maternal age, educational level, marital status, employment status, health insurance are strongly associated with income and poverty. Hence low or poor socioeconomic status is the overarching determinant of the higher IM among non-Hispanic Black women compared to their non-Hispanic White counterparts (APA, 2017; Taylor, 2017; Reeves, Rodrigue & Kneebone, 2016).

Historical Context

The historical context indicates conditions that developed over time that impacted IM in the US. The Black population in the US had experienced hundreds of years of racial discrimination in all US society systems, especially in the healthcare system. This discrimination had resulted in higher IM among non-Hispanic Black women than non-Hispanic White women (Ely & Driscoll 2018; Grimm, 2017; March of Dimes, 2020).

Discrimination is the biased treatment of a different group of people based on race. Non-Hispanic Black women who endure discrimination are more likely to have LBW and VLBW than non-Hispanic White women who do not experience racial discrimination. Racial discrimination still constitutes a critical factor associated with many adverse pregnancy and health-related outcomes, such as high IM in the US (Hartil, 2014, Taylor, 2017).

Over time, the development of racial bias overlapped with poor socioeconomic status in the Black communities, giving rise to increased IM rates among non-Hispanic Black women (Elder et al, 2014).

The historical context of the high IM among non-Hispanic Black women in Marion County, Indiana, dates back to about a century ago when "redlined" neighborhoods located close to the south of the White River were created in Marion County.

The industries were sited here and dumped their waste products-harmful chemicals, animal entrails, and gasoline into the river (Bowman, 2020). The neighborhoods were continually assaulted by pollution. Additionally, authorities sent the Indianapolis city sewage to the White River (Bowman, 2020).

The minority and marginalized populations, particularly Blacks, constituted 79% of the Riverside community. They were forced to live in these most hazardous “redlined” zip code areas close to the White River sewage overflow because they could not obtain loans from mortgage banks to live elsewhere (Bowman, 2020).

These redlined neighborhoods had characteristics of minority populatios-79% Blacks; lower median income level of $23,500; low property value of $25,000; low educational attainment, and employment status (Bowman, 2020).

On the other hand, many of the wealthiest communities along the White River and in all of Marion County were located near its northern border. The median income was approximately $133,000, and the property values averaged about $326,000 (Bowman, 2020).

Therefore, the Black communities located in the zip codes south of the White River where the industrial and sewage wastes were dumped experienced highly polluted, smelly waterways, poverty, poor health, and high IM due to historical “redlining” and structural racism (Bowman, 2020). Thus, zip codes located at the south White River in Marion County, Indiana, had the highest IMRs in Marion County

In my discussion with Dr. Swigonski of the Indiana University School of Medicine, she stated that high IM in Marion County occurred among non-Hispanic Black women living mainly in areas of historical redlining and structural racism. She further posited that living in economic, educational, safety, environmental, and resource-challenged areas gave rise to chronic stress, which led to a biological cascade that resulted in PTB, the leading cause of IM among non-Hispanic Black infants (Swigonski, 2019).

According to the Marion County Birth and Death certificate data compiled from 2015 – 2019, the following fifteen zip codes in Marion County had IMRs above 10.00 infant deaths per 1,000 live births-46113 – 21.74 infant deaths per 1,000 live births;

46202 – 19.56 infant deaths per 1,000 live births; 46204 – 18.75 infant deaths per 1,000 live births; 46228 – 14.64 infant deaths per 1,000 live births; 46218 – 13.38 infant deaths per 1,000 live births; 46260 – 13.24 infant deaths per 1,000 live births; 46278 – 12.82 infant deaths per 1,000 live births; 46203 – 12.23 infant deaths per 1,000 live births; 46235 – 12.23 infant deaths per 1,000 live births; 45226 – 11.17 infant deaths per 1,000 live births; 46205 – 10.96 infant deaths per 1,000 live births; 46204 – 10.84 infant deaths per 1,000 live births; 46229 – 10.75 infant deaths per 1,000 live births; 46222 – 10.21 infant deaths per 1,000 live births; and 46234 – 10.03 infant deaths per 1,000 live births (MCPHDE, 2020)

An improved understanding of the possible ways maternal race, socioeconomic factors, and geographic locations impacted IM in Marion County would help the development of intervention strategies to reduce the IM disparity gap between the non-Hispanic Black women and their non-Hispanic White counterparts in Marion County and Indiana and bring about positive social change, social justice and equity (Taylor, Novoa, Hamm & Phadke, 2019).

Conclusion

The risk factors linked to high IM among non-Hispanic Black women in Marion County are complex. The ISDHMCHE and the MCPHDE had implemented interventions targeting the IM disparity gap between the non-Hispanic Black women and the non-Hispanic White women. However, the disparity gap is still persistently high (MCPHE, 2020).

The persistent disparity gap results from the complicated association of racial discrimination, poor socioeconomic risk factors, historical context, environmental, biological, psychological, educational, and health/behavioral factors. This complex relationship results in PTB, LBW, VLBW, congenital disabilities, pregnancy complications, and injuries resulting in more than twice higher IM among non-Hispanic Black women than their non-Hispanic White counterparts.

Data from the research will be utilized to reduce the IM disparity gap between the non-Hispanic Black women and non-Hispanic White women in Marion County. Additionally, the research findings will provide data to manage health services to those who needed them most in the "redlined" zip codes. Thus, reducing the IM disparity gap between the non-Hispanic Black women and their non-Hispanic White counterparts in Marion County, Indiana (Taylor, Novoa, Hamm, & Phadke, 2019).

Chapter 3: Research Methods Introduction

The purpose of this quantitative research was to examine the possible reasons for the higher IM among non-Hispanic Black women compared to non-Hispanic White women in Marion County, Indiana, using a cross-sectional correlational research design (Curtis et al., 2016). The study population consisted of all non-Hispanic Black women and non-Hispanic White women in Marion County and their infants born between 2016 and 2019 inclusive.

The independent or predictor variables to be theorized as risk factors are maternal race, maternal ethnicity, maternal educational level, maternal marital status, maternal age, infant birth weight, infant gestational age, maternal residential zip codes, and prenatal care in the first trimester. The dependent or outcome variable will be infant mortality.

Research Design and Approach

A retrospective quantitative analysis was conducted using secondary data obtained from the MCPHDE linked infant birth and death certificates report from 2016 to 2019.

In calculating the IM rate for 2019, the MCPHDE retrieved the live birth and death certificates data in 2019 from the Vital Statistics system. The death certificates data comprised all infant deaths occurring between 0 and 365 days following the infant's birth. Live birth and death cohort files were then linked using the birth certificate identification (BCID) numbers. The IMR was then calculated using the number of infant deaths divided by the total number of births for 2019 and multiplying by 1,000 (MCPHE, 2020).

In this study, descriptive and inferential statistical analysis were performed to (a) compare the IM from 2016 to 2019 between non-Hispanic Black women and non-Hispanic White women in Marion County and (b) examine the influence of infant characteristics, maternal and family characteristics, community characteristics, and historical context on IM.

The cross-sectional correlational design (Curtis et al., 2016). Was employed to develop empirical models to examine the statistical association between the dependent or outcome variable and multiple independent or predictor risk factor variables for IM.

Population

The population consisted of infants born to non-Hispanic Black women (the study group) and non-Hispanic White women (the reference group) living in Marion County from 2016 to 2019. In 2019, the non-Hispanic Black women group aged 20 – 45 years in Marion County constituted 31.8% of the population, and the non-Hispanic White women group constituted 35.7% of the Marion County population (MCPHDE, 2020).

On the other hand, the Hispanic American women group formed 4.3% of the population. The Asian American women group formed 1.1% of the population, and the other women groups constituted 2.4% of the Marion County population (US Census Bureau, 2020) (See Appendix L).

Thus, these two women population groups (study and reference) were examined to determine the statistical relationship between the independent variables and the dependent variable, IM.

Instrument and Variables

I conducted the study based on secondary data. Therefore, the study did not involve the use of a specific instrument. The dependent variable was IM.

The independent variables indicating risk factors for IM which were grounded on the SEM (Alio et al., 2010), included maternal race, maternal ethnicity, maternal educational level, maternal marital status, maternal age, maternal residential zip codes, infant birth weight, infant gestational age, and prenatal care in the first trimester.

Data Collection and Analysis

After receiving Institutional Review Board (IRB) approval, I contacted the MCPHDE to provide the required data. The department supplied the information as an Excel SPSS data file. The data was statistically analyzed using SPSS version 27 statistical software**.**

Research Question and Hypotheses

This study addressed the following research questions.

RQ1a: Is there an association between mother's educational level, marital status, and age, and IM among non-Hispanic Black infants in Marion County, Indiana?

Ho1: There is no association between mother's educational level and IM among non-Hispanic Black infants in Marion County, Indiana.

Ha1: There is an association between mother's educational level and IM among non-Hispanic Black infants in Marion County, Indiana.

Ho2: There is no association between mother's marital status and IM among non-Hispanic Black infants in Marion County, Indiana.

Ha2: There is an association between mother's marital status and IM among non-Hispanic Black infants in Marion County, Indiana.

Ho3: There is no association between mother's age and IM among non-Hispanic Black infants in Marion County, Indiana.

Ha3: There is an association between mother's age and IM among non-Hispanic Black infants in Marion County, Indiana.

RQ1b: Is there an association between mother's educational level and IM after controlling for mother's marital status and age, among non-Hispanic Black infants in Marion County, Indiana?

Ho1: There is no association between mother's educational level and IM after controlling for mother's marital status and age, among non-Hispanic Black infants in Marion County, Indiana.

Ha1: There is an association between mother's educational level and IM after controlling for mother's marital status and age, among non-Hispanic Black infants in Marion County, Indiana

RQ2: Is there an association between mother's residential zip codes in Marion County, Indiana, and IM among non-Hispanic Black infants in Marion County, Indiana?

Ho2: There is no association between mother's residential zip codes in

Marion County, Indiana, and IM among non-Hispanic Black infants in Marion County, Indiana.

Ha2: There is an association between mother's residential zip codes in Marion County, Indiana, and IM among non-Hispanic Black infants in Marion County, Indiana.

RQ3; Is the association between a mother's race/ethnicity and IM moderated by infant's birth weight, infant's gestational age, or mother's prenatal care in the first trimester among non-Hispanic Black infants in Marion County, Indiana?

Ho3: The association between mother's race/ethnicity and IM is not moderated by infant's birth weight, infant's gestational age, or mother's prenatal care in the first trimester among non-Hispanic Black infants in Marion County, Indiana

Ha3: The association between mother's race/ethnicity and IM is moderated by infant's birth weight, infant's gestational age, or mother's prenatal care in the first trimester among non-Hispanic Black infants in Marion County, Indiana

The independent socioeconomic factor variables that were analyzed were mother's race/ethnicity (categorical variable), mother's educational level (continuous variable), mother's marital status (categorical variable), mother's age (continuous variable), mother's residential zip code (categorical variable), infant's birth weight (continuous variable), infant's gestational age (continuous variable), and mother's prenatal care in the first trimester (categorical variable). The dependent variable was IM (categorical, dichotomous variable).

Nature of the Study/Data Analysis Method

This research involved a retrospective analysis of secondary data obtained from the MCPHDE. I used SPSS 27 statistical software for conducting the quantitative statistical analysis (Creswell & Creswell, 2018) to compare IM between non-Hispanic Black women and non-Hispanic White women in Marion County from 2016 to 2019.

Additionally, I sought to examine the effects of infant characteristics such as PTB, LBW, maternal and family attributes, community characteristics, and historical conditions on IM among non-Hispanic Black women in Marion County.

A cross-sectional correlational research design was appropriate to construct empirical models to examine the significant statistical association between one dependent or outcome variable (IM) and multiple independent or predictor risk factor variables that may predict IM.

I employed the multiple logistic regression model with SPSS 27 statistical software to conduct the quantitative analysis to determine the statistically significant relationship between the independent risk factor variables and the dependent variable, IM. IM was coded as a dichotomous outcome variable indicating whether an infant died in the first year of life (Statistics Solution, n.d.).

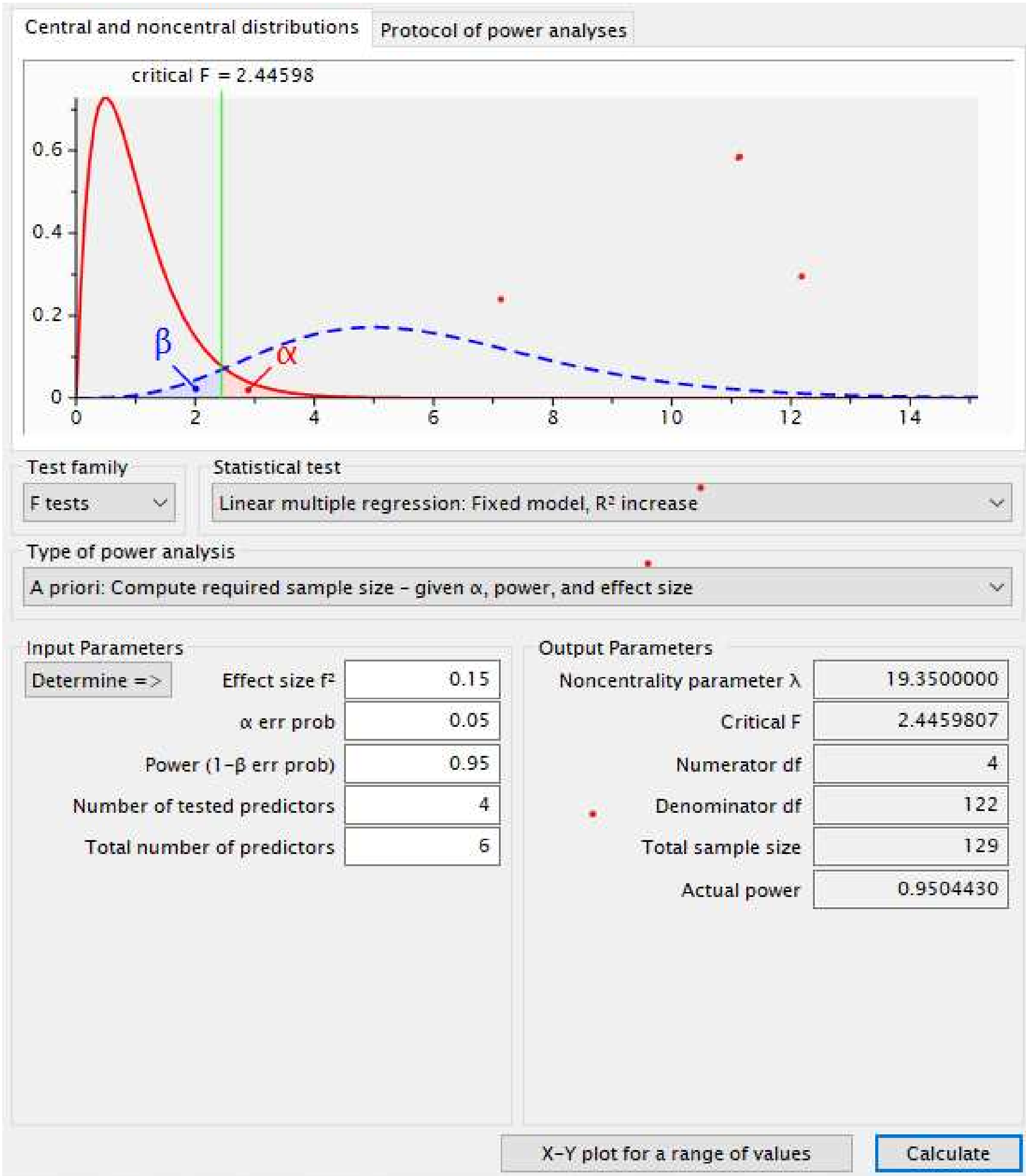
I selected the multiple logistic regression model for this study to determine the relationship between the independent risk factor variables and the dichotomous dependent variable and the odds ratio of a non-Hispanic Black infant dying in their first year of life (Statistics Solution, n.d.).

The cross-sectional correlational research design and multiple logistic regression test model were the appropriate research tools for the quantitative statistical analysis of the retrospective secondary data for my study**.**

G* Power a priori was used to compute the total sample size required for the quantitative research using a correlational design. The alpha level was 0.05, the power 0.95, and the effect size 0.15. The test family was the F test. The statistical test was Linear multiple regression - fixed model, R2 increase. The number of test predictors was four, and the total number of predictors was six. Therefore, the calculated total sample size using G* Power was 129 (Figure 1) (UCLA Statistical Consulting, 2021).

Figure I

G* Power Analysis



Protection of Participants' Rights

After receiving IRB approval for data collection, I requested secondary data from the vital statistics office of MCPHD.

There was no physical encounter with the study participants. When asking for the data, I contacted the MCPHDE via email.

I completed a Data User Agreement (DUA) that spelled out the conditions for accessing the data, the explicit purpose of using the data, and expiration, mandating the data file. I signed the contract, dated it, and returned it to the vital statistics office of MCPHD. All the participants' identifiers were deleted from the dataset to protect their confidentiality and privacy. The study findings will be shared with Black community leaders and health services providers of Black communities in the redlined zip codes to give quality health care and prenatal care to those most in need in the "redlined" zip codes.

Additionally, I will share the study findings with public health practitioners, medical providers serving the red-lined communities, political representatives, and policymakers of the affected Marion County zip codes for implementation to achieve a positive social change in IM among non-Hispanic Black women.

The data will stay with me for 3 years and be safeguarded on a personal computer that is only accessible to me and protected by password encryption.

Lastly, I will share data by publishing the research results in an academic journal, such as ProQuest.

Thus, the research findings will be disseminated to the community stakeholders and partners to achieve a positive social change of reducing IM among non-Hispanic Black women and the IM disparity gap between non-Hispanic Black women and their non-Hispanic White counterparts in Marion County, Indiana.

Conclusion

The research was a quantitative study using a cross-sectional correlational research design to compare IM between non-Hispanic Black women and non-Hispanic White women in Marion County, Indiana.

The SEM was employed as the theoretical framework to analyze the independent variables and the dependent variable based on the secondary data provided by the MCPHD. The data collection and analysis method to address the research questions was discussed in this chapter.

The results of the study addressing the research questions will be presented in Chapter 4. The research findings and their significance to the Black community, public health professionals, health services providers, and other stakeholders will be discussed in Chapter 5.

Additionally, the implications of the study for social change will be discussed in Chapter 5. Furthermore, the generalizability of the research findings to other Black communities outside Marion County will be discussed in Chapter 5.

Quantitative research was conducted to examine the complex causes of the higher IM among non-Hispanic Black women compared to non-Hispanic White women in Marion County from 2016 to 2019 using cross-sectional correlational research design and secondary data.

The study will use the research findings to implement an intervention to prevent or reduce the IM disparity gap (Healthy People 2020) between non-Hispanic Black women and their non-Hispanic White counterparts in Marion County, Indiana.

Chapter 4: Results

Introduction

Through this research, I aimed (a) to examine the complex causes of higher IM among non-Hispanic Black women compared to their non-Hispanic White counterparts in Marion County, Indiana from 2016 to 2019, and (b) to examine the effects of infant characteristics, maternal characteristics, community/societal characteristics, and historical context on IM.

Data Collection

The 11 variables used for the statistical analysis were defined in Table 1. IM was the dependent variable. The other 10 variables were classified as independent factors, or risk factors for IM.

Table 1

Variables Used in Statistical Analysis

Variable	Units
01 Infant Mortality	1 = Live birth/alive; 2 = Infant mortality/dead
02 Community	Marion County
03 Mother's Race/Ethnicity	1 = Non-Hispanic White; 2 = Non-Hispanic Black
04 Year of Infant's Birth	2016, 2017, 2018, 2019
05 Infant's Birth Weight	Grams
06 Infant's Gestational Age	Weeks
07 Mother's Age	Years
08 Mother's Education	Years

09 Mother's Marital Status	0 = Not Married, 1= Yes Married
10 Location of Birth-zip codes	Marion County zip codes
11 Prenatal Care in First Trimester	1 = Yes, 0 = No

Descriptive Statistics

Table 2 summarized the frequency distribution of the study participants and their live infant births in Marion County from 2016 to 2019.

The total number of live infant births within this study period was *N* = 44,653 (100.0%).

The reference racial/ethnic participant group, non-Hispanic White women had *n* = 18,070 (40.5%) infant births. On the other hand, the study racial/ethnic participant group, non-Hispanic Black women had *n* = 14, 833 (33.2%) infant births.

Other racial/ethnic women groups in Marion County who had live infant births during this study period comprised of the Latino or Hispanic group, *n* = 7,546 (16.89%) infant births; Asian women had n = 2,348 (5.3%) infant births; Native American women had *n* = 38 (0.1%) infant births; Hawaiian/Pacific Islanders women had *n* = 28 (0.1%) infant births; women of other, non-Hispanic races had *n* = 845 (1.9%) infant births; women of unknown, non-Hispanic races had *n* = 54 (0.1%) infant births; women of 2 or more non-Hispanic races had n = 891 (2.0%) infant births (MCPHDE, 2020).

Table 2 showed the frequency and percentage distribution of the live infant births among the various racial/ethnic groups of women relative to each other in Marion County from 2016 to 2019, while Figure 2 is a graph of the frequency and percentage of live infant births.

Table 2

Participants: Frequency and Percentage of Live Infant Births Among Races/Ethnicities in Marion County, 2016 to 2019

Variable	Category	
Mother's race/ethnicity	Live infant births *n*	Live infant births %
White, non-Hispanic	18,070	40.5
Black, non-Hispanic	14,833	33.2
Latino, Hispanic	7,546	16.9
Asian, non-Hispanic	2,348	5.3
Native American, non-Hispanic	38	0.1
Pacific Islander, non-Hispanic	28	0.1
Other, non-Hispanic	845	1.9
Unknown, non-Hispanic	54	0.1
2 or more races, non-Hispanic	891	2.0
Total	44,653	100.0

Figure 2

Frequency and Percentage of Live Infant Births Among Races in Marion County From 2016 to 2019

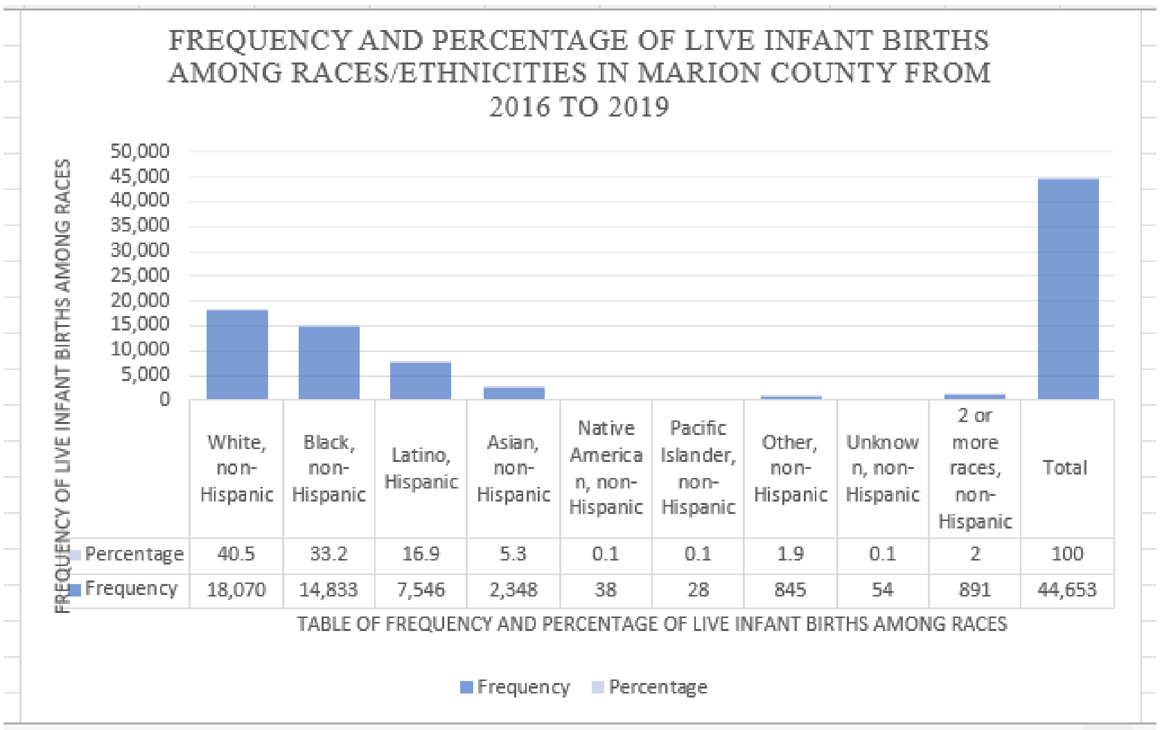


Table 3 summarized the frequency and percentage distribution of live infant births and infant mortalities (deaths) in Marion County from 2016 to 2019. The live infant births, *n* = 44,335, constituted 99.3% of the total live infant births during this study period.

On the other hand, the number of infant mortalities during the study period*, n* = 318, constituted 0.7% of the total infant births (MCPHD, 2020).

Figure 3 illustrated the frequency and percentage of the live infant births and infant mortalities in Marion County from 2016 to 2019.

Thus, Table 3 and Figure 3 portrayed the frequency and percentage of live infant births and infant deaths in Marion County from 2016 to 2019.

Table 3

Frequency of Live Infant Births and Infant Mortality (Deaths) in Marion County From 2016 to 2019

Variable	Category			
	Frequency	Percent	Valid percent	Cumulative percent
	n	%	%	%
Live infant births	44,335	99.3	99.3	99.3
Infant mortality	318	0.7	0.7	100.0
Total	44,653	100.0	100.0	

Figure 3

Frequency of Live Infant Birth and Infant Mortality in Marion County From 2016 to 2019

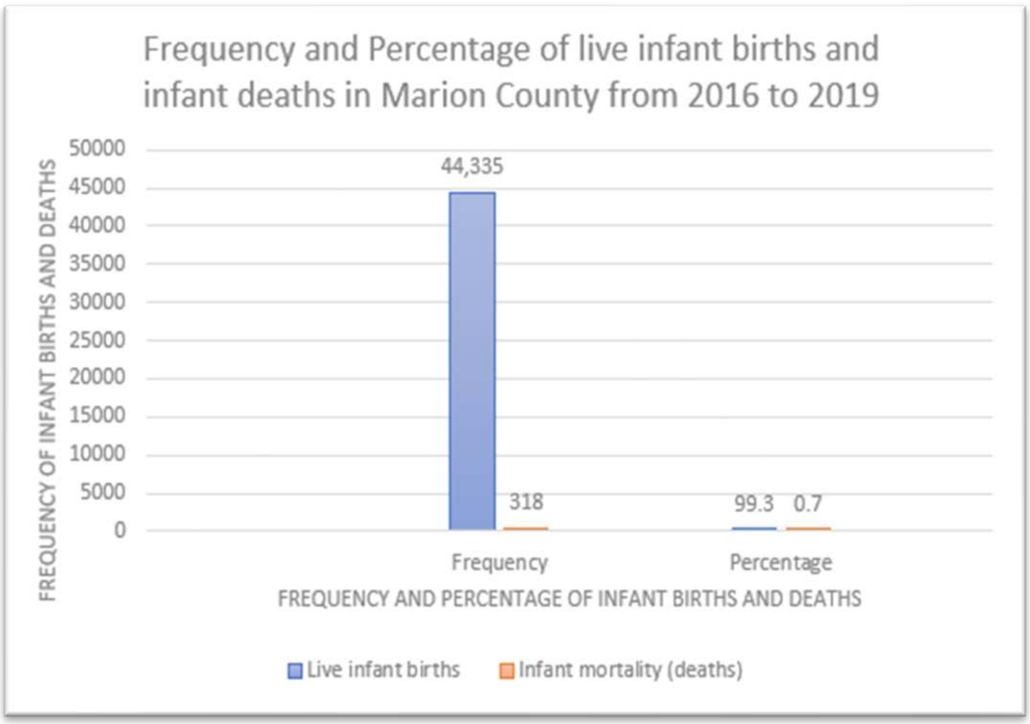


Table 4 summarized the frequency and percentage distribution of IM among the various racial/ethnic groups of women in Marion County from 2016 to 2019. The total number of infant deaths for the study period was $N = 318$ (100.0%).

White non-Hispanic women had $n = 101$ (31.8%) infant deaths; Black non-Hispanic women had $n = 158$ (49.7%) infant deaths; Latino women had $n = 33$ (10.4%) infant deaths: Asian non-Hispanic women had $n = 13$ (4.1%) infant deaths; women of 2 or more races had $n = 8$ (2.5%) infant deaths; women of unknown races had $n = 2$ (0.6%)

infant deaths; women of other races had *n* = 2 (0.6%) infant deaths; and Hawaiian/Pacific Islander women had *n* = 1 (0.3%) infant deaths (MCPHD, 2020).

Figures 4 illustrated the frequency and percentage of infant mortalities in Marion County from 2016 to 2019.

Thus, Table 4 and Figures 4 portrayed the frequency and percentage of infant deaths in Marion County from 2016 to 2019.

Table 4

Infant Mortality Among Races in Marion County, Indiana, 2016–2019

Variable	Category	
Mother's race/ethnicity	Infant mortality *n*	Infant mortality %
Total deaths for all races	318	100.0
White, non-Hispanic	101	31.8
Black, non-Hispanic	158	49.7
Latino, Hispanic	33	10.4
Asian, non-Hispanic	13	4.1
2 or more races, non-Hispanic	8	2.5
Unknown race	2	0.6
Other races	2	0.6
Hawaiian/Pacific Islanders	1	0.3

Figure 4

Frequency and Percentage of Infant Mortality in Marion County From 2016 to 2019

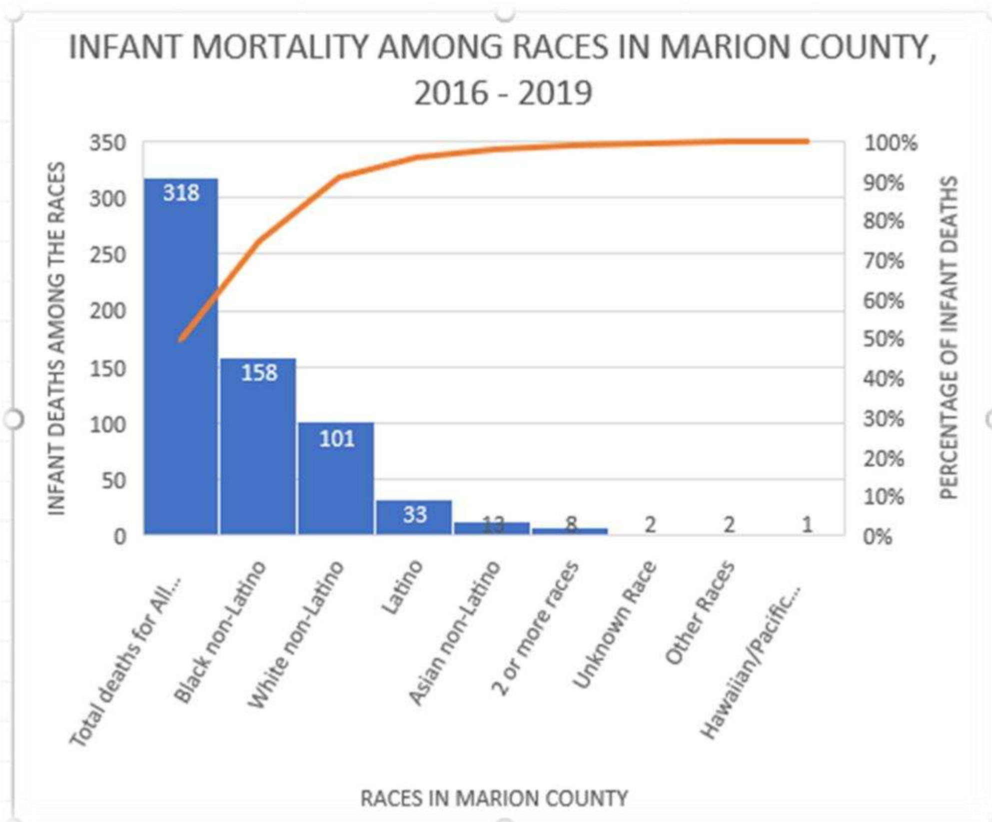


Table 5 summarized the frequency and percentage distribution of IM among the various racial/ethnic women groups in Marion County in 2016. The total infant deaths were N = 109 (100.0%). White non-Hispanic women had n = 28 (25.7%) infant deaths; Black non-Hispanic women had n = 62 (56.9%) infant deaths; Latino women had n = 11 (10.1%) infant deaths: Asian non-Hispanic women had n = 4 (3.7%) infant deaths; women of 2 or more races had n = 3 (2.8%) infant deaths; and women of unknown races had n = 1 (0.9%) infant deaths (MCPHD, 2020).

Figure 5 illustrated the frequency and percentage of infant mortalities in Marion County in 2016.

Thus, Table 5 and Figure 5 portrayed the frequency and percentage of infant deaths in Marion County in 2016

Table 5

Infant Mortality Among Races in Marion County in 2016

Variable	Category	
Mother's race/ethnicity	Infant mortality *n*	Infant mortality %
Total deaths for all races	109	100.0
White, non-Hispanic	28	25.7
Black, non-Hispanic	62	56.9
Latino, Hispanic	11	10.1
Asian, non-Hispanic	4	3.7
2 or more races, non-Hispanic	3	2.8
Unknown race	1	0.9

Figure 5

Frequency and Percentage of Infant Mortality Among Races in Marion County in 2016

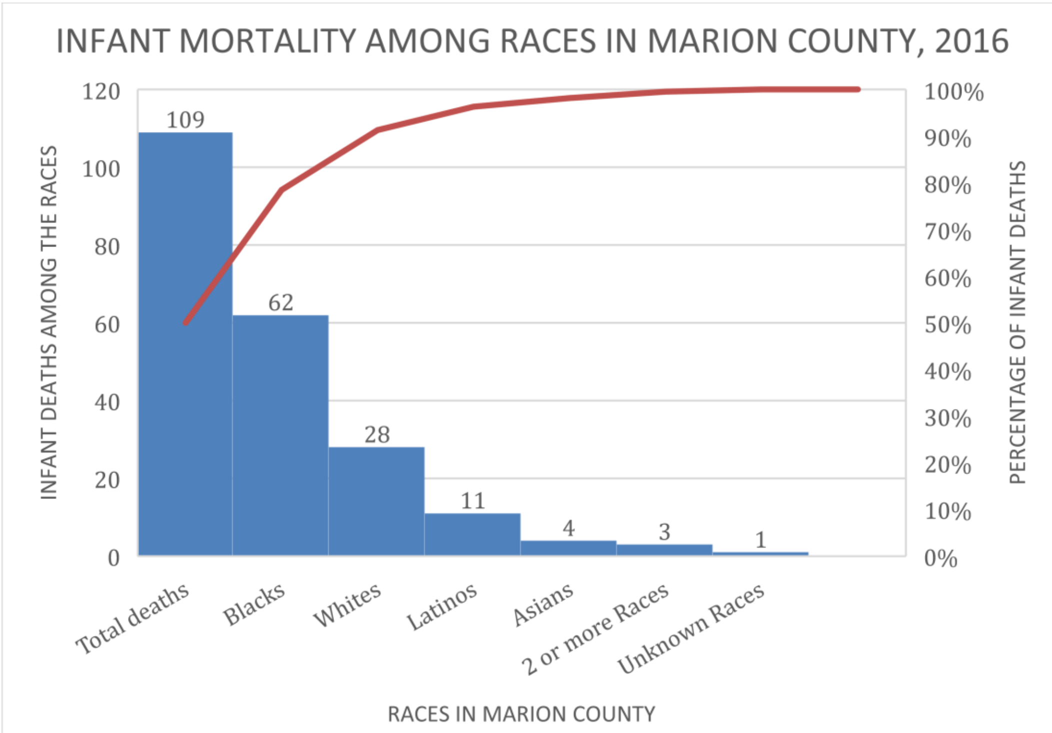


Table 6 summarized the frequency and percentage distribution of IM among the various racial/ethnic women groups in Marion County in 2017. The total infant deaths were *N* = 60 (100.0%). White non-Hispanic women had *n* = 22 (36.7%) infant deaths; Black non-Hispanic women had *n* = 25 (41.7%) infant deaths; Latino women had *n* = 7 (11.7%) infant deaths: Asian non-Hispanic women had *n* = 5 (8.3%) infant deaths1 and women with unknown races had *n* = 1 (1.7%) infant deaths (MCPHD, 2020).

Figure 6 illustrated the frequency and percentage of infant mortalities in Marion County in 2017. Thus, Table 6 and Figure 6 chart portrayed the frequency and percentage of infant deaths in Marion County in 2017.

Table 6

Infant Mortality Among Races in Marion County in 2017

Variable	Category	
Mother's race/ethnicity	Infant mortality *n*	Infant mortality %
Total deaths for all races	60	100.0
White, non-Hispanic	22	36.7
Black, non-Hispanic	25	41.7
Latino, Hispanic	7	11.7
Asian, non-Hispanic	5	8.3
Unknown race	1	1.7

Figure 6

Frequency and Percentage of Infant Mortality Among Races in Marion County in 2017

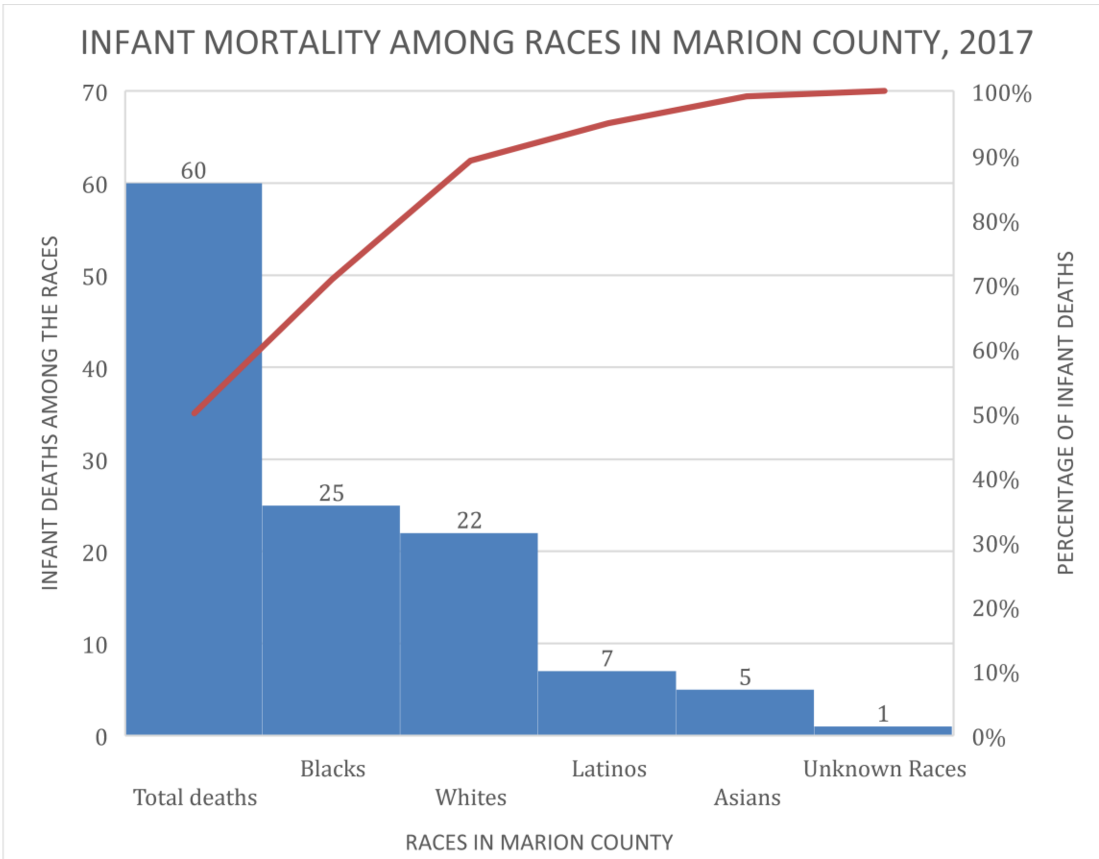


Table 7 summarized the frequency and percentage distribution of IM among the various racial/ethnic women groups in Marion County in 2018. The total infant deaths were *N* = 84 (100.0%). White non-Hispanic women had *n* = 26 (30.9%) infant deaths; Black non-Hispanic women had *n* = 46 (54.8%) infant deaths; Latino women had *n* = 2 (2.4%) infant deaths: Asian non-Hispanic women had *n* = 2 (2.4%) infant deaths; women of 2 or more races had *n* = 5 (5.9%) infant deaths; women of other races had *n* = 2 (2.4%)

infant deaths, and Hawaiian/Pacific Islanders had *n* = 1(1.2%) infant deaths (MCPHD, 2020).

Figure 7 illustrated the frequency and percentage of infant mortalities in Marion County in 2018.

Thus, Table 7 and Figure 7 portrayed the frequency and percentage of infant deaths in Marion County in 2018.

Table 7

Infant Mortality Among Races in Marion County in 2018

Variable	Category	
Mother's race/ethnicity	Infant mortality *n*	Infant mortality %
Total deaths for all races	84	100.0
White, non-Hispanic	26	30.9
Black, non-Hispanic	46	54.8
Latino, Hispanic	2	2.4
Asian, non-Hispanic	2	2.4
2 or more races, non-Hispanic	5	5.9
Other races	2	2.4
Hawaiian/Pacific Islanders	1	1.2

Figure 7

Frequency and Percentage of Infant Mortality in Marion County in 2018

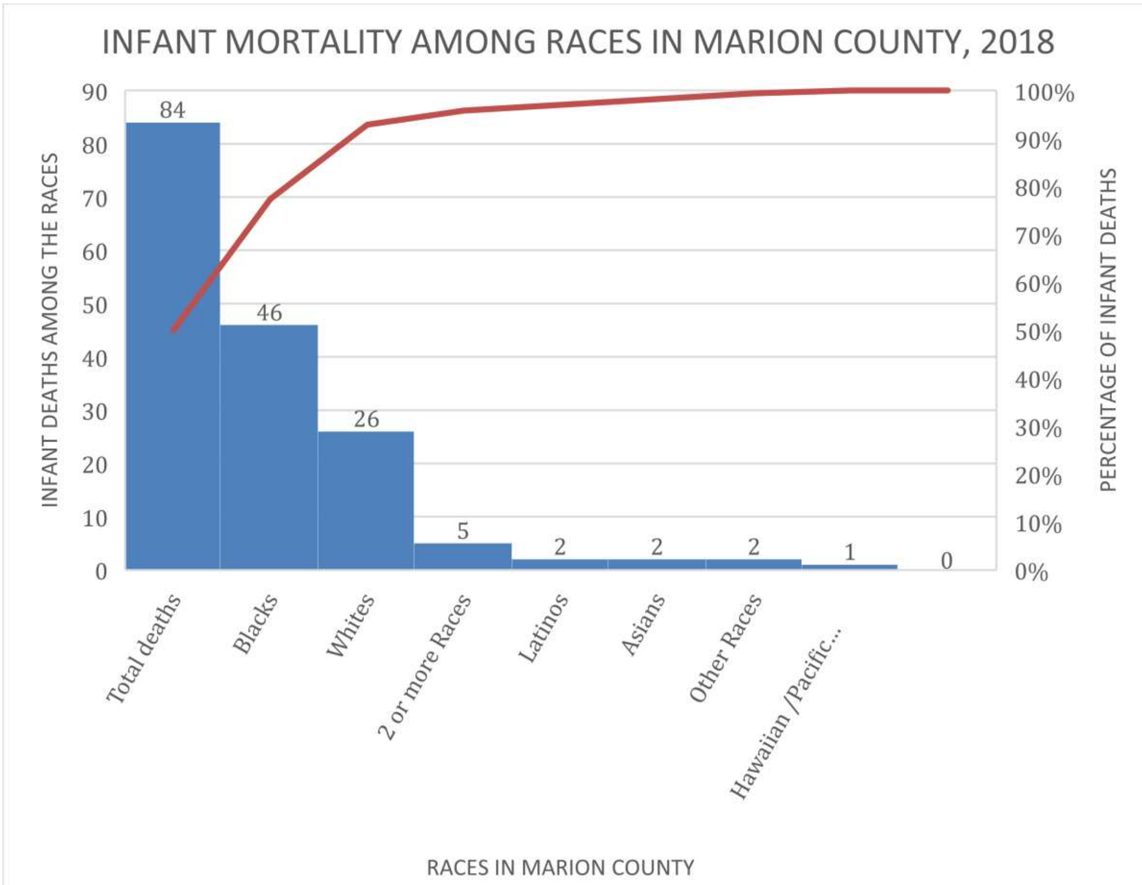


Table 8 summarized the frequency and percentage distribution of IM among the various racial/ethnic women groups in Marion County in 2019. The total infant deaths were $N = 65$ (100.0%). White non-Hispanic women had $n = 25$ (38.5%) infant deaths; non-Hispanic Black women had $n = 25$ (38.5%) infant deaths; Latino women had $n = 13$ (20.0%) infant deaths: and Asian non-Hispanic women had $n = 2$ (3.1%) infant deaths (MCPHD, 2020).

Figure 8 illustrated the frequency and percentage of infant mortalities in Marion County in 2019.

Thus, Table 8 and Figure 8 chart portrayed the frequency and percentage of infant deaths in Marion County in 2019.

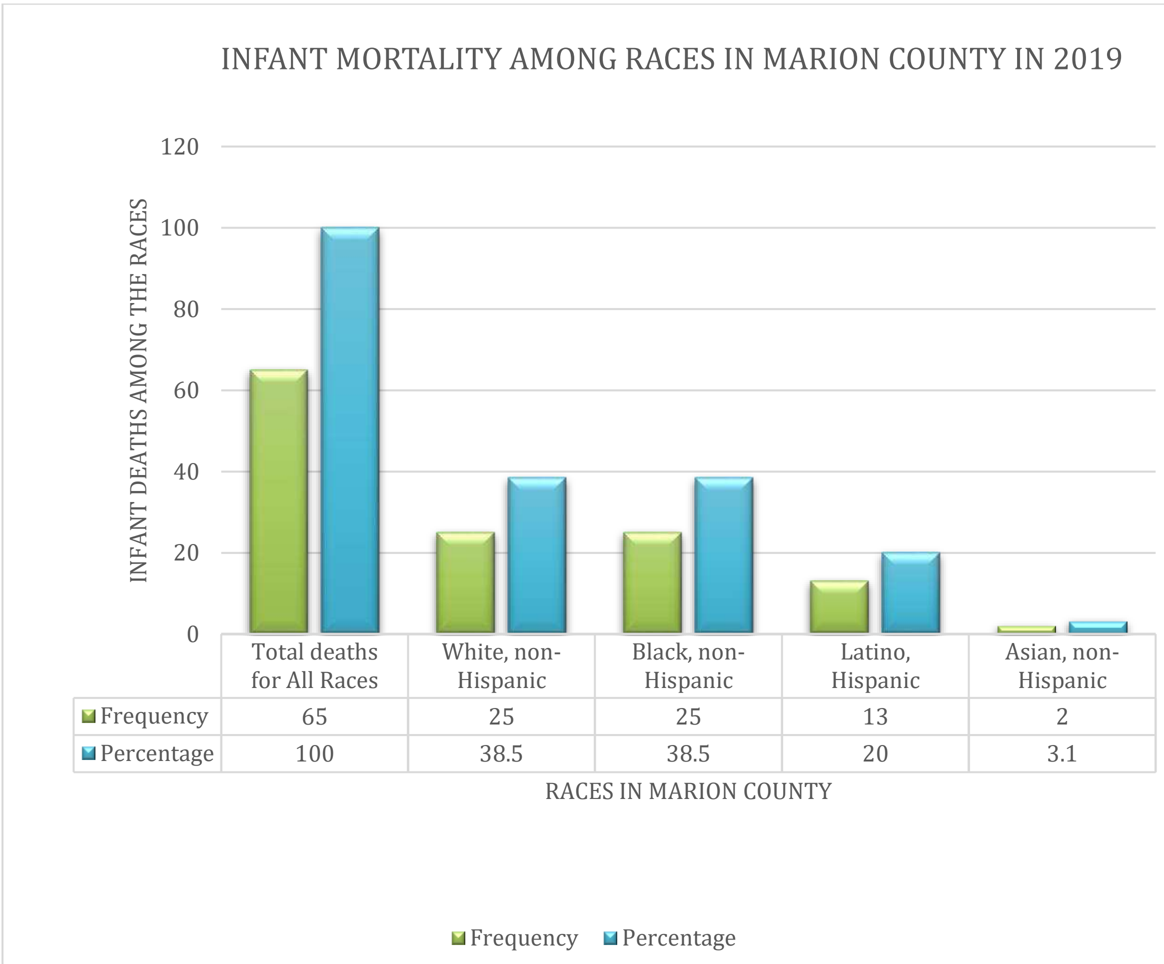
Table 8

Infant Mortality Among Races in Marion County in 2019

Variable	Category	
Mother's race/ethnicity	Infant mortality *n*	Infant mortality %
Total deaths for all races	65	100.0
White, non-Hispanic	25	38.5
Black, non-Hispanic	25	38.5
Latino, Hispanic	13	20.0
Asian, non-Hispanic	2	3.1

Figure 8

Frequency and Percentage of Infant Mortality in Marion County in 2019



Results

Research Question 1 Data Analysis

The data were analyzed using IBM SPSS version 27. To examine the research questions, I used Pearson's chi-square to compare the association of the categorical independent variables with the categorical dependent variable IM.

The binary logistic regression was also used to predict the association between the independent variables, and the dependent variable, IM (which was binary, 1 = alive/2 = dead) among non- Hispanic Black infants in Marion County, Indiana. The significance value *p* was set at 0.05 with a confidence interval set at 95%.

RQ1a: Is there an association between mother's educational level, marital status, and age, and IM among non-Hispanic Black infants in Marion County, Indiana?

Ho1: There is no association between mother's educational level and IM among non-Hispanic Black infants in Marion County, Indiana.

Ha1: There is an association between mother's educational level and IM among non-Hispanic Black infants in Marion County, Indiana.

Ho2: There is no association between mother's marital status and IM among non-Hispanic Black infants in Marion County, Indiana.

Ha2: There is an association between mother's marital status and IM among non-Hispanic Black infants in Marion County, Indiana.

Ho3: There is no association between mother's age and IM among non-Hispanic Black infants in Marion County, Indiana.

Ha3: There is an association between mother’s age and IM among non-Hispanic Black infants in Marion County, Indiana.

The format for mother’s education at Marion County were as follows:
8="8TH GRADE OR LESS"; 10="9TH THRU 12TH GRADE, NO DIPLOMA"; 12="HIGH SCHOOL GRADUATE OR GED"; 13="SOME COLLEGE CREDIT BUT NOT A DEGREE”; 14="ASSOCIATE DEGREE, AA, AS"; 15="MASTERS DEGREE, MA, MS, MENG, MED, MSW, MBA"; 16="BACHELORS DEGREE, BA, AB, BS" 20="DOCTORATE DEGREE, PHD, EDD, MD, DDS, DVM,LLB,JD"; .="UNKNOWN.

Bivariate logistic regression was performed to examine whether an association existed between mother’s educational level and IM among non-Hispanic Black infants in Marion County. Table 9 showed the table depicting the relationship between mother’s educational level and IM.

The study showed that compared to the eighth grade, if the mother had one year more of education, it decreased the odds of IM by 6.7% (OR = 0.933, 95%Cl [0.890 - 0.979], $p < 0 .05$).

The beta coefficient indicated that a mother's years of educational attainment were statistically significant predictors of IM. Therefore, the null hypothesis was rejected, and the alternative hypothesis was accepted.

Table 9

Bivariate Logistic Regression Model to Predict Infant Mortality by Mother's Education

Variable	B	*SE*	Wald	*df*	Sig	Exp(B)	95% CI for Exp(B)	
							Lower	Upper
Mother's ed.	-.069	.024	8.181	1	.004	.933	.890	.979
Constant	-4.075	.305	178.805	1	.000	.017		

Note. Significant predictor of infant mortality ($p < .05$).

Table 10 indicated the model showing the frequency and percentage of yes married mothers, 20,342 (45.6%), not married mothers, 24,258 (54.3%), and missing cases, 53 (0.1%), giving a total number of 44,653 mothers in Marion County (100.0%) from 2016 to 2019.

Table 10

Model Showing Frequency and Percentage of Mother's Marital Status

Variable	Category		
	Frequency	Percent	Cumulative
Mother's marital status			
Not married	24,258	54.3	54.3
Yes married	20,342	45.6	99.9
Missing cases	53	0.1	100.0
Total	44,653	100.0	

First, I performed a chi-square test of independence to solely examine the association between mother's marital status and IM. The association between these variables was statistically significant, $X^2 = 4.155$, $p = 0.042$

Bivariate logistic regression was also performed to examine whether an association existed between mother's marital status and IM among non-Hispanic Black infants in Marion County. Table 11 showed the table depicting the relationship between mother's marital status and IM. .

The study found that compared to unmarried mothers, married mothers were less likely to experience IM by 21% (OR = 0.792, 95%Cl [0.632 - 0.992], p < 0 .05).

The beta coefficient indicated that a mother's marital status was a statistically significant predictor of IM among non-Hispanic Black infants in Marion County, Indiana. Therefore, the null hypothesis was rejected, and the alternative hypothesis was accepted.

Table 11

Bivariate Logistic Regression Model to Predict Infant Mortality by Mother's Marital Status

Variable	B	*SE*	Wald	*df*	Sig	Exp(B)	95% CI for Exp(B)	
							Lower	Upper
Mother's marital status	-.234	.115	4.14	1	.042	.792	.632	.992
Constant	-4.836	.073	4432.32	1	.000	.008		

Note. Significant predictor of infant mortality ($p < .05$).

Bivariate logistic regression was performed to examine whether an association existed between mother's age and IM among non-Hispanic Black infants in Marion County. Table 12 showed the table depicting the relationship between mother's age and IM.

The study showed that a mother's age during pregnancy was not found to be significantly associated with infant mortality (OR = 0.997, 95%Cl [0.976 - 1.018], p > 0.05). Therefore, the null hypothesis was retained, and the alternative hypothesis was rejected.

Table 12

Bivariate Logistic Regression Model to Predict Infant Mortality by Mother's Age

Variable	B	*SE*	Wald	*df*	Sig	Exp(B)	95% CI for Exp(B)	
							Lower	Upper
Mother's age	-.003	.011	.087	1	.768	.997	.976	1.018
Constant	-4.848	.309	246.173	1	.000	.008		

Note. Significant predictor of infant mortality ($p < .05$).

Thus, in the study findings to answer RQ1a, the beta coefficients indicated that:

1. Compared to the eighth grade, if the mother had one year more of education, it decreased the odds of IM by 6.7%.

2. Compared to unmarried mothers, married mothers were less likely to experience IM by 21%.

3. A mother's age during pregnancy was not found to be significantly associated with IM.

To examine the best predictor of IM among this population of women, multivariable logistic regression was performed to determine which IV best predicted IM.

RQ1b: Is there an association between mother's educational level and IM after controlling for mother's marital status and age, among non-Hispanic Black infants in Marion County, Indiana?

Ho1: There is no association between mother's educational level and IM after controlling for mother's marital status and age, among non-Hispanic Black infants in Marion County, Indiana.

Ha1: There is an association between mother's educational level and IM after controlling for mother's marital status and age, among non-Hispanic Black infants in Marion County, Indiana

Table 13 showed the model depicting the relationship between mother's educational level and IM after controlling for mother's marital status and age.
The study showed that at the 10th grade, the mother's educational level was significantly associated with IM (OR = 0.111, 95%Cl [0.015 - 0.808], $p < 0.05$).
Thus, the study indicated that there was an association between mother's educational level and IM after controlling for mother's marital status and age, among non-Hispanic Black infants in Marion County, Indiana. Therefore, the null hypothesis was rejected, and the alternative hypothesis was accepted. Lastly, the mother's educational level was the best predictor of IM than mother's marital status and age among this population of women.

Table 13

Multivariable Logistic Regression Model to Predict Infant Mortality by Mother's Education after controlling for mother's marital status and age

infant mortality [a]

Variable	B	*SE*	Wald	*df*	Sig	Exp(B)	95% CI for Exp(B)	
							Lower	Upper
Live birth intercept	7.012	1.082	42.027	1	.000			
Mother's Marital Status	.087	.129	.458	1	.498	1.091	.848	1.404
Mother's age	-.012	.011	1.214	1	.271	.988	.966	1.010
[Mother's ed = 8]	-1.633	1.033	2.498	1	.114	.195	.026	1.480
[Mother's ed = 10]	-2.201	1.014	4.710	1	.030	.111	.015	.808
[Mother's ed = 12]	-1.868	1.011	3.414	1	.065	.155	.021	1.120
[Mother's ed = 13]	-1.866	1.012	3.400	1	.065	-155	.021	1.125
[Mother's ed = 14]	-1.977	1.023	3.733	1	.053	.138	.019	1.029
[Mother's ed = 15]	-1.596	1.036	2.374	1	.123	.203	.027	1.544
[Mother's ed = 16]	-1.540	1.014	2.307	1	.129	.214	.029	1.564
[Mother's ed = 20]	0[b]			0				

Note. Significant predictor of infant mortality ($p < .05$).

a. The reference category is: infant mortality.

b. This parameter is set to zero because it is redundant.

Research Question 2 Data Analysis

RQ2: Is there an association between th4e mothers' residential zip codes in Marion County, Indiana, and IM among non-Hispanic Black infants in Marion County, Indiana?

Ho2: Mothers' residential zip codes in Marion County, Indiana, were not associated with IM among non-Hispanic Black infants in Marion County, Indiana.

Ha2: Mother's residential zip codes in Marion County, Indiana, were associated with IM among non-Hispanic Black infants in Marion County, Indiana.

The mother's residential zip codes in Marion County, Indiana, were not categorized.

First, I performed a chi-square test of independence to solely examine the association between mother's residential zip codes and IM. The association between these variables was not statistically significant, Likelihood Ratio = 46.722, $p = 0.991$.

Bivariate logistic regression was also performed to predict the association between the variable, mother's residential zip code, and IM among non-Hispanic Black infants in Marion County. Table 14 showed the table depicting the relationship between mother's residential zip codes and IM. The study showed that mother's residential zip code was not found to be significantly associated with IM in Marion County, Indiana (OR = 0.951, 95%Cl [0.000 -.], p > 0.05).

Thus, in the study findings to answer the second research question, the odds ratio indicated that mothers' residential zip codes did not determine IM among the study and reference groups of women in Marion County. Therefore, the null hypothesis was retained, and the alternative hypothesis was rejected.

Table 14

Bivariate Logistic Regression Model to Predict Infant Mortality by Mother's Residential Zip Code

Variable	B	*SE*	Wald	*df*	Sig	Exp(B)	95% CI for Exp(B)	
							Lower	Upper
Mother's res. zip code			38.46	72	1.000			
Mother's res. zip code	-0.5	55168.66	.000	1	1.000	.951	.000	.
Constant	21.153	37790.29	.000	1	1.000	.000		.

Note. Significant predictor of infant mortality ($p < .05$).

Research Question 3 Data Analysis

RQ3; Is the association between a mother's race/ethnicity and IM moderated by infant's birth weight, infant's gestational age, or mother's prenatal care in the first trimester among non-Hispanic Black infants in Marion County, Indiana?

Ho3: The association between mother's race/ethnicity and IM is not moderated by infant's birth weight, infant's gestational age, or mother's prenatal care in the first trimester among non-Hispanic Black infants in Marion County, Indiana

Ha3: The association between mother's race/ethnicity and IM is moderated by infant's birth weight, infant's gestational age, or mother's prenatal care in the first trimester among non-Hispanic Black infants in Marion County, Indiana

The variable mother's race/ethnicity was recoded into "Newrace" depicting the White non-Hispanic women, "W" = 1, and Black non-Hispanic women, "B" = 2, to perform the data analysis to answer RQ3.

Table 15 showed a table indicating the significance of the variable, Newrace, on IM. The table indicated that the variable, Newrace was a statistically significant predictor of IM when comparing pregnancy outcomes between non-Hispanic Black women and non-Hispanic White women in Marion County, Indiana.

Table 15

Model Showing Significance of Interaction Terms on association between Newrace & IM

Variable	Category		
	Score	*df*	Sig
Newrace	11.145	1	.001
Newrace*BIRTH_WEIGHT_GRAM	219.219	1	.000
Newrace * EST_GEST	48.516	1	.000
Newrace * FIRSTPNC	6.001	1	.014

First, I performed a chi-square test of independence to solely examine the association between the variable, Newrace, and IM. The association between these variables was statistically significant, $X^2 = 25.453$, $p = 0.000$.

Bivariate logistic regression was also performed to predict the association between the variable, Newrace, and IM among non-Hispanic Black infants in Marion County. Table 16 showed the table depicting the relationship between the variable, Newrace and IM. The study found that a mother's race/ethnicity was a statistically significant predictor of infant mortality (OR = 1.884, 95% Cl [1.467 - 2.420], $p < 0.05$). The odds ratio indicated that non-Hispanic Black mothers were 1.884 times more likely to experience IM than non-Hispanic White mothers in Marion County. Therefore, the null hypothesis was rejected, and the alternative hypothesis was accepted.

Table 16

Bivariate Logistic Regression Model to Predict IM by Newrace

Variable	B	*SE*	Wald	*df*	Sig	Exp(B)	95% CI for Exp(B)	
							Lower	Upper
Newrace	.634	.128	24.637	1	.000	1.884	1.467	2.420
Constant	-5.805	.214	734.555	1	.000	.003		

Note. Significant predictor of infant mortality ($p < .05$).

To answer RQ3, I conducted a moderation analysis to examine if the infant's birth weight, infant's estimated gestation, or mother's prenatal care in the first trimester had any moderating effect on the association between the mother's race/ethnicity and IM among non-Hispanic Black infants in Marion County.

Table 17 showed the results of the moderation analysis. To determine if the infant's birth weight, infant's estimated gestation, or mother's prenatal care in the first trimester had any moderating effect on the association between the mother's race/ethnicity and IM, I checked the significance of the interaction terms. The interaction term, Newrace * BIRTH_WEIGHT_GRAM, had (OR = 1.000, 95% CI [1.000 - 1.000], p = 0.002), which is less than 0.05. We conclude that the moderator, infant's birth weight in grams, had a significant moderating effect on the association between mother's race/ethnicity and IM.

Additionally, the interaction term, Newrace * EST_GEST, had (OR = 0.847, 95% CI [0.831 - 0.862], p = 0.000), which is less than 0.05. We conclude that the moderator, infant's estimated gestation in weeks, had a significant moderating effect on the association between mother's race/ethnicity and IM.

Furthermore, the interaction term, Newrace * FIRSTPNC, had (OR = 0.829, 95% CI [0.673 - 1.021], p = 0.077), which is greater than 0.05. We conclude that the moderator, mother's prenatal care in the first trimester, had no significant moderating effect on the association between mother's race/ethnicity and IM.

From the research findings, the infant's birthweight in grams, and the infant's estimated gestation in weeks had significant moderating effects on the association between the mother's race/ethnicity and IM. Therefore, the null hypothesis was rejected, and the alternative hypothesis was accepted.

Table 17

Bivariate Logistic Regression Model to Examine Moderating Effects of Interaction Terms on association between Newrace & IM

Variable	B	*SE*	Wald	*df*	Sig	Exp(B)	95% CI for Exp(B)	
							Lower	Upper
Newrace	5.902	.260	517.031	1	.000	365.829	219.954	608.448
Newrace*BIRTH_WEIGHT_GRAM	.000	.000	10.056	1	.002	1.000	1.000	1.000
Newrace * EST_GEST	-.166	.009	315.490	1	.000	.847	.831	.862
Newrace*FIRSTPNC	-.188	.106	3.121	1	.077	.829	.673	1.021
Constant	-4.38	.274	255.561	1	.000	.013		

Note. Significant predictor of infant mortality ($p < .05$).

Conclusion

The study provided sufficient statistical evidence to conclude the following:

1. There was a significant difference in IM between non-Hispanic Black women and non-Hispanic White women in Marion County, Indiana, from 2016 to 2019.
2. The differences in higher IM among non-Hispanic Black women were significantly associated with infant characteristics, especially birth weight in grams and gestational age in weeks.
3. The differences in higher IM among non-Hispanic Black women were significantly determined by the mother's characteristics, especially race/ethnicity, years of educational attainment, and marital status.

4. The mother’s educational level was the best predictor of IM than mother’s marital status and age during pregnancy among this population of women.
5. On the other hand, the difference in IM among non-Hispanic Black women was not significantly determined by the mother's characteristics, especially the mother's age during pregnancy, prenatal care in the first trimester, or community/historical context, residential zip code during this study period.

Thus, the study findings examined the complex causes of the higher infant mortality among non-Hispanic Black women compared to their non-Hispanic White counterparts in Marion County, Indiana from 2016 to 2019.

Additionally, the research provided sufficient statistical evidence of the effects of infant characteristics, maternal characteristics, community/societal characteristics, and historical context on IM.

Chapter 5: Discussion, Conclusions, and Recommendations

This quantitative study examined the complex causes of the higher IM among non-Hispanic Black women compared to non-Hispanic White women in Marion County, Indiana from 2016 to 2019, using a cross-sectional correlational research design.

.. The study population consisted of all non-Hispanic Black and non-Hispanic White mothers in Marion County and their infants born between 2016 and 2019.

This chapter presented the discussion of the results in the following sections: i). Summary of the study; (ii) Interpretation of the findings; (iii) Implications for social change; (iv) Recommendations for policymakers; (v) Recommendations for action. (vi) Recommendations for future research, and (vii Conclusions.

Problem Statement

The problem examined by this research was the disparity gap in IM between the non-Hispanic Black American women and their non-Hispanic White American counterparts in Marion County, Indiana from 2016 to 2019. In 2017, the IMR for the US was 5.8 infant deaths per 1,000 live births. The IMR for non-Hispanic Blacks women was 10.97 infant deaths per 1,000 live births, which was more than double the IMR of 4.67 infant deaths per 1,000 live births for non-Hispanic White women. (Ely & Driscoll, 2019).

In 2018, the IMR for Indiana State was 6.8 infant deaths per 1,000 live births. However, the IMR for non-Hispanic Black infants was 13.0 infant deaths per 1,000 live births, 2.5 times more than the IMR of 6.0 infant deaths per 1,000 live births for non-Hispanic White infants (ISDHMCHED, 2020).

The primary causes of non-Hispanic Black infant deaths in Indiana included preterm birth (PTB), low birth weight (LBW), congenital disabilities, pregnancy complications, and sudden unexplained infant deaths (SUID). The high IM among non-Hispanic Black infants occurred from an interplay of biological, social, economic, psychological, educational, safety, and environmental factors (Novoa & Taylor, 2018).

Risk factors related to PTB, LBW, and high IM included smoking, poor or limited access to prenatal care, poor maternal health status, obesity, pre-existing chronic health conditions, anxiety and depression, substance abuse, short interval between pregnancies, and unsafe sleep practices (Swigonski, 2019).

Research data from the Indiana University School of Medicine indicated that one-quarter of Indiana's overall high IM cases occurred in 3% of the state’s zip codes. Most of these zip codes were located in neighborhoods of historical “redlining” and structural racism occupied by the minority and marginalized Black population in Marion County (Swigonski, 2018).

Therefore, in 2017, the IMR for all Marion County was 8.3 infant deaths per 1,000 live births. However, the IMR for non-Hispanic Black women was 12.6 infant deaths per 1,000 live births compared to the IMR of 5.5 infant deaths per 1,000 live births for non-Hispanic White women (MCPHDE, 2018; Swigonski, 2019).

Data from the Marion County infant birth and death certificate report 2015 - 2019 indicated that fifteen zip codes in Marion County had IMRs above 10.0 infant deaths per 1,000 live births (MCPHDE, 2020). Thus, the research gap was to determine the complex causes of the higher IM among non-Hispanic Black women in these Marion County zip codes compared to their non-Hispanic White counterparts from 2016 to 2019.

Summary of the Study

The total number of participants in this study was N = 44,653 (100.0%) live infant births. The two racial/ethnic groups, non-Hispanic White mothers and their infants, constituted n =18,070 (40.5%) live infant births, and non-Hispanic Black mothers and their infants constituted n =14,833 (33.2%) live infant births, giving a total percentage of 73.7%. All the other racial/ethnic group mothers and their infants had 11,750 live infant births constituted (26.3%) of the live infant births in the Marion County population during this study period.

The total number of infant deaths among the participants during this study period was N = 318 (100.0%) infant deaths. The non-Hispanic White mothers and their infants had n = 101 (31.8%) infant deaths, and the non-Hispanic Black mothers and their infants had 158 (49.7%) infant deaths, giving a total percentage of 81.5%. All the other racial/ethnic group mothers and their infants had 59 infant deaths constituted (18.5%) of the infant deaths in the Marion County population during this study period.

The analysis of the data provided by the Marion County Health Department was underpinned by the Social Ecological Model (SEM) developed by Urie Bronfenbrenner in 1977 and later established as a theory in the 1980s (Alio et al., 2010; Bronfenbrenner, 1977; Kilanowski, 2017).

The socioecological model (SEM) was the theoretical framework grounding this research to describe the differences in infant mortality between non-Hispanic Black and non-Hispanic White ethnic women groups and the intervention for preventing the high IM among non-Hispanic Black women.

The model consisted of individual, interpersonal or relationship, institutional or organizational, community, and public policy or societal factors (Alio et al., 2010; CDC, 2015).

The individual risk factors affecting IM among non-Hispanic Black women in this study included infant characteristics such as PTB, and LBW, which were the leading causes of the high IM among non-Hispanic Black women in Marion County (Swigonski, 2019); maternal characteristics, such as mother's educational level and marital status.

The mother's age during pregnancy and prenatal care in the first trimester were not significantly associated with IM during this study period.

Other risk factors included community and societal characteristics, such as the mother's residential zip codes, were not found to be significantly associated with IM. Nevertheless, the historical context, including the progression of racial discrimination, could not be used to explain the disparity gap in IM in this study.

Interpretation of the Findings

The two infant characteristics found to be significantly associated with higher IM among non-Hispanic Black women in Marion County compared to non-Hispanic White women were: (a) a higher proportion of Black infants with LBW.

(b) Black infants had a lower estimated gestational age and a higher proportion of PTB.

These research findings were consistent with considerable historical evidence in the literature review that:

(a) PTB (birth before 37 weeks gestation) was the leading cause of non-Hispanic Black infants' higher IM in Marion County (MCPHD, 2020; Swigonski, 2019).

(b) LBW (Weight less than 2500 grams or 5.5 lbs.) contributed to the disparity gap in higher IM between Black and White infants in the United States, Indiana, and Marion County (Ely & Driscoll, 2019; ISDHMCHED, 2020; MCPHD, 2018; MCPHD, 2020; Swigonski, 2019).

(c) the risk of IM rose significantly with decreasing gestational age (MCPHD, 2020; USDHHDS OMH, 2019).

Thus, PTB and LBW contributed significantly to the higher IM among non-Hispanic Black infants compared to their non-Hispanic White counterparts.

RQ1: Is there an association between mother's educational level, mother's marital status, mother's age, and IM among non-Hispanic Black infants in Marion County, Indiana?

The study findings to answer the research questions indicated that three maternal characteristics were risk factors for infant mortality.

(a) being Black, non-Hispanic race

(b) being unmarried.

(c) mother's low educational attainment (less than high school).

(d) mother's educational attainment was a better predictor of IM than mother's marital status and age.

The recognition of a mother's Black, non-Hispanic race/ethnicity, educational attainment, and marital status as predictors of infant mortality was consistent with the results of other researchers (Taylor et al., 2019).

Moreover, IM mainly affected non-Hispanic Black women who experienced low social and economic factors than their non-Hispanic White counterparts who experienced higher social and economic factors.

Social and economic factors such as education, income, and employment were usually protective for pregnant women by providing easy access to healthcare, quality prenatal care, and optimal conditions for fetal development.

However, these factors were not always as protective for pregnant non-Hispanic Black women as they do for their non-Hispanic White counterparts (Taylor et al., 2019).

The low social and economic factors influencing IM in Marion County also included low median household income (MCPHD, 2020).

Higher educational attainment guaranteed higher social and economic status and lower IM for non-Hispanic White women. However, higher educational attainment and higher social and economic status for the non-Hispanic Black woman did not ensure a lower IM. Consequently, a non-Hispanic Black woman with a master’s or professional degree would experience a higher IM than a non-Hispanic White woman with a high school diploma (MCPHD, 2018).

Therefore, a mother's Black, non-Hispanic race, poor educational attainment, unmarried status, low employment status, low-income level, inadequate nutrition, food insecurity, and greater health spending contributed to the higher IM among non-Hispanic Black women in Marion County than their non-Hispanic White counterparts (MCPHD, 2018; MCPHD, 2020).

These features demonstrated the low socioeconomic status of the non-Hispanic Black mothers compared to non-Hispanic White mothers. Thus, other researchers had recognized socioeconomic status as a significant risk factor to describe the disparity gap between the two racial women groups (MCPHD, 2020; Swigonski, 2019).

> RQ2: Is there an association between a mother’s residential zip code in Marion County, Indiana, and IM among non-Hispanic Black infants in Marion County, Indiana?

The study findings indicated that the mother's characteristic of age during pregnancy and the community/historical feature of residential zip code were found not to be risk factors for infant mortality in Marion County despite the racially discriminatory development of the "redlined" communities in Marion County primarily occupied by the non-Hispanic Black population (MCPHD 2020; Swigonski, 2019).

RQ3; Is the association between a mother’s race/ethnicity and IM moderated by infant’s birth weight, infant’s gestational age, or mother’s prenatal care in the first trimester among non-Hispanic Black infants in Marion County, Indiana?

The study found that a mother's race/ethnicity was a statistically significant predictor of infant mortality among non-Hispanic Black infants in Marion County, Indiana.

The results of the moderation analysis showed that the interaction terms of the moderators, infant's birth weight in grams, and infant's estimated gestation in weeks had significant moderating effects on the association between mother's race/ethnicity and IM among non-Hispanic Black infants in Marion County.

On the other hand, the interaction term of mother's prenatal care in the first trimester had no significant moderating effect on the association between mother's race/ethnicity and IM among non-Hispanic Black infants in Marion County.

Therefore, the null hypothesis was rejected, and the alternative hypothesis was accepted.

However, some researchers had shown that accessing prenatal care in the first trimester by pregnant women decreased the risk of IM. Conversely, accessing prenatal care in the third trimester by pregnant women elevated the risk of IM (Cox et al., 2011; Mendez et al., 2014; Gadson et al., 2017; Gross et al., 2019; Lhila & Long, 2012; Swigonski, 2019; Taylor et al., 2019).

The data from the Marion County Public Health Department utilized for this research showed that IM for 2019 was 25 infant deaths for both non-Hispanic Black and non-Hispanic White women. Thereby significantly decreasing the IMR for non-Hispanic Black women from 14.0 infant deaths per 1,000 live births in 2018 to 10.9 infant deaths per 1,000 live births in 2019 (MCPHD, 2020; WTHR staff 2020).

Additionally, the MCPHD data indicated that Hispanic mothers initiated infant breastfeeding at a higher rate (87%) compared to non-Hispanic White mothers (81%) and non-Hispanic Black mothers (75%). Thus, Hispanic mothers had lower IM than non-Hispanic White and non-Hispanic Black mothers (MCPHD, 2020; WTHR staff 2020).

Furthermore, the percentage of mothers who commenced prenatal care in the first trimester was 75% for non-Hispanic White women, 53% for non-Hispanic Black women, and 44% for Hispanic women respectively.

On the other hand, the research showed that 25% of non-Hispanic White women, 47% of non-Hispanic Black women, and 56% of Hispanic women respectively accessed prenatal care in their third trimester of pregnancy (MCPHD, 2020; WTHR staff 2020).

Thus, this research finding indicated that non-Hispanic Black mothers in Marion County did not experience higher infant mortality due to lack of prenatal care in the first trimester than non-Hispanic White mothers.

Further analysis of the data to understand the decrease in the IMR for non-Hispanic Black women from 14.0 infant deaths per 1,000 live births in 2018 to 10.9

infant deaths per 1,000 live births in 2019, revealed that the MCPHD adopted and vigorously implemented the robust Indianapolis Healthy Start program in the County, which gave health educational, referral, and support services to pregnant women and their families (MCPHD, 2020; WTHR staff, 2020).

The Healthy Start program was an evidence-based community-based federal program established in 1991 by the Health Resources and Services Administration (HRSA) of the United States Public Health Services (USDHHS) and later approved by Congress as part of the Children's Health Act of 2000 (CDC, 2020

The program sought to eradicate IM and perinatal outcome disparities among racial/ethnic women groups by working in communities across the nation to improve community care systems. The Indianapolis Healthy Start was one of the country's 101 Healthy Start sites.

The Healthy Start program’s practices consisted of actions, activities, strategies, or approaches aimed at improving women's health before, during, and after pregnancy, to improve birth outcomes and give infants a healthy start up to 2 years of age (CDC, 2022). The Indianapolis Healthy Start conducted free health education classes for pregnant women to enlighten them about the following:

- Safe sleep techniques:

    -Babies are safest sleeping on their backs

    -Room sharing is safer than bed-sharing

    -A safe crib is one without fluffy bedding, toys, and bumper pads.

- Breast is best:

    -Breast milk is free

    -Breastfed babies have fewer illnesses than formula-fed babies

    -Breastfeeding helps you to lose we

    -Know your partner and build healthy relationships.

    -You are important; see the doctor for your annual check-ups

    -Proper spacing between pregnancies can increase your chances of having a healthy baby.

Additionally, the program referred pregnant and nursing mothers to community resources and support services to assist them during their pregnancies to access prenatal care, childbirths, and early motherhood.

Thus, the Indianapolis Healthy Start program was linked with significantly lower PTB rates, enhanced infant gestational ages, improved birth outcomes, and eradication of IM and perinatal outcome disparities between non-Hispanic Black mothers and non-Hispanic White mothers in Marion County, hence the equal number of 25 infant deaths among these two groups of women in 2019 and the decrease in the IM rate from 14.0 infant deaths per 1,000 live births in 2018 to 10.9 infant deaths per 1,000 live births among non-Hispanic Black women in 2019 (MCPHD, 2020; WTHR staff 2020).

Limitations. Challenges and Barriers

The retrospective secondary data used for this study were limited because a researcher might seek permission from the authors to access some secondary databases.

Additionally, the secondary data were gathered by other researchers for purposes other than the current research. Thus, I had no control over the data's validity and reliability.

Given that the Marion County Health Department meticulously collected the data through the linked infant birth and death certificate records of all infants born in Marion County, Indiana, between 2016 and 2019, the data were assumed to be reliable and valid (CDC, 2017; MCPHDE, 2020).

Furthermore, because this retrospective research was conducted using secondary archival data from MCPHDE, the findings might not have external validity, meaning that they might not be generalizable to the other counties in the state, or other communities, at other times and in other contexts.

Finally, the limitation of a correlational design was that correlation did not signify causation, meaning that it was not feasible to confirm the presence of cause and effect or causality relationships between variables through statistical analysis of secondary archival data (Wickham, 2019).

A controlled experiment must be conducted to show causation. However, when two variables gathered by utilizing a non-experimental research design correlate, one variable regularly preceded the other (for example, PTB regularly preceded IM. Therefore, the correlation provided indirect proof supporting causation (Curtis, Comiskey, & Dempsey, 2016).

Implications for Social Change

Accomplishing the goal of social justice, equity, and positive social change in Marion County, Indiana, required the application of the theoretical model SEM to reduce

IM. The SEM was the theoretical framework grounding this research intervention for preventing high IM among non-Hispanic Black women (Alio et al., 2010; CDC, 2015).

The intervention process involved recognizing and targeting the group of people at the most significant risk - non-Hispanic Black women and their infants (Swigonski, 2019; MCPHD, 2020).

The researcher must interpret the empirical evidence to support professional practice to guarantee that new understanding and skills were acquired by the individuals and communities for which the research was conducted initially.

The significance of positive social change entailed the social control of the evidence-based factors disclosed in this research that described the reasons for the disparity gap in IM between non-Hispanic Black and non-Hispanic White mothers in Marion County.

The SEM underpinned this research to identify the subsequent IM risk factors. The differences in IM between non-Hispanic Black and non-Hispanic White women in Marion County were significantly determined by:

1. infant factors, particularly birth weight and gestational age.
2. maternal factors, particularly race/ethnicity, and marital status.
3. community and social characteristics, particularly educational level.

Thus, intervention action was required to target these factors to reduce the disparity gap between these two racial groups of women.

I would share the study findings with Black community leaders and health service providers in the "redlined" zip codes to give quality health care and prenatal care to those most in need in these communities.

Additionally, I would share the study findings with public health practitioners, medical providers serving the red-lined communities, political representatives, and policymakers of the affected Marion County zip codes for implementation to achieve a positive social change in infant mortality among non-Hispanic Black women.

Thus, the research findings would be disseminated to the community stakeholders and partners for implementation to achieve a positive social change by reducing the IM among non-Hispanic Black women. Also, by narrowing the IM disparity gap between non-Hispanic Black women and their non-Hispanic White counterparts in Marion County, Indiana.

Implications for Policy Makers

The policies that aim to achieve positive social change by reducing or eradicating the significantly higher proportions of PTB, LBW, and IM among non-Hispanic Black mothers in Marion County should include allocating resources to this particular group of mothers.

These policies should have the following objectives:

1. assisting unmarried non-Hispanic Black mothers to handle their pregnancies better.

2. counseling non-Hispanic Black mothers to commence prenatal care in the first semester of pregnancy.

3. giving free health education to pregnant non-Hispanic Black mothers to ensure they understood safe pregnancy strategies to guarantee good birth outcomes.

4. improving non-Hispanic Black women's access to quality healthcare, prenatal care with equity and without discrimination or prejudice.

5. improving non-Hispanic Black women's access to good educational, employment, income, and economic opportunities to enhance their socioeconomic status.

Thus, establishing and implementing these policies would achieve positive social change by reducing or eradicating the significantly higher proportions of PTB, LBW, and IM among non-Hispanic Black mothers and narrowing the IM disparity gap between non-Hispanic Black women and their non-Hispanic White counterparts in Marion County, Indiana.

Recommendations for Action

The recommendation for action was to apply a current evidence-based health promotion project in Marion County, Indiana.

A health promotion project aimed at encouraging non-Hispanic Black women to acquire and grow the vital knowledge and skills necessary to accept good health behaviors and inspire healthy lifestyles (Swigonski, 2019).

The requirements for an evidence-based health promotion project included (a) a particular target population; (b) empirical evidence to assist the application of the project; (c) definitive, measurable goals; (d) a distinct program design and time frame, and (d) an implicit assessment or evaluation process to estimate program quality and health outcomes (Swigonski, 2019).

The target population for the recommended health promotion project comprised non-Hispanic Black women in Marion County, Indiana.

The evidence for implementing this program was obtained from this current research, which recognized the various risk factors associated with IM.

The goal of the program was to create a quantifiable reduction in IM among the target population (Swigonski, 2019).

Planning for the program intervention required a coordinated, collaborative, multifaceted approach constructed on the recommendations of an appointed health promotion group comprising all the community stakeholders.

Thus, the health promotion group should include public health practitioners, researchers, community leaders, and other interested partners to determine the most suitable intervention for the community, particularly an intervention that would decrease IM and help eradicate the disparity gap.

Recommendations for Future Research

Most of the information incorporated into the literature review and the current research findings were based on quantitative research designs. Quantitative research designs were invaluable for measuring variables used to explore, define, and summarize the population from which a sample was extracted.

However, quantitative research designs could not describe in great detail how and why each member of a population behaved individually in the way that people frequently did (Creswell & Creswell, 2018).

A researcher should therefore utilize the qualitative research design to answer complex research questions to describe why the non-Hispanic Black women in Marion County behaved in the way that was disclosed by the current research.

Some examples of questions yet unanswered included:

"Why did unmarried mothers have a higher risk of IM than married mothers?”

"Why did some mothers not attend a prenatal care in the first semester?"

"Why did some mothers not have access to quality healthcare and prenatal care during pregnancy?"

"Why did some mothers not have access to good employment, income, and economic opportunities?"

The future suggested research, employing a qualitative design, would be to interview a group of non-Hispanic Black mothers in Marion County, Indiana. The research design should be hermeneutic phenomenology, which meant that the researcher would attempt to extract the essence of the participants' lived experiences (Creswell & Creswell, 2018).

Though phenomenology often produced more profound insight into the perceptions and behaviors of patients than quantitative methods, it had been underutilized in medical research (Carel, 2011, 2012).

The researcher should conduct a thematic analysis of the interview transcripts to extract emerging ideas that might describe why some non-Hispanic Black mothers in Marion County, Indiana, exhibited harmful behaviors that were risk factors for high IM, such as smoking during pregnancy, while some other mothers did not (Tonon, 2015).

Thus, a researcher should utilize the qualitative research design (hermeneutic phenomenology) to extract the essence of the participants' lived experiences to answer complex research questions to explain why some non-Hispanic Black women in Marion County, Indiana exhibited harmful behaviors that were risk factors for high IM, such as smoking during pregnancy, while some other mothers did not.

Conclusion

The findings of this research were consistent with the perspectives of other researchers, indicating that the IM disparity gap between the two racial/ethnic groups of women in Marion County was predictable by an interaction of covariates, such as single parenthood, poor education, occupation, and inadequate prenatal care.

These maternal, community, and societal characteristics were strongly associated with socioeconomic status (MCPHD, 2020; Swigonski, 2019).

Therefore, the low socioeconomic status of non-Hispanic Black mothers in Marion County was probably the overall determinant of the higher IM among this group.

To achieve social justice and equity, the researcher must implement the current study's findings in practice to assist in narrowing the disparity gaps by decreasing IM in Marion County. This study recognized non-Hispanic Black mothers as the mothers at the highest risk of IM.

The intervention policies that aimed to achieve positive social change by reducing or eradicating the significantly higher proportions of PTB, LBW, and IM among non-Hispanic Black mothers in Marion County should include allocating resources to this particular group of mothers.

These policies should have the following objectives:

1. assisting unmarried non-Hispanic Black mothers to handle their pregnancies better.
2. counseling non-Hispanic Black mothers to commence prenatal care in the first trimester of pregnancy.
3. giving free health education to pregnant non-Hispanic Black mothers to ensure they understood safe pregnancy strategies to guarantee good birth outcomes.

4. improving non-Hispanic Black women's access to quality healthcare and prenatal care with equity and without discrimination or prejudice.

5. improving non-Hispanic Black women's access to good educational, employment, income, and economic opportunities to enhance their socioeconomic status.

6. reducing preterm birth rates and improving birth outcomes by implementing the Indianapolis Healthy Start program, which conducted free health education classes for pregnant women to enlighten them about SAFE SLEEP strategies, the importance of breastfeeding their babies, and efficient planning for pregnancies.

Additionally, the program referred pregnant and nursing mothers to community resources and support services to assist them during their pregnancies, childbirths, and early motherhood.

Thus, establishing and implementing these intervention policies would achieve positive social change by reducing or eradicating the significantly higher proportions of PTB, LBW, and IM among non-Hispanic Black mothers and narrowing the IM disparity gap between non-Hispanic Black women and their non-Hispanic White counterparts in Marion County, Indiana.

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Appendices

Appendix A

Marion County Infant Mortality Rates by Race, 2016 -2019

Variable	Category			
Races	Years			
	2016	2017	2018	2019
	Infant Mortality Rates			
White, non-Hispanic	6.6	5.5	-	7.5
Black, non-Hispanic	15.8	12.6	14.0	10.9
Hispanic	8.5	6.8	-	7.6
All Races	10.0	8.3	9.2	8.8

Appendix B

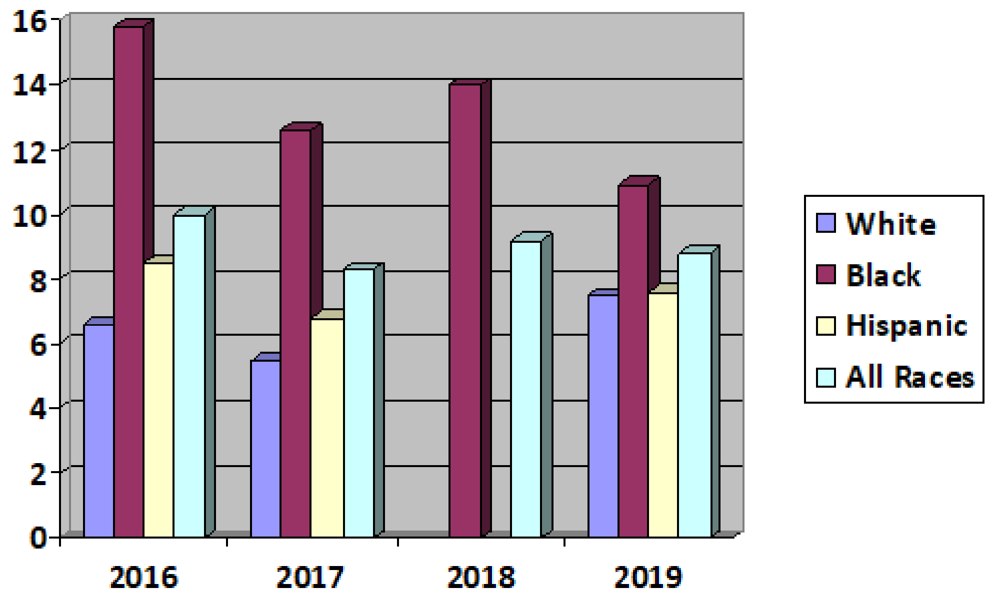

Chart of Marion County Infant Mortality Rates by Race, 2016 -2019

Appendix C

Leading Causes of Infant Mortality among Black and White Women in Marion County in 2016/2017

Variable	Category		
Races	PTB %	LBW %	VLBW %
Black, non-Hispanic	13.80	14.40	3.00
White, non-Hispanic	11.80	9.50	1.80
All Marion County	12.00	10.70	2.20

Appendix D

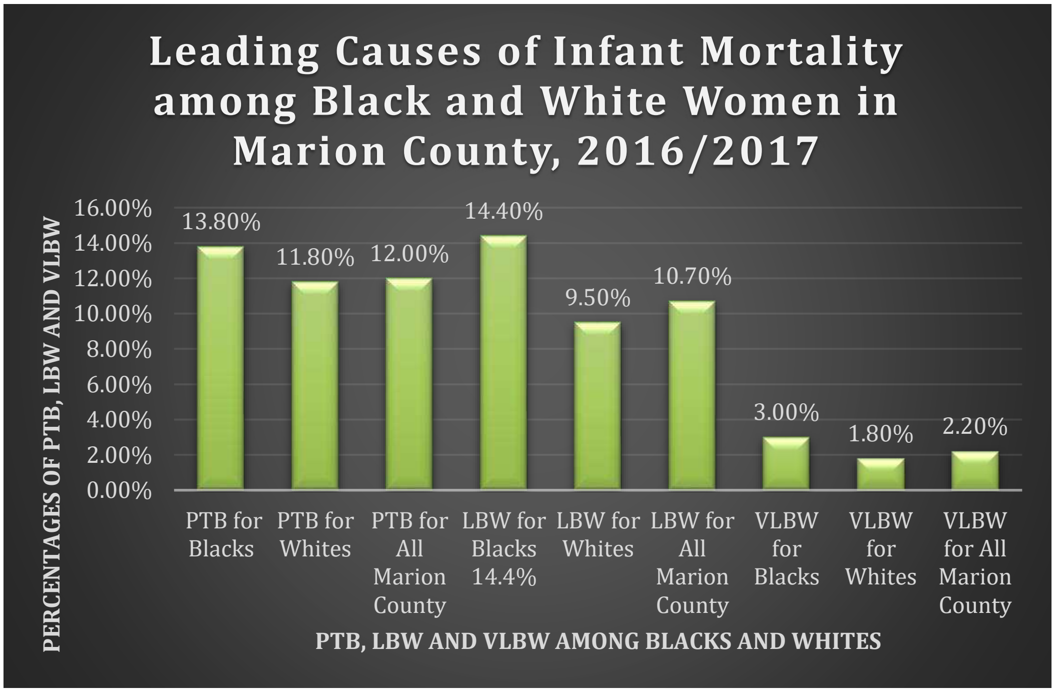

Chart of Leading Causes of Infant Mortality among Black and White Women in Marion County in 2016/2017

Appendix E

Other Causes of Infant Mortality among Black and White Women in Indiana, 2017.

Variable	Category				
Races	Congenital Anomalies	Perinatal Risks	SUID	Assaults/ Accidents	Other
	%	%	%	%	%
Black, non-Hispanic	10.30	52.10	24.80	4.20	8.50
White, non-Hispanic	20.70	45.30	14.60	4.10	15.30

Appendix F

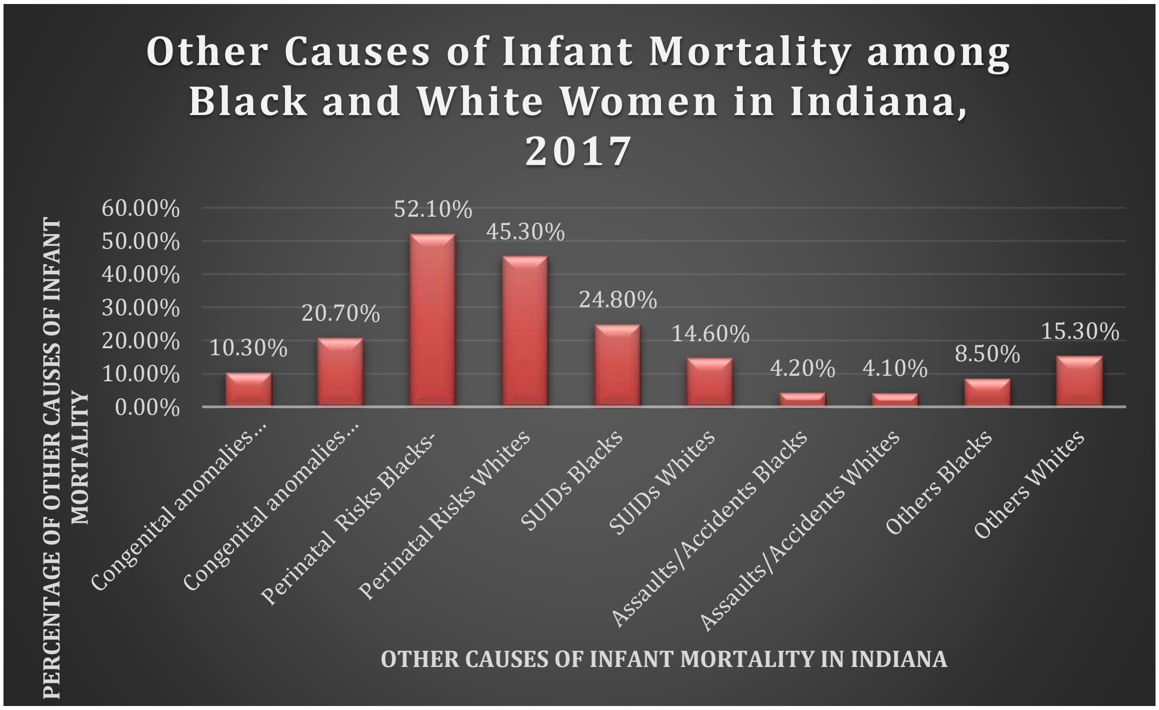

Chart of Other Causes of Infant Mortality among Black and White Women in Indiana, 2017.

Appendix G

Percent of Population Below Federal Poverty Guideline in Marion County, by Race

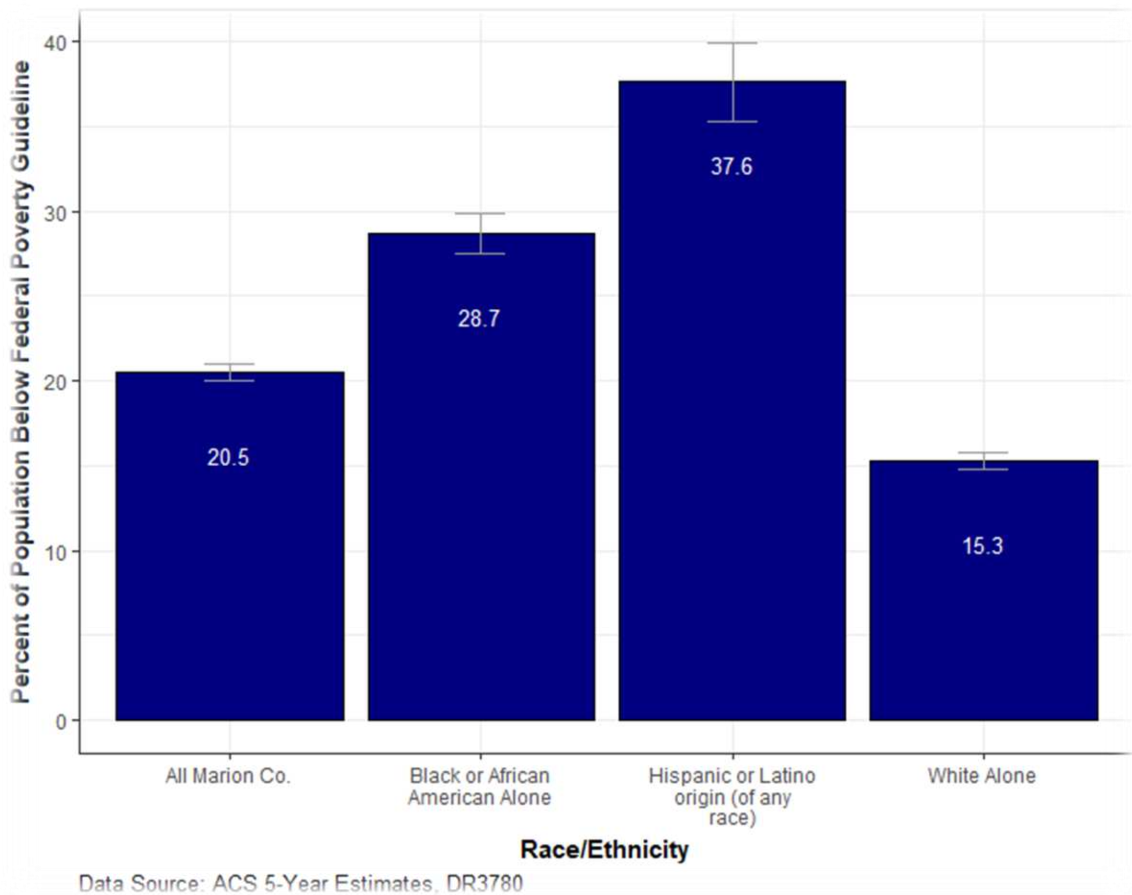

Chart of Percent of Population Below Federal Poverty

Guideline in Marion County,

Appendix H

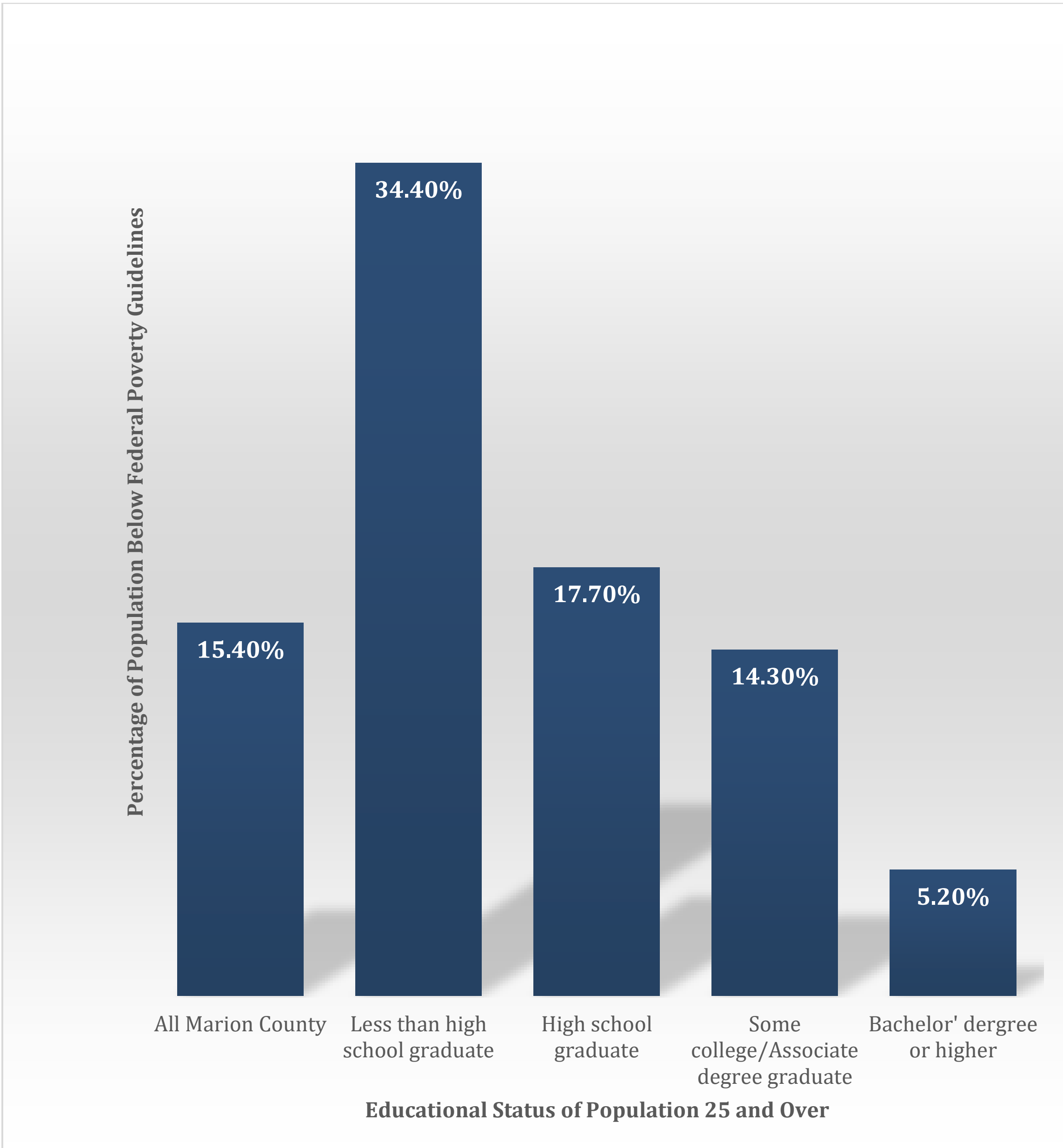

Chart of Percentage of Population Below Federal Poverty Guideline in Marion County, by Educational Attainment for those 25 years and over.

Appendix I

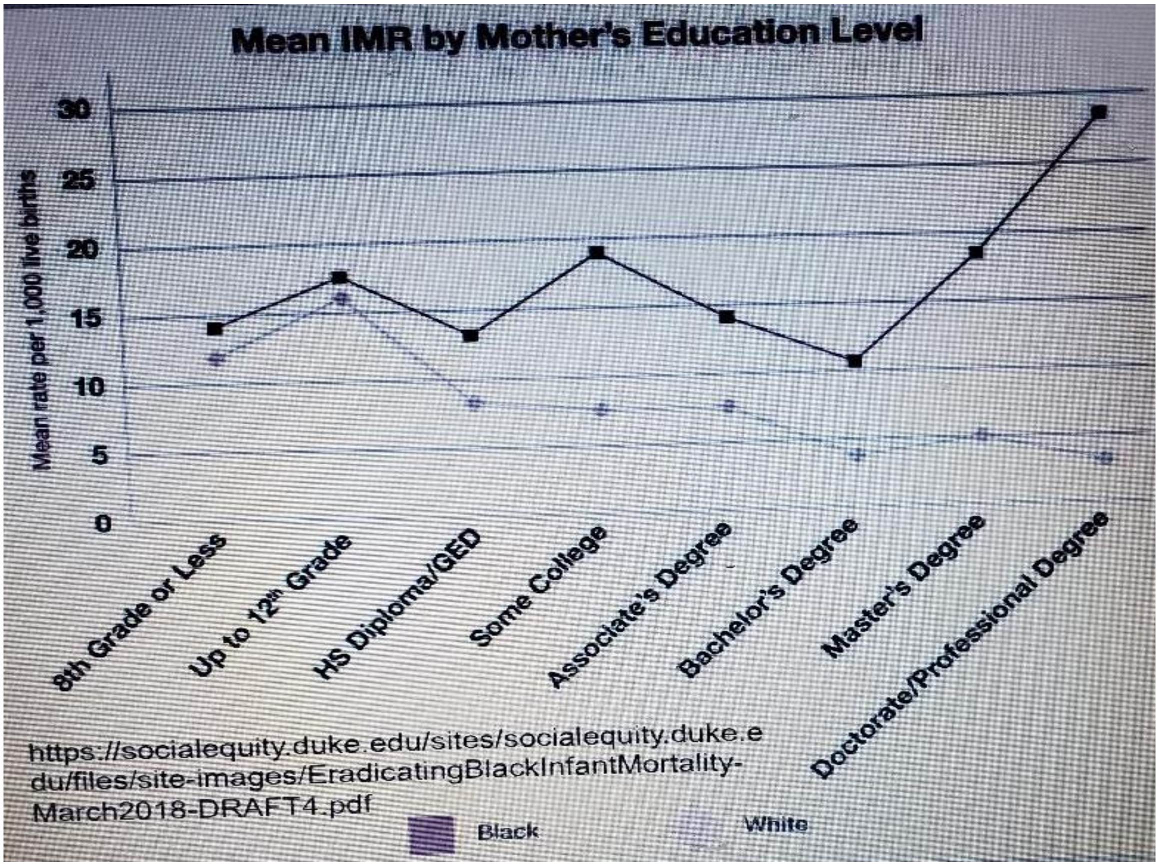

Chart of Mean IMR by Mother's Educational Level

Appendix J

IMR per 1,000 live infant births among Blacks & Whites (maternal age groups) in US, 2017

Variable	Category					
Races	Age of Mother					
	U-20yrs	20-24yrs	25-29yrs	30-34yrs	35-39yrs	40-54yrs
	Infant Mortality Rates					
Black, non-Hispanic	13.0	11.4	10.4	10.6	10.2	13.6
White, non-Hispanic	8.5	6.1	4.6	3.8	4.1	5.3
Black, non-Hispanic/ White, non-Hispanic Ratio	1.5	1.9	2.3	2.8	2.5	2.6

Source: CDC 2019. Infant Mortality Statistics from the 2017 Period Linked Birth/Infant Death Data Set. National Vital Statistics Reports

Appendix K

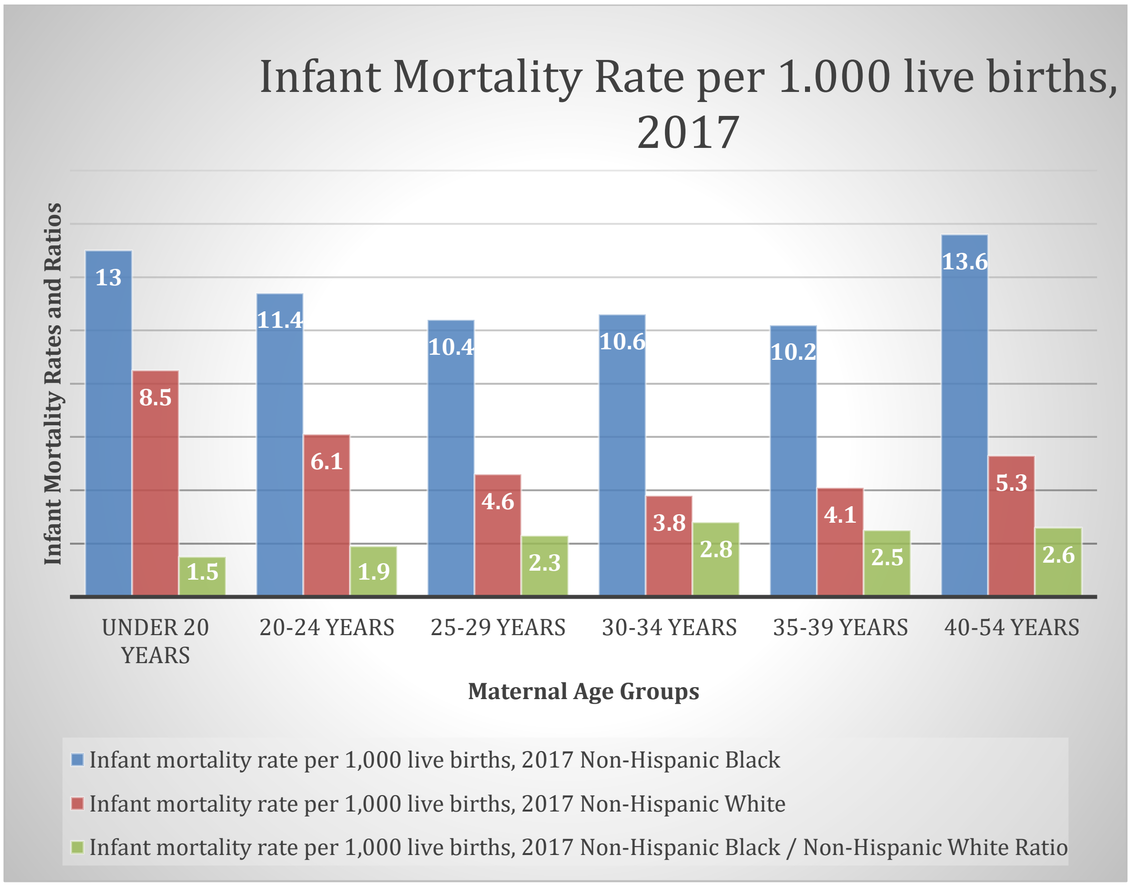

Chart of IMR per 1,000 live births among Blacks & Whites (maternal age groups) in US, 2017

Appendix L

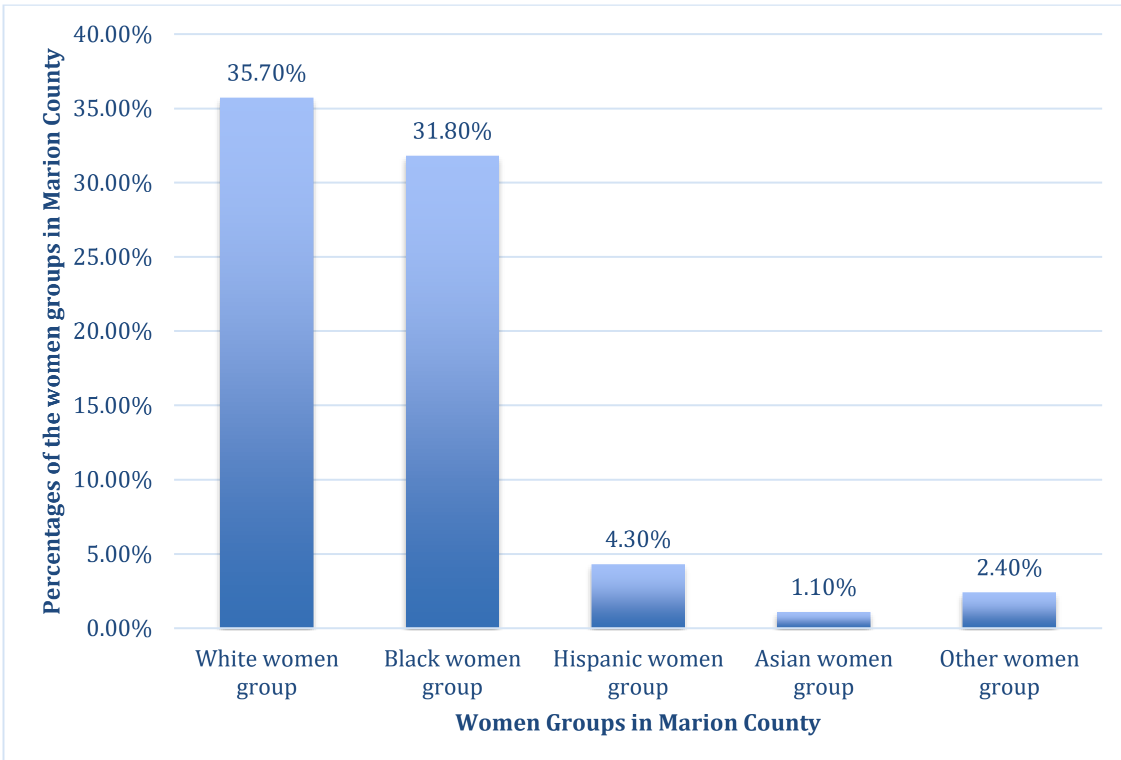

Chart of Percentages of the population of women groups in Marion County in 2019