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Assessment of the Utilization of Healthcare Services Specific to Pregnancy-Related Complications In Rural And Medically Underserved Georgia

Diana L. Aguirre

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ASSESSMENT OF THE UTILIZATION OF HEALTHCARE SERVICES SPECIFIC TO
PREGNANCY-RELATED COMPLICATIONS IN RURAL AND MEDICALLY
UNDERSERVED GEORGIA

by

DIANA LAURA AGUIRRE

(Under the Direction of Joseph Telfair)

ABSTRACT

Maternal mortality is a continuing issue, with rates for the state of Georgia (3.7 per 100,000 live births) are higher than that of the US rates (2.9 per 100,000 per live births) (Centers for Disease Control and Prevention, National Center for Health Statistics, n.d., 2023). However, maternal mortality may not account for health disparity factors, apart from access to quality care and physiological issues, which is a factor in pregnancy-related deaths, Pregnancy-related death, as defined by the US Centers for Disease and Control (CDC), is a death of a woman that occurs during or within one year of pregnancy that can be attributed to a complication, events initiated, or the aggravation of an unrelated condition by the physiologic effects of pregnancy. This mixed data study used secondary data using the Andersen healthcare utilization model to explore factors that may delay early prenatal care utilization in individuals with pre-existing hypertension who live in rural and medically underserved Georgia, which may increase the risk of pregnancy-related complications or death. The quantitative portion of this study did give some insight into the factors of importance that may influence the attainment of early prenatal care visits for individuals with pre-existing hypertension who were of a minority race compared to their white counterparts, regardless of insurance coverage before or during pregnancy particularly seen in individuals of rural county residence. The qualitative portion of this study highlighted some of the ongoing issues, such as support from leadership, changes in practices and policies, among others, and areas for needs of improvement to give adequate care for individuals with

pregnancies that are categorized as high-risk in rural communities. Findings from this study will be helpful in setting a foundation for further research to address barriers for individuals with chronic hypertension prior to pregnancy and healthcare utilization.

INDEX WORDS: Maternal health, Pregnancy-related complications, Rural health, Hypertension, Secondary analysis

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Fulfillment of the Requirements for the Degree

DEGREE DOCTOR OF PUBLIC HEALTH

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DEDICATION

I would like to dedicate this dissertation to my parents, Elin Aguirre and Filida Lopez. Por sus sacrificios y apoyo que han dedicado a mi crecimiento como una profesional, siempre estaré agradecida.

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CHAPTER 1

INTRODUCTION

Statement of Problem

There is an increase in chronic conditions in women diagnosed before pregnancy. One of these chronic conditions is hypertension. This increases the risk of complications during pregnancy and pregnancy-related death. However, most pregnancy-related deaths are preventable, with the majority being cardiovascular conditions (Petersen et al., 2019).

Introduction

Maternal mortality is a continual global concern. However, while maternal mortality rates in most Western countries are declining, maternal mortality rates have continually increased in the United States of America (US) (Neggers, 2016). The World Health Organization (WHO) defines maternal mortality" as the annual number of female deaths from any cause related to or aggravated by the pregnancy or its management (excluding accidents or incidents caused during pregnancy and childbirth or within 42 days of termination pregnancy [regardless] to the duration and the site of the pregnancy". However, maternal mortality may not account for health disparity factors, apart from access to quality care and physiological issues, which is a factor in pregnancy-related deaths. Pregnancy-related death, as defined by the US Centers for Disease and Control (CDC), is a death of a woman that occurs during or within one year of pregnancy that can be attributed to a complication, events initiated, or the aggravation of an unrelated condition by the physiologic effects of pregnancy.

The CDC reports that pregnancy-related mortality ratio has increased continually from 7.2 per 100,000 live births in 1987 to 17.3 per 100,000 live births in 2017 (Pregnancy Mortality Surveillance System, 2020). This distinction lies in the fact that an increase in pregnant women with chronic health conditions may put these individuals at an increased risk of adverse outcomes. US pregnancy-related mortality statistics from 2014 to 2017 showed that racial and ethnic minorities tend to be significantly affected by pregnancy-related deaths compared to their non-Hispanic white counterparts. Non-Hispanic

blacks (41.7 per 100,000 live births) had the highest death ratios compared to their non-Hispanic white counterparts (13.4 per 100,000 live births), regardless of age and education, among other factors (Petersen et al., 2019). While most pregnancy-related deaths do occur during delivery and the leading causes of pregnancy-related deaths vary by time of death, approximately every three in five pregnancy-related deaths were due to preventable causes (Petersen et al., 2019).

Efforts have been made to increase the proportion of pregnant women receiving early and adequate prenatal care to decrease the likelihood of issues contributing to maternal mortality and pregnancy-related deaths. However, reducing the irregularities of risk for pregnancy-related deaths can be more inclusive for several factors, such as access to care, quality care, the prevention, and the prevalence of chronic diseases, all of which can be due to systemic failures and gaps specific to the structural determinants of health. In addition, these factors, which have prolonged effects after birth, can be measured more effectively if the focus is on pregnancy-related death since maternal mortality has a shorter window for measurement in the postpartum stage.

Research Questions/ Hypothesis

1. What predicting risk factors are identified of healthcare utilization among pregnant women in Georgia from 2017-2020?

Hypothesis: Age and having any form of insurance coverage before during and after pregnancy increases the rate of earlier prenatal care utilization for individuals with pre-pregnancy hypertension.

2. Is there a moderation effect due to the identified risk factors among racial/ethnicity groups for individuals who have a pre-pregnancy high blood pressure diagnosis?

Hypothesis: There is an increased number of cases with women who have pre-pregnancy hypertension who do not use prenatal care at earlier rates.

3. What are the current factor characteristics of health organizations and health professional offering services to high-risk pregnancies, especially those at-risk for hypertension, in rural and medically underserved Georgia?

Hypothesis: Current efforts are insufficient in increasing awareness of the importance of proper use of health services for women with chronic hypertension.

Purpose of the Research

This study examines the gaps in relations between women with pre-existing hypertension and everyday interactions with health organizations, professionals, and advocates to increase awareness and understanding of health service utilization during pregnancy in rural and medically underserved Georgia. The primary hypothesis that will be tested and will serve as a focus to clarify the research problem is that "pre-existing hypertension is associated with a higher need for health service utilization to prevent pregnancy-related complications". This study aims to provide insight into the influences that health professionals, health organizations, and advocacy groups may have on maternal health and the continuation of care during all stages of pregnancy and during the high-risk postpartum period. This study also serves as a foundation for the author's interest in improving women's health, access to care, and adding to the work needed to reach health equity.

Brief Summary of the Major Literature

As mentioned before, while most pregnancy-related deaths do occur during delivery and the leading causes of pregnancy-related deaths vary by time of death, most pregnancy-related deaths, according to recent CDC reports, are related to preventable causes (Petersen et al., 2019). In addition, many of these preventable deaths are related to various cardiovascular conditions regardless of time relative to pregnancy (Petersen et al., 2019). In 2013, a task force created by the American college of obstetricians and gynecologists made some modifications and recommendations to similar classifications to those from the American Society of Hypertension guidelines and other College Practice bulletins for hypertension in pregnancy (Roberts et al., 2013). Most of the recommendations are for health care best practices to be carried out by health care providers in the treatment of individuals who have any level of chronic hypertension, gestational hypertension, and superimposed hypertension (a form of chronic hypertension in association with preeclampsia). In addition, during the postpartum period, there are

recommendations for the essential transfer of information between the health care provider and patient to be an integral part of health communication practices (Roberts et al., 2013).

Rural health services have significantly decreased in the past years, and more than 1 in 5 (20%) women over the age of 18 live in the rural US. Most rural areas tend to be medically underserved in Georgia, contributing to the poor outcomes in rural communities for women's health, particularly for population-level risk factors such as lack of access to appropriate care or poor-quality care (Jolles et al., 2020). There are various methods to reduce disparities for women in rural locations, particularly cardiovascular health, and adverse pregnancy outcomes. Some of these methods of migration include hospital and health system-level solutions, creating digital health interventions like telehealth, the health provider and patient interpersonal education reworking methods, and federal, state, and local healthcare policy implementations (DiPietro Mager et al., 2021; Shah et al., 2021; Taylor et al., 2002).

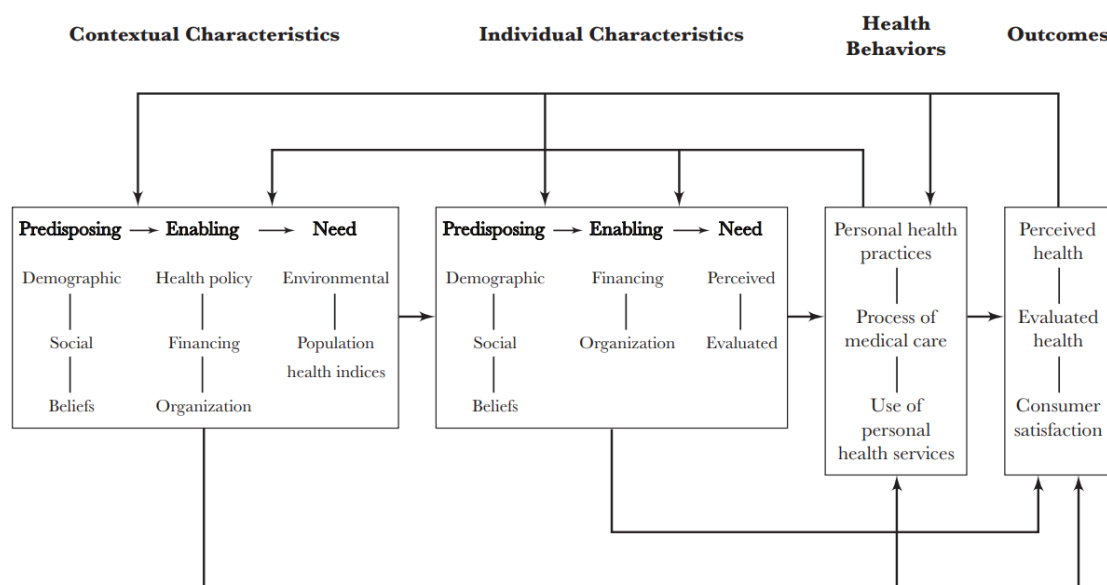
Conceptual Framework

The social-ecological model, which will be discussed in detail in chapter 2, helps to illustrate the multidimensional influences of pregnancy-related mortality in the US. Andersen's Behavioral Model of Health Service Utilization serves as a method for understanding the multiple dimensions of access to medical care. The Andersen Behavioral Model of Health Services will be used independently as multi-conceptual model separate from the SEM to future answer the research questions for this study. This is accomplished by identifying and analyzing the influence of various contextual characteristics, individual characteristics, health behaviors, and outcomes which all interact to explain the contributing variables that either aid or hinder health services utilization (Andersen & Davidson, 2014). The model itself has been built upon over time to understand the various effects and manner of uses for this model, such as the prediction of using health services, promotion of social justice, and improving the effectiveness and efficiency of health service delivery (Andersen & Davidson, 2014).

Andersen's Behavioral Model (Figure 1) consists of three major constructs: predisposing factors, enabling factors, and needs. Predisposing factors are defined as the existing conditions (either individual or circumstantial) that predispose individuals to use or not to services even though some situations and

circumstances may not be solely responsible for the use of medical services (Andersen, 1968; Andersen & Davidson, 2014). Enabling factors are defined as conditions that may enable or hinder seeking or the use of medical services (Andersen, 1968; Andersen & Davidson, 2014). The final construct of needs is defined as how patients or healthcare providers can identify and acknowledge the need for requiring medical treatment (Andersen, 1968; Andersen & Davidson, 2014). As seen in Andersen's Behavioral Model (Figure 1), the major constructs of predisposing, enabling, and needs are displayed at the individual and contextual levels to show how they are involved in determining access with various factors at these levels.

Figure 1: The Andersen Behavioral Model of Health Services Use Framework



Methodology

For this study, a mixed-methods convergent parallel approach will be used to investigate the issues that influence high-risk mothers for health problems that impact pregnancy-related deaths (Creswell & Creswell, 2018). The mixed method convergent parallel approach for this study consists of collection quantitative and qualitative data and analysis in which there is an attempt in relating the two and then interpreting the results (Creswell & Creswell, 2018). First, to measure prenatal care visit trends

with those who were diagnosed with HTN before pregnancy in the past three years (2017-2020) from data collected by the Pregnancy Risk Assessment Monitoring System (PRAMS) in Georgia (Pregnancy Risk Assessment Monitoring System, 2021). In addition, this could help develop a behavioral model to determine the influence of access to medical care in rural and medically underserved areas. The trends found across characteristics such as maternity care deserts, prenatal care by demographics, and health insurance coverage, among others, will be compared to the time of the first prenatal visit to determine the best recommendation for the feasibility of program development for the future continuation of this study. An assessment of secondary data collected via publicly available expert recordings with health providers and health professionals will also be implemented to determine a foundation of capability to help the population they are meant to serve and match the trends seen in the quantitative trends determined from PRAMS.

Limitations

Survey data collected from the PRAMS questionnaire were based on self-reported responses and could include participant bias. For the qualitative portion, it is assumed that participants may not truthfully answer some questions due to the sensitive questions. There is also the limitation of only having the previously recorded interviews in which further questions cannot be asked. Limitations for both data collection will be assessed for their effect on the study's outcome and adjusted accordingly.

Assumptions

It is assumed that all participants who answered the PRAMS questionnaire understand the survey instruments and answer truthfully. It is also assumed that the stratified random sample chosen to participate in the PRAMS questionnaire in Georgia is accurate in the resulting population estimates within the study's time frame. It is assumed that information relating to access to care, diagnosis, and interactions between patients and healthcare providers, advocates, and others would be collected during the qualitative portion of the study. The participants will answer truthfully and be representative of the population being studied.

Definitions of Terms

After pregnancy- for the purpose of this study, after pregnancy refers to the period of just delivering.

Before pregnancy- for the purpose of this study before pregnancy is defined as any time before the first trimester of pregnancy.

During pregnancy- for the purpose of this study, during pregnancy is defined as any time between week 1 of pregnancy to birth.

Health status before pregnancy- for the purpose of this study, health status before pregnancy is defined as individuals diagnosed with cardiovascular diseases, such as hypertension or cardiomyopathy.

*HTN-*Hypertension

Pregnancy-related complications- for the purpose of this study, pregnancy-related complications refer to any health problems arising during pregnancy or prior health problems that are aggregated due to the cause of pregnancy.

PRAMS- Pregnancy Risk Assessment Monitoring System

Rural county- As defined by the state of Georgia, rural counties are considered to be any county with a population of fewer than 50,000 persons.

SEM- Social-Ecological Matrix

CHAPTER 2

LITERATURE REVIEW

Overview of the challenge: From current maternal health literature, there is an intense focus on women's health, primarily during pregnancy, that is uneven in proportion to the amount of prenatal and postpartum care currently being given no matter the geographical location in the US (Tully et al., 2017). Due to numerous system-level constraints, such as a lack of rural obstetric services and financial difficulties, it would not be easy to provide comprehensive care to all women. The postpartum period is an odd period for new mothers where interrelated health issues are not addressed, and they are left to figure out these issues on their own, depending on the level of constraints they have. These constraints range from conceptual, financial, limited awareness, and practical structural barriers (Tully et al., 2017). These barriers are exacerbated for those with low socioeconomic status or who are publicly insured. Medical guidelines often do not align with the experience and constraints of women's health issues. For example, clinical interactions may be more meaningful for mothers and effectively promote optimal health behaviors (Tully et al., 2017). Although, this interaction may not be available in rural and medically underserved areas. To bridge the gap in the literature regarding different, it is important to first explain the items that are pertinent to tackling the various factors that are important in providing comprehensive care for women.

Overview of the Social Ecological Model (SEM) Background

For this dissertation, the SEM framework will only serve to explain the multilevel influences affecting pregnancy-related mortality, and none of the levels will be used in the research design. The Andersen Behavioral Model of Health Services will be used independently as multi-component model separate from the SEM to future answer the research questions for this study. The SEM framework acknowledges multiple factors across five layers, which examine health issues from a multilevel standpoint (McLeroy et al., 1988). These layers include individual, interpersonal, organizational, community, and policy factors. The SEM demonstrates the multidimensional influences contributing to

pregnancy-related mortality in rural and medically underserved areas in the US. While structural and social determinants of health play a role at all levels of the social-ecological matrix, it is essential to identify some SEM factors in pregnancy-related mortality (DiPietro Mager et al., 2021; Nelson et al., 2018). The discussion of these factors following:

Individual

The individual characteristics that influence their health would be at their core regarding pregnancy-related deaths. These characteristics would consist of an individual's beliefs, behaviors, and physiological factors. Physiological and biological factors such as pre-existing health conditions and age are one piece of the explanation for factors associated with increased risk for pregnancy-related mortality (Bingham et al., 2011; Neggers, 2016). However, the cause of pregnancy-related mortality goes far beyond the individual-level factors. Sufficient data shows that women in the US deal with various structural access barriers that inhibit them from attaining the necessary services. Though there is a great focus on both interventions and research commentary for changes needed to be done at the individual level, there is no comprehensive data to explain a gap between knowledge of when to get care or plan for action if the knowledge is present (Phillips & Higgins, 2017; Rockcliffe et al., n.d.; Zinsser et al., 2020). Additionally, there is only so much that can be changed in such a short time during pregnancy to have effective long-term effects if the individual has hypertension (Magee & von Dadelszen, 2021). This would require a focus at a secondary prevention level as this brings in the need for more interpersonal and organizational level influences to have a more prominent role for the individual's factor to be able to play.

Interpersonal

Social interactions or networks influence the interpersonal level. Limited availability and use of mental support affect the social support aspect, which is a leading factor for maternal depression. Which is a leading behavioral cause of pregnancy-related deaths (Nichols & Cohen, 2021). Due to poor communication with healthcare providers, inappropriate or delayed treatment has been indicated as a barrier to adequate care. A poor communication barrier may cause missed or delayed diagnoses (Richards

& Basnyat, 2021). This barrier still needs to be investigated, as in women with pre-existing conditions. In most cases, unless an individual has been classified as high-risk, physicians do not disclose pertinent information for which the individuals may need to take precautions during their pregnancy (Oza-Frank et al., 2015). However, despite a high-risk label for an individual, there are growing concerns that healthcare providers do not take their patients' concerns seriously (Sword et al., 2012; Terreri, 2020).

Organizational

At an organizational level in the SEM framework, contributing factors such as low quality of care, poor access to specialty obstetrics care, and lack of continuity care are among the structural factors contributing to pregnancy-related deaths (Enhancing Reviews and Surveillance to Eliminate Maternal Mortality, 2019; Petersen et al., 2019). In addition, racial disparities are commonly documented as having adverse effects on pregnancy outcomes. The Maternal Mortality Review Committee has identified limited access to clinical care (mainly in rural areas), unstable housing, and inadequate or lack of transportation options as some of the leading community factors influencing pregnancy-related mortality (Davis et al., n.d.). Outside of the great metropolitan Atlanta area, 52% of Georgia's primary care areas are deficient in obstetric providers (Spelke et al., 2016). Smulian et al. (2016) examined the characteristics, attitudes, and incentives for current obstetrics trainees to practice in areas lacking obstetric providers and services in Georgia. Of the 95 OB/GYN residents and 28 certified nurse-midwifery, only 19 residents and 15 certified nurse midwives expressed interest in practicing in rural Georgia. At the organizational level, it is also important to note that there is a missing whole human approach to pregnancy. Rural America also has difficulties with women's health services.

Policy

Insurance coverage plays one of the most prominent roles at the policy level in the appropriateness and quality of health care a pregnant individual can receive. According to a National Vital Statistics Report for 2019, Medicaid was listed as the principal payment source for about 42.1% of births. Medicaid is crucial for those of low socioeconomic status, and those in rural Georgia tend to be

covered by Medicaid (Medicaid and Rural Health, 2021). Pregnant women eligible for pregnancy-related Medicaid coverage under the Affordable Care Act's (ACA) expansion have coverage 60 days after giving birth to cover postpartum services (Family Medicaid, n.d.). However, not all states in the US have adopted the Medicaid exemption. Some states are taking action to extend pregnancy-related Medicaid coverage eligibility to include up to one year of postpartum care (Maternal & Infant Health Care Quality, n.d.; Ranji et al., 2021). As of February 7th, 2022, Georgia's senate passed senate bill 338, in which Medicaid coverage now included postpartum care for mothers for a year postpartum (Centers for Medicare & Medicaid Services, n.d.; "View Each State's Efforts to Extend Medicaid Postpartum Coverage," 2022). With the recent ruling by the US Supreme Court in June 2022, it is important to mention the issues regarding the overturning of Roe v Wade and how it affects health, considering that there was federal protection for women's reproductive decision-making during the first trimester. With this retraction of federal protection, the individual state oversight of regulations over women's reproductive health during all stages of pregnancy may cause issues in handling high-risk pregnancies and affect maternal health outcomes. The outcomes of the overturning of Roe V Wade will be further discussed in a larger focus in the discussion/recommendation section as it is not directly investigated in this study.

Theory Background

The Andersen Behavioral Model of Health Services model serves as a method for understanding the multiple dimensions of access to medical care. This is accomplished by identifying and analyzing the influence of various contextual characteristics, individual characteristics, health behaviors, and outcomes that all interplay to explain the contributing variables that either aid or hinder health services utilization (Andersen & Davidson, 2014). The model itself has been built upon over time to understand the various effects and manner of uses for this model, such as the prediction of using health services, promotion of social justice, and improving the effectiveness and efficiency of health service delivery (Andersen & Davidson, 2014).

Andersen's Behavioral Model (Figure 1) consists of three major constructs: predisposing factors, enabling factors, and needs. Predisposing factors are defined as the existing conditions (either individual or circumstantial) that predispose individuals to use or not to services even though some situations and circumstances may not be solely responsible for the use of medical services (Andersen, 1968; Andersen & Davidson, 2014). Enabling factors are defined as conditions that may enable or hinder the seeking or using of medical services (Andersen, 1968; Andersen & Davidson, 2014). The final construct of needs is defined as how patients or healthcare providers can identify and acknowledge the need for requiring medical treatment (Andersen, 1968; Andersen & Davidson, 2014). As seen in Andersen's Behavioral Model (Figure 1), the major constructs of predisposing, enabling, and needs are displayed in how they are involved in both the contextual influences and the individual's characteristics to determine access with various factors at the contextual and individual level. Adaptation of the model for this study will be further discussed in chapter 3. This adaptation will also explain the connection to the research question that will be answered by the specific constructs of interest.

Previous Applications

Maternal Health. The previous application of maternal health has largely been in international focus, and significant focus is on the antenatal period as it is easier to measure some of the influencing factors for seeking care (Adewuyi et al., 2018; Neupane et al., 2020). These studies also focus on the implementation of interventions to increase antenatal care to reduce maternal mortality in primary low-and middle-income countries. For this study, while the postpartum period is also an area of interest, the focus of the study is attempting to see which health behaviors are specifically influencing the timing for receiving prenatal care in women who have pre-pregnancy hypertension and create a continuation of care far into the postpartum period. In a similar fashion, many of the findings of these previous model applications and other similar research looking at maternal health care utilization do show that contextual factors such as distance to health facilities, information exchange, and the rural v. urban residence affect the timing and use of care related to maternal health (Adewuyi et al., 2018; Haruna et al., 2019; Neupane et al., 2020; Paul & Chouhan, 2020; Sharma et al., 2020).

Influence on the timing of care. Since this study would be the first of its kind and is helping fill in the gap in measuring behavioral hospital utilization in the US particularly for prenatal care, there are no adaptations of Andersen's model to measure prenatal care timing. Therefore, because of this gap, the only relevant previous application concerning the timing influence that would help inform this study model adaption would be studies where Andersen's model has been adapted to focus on particular influence on either timing of services received or patients' interaction with their health provider (Gregory et al., 2020; Hong et al., 2019; Petrovic & Blank, 2015; Pu et al., 2015; Soleimanvandi Azar et al., 2020; Travers et al., 2020). Some of these studies, in particular, have shown that their adaption of the Andersen model would require some variation of including of technical experience of the care provider, shared decision, -making, usual source of care to have a more precise understanding of the intention of care (Hong et al., 2019; Petrovic & Blank, 2015; Travers et al., 2020).

Limitations of the theory

Though this model has many components and has the potential to include a range of factors, there are limitations regarding cultural influences that cannot be included as a manner to measure the level of influence for the desired outcomes (Guendelman, 1991). Another major limitation of this model is that it tends to measure the desired outcomes as dichotomous factors, either present or not, making it difficult to get an accurate measure of influence (Andersen & Davidson, 2014; Wilson et al., 2005).

SEM and Theory Summary

Overall, there is a disjointed understanding of the preconception, prenatal care period to postpartum period understanding. The focus needs to be geared much more towards having a standard practice of intervention timing and information given, particularly for all women, regardless of their level of risk. Additionally, a large focus shift needs to be included to have rural and urban care held to the same high standards. The legislation still leaves quite some room for interpretation and primarily still tends to benefit urban areas even though rural health systems are continuously struggling.

There is limited literature on which the Andersen model has been adapted for prenatal care influence research in the U.S (Anderson et al., 2019; Lederle et al., 2021). This study would help explain some of the influencing factors for early prenatal attainment for women living in rural Georgia, specifically for women with pre-pregnancy chronic hypertension. Furthermore, this study would be the first of its kind to adapt the Andersen's behavioral model of health service use associated with prenatal care timing to prevent pregnancy-related complications.

Intervention Timing

While it would be ideal to have a preventative intervention routine from the onset of pregnancy confirmation or to be brought up regularly during women's wellness exam before the possibility of pregnancy is present, current practices show that there is a variation in the standards of practice in which the timing of intervention varies depending on factors such as the intention of pregnancy and the continuity of care during postpartum (Gourevitch et al., 2022). In particular, intervention timing is important to prevent negative outcomes due to chronic hypertension throughout pregnancy.

Prenatal care

Ideally, prenatal care visits are to occur during the first trimester for all levels of risk pregnancy as a method of prevention. As Powell et al. (2022) pointed out, earlier prenatal care visits, particularly in the first trimester, decrease the risk of serious issues, such as eclampsia, maternal ICU admission, and preterm delivery if the first prenatal care visit is during the third trimester. Comprehensive preconception care is very important for prenatal care delivery, and it is stated that it is essential, especially for first-time mothers planning a pregnancy (Wally et al., 2018). However, it is also known that prenatal care outcomes are better for women planning for pregnancy. With this said, health care providers must discuss the possible implications of current behaviors or medical conditions on all women regardless of pregnancy intentions. On the other hand, other public health prevention programs could include preconception messaging information about unhealthy behavior and its impact on pregnancy (Wally et al., 2018).

Postpartum Care

While most pregnancy-related care is during the prenatal period, the postpartum period is just as necessary to steer through the challenges after delivery. In North Carolina, the fourth-trimester project helps mothers, health care providers, and other stakeholders to investigate the needs of the families involved from birth to 12 weeks postpartum (Tully et al., 2017). During this project, four area topics came as a result. First, one of the themes is the concentrated focus on prenatal care and the lessened importance of maternal well-being during the postpartum period, especially before the standard 6-week postpartum period. Secondly, the medical guidelines in practice do not match up with the experiences and constraints of the women going through pregnancy. It would also help to include mothers in the conversation as experts on their infants and promote their strengths as mothers to help achieve better health goals. Furthermore, mothers need comprehensive care outside pregnancy to address interconnected health issues in women.

Part of improving postpartum care is the need to reorganize how care is provided. In Krishnamurti et al. (2020), postpartum care providers were randomly sampled about the priorities and frequency of postpartum care, both in-person and telehealth. Providers stated a high focus on certain types of care and routinely practiced these care items, such as depression screening. However, there is still a missing element for care in which items are still underperformed and some elements of care that may need extra attention for adequately caring for future standard care.

As mentioned previously, the timing of care is essential to reduce the likelihood of adverse pregnancy-related outcomes. Although, currently, there are no standard of interventions for women with chronic hypertension, regardless of pregnancy intention, to be made aware of the needed for prevention of pregnancy-related outcomes prior to pregnancy, regardless of the timing for intervention there is also a need for comprehensive care outside the realm of pregnancy to be address interconnectedness women health issues that may occur even so apart from the intention of pregnancy.

Information Exchange

In connection with intervention timing, the information exchange between the health provider and patients is important to increase awareness of the increased risk of pregnancy-related complications because of the presence of chronic hypertension. However, as with the issue with intervention timing, there is no standard of practice among health providers in which information is presented to patients, no matter their high-risk classification. Information exchange is important for this study, as this study will be looking into what information regarding chronic hypertension is shared with women who deal with this. In Richards & Basnyat's (2021) qualitative examination of women's experiences with risk information exchanges, most of the participants from this study stated that unless they had prior health issues, their health provider did not give more information unless the individuals were classified as high risk. In many cases, women feel that information is withheld from them, prevention information they should know (Helou et al., 2021; Oza-Frank et al., 2015; Richards & Basnyat, 2021). The only exception regarding information exchange was about c-sections, births, and genetic testing that was in standard risk information from handouts (Richards & Basnyat, 2021).

Some women who knew there was a risk of complications during their pregnancy felt that information was withheld. For example, Richards & Basnyat (2021) had women who experienced complications reported a perceived barrier due to a lack of information sharing and had to seek the information independently. This can cause information overload and unnecessary extra stress and may lead to researching evidence-based information. In another qualitative study by Helou et al. (2021), women who had experienced hypertensive disorders during pregnancy were more confident in their clinical management. However, women who did not have prior experience with the hypertensive disorder during pregnancy were shocked when they developed preeclampsia (Helou et al., 2021). In Helou et al.'s study, women with chronic hypertension tended to have a limited comprehension of the possible risks during pregnancy and did not fully recognize the seriousness of their condition.

Overall, information exchange has been perceived to be inconsistent by women during their pregnancy. This inconsistency in information exchanges was either perceived to be primarily insufficient

unless the women were labeled to be high-risk, which could lead these individuals to look for information on their own which may be incorrect or be too much information and overwhelm the individual. In the case that a woman already had an experience, she perceives herself to be more confident in caring for their current pregnancy and has prior knowledge of which information to ask for, which an individual dealing with their first pregnancy with hypertension may not know which information is needed and is highly reliant on their health provider for the foundation of their knowledge.

Prevention Messages

Preventative health messages serve as a primary prevention tactic in raising awareness on minimizing adverse outcomes in women with chronic hypertension. However, as a is running theme with intervention timing and information exchange, there are no standard practices in who is receiving the preventive messaging other than women who are already considered to be high-risk are more likely to receive preventative messages. The importance of this topic to this study is because the preventive messaging could play a modifying role in the level of healthcare service utilization a woman may have. Studies based on PRAMS data suggest that women who are perceived to be at high risk of adverse pregnancy outcomes (i.e., minorities, those with lower education, lower-income status, etc.) and or are engaging in high-risk behaviors (e.g., physical, inactivity) tend to be getting messages earlier than women who do not have these characteristics (Petersen et al., 2019). In a study by Oza-Frank et al. (2015), individuals considered to be at risk are more likely to receive specific messages prenatally. This was due to psychosocial factors that increased these populations' risk for adverse outcomes. This same study indicated that providers were basing their preventative messages on demographic factors or depending on the geographical location of the health site location/clinical setting instead of providing the same health message to all individuals, no matter their characteristics or access to care. In addition to the timing of when women are given preventative pregnancy, health-related messages vary by message, pregnancy intention, and the mother's characteristics (Moos, 2004).

Moos (2004) described a paradigm for preconception health promotion to prevent adverse pregnancy outcomes. This paradigm is still relevant to today's issues. Many of these include a

requirement to refine the concept of preconception information and the importance for health providers to utilize an agreed-upon method to discuss during the preconception time. For example, in Helou et al. (2021), many women with chronic hypertension were already on hypertensive medication that is not deemed safe during pregnancy when they discovered their pregnancy status. In comparison, some women were changed to a safer alternative as soon as possible. For others, the decision for medication change was delayed because the patient's assessment of possible risks was downplayed.

The information presented by a health provider to their patients plays a role in the likelihood of a woman being more aware of risks or possible complications or outcomes that are possible due to the presence of chronic hypertension during pregnancy. As chronic hypertension that is present before pregnancy may require management that is not ideal to be continued during pregnancy, it is important for prevention messages to be consistent and at all risk levels.

Rural Health

For this study, the geographical area of focus will be all rural counties and medical underserved areas in Georgia. It is essential to look at the capacity, current attempts in legislation to help bridge gaps, and the continuity of advocacy for the improvement of health services in rural areas, which directly affect the ability of health service utilization before, during, and after pregnancy in the prevention of pregnancy-related complications within women with chronic hypertension. As there have been closures for various health services in rural areas in the past decade, it is imperative to take this into consideration when looking further into the availability and ability of services that may aid in many factors in getting early prenatal care as well as get care for pregnancy-related complications (Miller, 2021).

Rural Health Capacity

Capacity for this study refers to the availability of health professionals and the health professional specialty and the availability of specific health services. For example, there are disparities in the number of health centers available between rural and urban health, which is an issue that can affect the ability to

care for or prevent pregnancy-related complications. In addition, there is a need for more obstetrics and gynecology, and cardiovascular health services that may be offered to rural areas.

Disparities between rural and urban health have led the American Heart Association and the American College of Obstetrics and Gynecology to publish statements focusing on health improvement for rural communities ("ACOG Committee Opinion No. 586," 2014; Harrington et al., 2020). From these statements, both groups advocate for the collaboration of rural health agencies to classify the barriers to care, increase healthcare provider numbers, expanding the use of telehealth services, and widening insurance coverage. There is also a need to improve health care at the facilities level for practitioners to better provide for the maternal populations they serve (DiPietro Mager et al., 2021).

Jolles et al. (2020) stated that "controlling for medical risk factors and when matched with the appropriate level of care, rural childbearing families have equal and, in some cases, better outcomes than those living in urban settings." While the distribution of birth in the US is primarily concentrated in urban areas, the maternal care system needs to be reshaped so that the appropriate level of care is given to the population regardless of geography (Jolles et al., 2020). It is unfair to expect the number of births to be distributed evenly and have the maternity care system based solely on birth distribution. Midwifery-led birth centers could also be an excellent mid-ground to improve outcomes.

Attempts to Improve Rural Health Capacity

In order to address the limited capacity of health services in rural areas, factors influence the structural makeup of this area. As a result, different forms of legislation at the national and state level have been written to help with the economic barriers that may lead to hospital closures in rural areas, specifically here in Georgia.

There have been eight-hospital rural hospital closures in Georgia since 2010 (Miller, 2021). These hospital closures significantly influence the healthcare provider capacity within the rural towns and surrounding areas that have relied on those hospitals. To combat the increase in rural hospital closure rates, attempts in legislation at the national level have been made to increase Medicare hospital reimbursement rates (Owens, 2021). Unfortunately, the state of Georgia itself has one of the lowest

reimbursement rates in the US. This proposed legislation would set up a national minimum, the Medicare Area wage index. With these new high requirements rates, rural hospitals may be able to adequately meet the amount needed to cover the rising operating costs of hospitals ("New Legislation Addresses Inadequate Reimbursement For Rural Hospitals," 2021). However, the legislative language in the national level house bill is written so that these reimbursements would significantly benefit states with greater urban populations rather than rural (Text - H.R.6281 - 116th Congress (2019-2020), 2020).

Georgia's House Bill (HB) 769 was introduced and signed into an act in 2018. This HB was initially drafted to propose various methods to aid in creating ways to ease the growing trouble plaguing the rural health system in Georgia (HB 0769 -Recommendations on Healthcare from House Rural Development Council, 2018). These tactics include increasing support for pharmacy services to aid in reducing the costs of staffing pharmacists in off-peak hours; the examination of methods to streamline the billing process that would help expedite the billing process for medication and other state health benefit plans; training for rural hospital leadership by creating the Rural Center for Health Care Innovation and Sustainability within the State Office of Rural Health to aid in improving education programs for healthcare administration; creating a new definition of micro-hospitals, establishing grants for physician malpractice insurance, and finally creating a rural hospital tax credit (HB 0769 -Recommendations on Healthcare from House Rural Development Council, 2018). It is important to note other standalone bills in which rural hospital credits are proposed (Marker, 2018). While HB 769 is an attempt at an overall solution to the rural health system crisis, this bill only touches upon some of the issues exasperating the rural health system crisis rather than improving the systemic issues that are only getting worse.

While legislation is only one form of an attempt to improve rural health capacity at the national and state-level, specifically in Georgia, it is essential because many of the closures have been due to the low reimbursement rates of Medicaid. Since Medicaid covers many pregnant women and is more likely to be used in rural areas, it is essential to have legislation as Medicaid is federally funded and distributed by the state. Additionally, it is crucial to note that legislative language at the national level has more significant benefits for areas with larger urban populations than rural areas. Additionally, the legislative

bills in Georgia only have a few items that would provide some solutions in the form of credits to the health the rural health system crisis and only touch on a few of the issues instead of a comprehensive list of matters plaguing the rural health system which may lead to further systemic issues down the road.

Advocacy for Rural Health

Since one portion of the study will be looking at advocacy groups that have a reach in rural areas, it is helpful to look at what address he has been doing for rural health to understand the current initiatives better. While there are different areas of interest for advocacy, the main focus of this coverage will be specific to research initiatives and policy changes.

Georgia maternal and infant health research group aims to complete several requites for research initiatives by allied researchers collaborating with community partners (Zertuche et al., 2016). The foundation's framework plays a crucial role in making cost-effective and efficient contributions to the health of Georgia s maternal and infant population while also providing student engagement for translating research into advocacy efforts. This group's efforts are a prime example of how leadership in public health and advocacy could be used for similar works in other states in the US for maternal and infant health.

A study by Villablanca et al. (2016) review remarks on the unbalanced burden women who reside in rural areas face when caring for cardiovascular disease in the US and provides some methods to solve this issue. These initiatives include board-based prevention that affects access to quality care, policy changes around insurance coverage availability, outreach initiatives that help with community outreach and education, and the proper translation modification of clinical research to environmental and social causality factors.

Turn advocacy at times for rural health or more aimed at improving research and his initiatives while working with community partners. As with the Georgia maternal and infant Health Group research group, their efforts are more aimed at leadership and public health and how similar advocacy initiatives could be used for similar works regarding maternal and infant research. Because there is such an imbalance and the burden of care for women who reside in rural areas and deal with chronic

cardiovascular diseases, there is also a need for initiatives to create awareness of the effects of not having access to quality care and needed policy change about insurance coverage. Other similar initiatives could properly affect environmental and social factors that play into modifying behaviors that may increase pregnancy-related complications.

Organizational and Policy Level Interventions

Up to this point, the need for policy changes and the capacity of rural Health Systems has been mentioned. It is necessary to see possible organizational and policy-level interventions that have been put into place and how they could be adapted to prevent pregnancy-related complications in Georgia. Interventions within hospital organizations in Georgia, Medicaid intervention discussion, and national-level and state-level policy strategies are discussed to see the different levels of interventions that may impact preventing and increasing hospital utilization for pregnancy-related complications.

Hospital Organization in Georgia

In recent relative House Bills in Georgia, policymakers have attempted to propose legislation that would help improve the maternal health system in Georgia by creating a rating system for birth facilities to raise efforts to run these facilities. Some doctors may work with one hospital but are contracted by other hospitals for their labor and delivery service expertise. This may lend itself to some pregnant individuals making decisions on the doctor who will be in charge of their health during pregnancy based on their health providers' connection.

With Georgia's worsening infant and maternal mortality rates, House Bill (HB) 909 was proposed to provide designations of perinatal facilities (HB909-Health Designation of Perinatal Facilities Provisions, 2018). This HB aims to create a rating system for birthing facilities as it has been done similarly for other Georgia hospitals for trauma, cardiac, and stroke care (Miller, 2018). The findings of the general assembly under section 1 article 3 state, "several states have established programs to inspect and designate facilities that have developed the capacity to provide expanded levels of neonatal and maternal care." This statement then explains that it is essential to encourage the improvement of quality

care to create better outcomes regarding maternal and neonatal health. While this act attempts to establish a rating system for perinatal facilities, the language of this legislation is made for facilities as they are at the time of this bill's approval. This means that the criteria for designation would be to judge facilities by their capacities at the time and encourage facilities that may need to improve their capacities to fit the criteria needed for a more favorable designation.

Ultimately, this bill does not consider the systemic structures needed to be revamped to deliver adequate quality care. Facilities need to apply for a designation through an application process and specific criteria established within this bill. This bill aims to improve the overall quality of care and outcomes by creating criteria levels in hopes that facilities meet a baseline requirement if they apply. However, as mentioned throughout this paper, rural hospitals would not have the capacity to deliver the services needed for their population. Therefore, they may not have the ability to apply for a designation. This would increase the risk of decreased use of the few rural hospitals with OB services and drive individuals to choose to go to urban hospitals that may not be feasible to match their health needs due to transportation, financial, and time constraints.

Though policymakers recognize the need to combat maternal and infant mortality rates in Georgia, one of the few pieces of legislation that has been introduced is attempting to pressure current birth facilities to improve their process and capacities. However, the other related systemic structure changes required for these necessary improvements are not accounted for in the legislation. At the same time, there are requirements to receive a particular rating, and no effort is made to aid these hospital organizations in increasing their rating, making them solely responsible for the changes.

Medicaid

As mentioned previously, Medicaid was listed as the principal payment source for about 42.1% of births in 2019 (Neggers, 2016). In 2020 47.2% of births were covered by Medicaid in Georgia (*Medicaid Coverage of Births*, 2022). Medicaid is also crucial for individuals of low socioeconomic status. Those in rural Georgia tend to be covered by Medicaid (Medicaid and Rural Health, 2021).

Insurance coverage is a barrier that many women face during pregnancy. However, pregnancy-only-Medicaid is available for those who qualify and do not have insurance coverage. Pregnancy-only Medicaid coverage only extends coverage for 60 days postpartum. DeSisto et al. (2020) analyzed the effect of continuous Medicaid coverage versus pregnancy-only Medicaid on postpartum care in Wisconsin. In this study, despite women with continuous Medicaid eligibility having a higher risk of not receiving postpartum care, they are more likely to receive the postpartum care they need than those with pregnancy-only Medicaid. Although states have different requirements for their pregnancy-only Medicaid eligibility, this could be true for other states with a similar 60 postpartum cutoff date. This is a reason for concern because postpartum care is a period where health risks that have emerged or were aggravated by the pregnancy could be addressed (McCloskey et al., 2021).

In April 2021, Georgia was approved by the Center for Medicare and Medicaid Services for their section 1115 waiver to extend postpartum Medicaid coverage from 60 days to 180 days (or six months) for mothers (*Georgia Postpartum Extension*, 2021). As of current statistics, 79% of pregnancy association deaths occurred within 43 days to a year postpartum in Georgia (Georgia Department of Public Health, n.d.). The goal of this waiver was to provide continuity of care for postpartum mothers covered by Medicare to eventually decrease the rates of maternal mortality and morbidity in the state. Early February 2022, Georgia's senate approved for Medicaid postpartum care extension with Senate Bill 338 (*Georgia General Assembly - SB 338*, n.d.). While this bill has not been signed into law, this new policy would build upon the previous waiver coverage and increase Medicaid coverage for postpartum mothers from six months to one year (Prabhu, 2022). While increased coverage time frame may aid in the need to cover medical expenses for complications that may arise within in year postpartum, this coverage still does not aid individuals who live in rural areas where there is a severe lack of maternal and fetal medicine specialists (Delima et al., 2020; Miller, 2022; Virtue, 2022).

As Medicaid covers nearly half of the births in Georgia, it is necessary to consider the impact it would also have on the coverage and ability to receive services during pregnancy and postpartum. Continuous coverage for the mother during pregnancy and the postpartum period reduces the barrier of

being uninsured and ensures the mother can get the necessary preventive services in a timely manner. However, with the time frame extension of the recent house bill in Georgia increasing the likelihood of getting care, there is a lack of coverage for mothers who may require special care.

Strategies

While there will be no direct research on the implementation of political and state strategies regarding maternal health, it is necessary to discuss the foundation creation of the researcher's future recommendations and public health implications once the data has been analyzed.

National Level Policy Strategies

As the US is one of the industrialized nations with the highest maternal mortality rates, policy strategies at a national level require various approaches to measure the current efforts in place and create programs and bills. The identification of ongoing efforts and plans for improvement could help in the prevention of maternal mortality and pregnancy-related mortality.

A 2020 report from the US Government Accountability Office reviewed issues relating to maternal mortality in the US. The finding of this report showed that the Department of Health and Human Services has 13 ongoing efforts to reduce pregnancy-related (U. S. Government Accountability Office, 2020). Of these 13 ongoing efforts, two of the most notable efforts are the support for Maternal Mortality Review Committee (MMRC) Cooperative Agreements and Maternal and Child Health Service Block Grants. The MMRC currently has agreements with 25 states to fund state organizations and agencies to coordinate these committees for their respective states, the findings that these committees are valuable in the revision of deaths in their respective states to identify prevention opportunities relating to maternal mortality (U. S. Government Accountability Office, 2020). In addition, the grant program helps fund in a manner that supports or adds to other federal initiatives in 59 US states and jurisdictions (U. S. Government Accountability Office, 2020). While these efforts are not directly related, joint efforts in this manner can identify some of the systemic faults that hinder programs for maternal healthcare systems.

As of December 1st, 2020, there are 19 proposed bills regarding maternal health care and coverage across the US for the 2019-2020 congressional session ("Analysis of Federal Bills to Strengthen Maternal Health Care," 2020). These proposed bills focus on various aspects of maternity care issues. These issues include extending Medicaid postpartum coverage from 60 days after the end of pregnancy, creating funding sources for clinical training on health equity and implicit bias for health care providers, expanding networks for maternity care in rural areas, and researching the prospective benefits of Medicaid coverage to include doula care. While most of these bills do provide more funding to improve efforts to reduce maternal mortality, some of the grant funding mentioned within these bills do have a short time frame of three years at a minimum. At the same time, these funding sources may or may not be suggested to be renewed for funding after the grant period ends. Though some of the bills require some form of collection and publication of data related to the efforts expressed in the bills, the data collected throughout these periods may not be sufficient to show any effect.

Overall, the efforts of the MMRC aim to coordinate 25 states in an effort to improve collaboration of ideas toward the common goal of reducing maternal mortality with instead of straining the experts and financial resources on attempting to improve current efforts at an individual states basis hinder progress in the maternal healthcare system. However, as only half of the US states are participating in the MMRC there is some room to increase collaboration with all the states to have a better grasp on the true size of the issue. At the same times, the proposed bills relating to maternal health, while well-meaning, dot does not allow for long term continuation of efforts which may exacerbate the issue of maternal mortality if efforts are only funded on a pilot testing basis, and there is no intention for long-term sustainability.

State-Level Strategies

In a similar manner with national policy strategies, state-level strategies are a manner in which identification of the ongoing efforts and plans for improvement could help in the prevention of maternal mortality and pregnancy-related mortality. While there have been forms of interventions at different scales of reach, it is important to recognize that even at a state level, any intervention strategy would

require collaborations across a variety of stakeholders and identification and subsequent undertaking of addressing influencing factors that could directly or indirectly impact implementation.

In California, maternal mortality rates have decreased due to strategies implemented to improve maternal health outcomes (Nichols & Cohen, 2021). Of the many strategies implemented, Nichols & Cohen (2021) identified which strategies are possible to implement nationwide to improve maternal health outcomes. These strategies include program funding that addresses the social determinants of maternal health and advocating for better maternal health by revising national standards and goals for health care systems nationwide—and finally, investing in monitoring and surveillance for maternal health, including the technology used for this. California initiation partnership between the California department of public health and the California maternal quality of care collaborative jointly began the effort for the improvement strategies in California. While this is a collaborative effort, many states in the US can implement similar strategies over time.

Georgia is one of the states that participate in the Title V Maternal and Child Health Block Program. In the most recent fiscal year application of 2022, the priority needs listed in the state action plan for women/maternal health were stated to be preventing maternal mortality and promoting oral health among maternal and child health populations (Georgia's Title V Maternal and Child Health Program et al., n.d., 2021; *Title V MCH Block Grant Program- Georgia-State Snapshot FY 2022 Application / FY 2020 Annual Report*, 2021). During this period, the MMRC for Georgia is currently reviewing cases to determine the leading causes of pregnancy-associated deaths and will then work with the Georgia Obstetrical and Gynecology Society to provide recommendations for maternal mortality reduction in this state. Nevertheless, not much more information is provided on other efforts that will focus on maternal health.

California's statewide strategies have proven that it is possible for states to implement to improve maternal health outcomes by focusing on efforts that address the social determinants of maternal health and advocating for better maternal health by revising national standards and goals. At the same time, Georgia has the funding to implement similar strategies that have been proven to work, there are no plans

that are identified for implementation other than just the identification of issues that are probable causes for pregnancy-related deaths.

CHAPTER 3

METHODOLOGY

For this study, a mixed-method convergent parallel design approach will be used to investigate the issues that pertain to high-risk mothers for health problems that impact pregnancy-related deaths (Creswell & Creswell, 2018). Consistent with this approach, the quantitative and qualitative data will be collected simultaneously, and each data type will provide different information and be analyzed separately and then compare the results of both to see if the findings confirm or disconfirm the hypothesis, the mixed-method convergent parallel design will be the best fit for this study. (Creswell & Creswell, 2018). This study will investigate trends of experiences, and behaviors of women before, during, and after pregnancy from the years 2015 to 2020, data collected by the Pregnancy Risk Assessment Monitoring System (PRAMS) in Georgia (Pregnancy Risk Assessment Monitoring System, 2021) and compare the trends to finding from key informant interviews in which health professional, nonprofit organizations, and advocacy groups interact with the population of interest and can influence the experiences and behaviors at all stages of pregnancy. The results of this study will be used to help identify potential recommendations for further steps that need to be taken to better serve women with chronic hypertension in how they may become pregnant.

The guiding research questions and hypothesis for this study are as follows:

1. What predicting risk factors are identified of healthcare utilization among pregnant women in Georgia from 2017-2020?
 - a. Hypothesis: Age and having any form of insurance coverage before during and after pregnancy increases the rate of earlier prenatal care utilization for individuals with pre-pregnancy hypertension.
2. Is there a moderation effect due to the identified risk factors among racial/ethnicity groups for individuals who have a pre-pregnancy high blood pressure diagnosis?

- a. Hypothesis: There is an increased number of cases with women who have pre-pregnancy hypertension who do not use prenatal care at earlier rates.
3. What are the current factor characteristics of health organizations and health professional offering services to high-risk pregnancies, especially those at-risk for hypertension, in rural and medically underserved Georgia?
 - a. Hypothesis: Current efforts are insufficient in increasing awareness of the importance of proper use of health services for women with chronic hypertension.

Analytical Framework -See Table 1

As stated previously under the conceptual framework section in, the following contextual predisposing and enabling factors and individual predisposing, enabling, and need factors as well as the modifying health variables constructs from Andersen's Model of Healthcare Services Utilization, will serve as the framework to guide the execution of the Mixed-Methods/Mixed-Data approach, as well as the item collection to analyze and answer each of the research questions (Figure 3). Table 1 shows the connection between the Andersen's Model of Healthcare Service Utilization constructs to be used and the research questions that are answered using that construct. The independent variables of interest include three predisposing contextual factors (demographic, social, and beliefs of health providers, health organizations, and advocacy groups), one enabling contextual factor (organization), predisposing individual factors (demographics of the priority population), one enabling individual factor (financing capability of priority population), and one need individual factor (evaluated health status of priority population). Modifying variables of interest that will be looped to include three health behaviors (personal health practice of individuals from the priority population, process of medical care practices as informed by key informants, and use of personal health services by the individual in the priority population). The dependent variable will cover only one outcome construct (the evaluated time of the first prenatal visit).

While there is limited information regarding the information exchanged during these visits, it will give some insight into trends of behaviors for women with pre-existing conditions.

Research Questions – See Table 1

1. What predicting risk factors are identified of healthcare utilization among pregnant women in Georgia from 2017-2020?

Research question one will look at the most recent trends of prenatal care utilization among pregnant women diagnosed with hypertension before pregnancy. This research question will take a deeper look into the individual predicting factors that can influence the decision of women who have pre-pregnancy hypertension, the timing for their 1st prenatal care visit. The individual character factors of interest gathered from the PRAMS data sets will be used to gain a better understanding of the predisposing, enabling, and need factors trends.

2. Is there a moderation effect due to the identified risk factors among racial/ethnicity groups for individuals who have a pre-pregnancy high blood pressure diagnosis?

Research question two will further investigate the trends found in research question one. This research question will look further into the potential moderation effect that race may have on the timing of women who have been diagnosed with pre-pregnancy hypertension. The individual character factor of interest is gathered from the PRAMS data sets and will be used to gain a better understanding of the predisposing, enabling, and need factors trends.

3. What are the current factor characteristics of health organizations and health professional offering services to high-risk pregnancies, especially those at-risk for hypertension, in rural and medically underserved Georgia?

Research question three will take a deeper look into the structural factors (see table 1-under constructs) which can influence the decisions of women who have pre-pregnancy hypertension and live in rural areas.

To determine the level of influence, these structural factors have overarching elements that will be looked at. These structural factors will be further broken down as the predisposing and enabling factors are the contextual levels further investigating social, beliefs, organizations, and health policies.

Table 1: Analytical Framework for Population Construct for Measurement Based on the Andersen Behavioral Model of Health Services for Quantitative Data

Constructs	Construct Elements	Specific Variables	Methods of Assessment	Construct Link to Research Question
Independent Variables				
Contextual Characteristics-Predisposing	Demographic	Provider characteristics	Podcast Transcripts	R3
	Social	Social structures within practicing organization		
	Beliefs	Provider beliefs based on interacts with priority population		
Contextual Characteristics-Enabling	Organization	Availability of Services	Podcast Transcripts	R3
		Availability of Providers		
	Health Policy	Current Practices		
		Current Organization Policies		
Individual Characteristics-Predisposing	Socio-demographics	Age (25-47)	PRAMS Data	R1 and R2
		Race/Ethnicity (White, Black, Asian, Other, Mixed Race)		
		Education level (Less than High School, High School Grad/GED, Some College/Associate Degree,		

		Bachelor's/Master/Doctoral/Professional Degree)		
Individual Characteristics-Enabling	Financing	Health insurance (Insurance 12 months prior to pregnancy, Insurance during pregnancy, Insurance at the time of the survey)	PRAMS Data	R1and R2
Individual Characteristics-Need	Evaluated	Having a Hypertension diagnosis before pregnancy	PRAMS Data	R1 and R2
Dependent Variable				
Outcome	Evaluated Health	1 st prenatal visit (Week of 1 st prenatal care visit)	PRAMS Data	R1

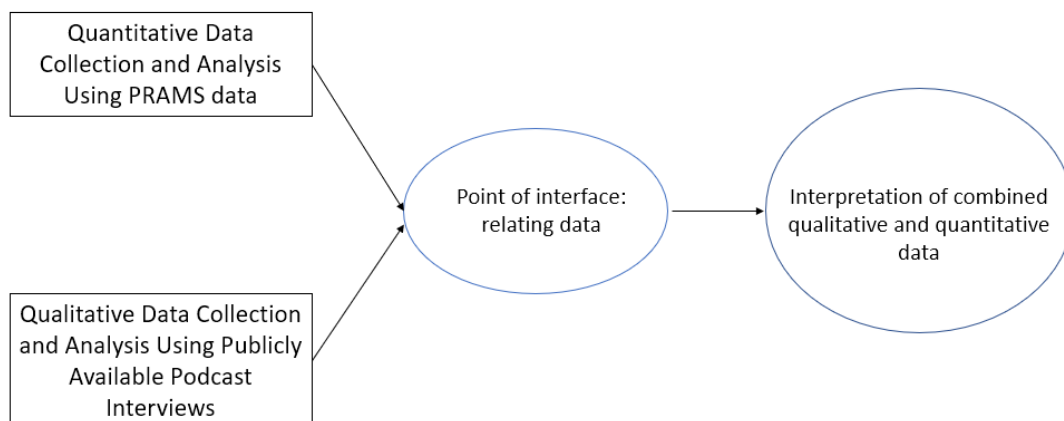
Research Design and Plan – See Figure 2

Overview

For this study design, mixed methods convergent parallel design approach will be taken (Creswell & Creswell, 2018). The concurrent phases will use quantitative data collected by PRAMS for the state of Georgia and information on current evaluated practices from key informants. As mentioned before, as far as this author's knowledge, there is no literature in which PRAMS data is used to measure knowledge of care during pregnancy among women with pre-pregnancy hypertension. In addition to this gap in the literature, there has not been any recent prediction analysis using PRAMS data for pre-pregnancy, prenatal, and postpartum behaviors in women with pre-pregnancy hypertension. As mentioned throughout this study so far, with the increasing rate of women who become pregnant having pre-existing chronic conditions, it is essential to see if preventive behaviors are increasing to decrease the risk of pregnancy-related complications. These behaviors will be cross-checked for possible confounding due to socioeconomic status, location, and race/ethnicity, impacting those behaviors.

The results of the qualitative approach of this study will allow for the explanation of any significance that preliminary descriptive statistics that PRAMS data has shown and any other significant or non-significant results from the trend analysis. During this portion, the gathered interviews will gather information regarding healthcare professionals and health organizations that target the population of interest of this study to comment on the structure and beliefs that may influence their patients or client's ability to increase awareness for earlier initiation of prenatal care in individuals who have pre-pregnancy hypertension. The qualitative approach would also give more information on data that cannot be explained by quantitative data alone. Figure 2 demonstrates the overview of the research plan.

Figure 2. Overview of Research Plan



Adapted from: Creswell, J. W., & Creswell, J. D. (2018). *Research Design: Qualitative, Quantitative, and Mixed Methods Approaches* (5th edition). SAGE Publications, Inc.

Philosophical Assumption and Interpretive Framework. A methodological-based philosophical approach will be used for this study's interpretive framework (Creswell & Creswell, 2018). As this study will be working on information from previous studies and using PRAMS data to describe some of the details of the context of this study, this intervention framework would be the best fit for use. Information found in this study will shape the researcher's experience in collecting data on health providers and other associated entities that help health systems for future research regarding health systems and patient relationships. The focus of maternal health research will be on the research questions using a ground-up approach.

The interpretive framework will be a mix of transformative and feminist theory (Creswell & Creswell, 2018). Though, at this time, this study will not involve inquiry directly into pregnant women, it is using the middle ground of health professionals, and health organizations that do encounter pregnant individuals. The interactions with these individuals should be able to reflect the systems, power dynamics, and social relationships that can construct a better maternal care system. The feminist theory interpretive framework serves as an approach that centers primarily on the problematic and diverse situations that women identify individuals experience within the institutions that they interact with (Creswell &

Creswell, 2018). For clarification, as not all birthing people identify as women, this feminist approach will focus more on the traditionally classified roles that have been assigned to cis-gendered women.

Framework Application for Data Interpretation. Considering that healthcare utilization is the point at which a patient's needs meet the health system, the predisposing and enabling factors at both the contextual and individual characteristics level, and the need factors at the individual characteristic constructs of the Andersen Behavioral Model of Health Services would be the best fit for this health issue. Apart from the need-related factors, the predisposing and enabling factors at both the individual and contextual levels are necessary due to the health system's supply-stimulated and strongly dependent structures to achieve the desired outcomes (Babitsch et al., 2012). As mentioned previously by the SEM in the background, various intertwined factors can predict the use of hospital utilization to prevent pregnancy-related complications. The feedback loops allow for understanding how access might improve (Andersen & Davidson, 2014). These feedback loops are indicated by the arrow pointing from the outcomes to health behaviors, individual characteristics, and contextual characteristics in (Figure 3). This model serves as a form to explain the relationship of the multitude of factors and how different implementations for several factors can impact the desired outcome for this study (earlier 1st prenatal visit).

It is important to note that due to the complexity and necessary details, the whole model will not be used for this study, and a modified version as seen below will be used. In addition, as stated by Andersen & Davidson (2014), depending on the type of service and the severity of the condition, several factors within the constructs hold different weights in their application for predicting hospital use. For this reason, this study will focus on a mix of predisposing, enabling, and need constructs at the individual character levels and only predisposing and enabling factors at the contextual levels for the adapted use of this model. See Figure 3 and 4 and Table 1.

Figure 3. The Andersen Behavioral Model of Health Services Use Framework

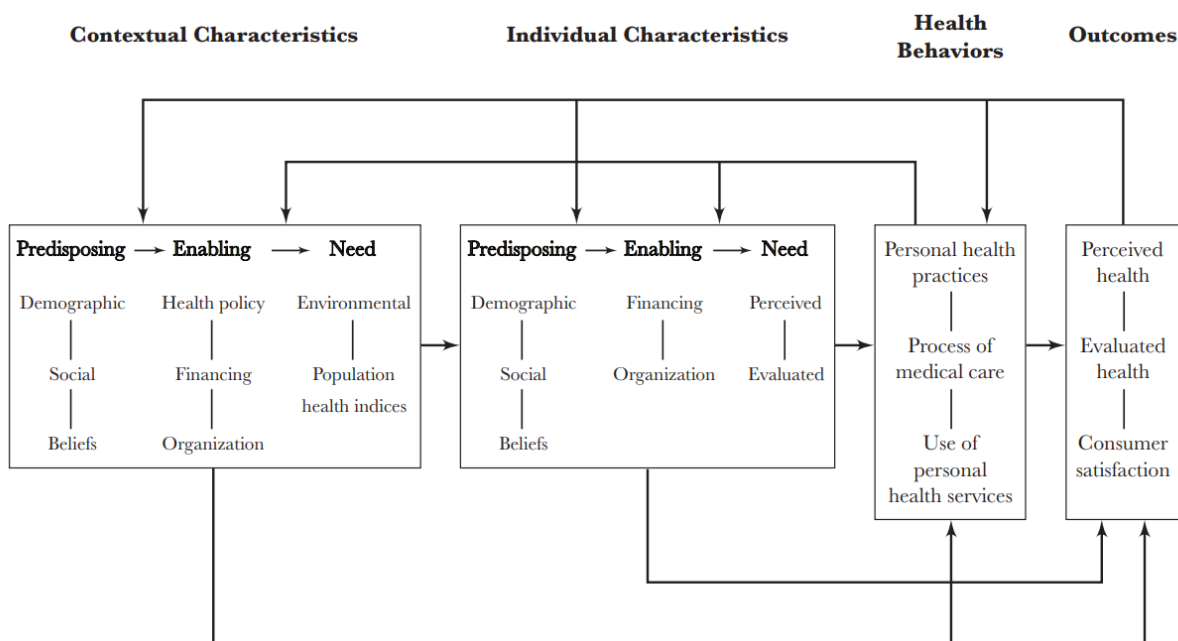
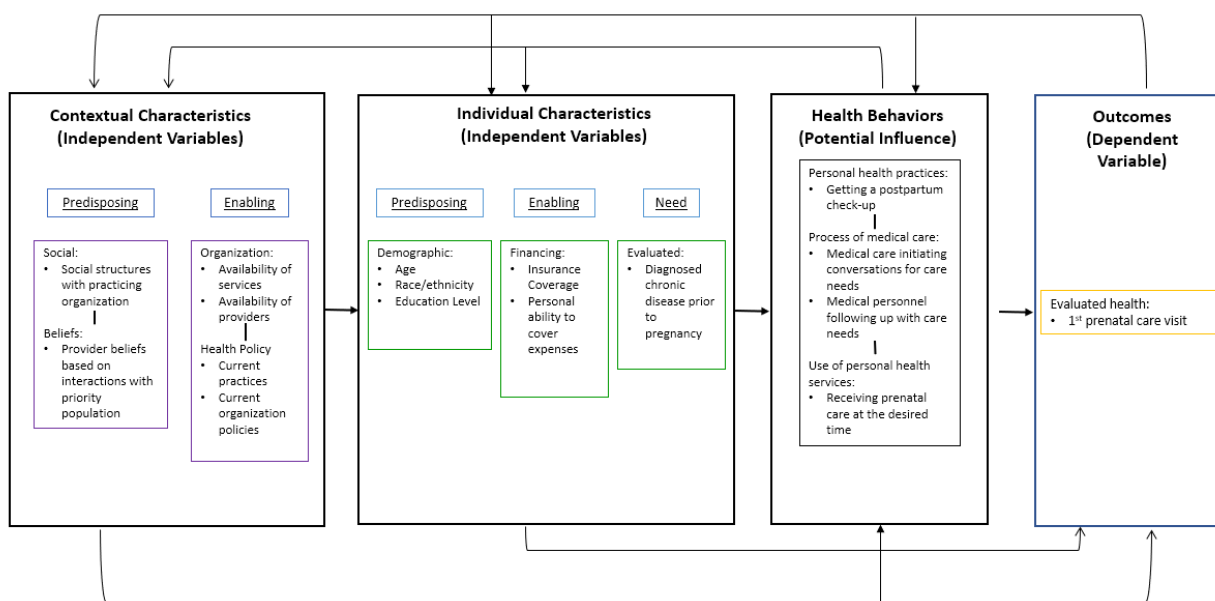


Figure 4. Adapted Version of Andersen Behavioral Model of Health Services Use Framework



Process of Data Collection

Quantitative data

The quantitative data collection will allow for the examination of trends of prenatal care use in the past 3 years (2017-2020) among pregnant women with pre-pregnancy hypertension in Georgia. As PRAMS is a surveillance project of the CDC and state health departments, a proposal was submitted requesting variables of interest to the Georgia Department of Health PRAMS office to access to the data. The following shows the step-by-step methods approach to the collection of quantitative data as stated in the standardized data collection methodology prescribed by the CDC Model Surveillance Protocol (*PRAMS Methodology, 2022*).

Two manners of data collection are used: a survey by mailed questionnaire with multiple follow-ups attempts and a survey conducted by telephone. The following states the contact approach used for the PRAMS surveillance.

1. A pre-letter introducing PRAMS to the mother and informs her that a questionnaire will be arriving to be completed.
2. An initial mail questionnaire packer with a multipurpose cover letter, survey booklet, Q&A brochure, memory aid calendar, and incentive/reward, is sent to the sampled mothers approximately 3 to 7 days after the pre-letter.
3. A thank you and reminder note is sent 7 to 10 days after the initial mail packet was sent.
4. If a sampled mother has not yet responded after the reminder note was sent, a second mail questionnaire packet is sent after 7 to 14 days.
5. A third mail questionnaire is sent to the remaining nonrespondents 7 to 14 days after the second questionnaire was sent.
6. Finally, a telephone follow-up is initiated for the mail nonrespondents 7 to 14 days after mailing the third mailed questionnaire.

The sampled population of interest of mothers asked to participate uses the same general approach and aims to reach a sample size between 1000 to 3000 women (Shulman et al., 2018). For each

participating state, a woman resident of the state who recently gave birth within their state to a live-born infant during the surveillance year. The state's birth certificate is used as the sampling time frame for identifying new mothers. These women sampled are between 2 to 6 months after giving birth. The PRAMS sample is also stratified so that the sub-population of public health interest for the state may be oversampled to reach more information for the public health issue of interest (Shulman et al., 2018).

Qualitative data

The qualitative data collection will give an initial understanding into the capacity, availability, and other relevant insights of health professionals and health organizations that serve rural and medically underserved individuals of interest in the study. The following is the step-by-step methods approach to the collection of the qualitative data.

1. Search for publicly available podcasts and audio transcripts with topics relating to hypertension in women, heart health in women, pregnancy-related complications, health providers who primarily serve a rural population.
2. Listen to audios or read transcripts to determine if inclusion criteria are met.
3. If there was no transcript for the audio, a transcript was created. If there was a provided transcript, it was verified to match the audio if an audio was available.

Qualitative Analysis Framework

For the sake of time and to determine a preliminary understanding of the perceived needs determined by the individuals in the field that could provide an insight into the potential influences for hospitalization utilization in pregnant women with a pre-pregnancy hypertension diagnosis, a modified version of the Delphi technique will be used for the qualitative portion (Nasa et al., 2021). To determine to which degree the health professionals and organizations who serve pregnant women in rural and medically underserved areas and to identify the manner of preparedness to properly serve their

community, the contextual characteristics sub-item constructs of the Andersen Hospital Utilization Model will be used to guide the structure for overarching themes for analysis.

Characteristics of That Will Serve as Samples

Inclusion for PRAMS Data

Women who participated in the PRAMS surveys in the years 2017, 2018, 2019, and 2020

Exclusion for PRAMS Data

Women who did not participated in the PRAMS surveys in the years 2017, 2018, 2019, and 2020

Inclusion for Secondary Qualitative Analysis

Publicly available audio and transcripts with a focus on obstetric and gynecological services, pregnancy-related complications, hypertension, and rural health.

Interview includes a health provider or decision maker who has direct patient interaction and work in rural populations.

Interview includes a health professional researcher whose research focuses on maternal health.

Recording or transcript must have been published between December 2019 and March 2023.

The focus of scope is on the US healthcare system.

Exclusion for Secondary Qualitative Analysis

Publicly available audio and transcripts without a focus on obstetric and gynecological services, pregnancy-related complications, hypertension, and rural health.

Interviews that do not include a health provider or decision maker who has direct patient interaction or works in rural populations.

Interviews that do not have a health professional researcher whose research focus on maternal health.

Recording or transcript has been published before December 2019.

The focus of scope is on international maternal healthcare.

Process for Analysis of Data

Quantitative Data Analysis. While most variables of interest are available within the Georgia-specific PRAMS data, some manipulation and data merging will need to be done to answer the overarching research question and sub-questions. Most of the data collected for analysis is quantitative and will follow a traditional form of analysis by STATA. Apart from the perceived need element, the other independent variables of interest would set a foundation to determine trends of factors influencing women's health service utilization among women with chronic hypertension in Georgia.

Tests Used for Quantitative Analysis. A logistic regression was used for predictive trend analysis. A logistic regression for predictive trends is used to determine the prenatal visit times as the prenatal visit time outcome was recoded to be a binary variable where <13 weeks was labeled as early prenatal care visits and ≥ 13 weeks was labeled as later prenatal care visits to account for the first time for prenatal care visit time during the first trimester compared to a secondary or tertiary trimester prenatal care visit, respectively. There also is an assumption that there will be a sample of more than 50 for each of the years and county that will be looked at. The only moderation variable of the mother's race will be used as the predictor that influences the strength of the ability to predict prenatal visit time.

Qualitative Data Analysis. Due to time constraints, a modified Delphi framework analysis format will be used for the qualitative data analysis. The Delphi framework is a method used to gain a consensus through controlled feedback from subject matter experts or individuals knowledgeable on the subject of interest (Taylor, 2020). A portion of the Delphi framework data analysis for this study includes using the contextual characteristics factors as guiding items of interest for analysis. This analysis will also be using a grounded theory approach which helps with the explanation of the detail to understand issues which may hinder the utilization of early prenatal care visits (Creswell & Poth, 2016). This approach will also help the researcher gain a better understanding of the current issues related to prevent pregnancy-related complications with a focus on rural populations.

A tailored adaptation of the Delphi technique with the use of deductive analysis was used with the modified Andersen Hospital Utilization model constructs for preliminary analysis. The constructs were used as the neutral domain topic names which then an inductive approach was used to find items which corresponded to overarching themes of interest. The researcher created a primary codebook with neutral domain topics. Then the researcher and a colleague reviewed all the transcripts with the codebook and any additional codes that were created by either of the researchers were discussed and reworked the codebook to include new codes. Once the researcher and a colleague reached a consensus on a codebook and definitions for the codes, the researcher and colleague proceeded to code all the transcripts with the finalized codebook.

Ethical Considerations

Though this topic focuses on issues exasperated by pregnancy, the primary population of interest would not be pregnant during the data collection as the PRAMS data that will be analysis will be handled as a secondary data source. Additionally, since this is a sensitive topic and deals with many issues regarding race/ethnicity and other factors that make health disparities apparent in the ability to get care of these pregnancy-related complications, there must be a fair distribution of results. For both forms of data collection, applications for institutional review board approval have been submitted to the Georgia Southern University office of Research Integrity prior to the collection of either form of data.

CHAPTER 3

RESULTS

This chapter contains the study results of both the quantitative and qualitative portions of this study to answer the three overarching research questions.

1. What predictors risk factors are identified of healthcare utilization among pregnant women in Georgia from 2017-2020?
2. Is there a moderation effect due to the identified risk factors among racial/ethnicity groups?
3. What are the current factor characteristics of health organizations and health professional offering services to high-risk pregnancies, especially those at-risk for hypertension, in rural and medically underserved Georgia?

This chapter is organized into two sections. The first section describes and presents the quantitative results for the PRAMS for the year 2017 to 2020. The second section describes the and presents the results from the secondary qualitative interview analysis. The results of the qualitative analysis will consist of both thematic description and quotes generated from the data.

Quantitative Results

Descriptive Statistics

Table 2 presents the complete demographic characteristics of the respondents by urban or rural county of residence at the time of the survey.

Table 2: Weighted PRAMS Demographic Characteristics of Interest by Urban or Rural County of Residence

	Urban (N/%)	Rural (N/%)
	2057 (85.13%)	359 (14.87%)
Pre-pregnancy Diagnosis High Blood Pressure		
No	1945 (94.76%)	334 (93.56%)
Yes	107 (5.24%)	23 (6.44%)
Mother's Race		
White	1067 (52.53%)	250 (70.22%)
Other	965 (47.47%)	106 (29.78%)
Age		
25-29	783 (38.08%)	191 (53.08%)

30-34	778 (37.82%)	113 (31.57%)
35-39	388 (18.88%)	51 (14.25%)
40-44	103(4.99%)	4 (1.10%)
45-47	5 (0.23%)	0 (0.00%)
Federal Poverty Level		
>200%	919 (51.09%)	94 (31.13%)
101-200%	427 (23.75%)	72 (23.81%)
0-100%	452 (25.16%)	136 (45.06%)
Mother's Education		
Less than HS/No Degree	182 (8.90%)	55 (15.27%)
HS Diploma/GED	484 (23.67%)	125 (34.81%)
Some College/Associate Degree	487 (23.78%)	81 (22.68%)
Bachelor's Degree	662 (32.34%)	70 (19.65%)
Master/Doctoral/Professional Degree	232 (11.31%)	27 (7.59%)
Year of Survey		
2017	541 (26.33%)	89 (24.78%)
2018	506 (24.60%)	77 (21.57%)
2019	506 (24.62%)	104 (29.00%)
2020	503 (24.45%)	89 (24.65%)
Insurance coverage 12 months prior to recent pregnancy		
No	481 (23.8%)	113 (31.76%)
Yes	1538 (76.2%)	243 (68.24%)
Insurance coverage during pregnancy		
No	151 (7.54%)	26 (7.34%)
Yes	1848 (92.46%)	322 (92.66%)
Insurance coverage at the time of the survey		
No	397 (19.75%)	99 (28.09%)
Yes	1612 (80.25%)	252 (71.91%)

For the county stratification of interest for this study there were a total of 2,057 participants of urban residence and 359 participants of rural residence. When looking at the diagnosis of high blood pressure prior to pregnancy, not having a diagnosis was much more common county of residence counts ranging from 94.7% and 93.56% for all counts for urban and rural county of residence, respectively. As for mother's race by county of residence had the highest counts for white mothers with others (the combination of Blacks, Asian, Others and Mixed Race) regardless of county of residence. The majority of women who responded to the survey, were between the ages of 25-34 for county of residence.

For federal poverty level there has urban respondents tended to have higher counts of individuals who are categorized to be greater than the 200% poverty line, while in rural respondents tended to have

counts for individuals who are categorized into the 0-100% federal poverty line for all years. The attainment of a high school or higher accounts for more than 91.1% of mother's education for participants of urban counties and 84.73% for participants or rural counties. For the Number of participants by survey year for counts for urban participants ranged from 503 to 541 and for rural participants counts ranged from 77 to 104. Having any form of insurance 12 months prior to the most recent pregnancy accounted for 76.2% and 68.24% for urban and rural county of residence, respectively. Having any form of insurance coverage during pregnancy accounted for 92.46% and 92.66% for urban and rural county of residence, respectively. Finally having any form of insurance coverage at the time of the survey (postpartum coverage) accounted for 80.25 % to 71.91% for urban and rural county of residence, respectively.

Main Effect Analysis

Table 3 show the odds ratio of pre-pregnancy hypertension for those who had a diagnosis with hypertension prior to pregnancy compared to individuals who did not have a prior diagnosis with a when controlled for the mother's race, age, federal poverty, maternal degree, survey year, and insurance coverage 12 months prior to the respondent's recent pregnancy regardless of county of residence. The only factor to show statistical significance was that of individuals of 0-100% federal poverty level which showed to have been associated with prenatal care visits in the first trimester (Odds ratio .42; p-value .03; 95% CI .19, .91) compared to individuals of the >200% federal poverty level and having any insurance coverage 12 months prior to recent pregnancy was associated with increase odds (Odds ratio 2.15; p-value .01; 95% CI 1.17, 3.98) of later prenatal care visits when compared to individual which did not have any form of insurance coverage.

Table 4 show the odds ratio of pre-pregnancy hypertension diagnosis for all survey participants from 2017 to 2020 for those who had a diagnosis with hypertension prior to pregnancy compared to individuals who did not have a prior diagnosis with a when controlled for the mother's race, age, federal poverty, maternal degree, survey year, and insurance coverage 12 months prior to the respondent's recent

pregnancy stratified by county of residence. When stratified by county of residence we see that there is a statistical significance for the factor of federal poverty of 0-100% (Odds ratio .34; p-value .02; 95% CI .14, .84) which is associated with receiving prenatal care in the first trimester when compared to individuals at >200% federal poverty level line in urban counties of residence. However, having insurance coverage 12 months prior to the most recent pregnancy to have a 2.14 (p-value .04; 95% CI 1.05, 4.37) greater odds of attending a later prenatal care visit for individuals of urban county residence. For individuals of rural residence there is an increased odds of attending later prenatal care visits for those of ages 30-34 (Odd ratio 6.89; p-value .02; 95% CI 1.44, 32.99) as compared to individuals ages 25-29 and for those individuals in the 101-200% federal poverty line level (Odd ratio 13.28; p-value .03; 95% CI 1.23, 143.27) as compared to individuals in the >200% federal poverty level. Finally, we also see for rural residence individuals with a high school/GED education (Odds ratio .07; p-value .01; 95% CI .01, .48) are associated with prenatal care in the first trimester as compared to individuals who have less than a high school education/no degree.

Table 3: Odds of first trimester prenatal carer visit with Pre-pregnancy HBP diagnosis (Controlled by mother's race, mother's age, federal poverty level, mother's education, survey year, and insurance coverage 12 months prior to recent pregnancy)

	Odds ratio	P-Value	95% CI	
Pre-pregnancy Diagnosed HBP				
No [†]				
Yes	1.59	0.27	0.70	3.59
Mother's Race				
White [†]				
Other	0.89	0.64	0.53	1.48
Age				
25-29 [†]				
30-34	0.80	0.44	0.46	1.40
35-47	0.78	0.47	0.39	1.53
Federal Poverty Level				
>200% [†]				
101-200%	0.68	0.32	0.31	1.47
0-100%	0.42	0.03	0.19	0.91
Maternal Degree				
Less than HS/No Degree [†]				
HS Diploma/GED	0.61	0.30	0.25	1.54
Some College/Associate Degree	0.79	0.64	0.29	2.17
Bachelor/Master/Doctoral/Professional Degree	0.72	0.55	0.25	2.11
Survey Year				
2017				
2018	0.63	0.19	0.32	1.26
2019	1.34	0.45	0.63	2.84
2020	0.95	0.89	0.46	1.97
Insurance coverage 12 months prior to recent pregnancy				
No*				
Yes	2.15	0.01	1.17	3.98

Table 4: Odds of first trimester prenatal carer visit with Pre-pregnancy HBP diagnosis moderated by mother's race (Controlled by mother's age, federal poverty level, mother's education, survey year, and insurance coverage 12 months prior to recent pregnancy)

	Urban				Rural				
	Odds ratio	P-Value	95% CI		Odds ratio	P-Value	95% CI		
Pre-pregnancy Diagnosed HBP									
No†									
Yes	1.28	0.60	0.51	3.18	1.06	0.95	0.16	7.18	
Mother's Race									
White†									
Other	0.97	0.92	0.55	1.72	0.78	0.74	0.17	3.48	
Age									
25-29†									
30-34	0.63	0.15	0.34	1.18	6.89	0.02	1.44	32.99	
35-47	0.66	0.29	0.31	1.42	2.78	0.56	0.09	85.47	
Federal Poverty Level									
>200%†									
101-200%	0.50	0.10	0.22	1.13	13.28	0.03	1.23	143.27	
0-100%	0.34	0.02	0.14	0.84	0.99	0.99	0.20	4.93	
Maternal Degree									
Less than HS/No Degree†									
HS Diploma/GED	0.81	0.67	0.30	2.16	0.07	0.01	0.01	0.48	
Some College/Associate Degree	0.83	0.74	0.29	2.42	0.26	0.22	0.03	2.27	
Bachelor/Master/Doctoral/Professional Degree	0.73	0.59	0.24	2.24	0.29	0.31	0.03	3.20	
Survey Year									
2017†									
2018	0.70	0.35	0.34	1.47	0.12	0.15	0.01	2.15	
2019	1.37	0.44	0.62	3.00	0.51	0.63	0.03	8.41	
2020	0.96	0.93	0.44	2.10	0.49	0.55	0.05	4.91	
Insurance coverage 12 months prior to recent pregnancy									
No†									
Yes	2.14	0.04	1.05	4.37	4.49	0.08	0.86	23.53	

†- reference group; Statistical Significance at <.05; 95% CI- Confidence Interval; HBP- High Blood Pressure

Table 5 show the odds ratio of pre-pregnancy hypertension for those who had a diagnosis with hypertension prior to pregnancy compared to individuals who did not have a prior diagnosis with a when controlled for the mother's race, age, federal poverty, maternal degree, survey year, and insurance coverage pregnancy regardless of county of residence. The only factor to show any statistical significance was the federal poverty level. Individuals of the 0-100% federal poverty level are associated with a receiving earlier prenatal care in the first trimester (Odds ratio .40; p-value .04; 95% CI .17, .94) as compared to individual in the >200% federal poverty level.

Table 6 show the odds ratio of pre-pregnancy hypertension diagnosis for all survey participants from 2017 to 2020 for those who had a diagnosis with hypertension prior to pregnancy compared to individuals who did not have a prior diagnosis with a when controlled for the mother's race, age, federal poverty, maternal degree, survey year, and insurance coverage during pregnancy stratified by county or residence. When stratified by county of residence we see that there is a statistical significance for the factor of federal poverty of 0-100% (Odds ratio .30; p-value .01; 95% CI .11, .78) which is associated with receiving prenatal care in the first trimester when compared to individuals at >200% federal poverty level line in urban counties of residence. For individuals of rural residence, we see there is an increased odds of attending later prenatal care visits for those of ages 30-34 (Odd ratio 7.54; p-value .01; 95% CI 1.57, 36.15) as compared to individuals ages 25-29. There was also an associated for later prenatal care visits for those individuals in the 101-200% federal poverty line level (Odd ratio 16.08; p-value .03; 95% CI 1.38, 187.20) as compared to individuals in the >200% federal poverty level. Finally, we also see for rural residence individuals with any insurance coverage during pregnancy is associated to have a 20.02 (p-value .03; 95% CI 1.45, 276.61) greater odds of attending a later prenatal care visit.

Table 5: Odds of first trimester prenatal carer visit with Pre-pregnancy HBP diagnosis (Controlled by mother's race, mother's age, federal poverty level, mother's education, survey year, and insurance coverage during pregnancy)

	Odds ratio	P-Value	95% CI	
Pre-pregnancy Diagnosed HBP				
No [†]				
Yes	1.73	0.23	0.71	4.23
Mother's Race				
White [†]				
Other	0.98	0.94	0.56	1.71
Age				
25-29 [†]				
30-34	0.83	0.55	0.46	1.51
35-47	0.83	0.60	0.41	1.68
Federal Poverty Level				
>200% [†]				
101-200%	0.61	0.25	0.26	1.41
0-100%	0.40	0.04	0.17	0.94
Maternal Degree				
Less than HS/No Degree [†]				
HS Diploma/GED	0.45	0.14	0.15	1.29
Some College/Associate Degree	0.58	0.36	0.18	1.85
Bachelor/Master/Doctoral/Professional Degree	0.54	0.33	0.16	1.83
Survey Year				
2017 [†]				
2018	0.67	0.29	0.32	1.40
2019	1.18	0.69	0.54	2.58
2020	1.00	0.99	0.44	2.24
Insurance coverage during pregnancy				
No [†]				
Yes	1.74	0.28	0.64	4.76
†- reference group; Statistical Significance at <.05; 95% CI- Confidence Interval; HBP- High Blood Pressure				

Table 6: Odds of first trimester prenatal carer visit with Pre-pregnancy HBP diagnosis moderated by mother's race (Controlled by mother's age, federal poverty level, mother's education, survey year, and insurance coverage during pregnancy)

	Urban				Rural				
	Odds ratio	P-Value	95% CI		Odds ratio	P-Value	95% CI		
Pre-pregnancy Diagnosed HBP									
No [†]									
Yes	1.49	0.43	0.55	4.08	1.07	0.95	0.12	9.34	
Mother's Race									
White [†]									
Other	1.25	0.49	0.66	2.34	0.36	0.22	0.07	1.82	
Age									
25-29 [†]									
30-34	0.71	0.31	0.37	1.36	7.54	0.01	1.57	36.15	
35-47	0.75	0.47	0.34	1.65	1.19	0.90	0.08	17.59	
Federal Poverty Level									
>200% [†]									
101-200%	0.44	0.06	0.18	1.05	16.08	0.03	1.38	187.20	
0-100%	0.30	0.01	0.11	0.78	1.85	0.52	0.28	12.26	
Maternal Degree									
Less than HS/No Degree [†]									
HS Diploma/GED	0.52	0.26	0.16	1.63	0.07	0.11	0.00	1.86	
Some College/Associate Degree	0.61	0.44	0.18	2.12	0.12	0.24	0.00	4.14	
Bachelor/Master/Doctoral/Professional Degree	0.53	0.34	0.15	1.94	0.20	0.37	0.01	7.01	
Survey Year									
2017 [†]									
2018	0.79	0.56	0.36	1.74	0.29	0.29	0.03	2.84	
2019	1.17	0.71	0.51	2.69	1.04	0.97	0.14	8.01	
2020	0.87	0.74	0.38	2.00	1.00				
Insurance coverage during pregnancy									
No [†]									
Yes	1.32	0.64	0.41	4.19	20.02	0.03	1.45	276.61	
†- reference group; Statistical Significance at <.05; 95% CI- Confidence Interval; HBP- High Blood Pressure									

Table 7 show the odds ratio of pre-pregnancy hypertension for those who had a diagnosis with hypertension prior to pregnancy compared to individuals who did not have a prior diagnosis with a when controlled for the mother's race, age, federal poverty, maternal degree, survey year, and insurance coverage pregnancy regardless of county of residence. The only factor to show statistical significance were that of individuals of 0-100% federal poverty level which showed to have been associated with prenatal care visits in the first trimester (Odds ratio .34; p-value .01; 95% CI .16, .73) compared to individuals of the >200% federal poverty level.

Table 8 show the odds ratio of pre-pregnancy hypertension diagnosis for all survey participants from 2017 to 2020 for those who had a diagnosis with hypertension prior to pregnancy compared to individuals who did not have a prior diagnosis with a when controlled for the mother's race, age, federal poverty, maternal degree, survey year, and insurance coverage during pregnancy stratified by county or residence. For individuals of urban county of residence there is statistical significance for the factor of federal poverty of 0-100% (Odds ratio .27; p-value <.001; 95% CI .11, .64) which is associated with receiving prenatal care in the first trimester when compared to individuals at >200% federal poverty level line. For individuals of rural county of residence, we individuals with a high school/GED education (Odds ratio .12; p-value .01; 95% CI .02, .61) are associated with prenatal care in the first trimester as compared to individuals who have less than a high school education/no degree.

Table 7: Odds of first trimester prenatal carer visit with Pre-pregnancy HBP diagnosis (Controlled by mother's race, mother's age, federal poverty level, mother's education, survey year, and Insurance coverage at the time of survey)

	Odds ratio	P-Value	95% CI	
Pre-pregnancy Diagnosed HBP				
No†				
Yes	1.71	0.19	0.77	3.81
Mother's Race				
White†				
Other	0.90	0.70	0.54	1.51
Age				
25-29†				
30-34	0.79	0.41	0.45	1.38
35-47	0.79	0.48	0.41	1.53
Federal Poverty Level				
>200%†				
101-200%	0.56	0.16	0.26	1.24
0-100%	0.34	0.01	0.16	0.73
Maternal Degree				
Less than HS/No Degree†				
HS Diploma/GED	0.66	0.37	0.27	1.61
Some College/Associate Degree	0.92	0.88	0.35	2.45
Bachelor/Master/Doctoral/Professional Degree	0.85	0.76	0.30	2.41
Survey Year				
2017†				
2018	0.66	0.23	0.33	1.30
2019	1.30	0.49	0.61	2.76
2020	0.87	0.70	0.42	1.79
Insurance coverage at the time of survey				
No†				
Yes	1.25	0.46	0.70	2.22
†- reference group; Statistical Significance at <.05; 95% CI- Confidence Interval; HBP- High Blood Pressure				

Table 8: Odds of first trimester prenatal carer visit with Pre-pregnancy HBP diagnosis moderated by mother's race (Controlled by mother's age, federal poverty level, mother's education, survey year, and Insurance coverage at the time of survey)

	Urban				Rural				
	Odds ratio	P-Value	95% CI		Odds ratio	P-Value	95% CI		
Pre-pregnancy Diagnosed HBP									
No [†]									
Yes	1.49	0.38	0.61	3.65	1.26	0.78	0.25	6.42	
Mother's Race									
White [†]									
Other	1.00	0.99	0.57	1.77	0.79	0.74	0.20	3.17	
Age									
25-29 [†]									
30-34	0.63	0.15	0.34	1.18	5.32	0.07	0.88	32.20	
35-47	0.69	0.33	0.33	1.45	1.59	0.72	0.13	19.85	
Federal Poverty Level									
>200% [†]									
101-200%	0.42	0.04	0.18	0.97	7.90	0.07	0.88	71.01	
0-100%	0.27	<.001	0.11	0.64	0.74	0.71	0.15	3.67	
Maternal Degree									
Less than HS/No Degree [†]									
HS Diploma/GED	0.84	0.73	0.32	0.32	0.12	0.01	0.02	0.61	
Some College/Associate Degree	0.96	0.94	0.34	0.34	0.38	0.36	0.05	3.03	
Bachelor/Master/Doctoral/Professional Degree	0.84	0.75	0.28	0.28	0.59	0.67	0.05	6.52	
Survey Year									
2017 [†]									
2018	0.74	0.43	0.36	1.56	0.20	0.13	0.02	1.65	
2019	1.30	0.51	0.59	2.86	0.88	0.90	0.11	6.90	
2020	0.90	0.78	0.42	1.93	0.53	0.55	0.06	4.34	
Insurance coverage at the time of survey									
No [†]									
Yes	1.22	0.52	0.66	2.28	1.02	0.98	0.20	5.08	
†- reference group; Statistical Significance at <.05; 95% CI- Confidence Interval; HBP- High Blood Pressure									

Interaction Analysis

Figure 5. Predictive probability plot for early prenatal care visits by pre-pregnancy hypertension diagnosis and race (controlled by, mother's race, age, federal poverty level, mother's education, year of survey, and insurance coverage 12 months prior to the recent pregnancy) Urban residence

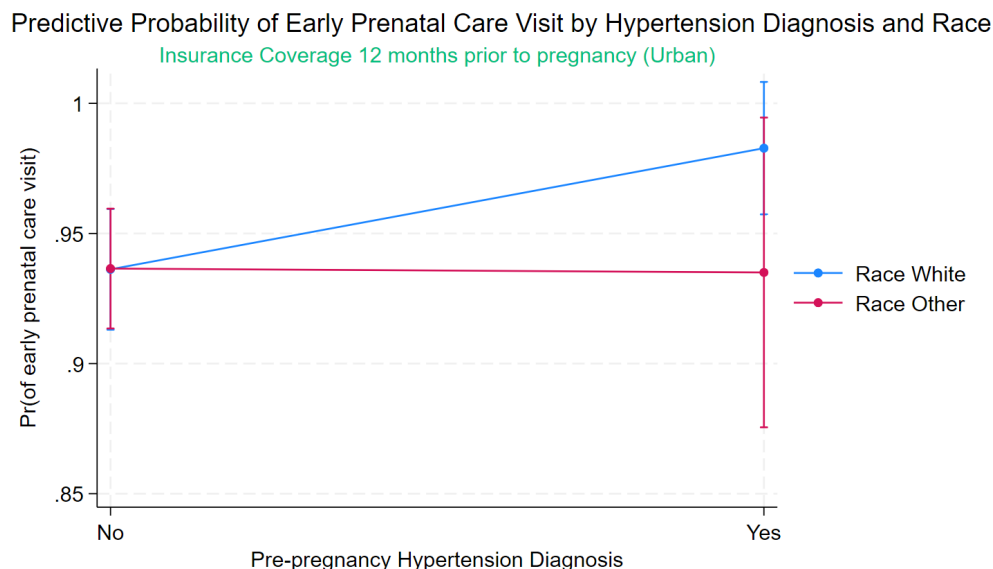


Figure 6. Predictive probability plot for early prenatal care visits by pre-pregnancy hypertension diagnosis and race (controlled by, mother's race, age, federal poverty level, mother's education, year of survey, and insurance coverage 12 months prior to the recent pregnancy) Rural residence

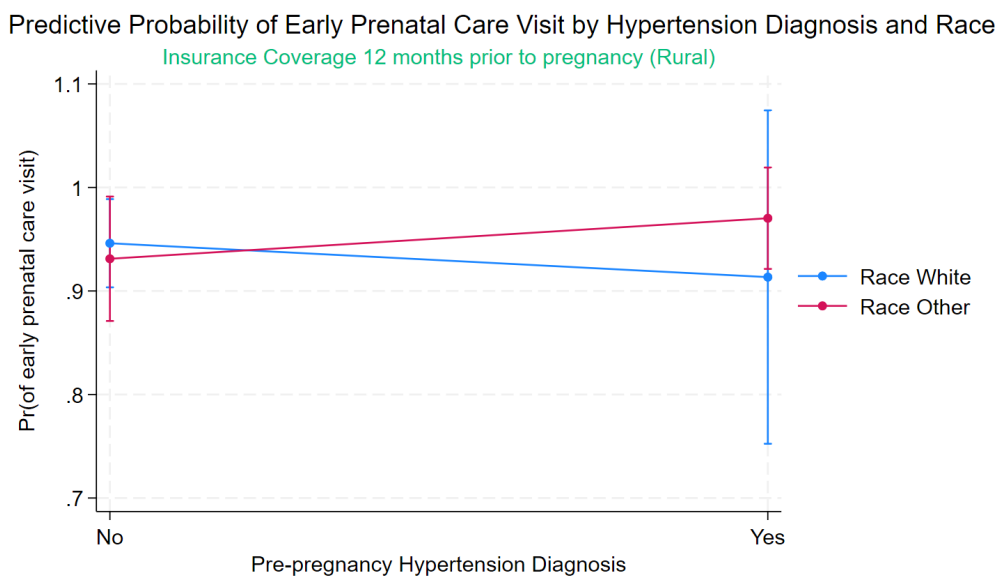


Figure 5 shows the plot for the predictive probability of those who had a diagnosis with high blood pressure prior to pregnancy compared to individuals who did not have a prior diagnosis with a

moderator effect for the mother race controlled for the mother's race, age, federal poverty level, mother's education, year of survey, and insurance coverage 12 months prior to the respondent's recent pregnancy for individuals of urban county residence. We see that there is an expected statistically significant probability in receiving early prenatal care for individuals who have a pre-pregnancy hypertension diagnosis and are white with a probability of .98 (p-value <.001; 95% CI .96, 1.01). However, for the race of others is about the same whether or not there is a pre-pregnancy hypertension diagnosis (Table 9).

Figure 6 shows the plot for the predictive probability of those who had a diagnosis with high blood pressure prior to pregnancy compared to individuals who did not have a prior diagnosis with a moderator effect for the mother race controlled for the mother's race, age, federal poverty level, mother's education, year of survey, and insurance coverage 12 months prior to the respondent's recent pregnancy for individuals of rural county residence. We see that there is an expected statistically significant probability in receiving early prenatal care for individuals who have a pre-pregnancy hypertension diagnosis and are race other with a probability of .97 (p-value <.001; 95% CI .91, 1.02). However, for the race of white there is a decrease to a .91 (p-value <.001; 95% CI .75, 1.07) probability of receive early prenatal care if the individual has a pre-pregnancy hypertension diagnosis compared to individuals who are race of white and do not have a pre-pregnancy hypertension diagnosis (Probability .95; p-value <.001; 95% CI .90, .99). (Table 9).

Table 9: Predictive probability for early prenatal care visits by pre-pregnancy hypertension diagnosis and race (controlled by, mother's race, age, federal poverty level, mother's education, year of survey, and insurance coverage 12 months prior to recent pregnancy) for urban and rural residence.

Predictive Margins for Early Prenatal Care Visits by Pre-pregnancy Hypertension Diagnosis and Race						
	Urban			Rural		
	Margins	95%CI		Margins	95%CI	
Pre-pregnancy Diagnosis of HBP/Mother's Race						
No/White[†]	0.94	0.91	0.96	0.95	0.90	0.99
No/Other	0.94	0.91	0.96	0.93	0.87	0.99
Yes/White	0.98	0.96	1.01	0.91	0.75	1.07
Yes/Other	0.94	0.88	0.99	0.97	0.92	1.02

†- reference group; *Controlled by mother's race mother's age, federal poverty level, mother's education, survey year, and Insurance coverage 12 months prior to recent pregnancy; 95% CI- 95% Confidence Interval*

Figure 7. Predictive probability plot for early prenatal care visits by pre-pregnancy hypertension diagnosis and race (controlled by, mother's race, age, federal poverty level, mother's education, year of survey, and insurance coverage during pregnancy) Urban residence

Predictive Probability of Early Prenatal Care Visit by Hypertension Diagnosis and Race

Insurance Coverage during pregnancy (Urban)

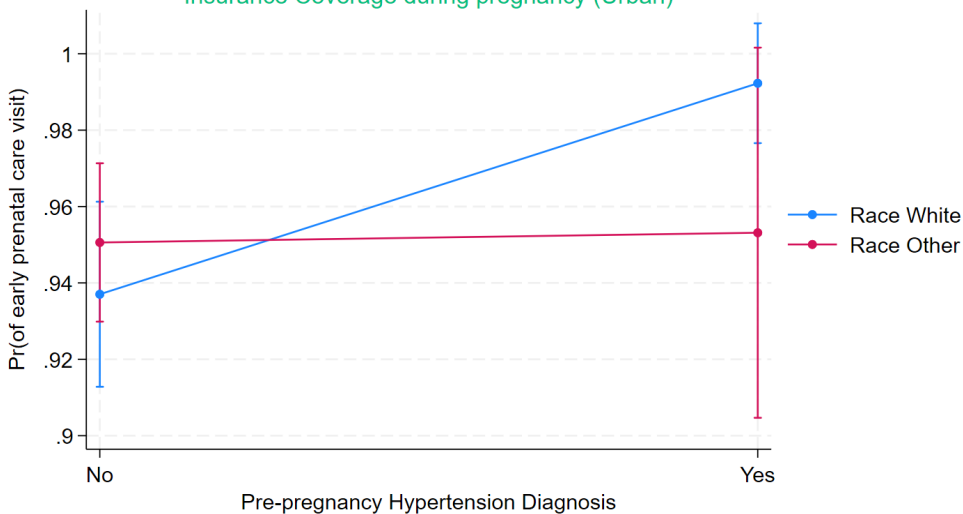


Figure 8. Predictive probability plot for early prenatal care visits by pre-pregnancy hypertension diagnosis and race (controlled by, mother's race, age, federal poverty level, mother's education, year of survey, and insurance coverage during pregnancy) Rural residence

Predictive Probability of Early Prenatal Care Visit by Hypertension Diagnosis and Race

Insurance Coverage during pregnancy (Rural)

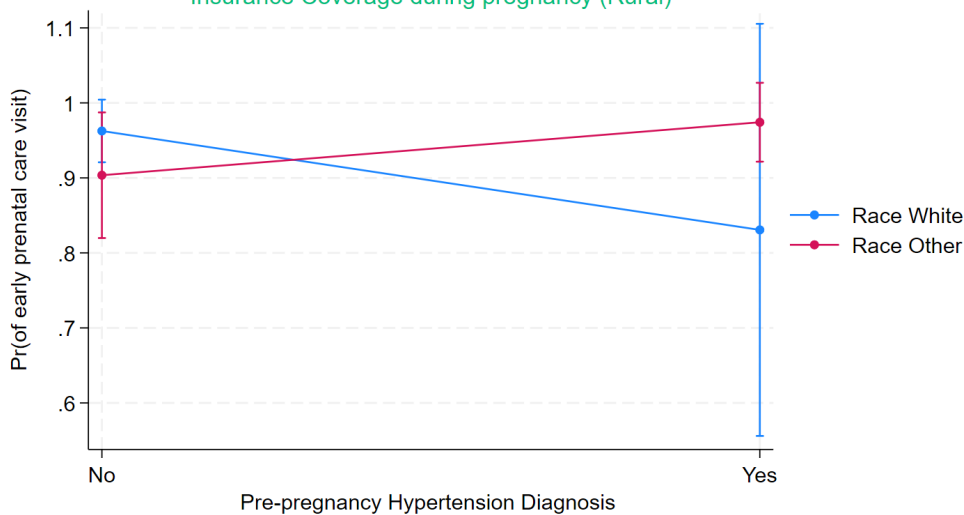


Figure 7 shows the plot for the predictive probability of those who had a diagnosis with high blood pressure prior to pregnancy compared to individuals who did not have a prior diagnosis with a moderator effect for the mother race controlled for the mother's race, age, federal poverty level, mother's education, year of survey, and insurance coverage during pregnancy for individuals of urban county residence. We see that there is an expected statistically significant probability in receiving early prenatal care for individuals who have a pre-pregnancy hypertension diagnosis and are white with a probability of .99 (p-value <.001; 95% CI .98, 1.01). However, for the race of others the probability of receiving prenatal care there is small difference of .01 between those with a pre-pregnancy hypertension diagnosis and those without (Table 10).

Figure 8 shows the plot for the predictive probability of those who had a diagnosis with high blood pressure prior to pregnancy compared to individuals who did not have a prior diagnosis with a moderator effect for the mother race controlled for the mother's race, age, federal poverty level, mother's education, year of survey, and insurance coverage during pregnancy for individuals of rural county residence. We see that there is an expected statistically significant decrease in the probability in receiving early prenatal care for individuals who have a pre-pregnancy hypertension diagnosis and are race white with a probability of .83 (p-value <.001; 95% CI .48, 1.13). However, for the race of other there a negligible increase of a .01 in the probability of receive early prenatal care if the individual has a pre-pregnancy hypertension diagnosis compared to individuals who are race of white and do not have a pre-pregnancy hypertension diagnosis (Table 10).

Table 10: Predictive probability for early prenatal care visits by pre-pregnancy hypertension diagnosis and race (controlled by, mother's race, age, federal poverty level, mother's education, year of survey, and insurance coverage during pregnancy) for urban and rural residence.

Predictive Margins for Early Prenatal Care Visits by Pre-pregnancy Hypertension Diagnosis and Race						
	Urban			Rural		
	Margins	95%CI		Margins	95%CI	
Pre-pregnancy Diagnosis of HBP/Mother's Race						
No/White [†]	0.94	0.91	0.96	0.96	0.92	1.00
No/Other	0.95	0.93	0.97	0.90	0.82	0.99

Yes/White	0.99	0.98	1.01	0.83	0.56	1.11
Yes/Other	0.95	0.90	1.00	0.97	0.92	1.03
†- reference group; <i>Controlled by mother's race mother's age, federal poverty level, mother's education, survey year, and Insurance coverage during pregnancy; 95% CI- 95% Confidence Interval</i>						

Figure 9. Predictive probability plot for early prenatal care visits by pre-pregnancy hypertension diagnosis and race (controlled by, mother's race, age, federal poverty level, mother's education, year of survey, and insurance coverage at the time of the survey) Urban residence

Predictive Probability of Early Prenatal Care Visit by Hypertension Diagnosis and Race

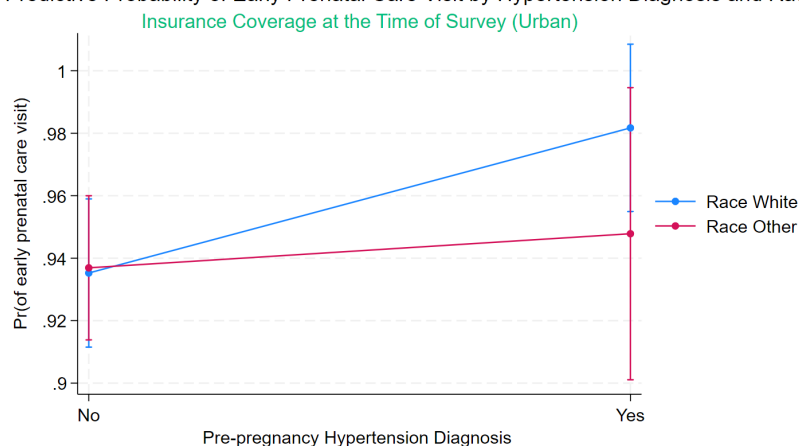


Figure 10. Predictive probability plot for early prenatal care visits by pre-pregnancy hypertension diagnosis and race (controlled by, mother's race, age, federal poverty level, mother's education, year of survey, and insurance coverage at the time of the survey) Rural residence

Predictive Probability of Early Prenatal Care Visit by Hypertension Diagnosis and Race

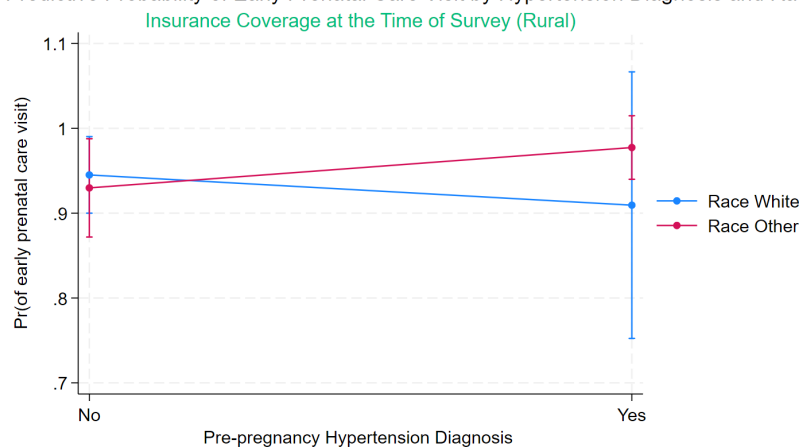


Figure 9 shows the plot for the predictive probability of those who had a diagnosis with high blood pressure prior to pregnancy compared to individuals who did not have a prior diagnosis with a moderator effect for the mother race controlled for the mother's race, age, federal poverty level, mother's

education, year of survey, and insurance coverage during the time of the survey for individuals of urban county residence. We see that there is an expected statistically significant increase in the probability in receiving early prenatal care for individuals who have a pre-pregnancy hypertension diagnosis and are white with a probability of .98 (p-value <.001; 95% CI .95, 1.01). For the race of others, the probability of receiving prenatal care is increases by a .01 probability if an individual does have a pre-pregnancy hypertension diagnosis compared to an individual without a pre-pregnancy hypertension diagnosis (Table 11).

Figure 10 shows the plot for the predictive probability of those who had a diagnosis with high blood pressure prior to pregnancy compared to individuals who did not have a prior diagnosis with a moderator effect for the mother race controlled for the mother's race, age, federal poverty level, mother's education, year of survey, and insurance at the time of survey for individuals of rural county residence. There is an expected statistically significant decrease in the probability in receiving early prenatal care for individuals who have a pre-pregnancy hypertension diagnosis and are race white with a probability of .91 (p-value <.001; 95% CI .75, 1.07). For the race of other there a decrease of a .06 in the probability of receive early prenatal care if the individual has a pre-pregnancy hypertension diagnosis compared to individuals who are race of white and do not have a pre-pregnancy hypertension diagnosis (Table 11).

Table 11: Predictive probability for early prenatal care visits by pre-pregnancy hypertension diagnosis and race (controlled by, mother's race, age, federal poverty level, mother's education, year of survey, and insurance coverage at time of survey) for urban and rural residence.

Predictive Margins for Early Prenatal Care Visits by Pre-pregnancy Hypertension Diagnosis and Race						
	Urban			Rural		
	Margins	95%CI		Margins	95%CI	
Pre-pregnancy Diagnosis of HBP/Mother's Race						
No/White[†]	0.94	0.91	0.96	0.95	0.90	0.99
No/Other	0.94	0.91	0.96	0.93	0.87	0.99
Yes/White[†]	0.98	0.95	1.01	0.91	0.75	1.07
Yes/Other	0.95	0.90	0.99	0.98	0.94	1.01
[†] - reference group; <i>Controlled by mother's race mother's age, federal poverty level, mother's education, survey year, and Insurance coverage at the time of the survey; 95% CI- 95% Confidence Interval</i>						

Qualitative Results

Characteristics and Descriptions of Audio Recordings

24 podcasts were used for the qualitative analysis. 6 of the podcasts had discussions on the general issues of pregnancy-related complications in rural America. 6 podcasts discussed issues for pregnancy-related complications that affect the maternal healthcare system of the US. 6 podcasts are a mix of various rural areas in the US discuss issues pertaining to the rural health system and its effect on pregnancy-related complications. 4 podcasts discussed issues for pregnancy-related complications for the state of Georgia. 6 podcasts. Further details of the audio recordings can be found under appendix 1.

Themes from audio recording analysis

Predisposing Factors. In this study, contextual predisposing factors reflect a combination of the social and beliefs which are independent variables describe the support or lack thereof, and which values and perspectives rural health systems take on pregnancy-related complications in increasing awareness for earlier prenatal care. By using a modified form of the Delphi techniques and a semi-structured format by using the Andersen hospitalization model as overarching themes. Below is an in-depth report of results on predisposing factors. Four major themes resulted from the secondary audio recordings under predisposing factors: (1) Needs for improvement, (2) Provider belief on the important of maternal health for hospital success, (3) Support from leadership, and (4) Solutions to overcome obstacles for appropriate care.

Theme 1: Needs for improvement. While many of the audio recordings shared points of where the maternal health system needs improvement, the most common issue that needs improvement is for belief of ingraining continuity of care throughout a woman's lifetime and outside of pregnancy. As was stated by Dr. Wenger in 'Heart Health- What Everyone Needs to Know': "Now, we must cooperate with our OBGYN colleagues in this regard because remember that for young and apparently healthy women, often the OBGYN is their primary care physician. And you know, the OBGYN doctors are in the prevention mode. They talk about mammograms; they talk about pap smears. But we would like to encourage them to talk about women's heart health." In another recording, in regard to rural OBGYN services it was stated

in Maternal and Obstetric Care in Rural America from the National Advisory episode: “[T]o improve healthcare delivery, rural communities need to leverage all providers from OBGYN to primary care physicians, to advanced practice nurses, to clinical nurse midwives.”

Theme 2: Provider belief on the importance of maternal health to hospitals success refers to the belief of the importance of maternal health has within communities, particularly for rural communities. As stated in Rural obstetrics episode, “I firmly believe. And you've heard me on this podcast before that a hospital can be sustained through their obstetrics department. When a hospital loses their obstetrics department so goes the hospital. I firmly believe that and the reason for that is, is where that life begins. You have a captured population that can be with you throughout the entirety of their life in your community.” In addition, as primary care doctors often tend to be the substitute OBGYN care for in rural communities it was also common to refer to maternal health in connection to the health of a family.

“Well, of course pregnant patients are our patients, but really maternal health is very closely related to the health of the family and the entire community. Mothers tend to not only bring their children, but they bring their mothers, they bring their sisters, they bring their spouses to the doctor, and that's something that I've seen over and over again, especially in our community. So when they know that they are being well cared for, when they know that they get good care, then they're going to be more likely not only to come back themselves throughout their life, but also bring in other members of the family, and that, in turn, improves the health of the entire community, because they see the value in having a primary care physician.” -Zita Magloire, Family Physicians and Maternal Health in Rural America

Theme 3: Support from leadership refers to the social aspect of leadership taking an interest in and demonstrating that obstetric care in rural communities is vital to the wellbeing of the community as a whole. As stated in the Family Physician and Maternal Health in Rural America episode

“[W]ith the proper support, as we've already kind of talked about during the podcast, both from our academy, which has really done a really outstanding job in voicing the issues surrounding maternal care, as well as from the community, from the hospital at administrative level, the department of health just recognizing that we are on the front lines and then empowering us to help those patients. I think that's what's going to make the biggest difference.”

Along with the aspect of support comes advocacy efforts that help get buy in from higher-up decision makers for prioritizing maternal health in their hospitals and communities. In regard to decision makers in the state of Georgia, pregnancy Medicaid coverage was extended to cover up to 6-month postpartum.

While it is a step in the right direction, in the Maternal and Obstetrics Care Challenges in Rural America

from the National Advisory episode states that, “Fortunately, in the budget that was just passed, the governor will be implementing six months of postpartum coverage here in Georgia. So that's going to be revolutionary for maternal health. We still have six months gap there to get full postpartum coverage, but this has been a major issue for us in the past and we're excited to see this changing.”

Theme 4: Potential solution to overcome obstacles for appropriate care refers to the various ways that support from all dimensions within the rural healthcare system needs to support to overcome obstacles that are detrimental to rural communities to have access to appropriate health care services. One of these solutions hinge on the need for preparedness for communities who have limited or no OBGYN providers in which other health providers have the knowledge of be ready for OB needs. An example of this is referenced in the Family Physician and Maternal Health in Rural America Episode in which case individuals cannot make it to a facility to deliver:

“And so if a facility is not prepared, doesn't have services, and one of our main concerns is what if there is no facility? A lot of times that's a family physician in a community, or even on the roadside or whatever is what can we do as AAFP, and family physicians to help that community or our members be ready? And so, we are working on a concept with a lot of our colleagues, for example, NRHA [National Rural Health Association], ACOG, and others to start promoting this concept of OB readiness, and what does that mean? So that is something that's a fairly new concept because there's a lot of work going on in hospital settings.

But what about units that have closed that don't have people to deliver? They don't have facilities anymore, or they're just no facilities. So, I think some of those things we're talking about already, like drills, practice, making sure you really do have supplies, even if you are not a hospital that thinks of themselves as a delivery facility, or there just is no facility. Helping first responders be ready and learn those skills.”

Enabling Factors. In this study, contextual enabling factors refer to resources that may facilitate or impede early prenatal care. Items of interest are the current policies and practices that are pertaining to improving or contributing to the pursuit of early prenatal care, as well as the amount and distribution of health services and providers at the organizational level. Below is an in-depth report of results on enabling factors. Five themes resulted from the secondary audio recording under enabling factors: (1) Availability of services, (2) Availability of providers, (3) Changes in practices, (4) Changes in policies, and (5) Evaluation efforts.

Theme 1: Availability of services referred to access to health service facilities and appropriate care that enable putting off necessary care. In the Maternal and Obstetric Care Challenges in Rural America episode one individuals stated that, ‘when we look at the accessibility of obstetric care and primary care, it's important to note that in large part, maternity care in rural areas is also dependent on hospital infrastructure.’ Which is further given proof in the Obstetrics, Gynecologists, and Maternal Health in Rural America episode.

“Many rural hospitals, because of the way our payment system is set up for obstetrics, it is not really a high-volume money maker. And we don't really prioritize maternal and infant health like we say we do. So, we say lots of things about prioritizing it, but we don't really put our money where our mouths are in this case. And so it is a challenge for many rural hospitals to financially continue to support their birthing facilities. Because of that, those end up closing, and the areas that are unserved, completely in many cases, get larger and larger as scattered small hospitals end up closing their units and it happens more and more.”

As the COVID pandemic did have a large impact on the US healthcare systems overall, it also highlighted the distinctive difficulties that rural health care organizations face.

“All know that rural health care organizations face unique challenges in caring for patients resulting from geography and staffing shortage, patient mix and patient volumes. As in all communities, rural hospitals serve a critical role in promoting health and well-being. And the pandemic only increased the existing challenges faced by rural health care organizations as they work to meet that mission.” – John Hauptert, Leadership Dialogue series- Strengthening Rural Health Care with Jennifer Havens

In other similar medically underserved areas across the US there is also the issue of travel time to receive care for needed services.

“Where I am now in Maryland, I'm on the southeastern shore, and it is also very isolated. We have one hospital in our county that makes deliveries. And so leaving from our hospital, it takes about 30 to 40 minutes to get to the next closest hospital if you go northeast, and it takes about 40, maybe a little longer, to get to the next closest hospital if you're going northwest. And most recently, I actually heard that one of those hospitals is no longer doing deliveries. So even in places on the East Coast, we are starting to see these maternity deserts in the areas that are less populated, making it more challenging for patients who have limited access to resources to get to those facilities.” – Anne Banfield, Obstetrics, Gynecological, and Maternal Health in Rural America

Theme 2: Availability of providers refers to all forms of health providers that interact with the maternal health system and how these providers play a role in services given. While most of the focus has been on OBGYNs and maternal fetal medicine specialist involved in the care for maternal health during the

analysis it was decided that there are other health providers that may be able to help fill in gaps where there are no OBGYNs or MFM specialists. As stated in the Hospitals and maternal health in Rural America episode, “It’s one [thing] to say that we have a lack of number of services, but that lack of services stems from the lack of clinical capacity in order to provide those services in the community.” Further on in the episode there was a discussion of the intersection between decision makers and providers influencing the role they played in the availability of providers in rural communities.

“[T]here was the time when rural hospitals that had access to clinicians were willing to fund these services as a loss leader to meet that community need and then create those lifelong loyalties, but in the absence of the needed clinical capacity, hospitals are no longer willing to fund obstetrics and therefore, you're seeing them close the service.”

Then there is the issue of seeing obstetrics services as a supply and demand as stated in Family Medicine Obstetrics episode: “Just because there's not enough obstetricians to go around in all rural areas and sometimes not enough patients for an obstetrician to have enough patients to practice.” However, there are other providers that argue the opposite as stated in Hospitals and Maternal in Rural America, with John, “[a]nd the demand for the service is greater than the supply of the clinicians. How we train rural family docs then and how we supplement the shortage of obstetricians through midwives and doulas is critical then to meet the demand for the service.”

Theme 3: Changes in practices refers to how common care practices have changed over time and what is currently being practiced when giving care. As stated in the maternal mortality and 10 ways to stay safe episode:

“We have started focusing our efforts on things like team training, individual training, simulations, drills to deal with emergencies, protocols, guidelines, checklist, all of those activities help us diagnose and treat things earlier and more and more and more hospitals are getting better with this. We're also doing better with implementing a multidisciplinary approach where the nurse, the OB providers, the anesthesiologists, we talk to each other, talk about the patient's risk. And we identify those who are at high risk for complications so that we can be ready early.”
– Nicole Rankins, Maternal Mortality and 10 Ways to Stay Safe

As for easier practices to encourage earlier prenatal care one location as stated in the access to prenatal care in rural communities episode has started to incorporate telehealth services in which other health providers like a midwife or nurse are able to aid in increasing prenatal care visits, so individuals are able

to have easier access to the services they need.

“[We molded] around the idea of running it by our physicians on let's create a flexible prenatal care, you know, plan for our patients here in this community. So certain weeks of gestation, they would actually have to be on an in-person visit in the office and that could provide them with like fundal checks. You know, their weight, their blood pressure. [...] That way, we are not putting so much on them to attend their prenatal care appointments when truly they can't. If they can't, they don't have a ride to the office, or they don't have the money to get to the office or nobody can watch their children.” - Brittany Paige, Access to Prenatal Care

Other providers who were discussion the potential of telehealth services as a way to increase the number of services rendered also mentioned the potential of including this practice in the future.

Theme 4: Changes in policies refer to more formal organizational procedures and on the books policy.

One item that has now been included into policies or hospitals to give care include the changes that were required to adapt to give care during the Covid pandemic. As stated in the Family Physicians and Maternal Health in Rural America with Julie Wood and Zita Magloire:

“So, we were not using telehealth before the pandemic. And then during the pandemic, the Society for Maternal-Fetal Medicine had some guidelines on using telehealth for certain prenatal visits to limit the exposure to patients, and medical providers. And so we instituted that, and then not only with our pregnant patients, but non-pregnant patients as well, we have continued to provide telehealth services and the patients really do like it.”

When specifically talking about heart health, there have also been some changes to the guidelines that were previously published. Dr. Nanette Wenger stated in the Heart Health-What Every Woman Needs to Know episode stated, “The new chest pain guidelines that came out are encouraging physicians not to use the term atypical chest pain because it may be typical for women. But then what the clinician has to do is to say is this cardiac or noncardiac? If it's noncardiac chest pain or what is causing it and let us evaluate that. if it's cardiac, is it due to coronary disease, or is it due to pericarditis or pulmonary embolism?” In addition to this there are also changes in in national organizations who also recently changed their guidelines to provide postpartum care but are still missing pieces within the guidelines that give further guidance for other aspects that affect an individual from getting care.

“[The American College of Obstetricians and Gynecologists] made an amazing update to their guidelines where instead of waiting until six weeks after birth for you to go see your doctor after having the baby, they now recommend going 3-4 weeks after, and they did say a phone visit is

fine. But one of the questions I had asked was, ok, so now that you have these guidelines, what are the insurance providers doing? And do the doctors have the capacity for these additional visits? And unfortunately, the rest of this great guidelines hadn't been thought out, and you know, we've now created this capacity issue.”

Theme 5: Evaluation efforts refers to the efforts that are in place to evaluate or research issues that may enable pregnancy-related complications to occur. Three audio recording had mentioned of state level initiatives in reviewing and assessing the rates of for maternal death and pregnancy-related mortality. For the state of Georgia in particular there is a perinatal quality collaborative that has been in place since 2017.

“And part of the perinatal quality collaborative is doing QI quality improvement projects, focus on the areas of high morbidity mortality for both neonates and maternal care as well. And so some of these, we call them AIM bundles and these bundles are meant to be used, and used to instruct hospitals to respond to emergencies. AIM project safety initiatives is a partner with ACOG [American College of Obstetricians and Gynecologists] on that.” – Zita Maglorie, Family Physicians and Maternal Health in Rural America with Julie Wood and Zita Magloire

On a more community level, there are projects and initiatives in which there is a focus on the community aspect in conjunction with the hospital infrastructure for long-term continuity of care.

“And there's also an AIM CCI project now, which is community care initiative. So they've recognized that the hospital piece of that's really important, but also there's a second wave of that in the community part. So there's a lot of focus now about what happens in the community. So we're also partnering on that AIM CCI project as well. So looking forward to continued work there, it's more of the postpartum focus out in the community.” -Zita Magloire, Family Physicians and Maternal Health in Rural America with Julie Wood and Zita Magloire

However, some initiatives are not without their faults, as they may be very expert heavy and not have much input from the community that would be directly impacted by the results of the initiatives.

“[T]heir review committee didn't have community members on it from advocacy groups, it was very OB provider heavy, very MFM heavy. As an MFM, I love that, but we can share. One of the things that I thought would be interesting to this – and I'm sure this would cost a lot of money, so in my pretend world, where nothing costs anything – I would love to see the integration of a verbal autopsy tool into this.”-Heather Link, The OBGYN Podcast- Maternal Mortality-Part 3

CHAPTER 5

DISCUSSION AND CONCLUSION

Summary of Study

Pregnancy-related death is defined as a death of a woman that occurs during or within one year of pregnancy that can be attributed to a complication, events initiated, or the aggravation of an unrelated condition by the physiologic effects of pregnancy (*Pregnancy Risk Assessment Monitoring System, 2021*). Many of these pregnancy-related deaths are caused by cardiovascular diseases that can be prevented with adequate care (*Pregnancy Mortality Surveillance System, 2020*). As hypertension accounts for about 1 in 5 deaths in women is one of the largest modifiable risk factor for cardiovascular disease in the US, it is important for those individuals to get early prenatal care utilization which can decrease the risk of pregnancy related complications or even death (Mpofu et al., 2021; Wenger et al., 2018).

This mixed methods secondary data study aimed to examine the gaps in relation between women with pre-existing hypertension and everyday interactions with health providers and health professionals as well as the utilization of early prenatal care visits for those with a hypertension diagnosis prior to pregnancy for individuals in rural Georgia. Georgia specific PRAMS data was used to conduct an analysis of the specific trends for early prenatal care utilization between individuals who had did have a pre-pregnancy hypertension diagnosis and those who did not have a diagnosis. The results were further stratified by urban and rural county of residence. Publicly available interviews with experts were used to explain the capacity of health providers and health professionals for care in order to prevent pregnancy-related complications and mortality for women who are from rural areas and have been diagnosed with hypertension prior to pregnancy.

To further explore factors that may impact early prenatal care health service utilization for individuals with diagnosed pre-pregnancy hypertension in rural and medically served Georgia, an adapted version of the Andersen health utilization model was used. This adapted utilization model was used to identify and analyze the influence of various contextual characteristics, individual characteristics and outcomes which

all interact to explain the contributing variables that either aid or hinder health services utilization (Andersen & Davidson, 2014). The quantitative portion of this study did give some insight into the decreased rates of early prenatal care visits for individuals who did have preexisting hypertension and were of a minority race compared to their white counterparts, regardless of insurance coverage before or during pregnancy. As for the qualitative portion of this study, highlighted some of the ongoing issues and areas for needs of improvement in order to give adequate care for individuals with pregnancies that are categorized as high-risk in rural communities.

To the best of the researcher's knowledge this study is the first in attempting to explore issues and trends of pre-pregnancy hypertension diagnosis in rural Georgia. The combination of this mixed-data approach will aid in setting a foundation for perspectives needed to bridge care for women across their life course rather than having a sole focus during pregnancy. Findings from this study will be useful in setting a foundation for further research to address barriers for individuals with chronic hypertension prior to pregnancy and healthcare utilization with an emphasis in rural areas.

Interpretation of Findings and Discussion

Research questions 1 and 2.

In this study predisposing, enabling, and need factors at the individual level were used as the predicting variables to measure for earlier prenatal care visits. As the interest of this study is primarily on rural county health outcomes, it was important to use the comparison of urban health outcomes to identify the difference in rates by county categorization and by year. As mentioned earlier in Smulian et al. (2016), in the state of Georgia there is low rate of obstetric providers outside of the Atlanta metropolitan area which is the researcher hypothesized would lead to late prenatal care times. In the comparison of urban and rural residence by pre-pregnancy high blood pressure diagnosis with an effect modification other the mother race, when controlled for mother age, federal poverty level, mother's education, survey year and for insurance in the 12-months leading up to pregnancy the majority of those individuals who did have a pre-pregnancy diagnosis and where of minority groups did have a slight increase in the

probability for earlier prenatal visits as compared to their white counterparts who also had a pre-pregnancy high blood pressure diagnosis for those who lived rural counties. In urban counties it was observed that there was an increase in the probability of earlier prenatal care visits while the probability was about the same for race other regardless of pre-pregnancy hypertension diagnosis.

In the comparison of urban and rural residence by pre-pregnancy high blood pressure diagnosis with an effect modification by mother's race, when controlled for mother age, federal poverty level, mother's education, survey year, and for insurance coverage during pregnancy those individuals who did have a pre-pregnancy diagnosis and where of other race did have about the same probability of early prenatal care regardless of pre-pregnancy hypertension diagnosis. While whites had an increase probability for prenatal visits as had a pre-pregnancy high blood pressure diagnosis were only for those who lived in urban counties. When looking at rural counties, we see a decrease in the probability for early prenatal care visits is there is a pre-pregnancy hypertension diagnosis. Those of other races showed to have an increase in the probability of attending prenatal care visits in the first trimester.

In the comparison of urban and rural residence by pre-pregnancy high blood pressure diagnosis with an effect modification by mother's race, when controlled for mother age, federal poverty level, mother's education, survey year and for insurance coverage during the time of the survey those individuals who did have a pre-pregnancy diagnosis shown to have increased prenatal care visits, where there was a noticeable increase for whites and a slight increase for other races compared to their counterparts who also did not have a pre-pregnancy high blood pressure diagnosis for those in urban county of residence. For those in rural countries there was an increase in the probability of getting earlier prenatal care visits for other races while there was a decrease probability for those who are white compared to their counterparts who did not have a pre-pregnancy high blood pressure diagnosis. As PRAMS surveys are sent out between two to four months after birth some of those individuals that may have been covered by Medicaid during pregnancy may not have been covered during the time of the survey, as Georgia did not expand Medicaid postpartum coverage from 60 days to 6 months until July

2021 (Johnson, 2023). This may account for only slight increases in the probability of prenatal care if the individual were to become pregnant again very shortly after the previous birth. Additionally, this could potentially serve as an indicator that a mother may be less likely to get postpartum care as well. As of the most recent iteration of the PRAMS questionnaire there is no option for individuals to check if they had a postpartum checkup specifically to see of the individual health regarding their high blood pressure condition (Figure 5). The follow-up options are geared primarily to pregnancy prevention intention and other behavioral items.

Figure 11. PRAMS Questionnaire-Questions Regarding Postpartum Visit

69. Since your new baby was born, have you had a postpartum checkup for yourself? A postpartum checkup is the regular checkup a woman has about 4-6 weeks after she gives birth.

No → **Go to Question 71**

Yes ↓

70. During your postpartum checkup, did a doctor, nurse, or other health care worker do any of the following things? For each item, check **No** if they did not do it or **Yes** if they did.

	No	Yes
a. Tell me to take a vitamin with folic acid ...	<input type="checkbox"/>	<input type="checkbox"/>
b. Talk to me about healthy eating, exercise, and losing weight gained during pregnancy.....	<input type="checkbox"/>	<input type="checkbox"/>
c. Talk to me about how long to wait before getting pregnant again	<input type="checkbox"/>	<input type="checkbox"/>
d. Talk to me about birth control methods I can use after giving birth.....	<input type="checkbox"/>	<input type="checkbox"/>
e. Give or prescribe me a contraceptive method such as the pill, patch, shot (Depo-Provera®), NuvaRing®, or condoms.....	<input type="checkbox"/>	<input type="checkbox"/>
f. Insert an IUD (Mirena®, ParaGard®, Liletta®, or Skyla®) or a contraceptive implant (Nexplanon® or Implanon®)	<input type="checkbox"/>	<input type="checkbox"/>
g. Ask me if I was smoking cigarettes	<input type="checkbox"/>	<input type="checkbox"/>
h. Ask me if someone was hurting me emotionally or physically.....	<input type="checkbox"/>	<input type="checkbox"/>
i. Ask me if I was feeling down or depressed	<input type="checkbox"/>	<input type="checkbox"/>
j. Test me for diabetes	<input type="checkbox"/>	<input type="checkbox"/>

Source: Georgia Department of Public Health. (2023, February 28). *Georgia Pregnancy Risk Assessment Monitoring System (PRAMS)- Questionnaire*. Georgia Department of Public Health. <https://dph.georgia.gov/PRAMS>

Main Effects.

When looking at main effects of factors of interest, individuals of the federal poverty level 0-100% for individuals of urban county residence showed to have a statistical significance in receiving prenatal care

in the first trimester no matter the time of insurance coverage. The other factors that showed to have a statistical association in receiving later prenatal care was having insurance coverage 12 months prior to the recent pregnancy. For factors of interest for those of rural county of residence individuals in the age range of 30-34 and federal poverty level of 101-200% showed to have a statistically significant association in receiving later prenatal care if there was coverage before and during pregnancy. Having insurance coverage during pregnancy was also statistically significantly associated with later prenatal care. The only factor that showed to have a statistically significant association in receiving earlier prenatal care for individuals with an education level of a high school graduate for both insurance coverage 12 months prior to pregnancy and for insurance coverage at the time of the survey. The finding of age in rural county of residence is particularly of interest because of the findings in Osterman et al. (2022), in which the mean age of pregnant of individuals is increasing and the likelihood of adverse outcome for maternal health also increase (Gantt et al., 2022; Glick et al., 2021).

As for the factor of race, due to the manner in how Georgia's population is primarily white with black being in second and very small percentages of other minority groups, race did show to have odds less than one, but were not statistically significant. This could be in large part be due to the small number of responses for individuals of minority groups making it difficult to accurately see if race does play a factor prenatal care attainment as shown in other works of literature (Baer et al., 2019; Latoya Hill et al., 2022). When looking at the comparison of the percentage of those living in rural counties v. urban counties, based on 2020 US census data, 2,777,922 (25.9%) of Georgia's population lives in rural counties while 7,933,986 (74.1%) live in urban counties with the majority of white individuals living in rural areas as compared to urban counties that tend to be more racially diverse (US Census Bureau, 2023).

Research question 3.

The Andersen Health Service Utilization Model is typically used for identifying an individual's access and use of health services and uses their factor: predisposing, enabling, and need. However, the qualitative portion of the study focused on the contextual influences as independent variables that

influence the expected outcome of earlier prenatal care visits for high-risk pregnancies. As a modified version of the Delphi framework was used to deduce important aspects on publicly available audio recording, only predisposing factors and enabling factors were used to answer research questions 3, as contextual need factors are too large of a factor to measure for this study.

Predisposing Factors. In this study, the contextual predisposing factors reflected the influence that providers and organizational beliefs and social structure have on patient utilization for earlier prenatal care if an individual has a pre-pregnancy diagnosis of hypertension. The results for predisposing factors were the belief of needs for improvement, provider beliefs on the importance of maternal health to a hospital success, support from leadership, potential solutions to overcome obstacles for and appropriate care. The results of these factors suggest that health providers are having a greater outlook on the holistic approach to maternal health outside of pregnancy regardless of rural or medically underserved status.

When referencing directly to maternal health in rural areas, results did show that health providers state that obstetric plays a much larger role in rural communities than is normally perceived and can create a connection through the community if services are able to stay in the community rather than have outsourced care. This also connects to the theme of support from leadership, the social characteristics from hospital leadership can support health care providers in aid continuing to have obstetric services in rural areas. If there is interest from leadership and they too recognize that maternal health is vital to the well-being of the community, then healthcare providers are more likely to feel supported in their role and be less likely to leave. Though there are obstacle the impeded giving appropriate care in rural communities, there are health providers and health professionals, who do have hope and are trying to find ways to overcome the limited resources they must provide care such as preparedness training for other health providers not directly involved in OBGYN services.

There has been a slow, but increasingly holistic approach to maternal health. And it is clear that it is much needed in rural communities. As rural communities tend to be tight knit communities it is important to ensure individuals to a person-center coordination and community partnerships to help improve access

to care that address all the needs of the rural community (*Strengthening Partnerships Makes for Better, More Holistic Rural Healthcare*, 2019). A recent case study which focused on team training to help support rural obstetrics within a health-system throughout South Dakota, North Dakota, Minnesota, Iowa, and Nebraska increased support moral within the healthcare providers themselves and felt as if their leadership is supporting them as a team and are additionally gaining confidence in their ability to deal with obstetric emergencies regardless of specialty (Shannon, 2017). On the other hand, Kozhimannil et al. (2022) found that when rural hospital administration focused more on the need to meet annual birth quotas and financial expectations to keep the hospital afloat, decision about maintain obstetric care is prioritized only if the local community needs those services. In this same study of the 93 hospitals researched 23 of the hospitals responded that they were not sure if they would continue providing obstetrics, or they expected to stop offering obstetric services.

Enabling Factors. In this study, enabling factors refer to the resources that may facilitate or impede early prenatal care, which for this study the items of interest were on the availability of services, availability of providers, changes in practices and evaluation efforts. While it is known that there are limited available obstetric services and OBGYN providers in rural communities this is due largely in part because of the way our rural health care system infrastructure is set up. Due to typically modest budget designations because of low population density, budget tend to have very limited flexibility in cash that directly limit any necessary investments difficult (*Rural Hospitals Overview*, 2022). In addition to this, workforce retainment is an ongoing challenge due to the nature of the remote geographical location that rural hospitals tend to have (*Recruitment and Retention for Rural Health Facilities Overview*, 2022). Of course, this an issue that in itself is a topic, but it is worth noting that there is growing interest for increasing recruitment and retention strategies (Baker & Schmitz, 2017; *Recruitment and Retention for Rural Health Facilities Overview*, 2022; *Rural Physician Recruitment and Staffing 2022 Survey Results*, n.d.).

Changes in practice and policies are also factors that have the potential to influence the utilization of earlier prenatal care positively or negatively. Changes in practices are geared to understanding how health

care providers have changed their practice for care. Many of which the findings showed that there are increased effort in training staff appropriately, communicating between within providers such as nurses, OB provider, midwives, doulas, etc. Additionally, healthcare providers are trying to be more flexible with their practices for individuals to have timely access to prenatal care which, due to the COVID pandemic made telehealth a practice of interest for many rural hospitals. (Kozhimannil et al., 2020; US Government Accountability Office, 2022).

While there has been increasing change in policies based of the finding of the analysis there are still items that these policies do not include or are vague on the meaning. Additionally, the changes in policies may only be in effect for the organization and not influencing factors such as insurance. As many of the individuals that use rural hospitals services are primarily covered by Medicaid there are federal legislation in the works for bridging this gap to help with financial aid for rural hospitals of improvement reimbursement rates (Centers for Medicare & Medicaid Services, 2023; Text - S.803 - 118th Congress (2023-2024), 2023).

Finally, evaluation efforts are a part of the enabling factors that may enable identify or research issue that may enable pregnancy-related complications to occur. While there are various static initiatives as stated by some of the individual in the podcasts that were analyzed, these initiatives are focused on the assessment of rates rather mortality rather than using the evaluation efforts to aid in evidence-based practices. However, there is a small victory to that some of these initiatives are now included a community impact evaluation efforts (*Evaluation of the Rural Maternity and Obstetrics Management Strategies (RMOMS) Program: Second Annual Report Executive Summary, 2022; Family Medicine Recognized in Rural Maternal Health Equity Summary, n.d.*).

Point of Interface Discussion

While the quantitative portion of the study highly focused the interaction probability of prenatal visits attainment for individuals who were diagnosis with pre-pregnancy hypertension modified by mother's race and stratified by urban or rural county categorization of residence, it is clear that while

there may have been some statistical significance of association, it is not enough to be able to make a true comparison and only an estimation that there are lower probabilities early prenatal of white individuals and increased probabilities for other races in attending earlier prenatal care visits earlier. While it was not a major theme, in the qualitative analysis it is clear that health providers do tend to see those individuals of rural minority populations receive later prenatal care regardless of a pre-pregnancy hypertension diagnosis due to various barriers ranging from transportation, costs, and limited time availability. As this study in its entirety was meant to be an foundation explorational of barriers hindering for early prenatal care for rural individuals diagnosed with hypertension prior to pregnancy it is clear that evaluation efforts in the form of quantitative and qualitative are still needed to be developed to properly measure maternal health outcomes that include efforts measure across the life course of the individual rather than for the sole purpose for the improvement of pregnancy outcomes (Ford, 2022; Garovic et al., 2022; Kattah & Garovic, 2013; Mpofu et al., 2021; Wenger et al., 2018).

Future Research Recommendations

Future research on chronic hypertension prior to pregnancy should consider the following: (1) current data collection efforts are not tailored for physical health outcomes which need a farther-in depth analysis for needs assessment for chronic physiological conditions. This is particularly needed to further investigate differences between rural and urban areas., (2) Conducting a primary data study with individuals who have had what is classified high-risk pregnancy would show first-hand tailored results for specific issues pertaining to access for care at before, during, and after pregnancy, (3) The analysis of this data focused primarily on the years prior to the COVID pandemic. So further exploration analysis with a similar timeframe would be required to fully measure current rates for early prenatal visits if an individual is diagnosed with high blood pressure prior to pregnancy as care measures may vary post-COVID times. Along with this, as COVID has been shown to target major organs if a person has been previously infected, a further detailed study must account for this probability in particular for heart health (Davis et al., 2023)., (4) Further research into leadership support for healthcare providers is important, especially

for rural providers. Also, further phenomenological exploration is needed determine particular influences rural health providers have connection to the community they serve is important.

Lessons Learned

For this study, while secondary data collection was appropriate for use in this study because of time constraints, there is still so much to explore of all sides for women's health and maternal health. One of the major limitations is that current practices for interviewing health providers is that there is a limited amount of availability in both time and the number of specialty health providers particularly for rural and medically underserved areas. It is clear that there needs to be an established connection or network willing to collaborate on research projects of this type. Initially this study was meant to interview rural health providers, rural health professionals, and advocacy groups, but due to both time constraints and health providers overbooked schedules it was not possible at this time.

Most importantly, while at the formation of this study, the researcher was interested in high-risk pregnancy at all stages. However, focusing on more on the preconception stage of potential high-risk pregnancy could potentially be more beneficial as the current political climate and other influencing factors will impact women's and maternal health care. Additionally, heart health research has continued to uncover important biological differences between the female and male sex on which much of the knowledge gathered from previous research of heart health has used results from males and translated them to heart health care for females (Wenger et al., 2022).

Implications for Public Health and Conclusion

This study makes contributions to both rural women's and maternal health research. As there has been a large number of rural hospitals closures in the past decade, it is important for pregnancy-capable individuals to have access to obstetrics care and care outside the scope of pregnancy. Health providers can impact the utilization of health services of women across their life course and in particular for health heart. While it is important to decrease pregnancy-related mortality and maternal mortality rates, public health interventions and programs targeted to reduce these rates will require a life course approach in their

design regardless of intension of pregnancy to insure a holistic approach for care. This study shows that there is still much that needs to be done to improve our maternal health system in rural America. There are potential solutions that have been identified and others that are currently being piloted, but there is a great need for support from leadership in particular for health providers and health professionals to find and implement well tested and evidence-based solutions.

Rural communities themselves tend to be made up of tight knit connections. This was expressed in various of the expert interviews by health providers who have worked with in rural communities for the most part of their careers. Therefore, it is important for health providers who serve in rural communities to find a way to connect with their patients not only on an individual level, but also on a community level. Additionally, the shortage of obstetrics providers in rural areas can be mitigated by incorporation more family physicians with obstetrics training to minimize the shortage of obstetrics care. As family physicians tend to have a full life course approach to their health care, they are a great way to bridge the rural communities and aid in minimizing the lack of obstetric care availability. Mothers tend to play a large role in the health of their families and communities and do have influence on the ability to overcome public health challenges.

The findings of this study emphasis the importance of greater evaluation efforts for physiological factors that contribute to pregnancy-related complications and mortality. In conclusion, to effectively improve the utilization of prenatal healthcare services, there must be a multi-layer and intersectional approach to overcome the barriers for individuals who have the capability to become pregnant to have access to timely care and for rural healthcare providers to have capability to care for their communities.

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[Confidence/GBWC-Post/make-sure-your-pregnancy-concerns-are-heard-cdc-urges-providers-to-hear-her-1](https://www.lamaze.org/Giving-Birth-with-Confidence/GBWC-Post/make-sure-your-pregnancy-concerns-are-heard-cdc-urges-providers-to-hear-her-1)

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APPENDIX A IRB Approval Form



Institutional Review Board (IRB)
PO Box 8005 • STATESBORO, GA 30460
Phone: 912-478-5465
Fax: 912-478-0719
IRB@GeorgiaSouthern.edu

To: Aguirre, Diana
Telfair, Joseph; Cowan, Logan

From: Georgia Southern Institutional Review Board

Approval Date: October 21, 2022

Subject: Institutional Review Board Exemption Determination - Limited Review

The following protocol involves activities that do not require full approval by the Institutional Review Board (IRB) according to federal guidelines.

Protocol #: H23096
Title: Assessment For Care Relating to Pregnancy-Related Complications in Rural and Medically Underserved Georgia

According to the Code of Federal Regulations Title 45 Part 46, your research protocol is determined to be exempt from full review under the following exemption category(s):

Review Type: E2/E4

Exemption 2 Research involving only the use of educational tests (cognitive, diagnostic, aptitude, achievement), survey procedures, interview procedures or observation of public behavior, if: Information obtained is recorded in such a manner that human participants cannot be identified, directly or through identifiers linked to them. Please visit our FAQ's for more information on anonymous survey platforms; Any disclosure of the human participant's responses outside the research could not reasonably place the participant at risk of criminal or civil liability or be damaging to the participant's financial standing, employability or reputation; Survey or interview research does not involve children; The research project does not include any form of intervention.

Exemption 4 Secondary research uses of identifiable private information or identifiable biospecimens, if at least one of the following criteria is met: The identifiable private information or identifiable biospecimens are publicly available; Information, which may include information about biospecimens, is recorded by the investigator in such a manner that the identity of the human subjects cannot readily be ascertained directly or through identifiers linked to the subjects, the investigator does not contact the subjects, and the investigator will not re-identify subjects.

Any data use agreement or agreement change required by the data owner must be supplied to the IRB prior to execution for review. This approval is contingent upon researcher compliance with the conditions of the data use agreement (where required) and current institutional data security policy. "

Therefore, as authorized in the Federal Policy for the Protection of Human Subjects, I am pleased to notify you that the Institutional Review Board has approved your proposed research **with the understanding that you will abide by the following conditions:**

No COVID Safety Plan No in person procedures were included in this protocol.
Incentives: No monetary incentives are approved for this protocol.

Special Conditions: None

Any alteration in the terms or conditions of your involvement may alter this approval. Therefore, as authorized in the Federal Policy for the Protection of Human Subjects, I am pleased to notify you that your research, as submitted, is exempt from IRB Review. No further action or IRB oversight is required, as long as the project remains the same. If you alter the project, it is your responsibility to notify the IRB and acquire a new determination of exemption. Because this project was determined to be exempt from further IRB oversight, this project does not require an expiration date.



Institutional Review Board (IRB)
 PO Box 8005 • STATESBORO, GA 30460
 Phone: 912-478-5465
 Fax: 912-478-0719
 IRB@GeorgiaSouthern.edu

To: Aguirre, Diana
 Telfair, Joseph; Cowan, Logan; Apenteng, Bettye

From: Georgia Southern Institutional Review Board

Amendment Approval Date: January 27, 2023

Current Expiration Date: Exempt

Original Approval Date: October 21, 2022

Subject: Status of **Modification Request** for Approval to Utilize Human Subjects in Research
 Amendment #: 1
 Originally Approved By: Exempt

After a review of your Extension Request for the following research project, it appears that (1) the research subjects are at minimal risk, (2) appropriate safeguards are planned, and (3) the research activities involve only procedures which are allowable

Protocol #: H23096
Title: Assessment For Care Relating to Pregnancy-Related Complications in Rural and Medically Underserved Georgia
Maximum Number of Subjects: 10000

Therefore, as authorized in the Federal Policy for the Protection of Human Subjects, I am pleased to notify you that the Institutional Review Board has approved your extension and modification.

Modification Description: Changing research question 1 from the time range of 2015-2020 to 2017-2020;
 Changing Georgia data request form submitted to the Georgia department of health to the years 2017-2020;
 Addition of Bettye Apenteng as Co-I.

Please provide the IRB with any information concerning any significant adverse event, whether or not it is believed to be related to the study, within five working days of the event. In addition, if a change or modification of the approved methodology becomes necessary, you must notify the IRB Coordinator prior to initiating any such changes or modifications. At that time, an amended application for IRB approval may be submitted. Upon completion of your data collection, you are required to complete a Research Study Termination form to notify the IRB Coordinator, so your file may be closed.

APPENDIX B

Characteristics of Audio Recordings Used for Qualitative Analysis

Name of Podcast	Name of Episode	Expert(s)	Location of discussion	Date of audio publication
The OB/GYN Podcast	67: Maternal Mortality -Part 3	Dr. Heather Link, OB/GYN	The state of Louisiana	February 1, 2020
Rural Health Information Hub: Exploring Rural Health	Obstetricians, Gynecologists, and Maternal Health in Rural America, with Anne Banfield	Dr. Anne Banfield, OB/GYN	Rural America	September 6, 2022
KUNC Public Radio	Rural pregnancy care is in 'crisis.' Banner hopes telehealth can help	Dr. Blake McLaughlin, OB/GYN	Rural North Colorado	April 22, 2022
Clinical Training Center for Sexual and Reproductive Health	The Intersection of Maternal Health and Cardiovascular Disease	Dr. Karen Florio, DO, MPH	United States of America Maternal Healthcare	March 9, 2022
Rural Health Information Hub: Webinar	Maternal and Obstetric Care Challenges in Rural America from the National Advisory Committee on Rural Health and Human Services	Jeff Colyer, MD, Darci Graves, MPP, MA, MA, Jacob Warren, Ph.D., M.B.A., C.R.A., Maria Poepsel, CRNA, APRN, Ph.D.	Rural America	August 26, 2020
Health Matters Podcast	Maternal Health	Dr. Mercedes Morales-Aleman	Rural Alabama	April 13, 2020
Advancing Health: American Hospital Association	Leadership Dialogue Series: Strengthening Rural Health Care with Jennifer Havens	Jennifer Havens and John Hauptert	Rural America	February 27, 2023
PBS: WABE	Leaders in Medicine Discuss Georgia Health Care Issues	Dr. Jacqueline Fincher, Dr. Sally Goza, Dr. Patrice Harris	The State of Georgia	February 19, 2020
Journey To Midwifery	Lodz, CNW, Georgia	Lodz, CNM	The State of Georgia	February 2020
Rural Health Information Hub: Exploring Rural Health	Hospitals and Maternal Health in Rural America, with John Supplitt, Aisha Syeda, Virginia Uhlenkamp, and Ashleigh Wiederin	John Supplitt, Aisha Syeda, Ashleigh Wiederin	Rural America	August 2, 2022

Name of Podcast	Name of Episode	Expert(s)	Location of discussion	Date of audio publication
Georgia Public Broadcasting	How A Rural Georgia Doctor Is Taking An Holistic View On Maternal Care	Dr. Keisha Callins	Rural portions of the state of Georgia	October 8, 2020
Health Matters Podcast	Hypertension with Dr. J Mcdonald	Dr. John McDonald	Rural Alabama	March 9, 2022
How Not to Kill Your Patient	Pregnancy Related Complications 2022	Dr. Lisa Wolf, Kevin McFarlane RN	United States of America Maternal Healthcare	August 10, 2022
Fempower Health	Heart Health: What Every Woman Needs to Know Dr. Nanette Wenger	Dr. Nanette Wenger	United States of America Maternal Healthcare	June 28, 2022
Rural Health Information Hub: Exploring Rural Health	Family Physicians and Maternal Health in Rural America, with Julie Wood and Zita Magloire	Dr. Julie Wood, Dr. Zita Magloire	Rural America	October 4, 2022
Health Matters Podcast	Family Medicine Obstetrics	Dr. Connie Leeper	Rural Alabama	August 21, 2020
Rural Health Rising	Episode 64: Access to Prenatal Care in Rural Communities	Brittany Page, RN	Hillsdale County, Michigan	June 23, 2022
Rural Health Rising	Episode 90: Rural Obstetrics	Dr. Alfred Bediako, OB/GYN	Hillsdale County, Michigan and Rural America	February 2, 2023
All About Pregnancy & Birth Podcast	Ep 117: Maternal Morbidity and Mortality and 10 Ways to Stay Safe	Dr. Nicole Calloway Rankins, OB/GYN	United States of America Maternal Healthcare	September 2022
All About Pregnancy & Birth Podcast	High Risk Pregnancy with Dr. Keisha Reddick	Dr. Nicole Calloway Rankins, OB/GYN, Dr. Keisha Reddick, MFM,	United States of America Maternal Healthcare	February 2020
Georgia Public Broadcasting	Doulas in Georgia work to support better, safer births — one family at a time		The State of Georgia	November 16, 2022

Name of Podcast	Name of Episode	Expert(s)	Location of discussion	Date of audio publication
Breakthroughs: Northwestern University Feinberg School of Medicine	Declining Heart Health in Most Pregnant Women with Sadiya Khan, MD, and Natalie Cameron, MD	Sadiya Khan, MD, Natalie Cameron, MD	United States of America Maternal Healthcare	February 14, 2022