**The Effect of Rurality on Utilization of Psychotherapy for Perinatal Mood Disorders among Georgia Congenital Heart Defect Medicaid Patients**

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**THE EFFECT OF RURALITY ON UTILIZATION OF PSYCHOTHERAPY FOR**

**PERINATAL MOOD DISORDERS AMONG GEORGIA CONGENITAL HEART**

**DEFECT MEDICAID PATIENTS**


By

Erin Reynolds


Bachelor of Science - Biology

Baylor University

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An abstract of

A thesis submitted to the Faculty of the

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Abstract

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**Purpose:**
As the number of people born with congenital heart defects (CHD) living into childbearing years increases, the need to assess possible health risks of pregnant women living with CHD is paramount. Perinatal mood disorders (PMD) affect 15-20% of women experiencing pregnancy and are the number one complication in pregnancy and childbirth in the U.S, yet remain undertreated. Literature suggests that a major barrier to the receipt of treatment, such as psychotherapy, is geographic access to mental health providers. There is no current research concerning the receipt of psychotherapy for PMD in women with CHD. Therefore, this study seeks to address this gap in knowledge utilizing the geographic distribution of Georgia's CHD Medicaid beneficiaries.

**Methods:**
This study uses Medicaid claims data from the Medicaid Analytic Extract (MAX) files spanning the years 1999-2013 to assess the effect of rurality on the receipt of psychotherapy for PMD in a CHD population. A two-part model using logistic regression analysis will be used to evaluate the receipt of any treatment and adequate treatment, given any treatment, across the urban to rural continuum.

**Results:**
Results indicate that of the 5,235 women with CHD who had a delivery, 931 (17.8%) had a diagnosis of PMD. Only approximately 15% of these women received any psychotherapy. Those living in rural areas were significantly less likely to receive any psychotherapy within 12 weeks of diagnosis of PMD as compared to their urban counterparts, even after accounting for differences in geographic access

**Conclusion:**
This study suggests that pregnant and postpartum women with CHD and a PMD diagnosis who live in rural areas are less likely to receive psychotherapy. These findings provide support for adopting a prescriptive approach to perinatal mental health services for women with chronic disease and encourage the formation of public health policies that address barriers to mental health treatment in the perinatal period.

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## Chapter 1: Introduction

The majority of children born with congenital heart defects (CHD) now live into their childbearing years, with the total adult U.S. CHD population at an estimated 1.3 million individuals in the year 2010. (Moons et al., 2010) (Mended Hearts, 2020; Gurvitz et al., 2016; Daniels, n.d.). Persistent upward trends in CHD survival can be attributed to advances in medical technology and procedures that correct cardiac structural abnormalities at an early age (Gurvitz et al., 2016). Once in adulthood, pregnancy and child birth have shown to have mild to significant adverse health outcomes for women with CHD, and in some cases, pregnancy may be completely contraindicated (Hinze et al., 2012). Additionally, mental health concerns have emerged as a health burden in the aging CHD population. limited current literature suggests that few CHD individuals diagnosed with mental health conditions ever receive treatment (Kovacs et al., 2008). No current studies have jointly addressed pregnancy and mental health within the CHD population.

Perinatal Mood Disorders (PMD) have been cited as the most prominent complication in pregnancy and childbirth affecting approximately 1 in 7 U.S. women during the perinatal period (Mathematica, 2019). PMD encompass mood, depression, anxiety, psychosis, substance use, and several other types of disorders in the perinatal period which spans the entirety of pregnancy up to a year post-partum. Untreated PMD accounted for $14.2 billion in societal costs for all births in 2017 (Mathematica, 2019). However, even after a PMD diagnosis, only half of women received necessary treatment. Treatment can avoid the adverse physical, psychological, and developmental health outcomes associated with PMD (Mathematica, 2019). Psychotherapy, a common first-line treatment for maternal mental health, involves speaking with a trained mental health professional to address mental and emotional difficulties (APA, 2020). Additionally,

because of the safety and efficacy of psychotherapy, literature has shown that the majority of women prefer psychotherapy when given treatment options (Fitelson, et al.,2010).

In this study, Medicaid covers the population of pregnant women with CHD who also have been diagnosed with a mental health condition. In 2015, it was reported that Medicaid covered over one fifth of nonelderly U.S. adults with a mental health condition and over one quarter of those with a serious mental health condition. (KFF, 2017) Furthermore, it has been shown that those with any mental health issue covered by Medicaid are significantly more likely to receive mental health treatment than their uninsured or privately insured counterparts (KFF, 2017). Medicaid also plays a key financial role in covering deliveries in the U.S., insuring approximately half of all births (Galewitz, 2013). Despite this seemingly ubiquitous coverage, those with Medicaid have reported significant barriers to mental health treatment including financial and physical barriers (Teh et al., 2010). The latter is of specific interest as approximately 24% of nonelderly adults living in rural areas are covered by Medicaid, and in some states, a greater proportion of the rural population is covered by Medicaid as compared to urban populations(Foutz, Artiga, and Garfield, 2017). Those living in rural areas have similar mental health burdens as their urban counterparts but are less likely to receive mental health treatment (Fortney, Harman, and Dong, 2010; Fortney, 2018; Gamm, Stone, and Pittman, 2003). This disparity may be a result of both lack of available providers within a reasonable traveling distance and the stigma associated with rural areas (Hill et al., 2016) (Fortney, Harman, and Dong, 2010). There have been no examinations of the disparities in utilization of mental health treatment for those with CHD who are pregnant living in urban and rural areas. To address this gap in knowledge, the current study assesses psychotherapy as a form of mental health treatment for pregnant women with CHD covered by Medicaid. Andersen's Behavioral Model for Health

Care Utilization was used to guide this study (Andersen and Davidson, 2007). The contextual and individual characteristics of this population provide a unique lens through which to assess the burden and disparities in maternal mental health and mental health treatment in a high risk, chronic disease population.

## Chapter 2: Literature Review

### *Background*

The following section addresses the confluence of multiple health issues and contexts that characterize the proposed study population of Medicaid beneficiaries with CHD experiencing pregnancy. This review encompasses the current state of the literature concerning: a population with CHD, perinatal mood disorders (PMD), and the policy and legislative environments surrounding maternal mental health in the U.S.

### *CHD in the U.S.: definition and prevalence*

Due to improved medical technology and training within the past 50 years, 85% of individuals with the chronic condition of CHD now live into adulthood (Bjornard et al., 2013) (Warnes, 2015). This has resulted in a population of approximately 2.4 million with CHD in the U.S (Khanna et al., 2019). CHDs are structural cardiac abnormalities present at birth that can vary in form and severity (Bjornard et al., 2013). Approximately, 1% infants each year are born with CHD and 25% of these experience severe CHDs (Oster et al., 2013). In the Atlanta metropolitan area, the burden of CHD among newborns between 2000 and 2005 was 84.5 per 10,000 live births, and the burden of more severe (critical) CHD was 17.8 per 10,000 live births (Oster et al., 2013). The surgeries and interventions allowing these infants to survive into adulthood are often carried out within the first year of life (Oster et al., 2013). Common procedures include shunting, catheterization, repairs, and other operational techniques (Johns

Hopkins, 2020). The Fontan procedure is an operational technique used to redirect cardiac blood flow that has achieved success in approximately 70,000 patients in the U.S. (Rychik et al., 2019). Patients who have experienced this procedure and the general population of those with critical CHD often exhibit poor neurological and behavioral development and functioning in adolescence, some of which has been shown to be predictive of poor adult social cognition (Rychik et al., 2019). The propagation of these issues into adulthood may be compounded by health risks associated with childbearing within the CHD population. This is of important concern as patients with CHD commonly have lapses in care leading to elevated rates of emergency hospitalization as adults (AAP, 2019). The American Academy of Pediatrics estimates that 25% of patients lose contact with a provider who treats CHD after the age of six and 50% have no contact after the age of thirteen (AAP, 2019).

### *CHD in pregnancy*

A recent study found that over a ten-year period, the increase in women with CHD giving birth surpassed the increase within the general population, with birth rates at 34.9% and 21.3%, respectively (Opotowsky, Siddiqi, Webb, Fern, 2012). However, pregnancy can entail substantial risks for this population. Recommendations for pregnancy and contraceptive use exist for four classes of patients with CHD based on cardiac lesion severity and are specified by the World Health Organization (WHO), with classes three and four entailing significant to very high health risks during pregnancy and pregnancy completely contraindicated in for those in category four (Hinze et al., 2012). These risks include arrhythmias, heart failure (HF), and thromboembolic complications, which have been shown to occur in up to 25% of women with CHD  (Rychik et al., 2019). Fetal risks can include intrauterine growth retardation (IGR), need for pre-term delivery, fetal demise, and miscarriage (Warnes, 2015). In studies involving women who

underwent a Fontan procedure for CHD and became pregnant, the rate of miscarriage was over 50% (Rychik et al., 2019). Given these implications, it is surprising that most of these women with CHD who have had a Fontan procedure decide to continue with pregnancy even after being counseled on the serious maternal and fetal health risks involved (Rychik et al., 2019).

### *CHD and mental health*

CHD has also been associated with severity of mental health issues in adulthood. In fact, the prevalence of anxiety in patients with more complex CHD is 70-90% higher than in those with less critical CHD (Khanna et al., 2019).  In a study utilizing a state CHD surveillance system encompassing almost 7,000 adults, 33% of patients were reported to be diagnosed with a mental illness and 13% with anxiety (Khanna et al., 2019). Anxiety and mood disorders were found to be most prevalent in patients with CHD in their thirties, and those with mental health issues were more likely to be covered by government insurance than those without (Khanna et al., 2019). These findings support and echo a growing body of literature that has found that a considerable proportion of patients with CHD suffer from anxiety and mood disorders (Bromberg et al., 2003) (Horner, Liberthson, Jellinek, 2000).While several studies call for the need for mental health screening and continuity of care for patients with CHD experiencing mental health issues, smaller studies show that mental health service utilization remains low (Rychik et al., 2019) (Khanna et al., 2019). One study reported that half of their population with CHD met the criteria for having a mood disorder or anxiety, with less than 40% of them having ever been treated for any mental illness (Katon, 2003). Another study found that none of the patients with CHD meeting diagnostic criteria for a mood or anxiety disorder were received any treatment (Horner, Liberthson, and Jellinek, 2000).

### *Perinatal mood disorders: definition, prevalence, treatment*

Perinatal Mood Disorders (PMD) affect approximately 15-20% of pregnant and postpartum women and are underdiagnosed and undertreated (Meltzer-Brody and Jones, 2015; (Keefe, Brownstein-Evans, and Rouland Polmanteer, 2016). In fact, it has been found that up to half of women experiencing PMD symptoms, specifically depression, do not seek treatment (CDC, 2008). PMD is a term encompassing mood, anxiety, psychotic, bi-polar, depression, and several other types of disorders in the perinatal period (Paschetta et al., 2014; NPA, 2018). More recently, PMDs have become a concern for many healthcare systems after a report was published in the United Kingdom attributing the majority of maternal deaths within the first year after giving birth to PMDs (Paschetta et al., 2014). This is a cogent finding for the state of Georgia with a recently reported high maternal mortality rate at 46.2 deaths per 100,000 live births (2018), an 18% increase in maternal mortality from 2016 (America's Health Rankings, 2018). PMD can also result in adverse birth outcomes such as preterm birth and disruption of natural maternal-child bonding (Paschetta et al., 2014; NPA, 2018). The American College of Obstetricians and Gynecologists (ACOG) recommends that women receive a mental health screening at least once in the perinatal period (ACOG, 2018). In fact, several entities including American College of Nurse-Midwives, U.S. Preventative Services Task Force, and the American Academy of Pediatrics have all recommended routine screening for perinatal depression (NPA, 2018). Additionally, more current guidelines suggest screenings in every trimester, at a 6-week post-partum visit, and at the two, four, and six month well-baby visits. These screenings are to be administered by OB/GYNS, pediatricians, and primary care providers (NPA, 2018). The Patient Health Questionnaire and Edinburg Postnatal Depression Scale (EPDS) are two screening tools that have been validated for women in the perinatal period, and

routine use of the EPDS has been found to be acceptable by a majority of women (Kendig et al., 2017; Buist et al., 2006). Additionally, screening tools such as the EPDS have been shown to accurately identify mood disorders across varying age groups and cultures (NPA, 2018). In the interest of insuring a continuum of care, ACOG also recommends that systems be in place for treatment in the form of medication therapy and behavioral health resources (ACOG, 2018). Literature concerning The Council on Patient Safety in Women's Health Care "bundles" has outlined a perinatal mental health "bundle" to be offered across care settings for women. (Kendig et al., 2017) This bundle includes prescriptive phases of preparation and care to be implemented and enacted by providers throughout the perinatal period including; readiness, recognition and prevention, response, and reporting and systems learning (Kendig et al., 2017). Similar calls for increased mental health awareness and screening in the perinatal period are echoed throughout literature (Accortt and Wong, 2017; NPA, 2018; Witt et al., 2011). Furthermore, although not specifically addressing PMD, several studies have called for comprehensive and continuous mental health care for patients with CHD throughout treatment phases and life stages. These often emphasize the need for all providers who treat CHD to be equipped to recognize and address mental health concerns (Khanna et al., 2019; Rychik et al., 2019).

While there are several treatment modalities available for PMD, psychotherapy has been shown to be preferred by both practitioners and mothers over medication therapy (Stuart and Koleva, 2014; Fitelson et al., 2010). Literature supports that psychotherapy is often recommended as the first-line treatment, especially in the event that the mother is breast-feeding, given the risk of pharmaceuticals passing to an infant through breast milk (Stuart and Koleva, 2014). This is an especially important insight given that breast-feeding is now widely promoted for improving maternal and infant health (Rojjanasrirat and Sousa, 2010). Furthermore,

psychotherapy for PMD can be modified to meet the unique needs of lower-income women, and populations with CHD have noted psychotherapy and individual/group therapy as their preferred modality of mental health treatment (Grote Swartz, and Zuckoff, 2008; Page, Kovacs, and Irvine, 2012; Kovacs et al., 2009).

### *Mental health in Medicaid populations*

The largest payer for mental health services in the U.S., including psychotherapy, is Medicaid (KFF, 2017).  Additionally, Medicaid covers approximately 50% of all births nationally and over 50% of the births in Georgia (Galewitz, 2013; KFF, 2016).  Although the Medicaid coverage of the population with CHD is not known at the national level, care for general chronic disease accounts for approximately 83% of Medicaid spending, and one study found that Medicaid covered approximately 40% of patients in a state's CHD surveillance system (National Association of Chronic, n.d.; Khanna et al., 2019). It has been shown that women covered by Medicaid experience significant physical and fiscal barriers to care and a higher prevalence of depression than other populations experiencing depression (Teh et al., 2010). A specific study found that women receive lower rates of minimally adequate psychotherapy than men in the Medicaid population (Teh et al., 2010). Disparities within the Medicaid population also exist across place of residence, with the Medicaid population encompassing a larger portion of rural areas compared to urban (GSU, 2017).

### *Utilization of mental healthcare across urban & rural populations*

Although research shows that providers in rural areas are more likely to accept Medicaid and that Medicaid insures more per capita and overall for mental health service use in rural areas, beneficiaries living in these areas are commonly found to still lack access to providers who accept Medicaid (MACPAC, 2018; Ziller, Anderson, and Coburn, 2010; Merwin et al., 2003)

The general population living in rural areas, as classified by Rural Urban Continuum Codes, have a lower odds of accessing and receiving adequate mental health treatment as compared to their urban counterparts (Lambert, Agger, and Hartley, 1999; Fortney, Harman, Xu, and Dong, 2010) Although rates of major depressive disorder (MDD) do not vary significantly among rural and urban populations, those in rural areas are less likely to have ever utilized any specialty mental health care (Fortney, Harman, Xu, and Dong, 2010) (Fortney et al., 2018; Wang et al., 2005) Furthermore, those living in rural areas have a lower probability of utilizing and receiving minimally adequate psychotherapy treatment as compared to pharmacotherapy (medication therapy) within their own community and in comparison to psychotherapy utilization in urban areas (Fortney, Harman, Xu, and Dong, 2010). Findings of higher use of psychotherapeutic medication and lower office-based mental healthcare use among rural Medicaid populations persist even when rural beneficiaries experienced lower out-of-pocket costs for office-based care than their urban counterparts (Ziller, Anderson, and Coburn, 2010). Similarly, other research has found that Medicaid beneficiaries in rural areas have fewer outpatient visits for mental health services than those living in urban areas (Gamm, Stone, and Pittman, 2003).

### *Access to and acceptability of mental health services in rural areas*

To understand these disparities, possible drivers such as health provider shortage areas (HPSAs), long travel times, and lack of transportation are often key points of interest, as well as socio-economic and cultural characteristics inherent to many rural communities (Fortney, Harman, Xu, and Dong, 2010; Hill et al., 2016; Arcury et al., 2005). Specifically in the state of Georgia, 151 out of 159 counties are designated as mental health provider shortage areas (MHPSA), with MHPSA being designated as areas with less than one provider per 30,000 residents (KFF, 2019a). Technological advancements have created the opportunity to reveal and

circumvent some of these barriers to mental health care. Most notably, telehealth use has been examined across urban and rural communities. A recent study found that among Medicaid beneficiaries, those living in rural areas were more likely to utilize telehealth services than beneficiaries residing in urban areas (DCH, 2018; Talbot et al., 2019). Additionally, across both populations, mood disorders were found to be the most common health issue, and psychotropic medication management was the most common treatment followed by use of behavioral health services (Talbot et al., 2019). These findings further reveal the need for accessibility to services and raise questions about the acceptability and efficacy of treatment provided to rural populations for mental health issues. Several qualitative studies have found rural women to be discontented with interpersonal mental health care supplied by providers, often citing a perceived lack of capability and empathy among providers as primary reasons (Snell-Rood et al., 2017; Hill et. al, 2016). Similarly, providers in rural areas have noted lack of training and even personal discomfort as barriers to discussing mental health issues with patients (Hill et. al, 2016).

### *National Legislative Context of Maternal Mental Health*

Over the past decade the legislative landscape surrounding maternal mental health in the U.S. have evolved both at the national and state level. At the national level, the *Melanie Blocker Stokes (MOTHERS) Act* advocated for support services and education in postpartum mental health (Rhodes and Segre, 2013; PSI, 2019a; 2020Mom, 2020). This legislation was included in the *Affordable Care Act (ACA)* in 2010, but no funding was ever implemented to carry out the provisions. However, the ACA introduced the appropriate language and foundation for moving this issue forward (Rhodes and Segre, 2013; PSI, 2019a; 2020Mom, 2020). In 2016 the *Bringing Postpartum Depression Out of the Shadows Act* was signed into law (PSI, 2019a; 2020Mom, 2020). This law leveraged $5,000,000 in funding for maternal mental health screening and

treatment that was disbursed by the Health Resources and Services Administration (HRSA) in

2018 to a group of seven states including Florida, Kansas, Louisiana, Montana, North Carolina,

Rhode Island and Vermont (PSI, 2019a; 2020Mom, 2020). Legislation that has been introduced

but not yet enacted encompasses maternal mental health specifically within the Medicaid

population. The *Maximizing Outcomes for Moms through Medicaid Improvement and*

*Enhancement of Services (MOMMIES) Act*, S.3494, introduced in 2018, advocates for the

extension of Medicaid for pregnant women up to 12 months after giving birth, improving on the

termination of coverage at 6 weeks after delivery in the current Medicaid for pregnant women

program (2020Mom, 2020). Extending coverage would ensure that women have access to

screening and treatment as approved by the Centers for Medicare and Medicaid (CMS) in 2016,

throughout the time period in which PMD can occur and be successfully treated (Ranji, Gomez,

and Salganicoff, 2019).

### *State Legislative and Policy Context of Maternal Mental Health*

A bill similar to S.3494 has been introduced at the state level, Georgia's HB 693

*Expanding Medicaid to Improve Health Outcomes for the state of Georgia* (Georgia General

Assembly, n.d.). Expanding the duration of coverage during pregnancy in the state of Georgia

would be especially influential, as many women are not covered under Medicaid before

pregnancy due to the state's decision to not expand Medicaid to cover those living at or below

138% of the federal poverty line (FPL) (Ranji, Gomez, and Salganicoff, 2019). The bill cites

Georgia's high maternal mortality rates, as mentioned earlier, and that half of those deaths occur

after 6 weeks and before 12 months postpartum in support for this legislation. This bill was

introduced in the 2019-2020 Regular Session and is currently in the second round of Georgia's

House Member reading (Georgia General Assembly, n.d.). Several other bills in the 2019-2020

session advocate for the creation of research committees focused on gathering data to gain a better understanding of the landscape of mental health and maternal mental health in the state of Georgia. This legislation includes HB 514 *Georgia Mental Health Reform and Innovation Commission* which became effective in July 2019, HR 447 *General Assembly to fund a study of the causes of infant and maternal mortality in this state*, which advocates for the appropriation of approximately $10 million to conduct research, and several other resolutions and bills (Georgia General Assembly, n.d.). In the first months of 2020, HB 1114 *Medicaid Coverage for Lactation Care and Services and Postpartum Care* was introduced and passed through the House and on to the Senate. This bill will extend postpartum coverage for Medicaid women from 60 days to 6 months postpartum (Georgia General Assembly, 2020). Working in tandem with legislation, Georgia's budget for the fiscal year 2020 entails dispersal of $1 million for the screening, referral, and treatment of maternal depression in rural and underserved areas, $600,000 in additional funds for three satellite perinatal support sites in Georgia, and several other aligning projects (Kanso, 2019). It should be noted, that due to the current COVID-19 Pandemic, the Georgia legislature has been suspended indefinitely, and when reconvened, may have a heavier focus on recouping the losses in tax revenue experienced during this time. (Georgia General Assembly, 2020) It is estimated that Georgia could face a deficit above $1 billion before the end of the fiscal year (Loughead et al., 2020). So, although HB 1114 was quick moving, postpartum women on Medicaid may not experience the effects of the proposed extended coverage for quite some time. However, this expansion of coverage will likely affect an increasing number of Georgians in the future for several reasons; the economic effects of this COVID-19 will result in more women being eligible for Medicaid and Georgia can take advantage of the flexibility provided by Medicaid to streamline enrollment and extend coverage to additional populations.

(Harker, 2020) These populations include adults with chronic disease and lawfully residing pregnant women. (Harker, 2020)

With national and state legislative and fiscal movement towards more complete maternal health care, specifically within the Medicaid population, changes may be implemented within Georgia's Medicaid system. As previously mentioned, Georgia has not yet expanded Medicaid coverage, however, Medicaid for pregnant women covers Georgians with incomes up to 225% FPL. Again, this coverage only lasts until 6 weeks postpartum. At this point, women may only continue with general Medicaid coverage if they are at or below 35% FPL, or they meet the requirements to qualify for Georgia's Section 1115 Medicaid family planning demonstration program, known as Planning for Healthy Babies or P4HB. (DCH, 2018) To be eligible for this waiver program, a woman must be between the ages of 18 and 44 years old, a U.S. citizen or legal resident, a resident of Georgia, and have a family income at or below 211% FPL (Ranji, Gomez, and Salganicoff, 2019; Georgia Medicaid, 2018). Women are enrolled in either the 'family planning only' (FP-only) component of the program or in the 'inter-pregnancy care' (IPC) component. FP-only services include annual exams, STD testing and treatment, contraception services, and infertility counseling and are for any woman who meets the eligibility, age, and financial criteria of the program. The IPC component is targeted towards women who meet the same age, income, citizenship and residency criteria but have also have given birth to a very low birth weight baby (<1,500 grams) (CHOP, 2014; Georgia Medicaid, 2018). IPC services include family planning, primary care case management, management of chronic disease, and screening for mental health and substance abuse (Georgia Medicaid, 2018). If a mother does obtain Medicaid coverage, barriers to receiving adequate mental health care may still exist. Medicaid in the state of Georgia is predominantly organized into Care

Management Organizations (CMO) designed to monitor and control costs and use of health services (CMS, n.d.; Blake et al.,2019). A recently published qualitative study focusing on Georgia's low-income adolescent population found that the organization of Medicaid into CMOs within the state may create barriers to the receipt of mental health treatment (Blake et al.,2019). Necessity of provider adherence to prior authorization and preferred drug lists, CMO cost and utilization containment tools created significant barriers to mental health care use in this population (Blake et al.,2019). In 2011, approximately 90% of all Medicaid beneficiaries (including adults) in the state of Georgia were enrolled in a CMO, and were subsequently affected by CMO practice and policy (CMS, n.d.).

### *Hypotheses and Conceptual Framework*

It is hypothesized that after controlling for confounders, increasingly *rural residence*, on an urban to rural continuum, is negatively associated with *adequate utilization of psychotherapy*. I also hypothesize that *geographic access to Medicaid accepting providers* partially explains this negative focal relationship.

To examine the association between *rural residence* and *utilization of psychotherapy for PMD* in a Medicaid population experiencing CHD, in my conceptual model, Andersen's Behavioral Model for Health Care Utilization will be applied (Andersen and Davidson, 2007). This model seeks to explain healthcare utilization through identifying predictors, encompassing contextual and individual level predisposing, enabling, and need factors (Babitsch, Gohl, von Lengerke, 2012) The outcome of interest draws upon Andersen's conceptualization of realized access (Andersen and Davidson, 2007). To understand the focal relationship, predisposing and need factors at the individual level and enabling factors at the contextual level will be employed. By incorporating factors at both the individual and contextual levels the model can address

factors applicable to each mother within the broader context and assess characteristics of their respective geographic groups. The mechanism of *geographic access to Medicaid accepting providers* draws upon Andersen's conceptualization of potential access (Andersen, 1995). Current literature and economic theory will support and guide the direction of the effect these factors have upon the focal relationship.

### *Summary of findings and gaps in the literature*

Mental health and childbearing are growing concerns within the aging population with CHD. More broadly, treatment of maternal mental health issues, specifically PMD, is developing into a significant focus within the U.S. healthcare system. However, as the literature reveals, many populations do not adequately utilize mental health treatment such as those living in rural areas or those with low-incomes. Currently, no studies have examined disparities in the utilization of psychotherapy for PMD among the chronically ill Medicaid population living in rural and urban areas. This research will contribute to gaps in practice through supporting evidence-based strategies in maternal mental health. Specifically, there is currently a lack of prescriptive organization of appropriate mental health services around the general population experiencing PMD and within the population with CHD experiencing PMD.

# Chapter 3: Methodology

The following section presents the conceptual framework, data, and analytic approach used to assess the relationship between rurality and psychotherapy utilization. Possible mechanisms and confounders affecting the focal relationship and the directionality of this relationship are also discussed.

## *Conceptual Model*

In the conceptual model, Andersen's Behavioral Model for Health Care Utilization is employed to examine the association between the continuum of urban to rural residence and utilization of maternal mental health services in a Medicaid population with CHD.

The outcome of interest draws upon Andersen's conceptualization of realized access, or the actual use of services. (Andersen and Aday, 1978) To understand the focal relationship, predisposing and need factors at the individual level and enabling factors at the contextual level are included. According to Andersen, contextual determinants compose the setting of access at the aggregate level and are connected to individuals and individual level determinants (Andersen and Davidson, 2007). Predisposing contextual factors include the demographic and social composition of groups. Enabling contextual factors include physical and fiscal barriers or pathways, such as place of residence (urban/rural) and health policies, to receiving care. Contextual needs include the composition of a community's health and illness. Predisposing, enabling, and need characteristics also exist at the individual-level, allowing the model to address factors applicable to each mother within the broader context of their respective geographic groups. Need characteristics encompass an individual's perceived and realized need for health services. Predisposing characteristics at the individual level include the social and biological characteristics that effect the likelihood of an individual seeking health services.

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Individual enabling characteristics include financial factors that may increase or decrease an individual's ability to attain health services. Current literature and economic theory will support and guide the direction of effect these factors have upon the focal relationship.

*Focal Relationship*

The focal relationship to be investigated is the effect of rurality residence on adequate utilization of psychotherapy for PMD among women with CHD who experienced a delivery. Healthcare utilization is defined as the point of contact between patients and the health system where health needs are addressed (Babitsch, Gohl, and von Lengerke, 2012). This model extends the construct to examine the time frame when adequate *utilization of psychotherapy* occurs. Adequate utilization is defined as the amount of therapy necessary for a provider to asses a patient's responsiveness to treatment according to treatment guidelines (Cummings et al., 2019).

On the rural/urban continuum, rural communities are often conceptualized as having lower population densities and less economic and social integration than more urban communities (OMB, 2018). Rural populations disproportionately experience illness and more commonly report barriers to care compared to urban residents (MACPAC, 2018). Additionally, rural health stakeholders recently reported mental health and maternal and child health as areas of concern to be prioritized in forming the future landscape of rural mental health (Bolin et al., 2015). While some research has reported an increase in mental health service use among rural populations, the majority of prior studies have shown a negative association between rural residence and physical and mental health service use (Teh et al., 2010; Fortney, Harman, Xu, and Dong, 2010; Larson and Correa-de-Arauio, 2006; Hauenstein et al., 2007)

*Access: A mechanism*

In this model, *Geographic Access to Medicaid Accepting Providers* serves as the mechanism between rurality of residence and utilization of psychotherapy. Access, in a basic definition, is the consumer's opportunity to utilize healthcare (Levesque, Harris, Russell, 2013). Access in this model draws heavily on Penchansky and Thomas' definition of accessibility as the location of health services in relation to the consumer's location (Penchansky and Thomas, 1981).

This mechanism functions through the economic theory of time-cost. Rural residents are more likely to live in MHPSA where the mental health provider: patient ratios are less than 1: 30,000, indicating reduced availability of services (MACPAC, 2018; KFF, 2019a). To reach health providers, rural residents face longer travel times and lost wages due to these travel times, ultimately resulting in the increased effective cost of seeking care (Penchansky and Thomas, 1981).

Overall, it is hypothesized that with increasing rurality of residence, there is a decrease in psychotherapy utilization through the mechanism of reduced *Geographic Access*.

*Stigma: A mechanism*

A second mechanism remaining unmeasured is the contextual level *stigma*. Stigma is a social construct allowing people to distinguish between groups within a given context and usually entails negative connotations associated with those outside one's own group (Pescosolido et al., 2008). In this role, stigma is conceptualized as the negative perspectives a community associates with mental health treatment in a given area of residence. Studies have shown increased stigma among rural residents concerning treatment and care for mental health issues (Rost, Smith, and Taylor, 1993; Stewart, Jameson, and Curtin, 2015). Ultimately, this is

hypothesized to lead to reduced utilization of mental health treatment (Hill et al., 2016).

Therefore, stigma is included as a mechanism in this focal relationship between rurality and

adequate utilization of psychotherapy.

### *Confounders and associations with the focal relationship*

The following confounders are categorized as predisposing, enabling, and need

characteristics of the population (Figure 1) at the individual and contextual levels that have

possible effects on the focal relationship.

*Contextual Enabling Characteristic*

It is important to note the county level enabling factor of *Socioeconomic Status* (SES).

SES is conceptualized by the American Psychological Association (APA) as a community's

social standing and class that can differ from other communities' SES, resulting in inequities in

access, resources, power, and control (APA, 2019). Rural populations experience lower SES

(MACPAC, 2018). SES is positively associated with use of health services, and in the current

model, adequate use of psychotherapy (Eberhardt and Pamuk, 2004).

*Individual Predisposing Characteristics*

*Maternal age* is another confounder in the focal relationship and is defined as years lived

since birth. It encompasses processes that represent biological maturation and behavioral

capacity to acclimate and function within changing contexts (Schwall, 2012; Birren and

Cunningham, 1985). Younger maternal age (15-19 years old) versus older maternal age (>19

years old) is positively associated with increasing rurality (Daniels, Martinez, and Nugent, 2018).

Those of younger maternal age experience higher rates of depressive symptoms (48%) and are

four times less likely to utilize their child's healthcare services than older counterparts (Schuyler

Center, 2008). Research shows that there are associations between child and maternal healthcare

use patterns with mothers utilizing their child's healthcare approximately as often as their own (Minkovitz, 2002). Therefore, in this model, younger maternal age is negatively associated with adequate psychotherapy utilization.

*Household structure* is another predisposing characteristic in this model. Household structure can be conceptualized as the number and type of financial, legal providers (ie single-parent, two parents, female, male) within a housing unit, affording differing economic and social support characteristics to said households (Lofquist et al., 2012). One study found that among those with incomes below the FPL, those living in rural and small town communities had higher percentages of female-headed households (FHH) with children compared to urban populations (HAC, 2012). Women in FHH face logistical and economic barriers to health care for themselves because of their role as sole guardian and economic provider for the dependents in their household (USDA, 2019; HAC, 2012). Some of these barriers may include long travel times or the high cost of childcare, increasing the effective cost of seeking healthcare for the mother. Thus, those in counties with higher percentages of FFH will have less adequate psychotherapy use.

*Number of children*, a predisposing confounder, is conceptualized as the number of children a mother has guardianship over. Rural mothers have more children on average than their urban counterparts (Daniels, Martinez, and Nugent, 2018). This confounder's association with the dependent variable draws from literature on the impact that seeking out and paying for childcare has on a mother's ability to utilize health services for herself and the embedded economic theory, much like the previous construct (Teh et al., 2010; Russell, 1992). Women who are responsible for more children will be less likely to utilize psychotherapy.

*Ethnicity* is a social construct encompassing shared culture, language, and beliefs drawn

from a common origin, differentiating a people group from other societal groups (Ford and

Kelly, 2005; Moscou, 2008).

*Race* is also a social construct based on phenotypic genetic expression (Ford and Kelly,

2005). Within this model, these constructs combine to form the confounder of *race/ethnicity*.

Those identifying as non-Hispanic (NH) white show higher rates of mental health treatment

uptake and sustained use as compared to minority racial/ethnic groups and make up 77% of the

adult Medicaid population in rural areas as opposed to only 38% in urban areas (Wong et al.,

2017; MACPAC, 2018). Thus, race/ethnicity, with a reference category of non-Hispanic white,

is negatively associated with increasing rurality and utilization of psychotherapy.

*Individual Need Characteristics*

*Medicaid eligibility* is an individual level confounder. Various eligibility categories

represent the differing financial and non-financial characteristics by which a beneficiary has

qualified for Medicaid. Within each category, further income and resource eligibility thresholds

are specified (Schneider, Elias, and Garfield, 2013).

This model includes several eligibility categories. Section 1931 allows states to extend

coverage to more low-income adults through disregarding income requirements, disregarding

assets, and increasing income and asset limits. This section was added to the Social Security Act

(Birnbaum, 2000). In the state of Georgia, the adult income level to be Section 1931 eligible has

been reported as 38% of the FPL (Georgetown University Health Policy, 2012). Eligibility for

Medicaid for low-income parents apart from section 1931 mandates that parents' income be no

more than 35% of the FPL. The threshold for childless adults in Georgia is 0% FPL(KFF,

2019b). Children (ages 0-18) who are eligible for state Children's Health Insurance Program

(SCHIP) have family incomes below 200% FPL. State 1115 waivers allow for eligibility of specific populations (Schneider, Elias, and Garfield, 2013). Georgia's waiver allows Medicaid eligibility for women with a family income at or below 200% FPL who have delivered a very low weight baby (CMS, 2019). Medicaid eligibility through the aged, blind, disabled pathway in Georgia mandates an income of 74% or less than the FPL, an annual income limit of $9,000, and an asset limit of $2,000 (KFF, 2018). Right from the Start Medical Assistance Group (RSM) Medicaid covers pregnant women, children under 19 years old, and those with breast or cervical cancer (DFCS, n.d.). For pregnant women, RSM covers medical care including labor and delivery, from enrollment to 60 days postpartum (Georgia Medicaid, n.d.). Given the higher prevalence of disability and lower income within rural populations, higher proportions of blind/disabled and low-income beneficiaries are expected in rural areas (MACPAC, 2018). Because blind or disabled populations are characterized by having higher medical need and therefore likely more contact with practitioners, we expect this population will have more utilization of psychotherapy. Additionally, some women may qualify for blind/disabled enrollment based on a mental health issue considered to be disabling, indicating prior use of mental health services and established connections with mental health providers. (MACPAC, 2017)

Another possible confounder to address is *birth outcomes*. An adverse birth outcome is defined as certain infant characteristics deviating negatively from average birth characteristics that qualify for medical care or attention. Adverse outcomes often encompass pre-term birth, small for gestational age, and stillbirths (Kent et al., 2013). Several studies indicate that birth outcomes vary across the continuum of rurality. Urban areas and isolated rural areas experience higher rates of preterm and low weight births than those living in areas with intermediate

population density (Georgetown University Health Policy, 2012; Fortney, Harman, Xu, and Dong, 2010). Additionally, literature confirms the presence of perinatal psychological distress in mothers experiencing adverse birth outcomes, which may in turn lead to increased mental health service use (Singer et al., 1999).

### *Outcome Variable*

The primary outcome is *utilization of psychotherapy* prior to the perinatal period (*previous utilization of psychotherapy*) and is defined as the receipt of any psychotherapy. Those living in rural areas are less likely to receive adequate mental health treatment, especially in the form of psychotherapy. This model indicates that women who are already receiving mental health treatment prior to pregnancy are more likely to utilize psychotherapy during pregnancy because they are already familiar with a mental health provider and the treatment process (Fortney, Harman, Xu, and Dong, 2010).

### ***Hypotheses***

H1: After controlling for confounders, increasingly rural residence is negatively associated with utilization of psychotherapy. Psychotherapy is an evidence-based and often preferred form of treatment, among providers and mothers, for PMD (Fitelson et al., 2010; Stuart and Koleva, 2014). It is hypothesized that, within rural areas, there will be a decrease in adequate utilization of psychotherapy through reduced geographic access to providers and increased stigma.

H2: The hypothesized negative relationship between rurality of residence and utilization of psychotherapy is partially explained after including *Geographic Access to a Medicaid Accepting Providers* in this model.

The use of this mechanism in the model draws heavily from the economic theory of time-cost as it relates to the effective cost of healthcare for an individual. This economic theory presents itself in a specific domain of Penchansky and Thomas' concept of access, accessibility (Penchansky and Thomas, 1981). With increased distance from a provider, patients' travel costs and possible lost wages (opportunity costs) increase when seeking care from said provider.

## *Study Design*

This study is a retrospective cohort study analyzing secondary data extracted from a larger CHD data repository built in collaboration with Emory School of Public Health, Department of Epidemiology, and the CDC.  One aim of the larger parent project was to develop a population-based surveillance system comprised of Georgia individuals with CHD and to estimate the prevalence of CHD across the lifespan by race/ethnicity, gender, CHD severity, etc. This thesis contributes to the larger project by assessing the psychotherapy visit rate among this cohort as a function of rurality for those who had a delivery during the study period, 1999-2013, and who were also diagnosed with a PMD.

Medicaid data were obtained from the Centers for Medicare and Medicaid Services (CMS) via Research Data Assistance Center (ResDAC), a CMS contractor that assists academic, government, and non-profits and for-profit organizations acquire Medicaid and/or Medicare datasets. This analysis will utilize Medicaid claims data from the Medicaid Analytic Extract (MAX) files (1999-2013) (ResDAC, n.d.). Specifically, I will use the MAX personal summary, inpatient, and other therapy, and long term care files. These administrative claims records were gathered from the Georgia state Medicaid Management Information System (MMIS) by fiscal quarter and organized annually. These data provide individual-level fee-for-service and

capitation claims, and include patient diagnoses and procedure codes, provider and facility identification, demographic, and eligibility information (MACPAC, n.d; ResDAC, n.d.) In addition, the current study utilized data from the Area Health Resources File (AHRF) using the Federal Information Processing Standard (FIPS) county code in AHRF data (AHRF, n.d.). AHRF is available from 1997-2017 and serves as a resource for measures of county level economic characteristics, healthcare providers, and facility characteristics, including health provider shortage areas (HPSAs) in U.S. states (HRSA, 2019).

## *Data Management and IRB*

Approval for the parent investigation was granted from Emory University's Institutional Review Board (IRB#0000064051). Data security was maintained by storing, managing, and conducting analyses on a secure, private, Federal Information Security Management Act (FISMA)-compliant network storage drive at the Emory University, Rollins School of Public Health, IT Department server system, maintained only by authorized IT personnel and study researchers. Once the analytic dataset was created, all Protected Health Information (PHI) was excluded to maintain confidentiality and replaced with a unique identifier for each patient. Prior to analysis, all data were cleaned and de-duplicated.

## *Analytic Sample*

### *Population*

The population consists of female patients, age 15-55 with a known diagnosis of CHD who experienced pregnancy and had a PMD diagnosis. as captured in ICD-9-CM procedure or diagnosis codes. There are several measures that must be operationalized to derive this sample. The *diagnosis of PMD* is operationalized as a dichotomous indicator and was created using Clinical Classifications Software (CCS) codes 650-670. Those having any of these codes within

this range occurring within an individual's perinatal period will be considered as having a diagnosis of PMD (AHRQ, 2016). These CCS codes are groupings of ICD-9 –CM codes present in the claims data. Those ICD-9-CM codes indicating substance use or addiction were removed from this measure as treatment methods may significantly differ from other mental health treatment. The *perinatal period* was determined by first capturing the *date of delivery* as the month that the mother received an ICD-9-CM diagnosis or procedure code or a CPT code concordant with delivery (ICD9Data, n.d.; Hornbrook et al., 2007). A flag was created signaling delivery if any of the various aforementioned codes were present in the beneficiary's encounter claims. Then, the perinatal period was considered as 9 months prior to and 12 months after the date of delivery (WHO, 2013; ICD9Data, n.d.).

### ***Measurement of Constructs***

### ***Focal Relationship Variables***

*Rurality of Residence.* The construct of Rurality of Residence is assessed using the percent of population in a county living in a rural area from the AHRF. These codes are linked to Medicaid analytic extract (MAX) Personal Summary files via FIPS county codes provided for each beneficiary. The mathematical complement to this percentage was used to determine the continuous measure of percent rural population within a county. This continuous measure was further classified into quartiles to create a categorical measure. Rural populations are those living in areas with less than 2,500 residents that exist outside of urban areas and urban clusters with densely developed and settled territory (HRSA, 2018). An increasing percentage of those living in rural areas is negatively associated with utilization of psychotherapy.

*Adequate Utilization of Psychotherapy.* Adequate use of psychotherapy is assessed using Current Procedural Terminology (CPT) codes for individual, group, and family psychotherapy

(AACAP, n.d.). In accordance with previous literature, adequate psychotherapy is measured as attending four or more sessions of psychotherapy within 12 weeks of receiving a mental health issue diagnosis (Cummings et al., 2019; Teh et al., 2010; Stein, Sorbero, and Dalton, 2013). Thus, *Adequate Utilization of Psychotherapy* after a diagnosis of PMD can be operationalized as a dichotomous variable with those receiving four or more sessions denoted as having adequate use of psychotherapy and those with less than four as having inadequate use of psychotherapy. Those having zero sessions will be considered to have no psychotherapy. Those with one or more sessions will be considered to have had any psychotherapy. Due to the nature of the data, utilization of psychotherapy was dichotomized into no psychotherapy and any psychotherapy.

## Mechanisms

*Geographic Access to Medicaid Accepting Providers (MAP)* Geographic Access to Medicaid Accepting Providers (MAP) is assessed using the categorical variable of Mental Health Provider Shortage Area (MHPSA) for the year 2010 from the AHRF that is linked to existing data using FIPS codes. This variable specifies if a given county is a complete MHPSA, partial MHPSA, or in no part a MHPSA. This measure encompasses the mental health professionals of psychiatrists, clinical psychologists, clinical social workers, psychiatric nurse specialists, and marriage and family therapists (HHS, 2019).

*Geographic Access to MAP* is positively associated with adequate utilization of psychotherapy. Additionally, the mechanism of *stigma* will remain unmeasured.

## Contextual Enabling Characteristics

The continuous measure of *Socioeconomic Status (SES)* is assessed using the AHRF variable of county-level median household income (AHRF, n.d.). Increasing socioeconomic status in positively associated with adequate utilization of psychotherapy.

***Individual Predisposing Characteristics***

*Race/Ethnicity* is initially categorized into six racial/ethnic groups (Hispanic, Non-Hispanic (NH) white, NH black, NH Asian, NH more than one race, NH other) using categories reported in the MAX personal summary file. Beneficiaries with a designated ethnicity of Hispanic or Latino are considered Hispanic regardless of race recorded. All those who are designated as NH will be further categorized as the race recorded in the MAX file, with the category of 'Other' encompassing the races of Native Hawaiian/other Pacific Islander and American Indian/Alaskan Native. Being of a race/ethnicity other than NH white is negatively associated with the dependent variable. It should be noted that due to the nature of the data in this study, *race/ethnicity* is collapsed into three race categories for analytics: NH white, NH black, and NH Other.

*Maternal age* is operationalized into three categories with young maternal age encompassing those 15-19 years of age, mid-maternal age capturing those 20-35 years old, and older maternal age comprising those 36-55 years of age. The category of younger maternal age is in accordance with previous literature (Daniels, Martinez, and Nugent, 2018; . Schuyler Center, 2008). Date of delivery is operationalized as explained in previous sections. The difference between the beneficiary's date of birth and the date of delivery is used to determine the age of the women at time delivery. Younger maternal age is negatively associated with the dependent variable (DV).

*Household structure* is assessed using the county-level measure of percent of families with female heads of households (FHH) as found in the AHRF. This county level variable serves as a proxy for the individual level measure of household structure. It is hypothesized that as the

percentage of those living in FFH increases in a county, residents will have less adequate utilization of psychotherapy compared to counties with lower percentages of FFH.

The confounder of *number of children* will be assessed using the number of deliveries experienced by women in the sample population between 1999-2013.

### *Individual Need Characteristics*

The construct of beneficiaries' *Medicaid eligibility* category during the month of birth will serve as a proxy for need. The categories will be as follows; Low-income Adult, Section 1931 Adult, Blind or Disabled, Adult/child other. Blind or Disabled eligibility encompasses cash assistance and other blind disabled eligibility categories. Child eligibility encompasses SCHIP, child section 1931, and foster care eligibility categories, and is combined with adult eligibility encompasses breast and cervical cancer prevention act of 2000, adult-section 1115 demonstration expansion, and other adult eligibility categories. Being SSI eligible is hypothesized to be negatively associated with adequate use of psychotherapy as compared to all other categories.

*Birth outcome* is assessed using ICD-9-CM codes to create a dichotomous indicator for adverse birth outcomes or non-adverse birth outcomes. If a beneficiary's record shows any ICD-9-CM codes corresponding to a missed abortion or fetal death/stillbirth, the mother is designated as experiencing an adverse birth outcome (Zhang et al., 2013). Missed abortions were included as a measure of delivery for two reasons germane to both practice and policy. First, any stage of pregnancy, not just childbirth has been shown to have potentially adverse health outcomes in among women with CHD. (Hinze et al, 2012) Secondly, Medicaid coverage for women who are eligible for Medicaid based on pregnancy are covered for 60 days after childbirth or miscarriage. (Harker, 2020) Adverse birth outcomes are hypothesized to be positively associated with adequate utilization of psychotherapy. Pre-term birth and low-birth weight remain unmeasured as

coding for these outcomes is most often recorded on the fetal and not the maternal record. The confounders of *use of pharmacotherapy and previous utilization of psychotherapy* remain unmeasured.

## Analytic Strategy

### Statistical Analyses

In this study, logistic regression is employed to test the hypothesis that rurality of residence is negatively associated with any utilization of psychotherapy after controlling for confounders. This will be conducted at two time horizons, 12 and 8 weeks, to ensure validity of results. A multinomial logistic regression is used to test the hypothesis that rurality of residence is negatively associated with levels of utilization of psychotherapy among individuals who initiated psychotherapy, after controlling for confounders. The continuous independent variable will be split into quartiles and marginal effects (ME) will be calculated.

A second logistic regression model tests the hypothesis that the negative relationship between rurality and adequate utilization of psychotherapy is partially explained after including *Geographic Access to a Medicaid Accepting Providers*.

Time fixed effects are added to the models to account for time invariant factors that may influence our focal relationship (Hanck et al., 2019).
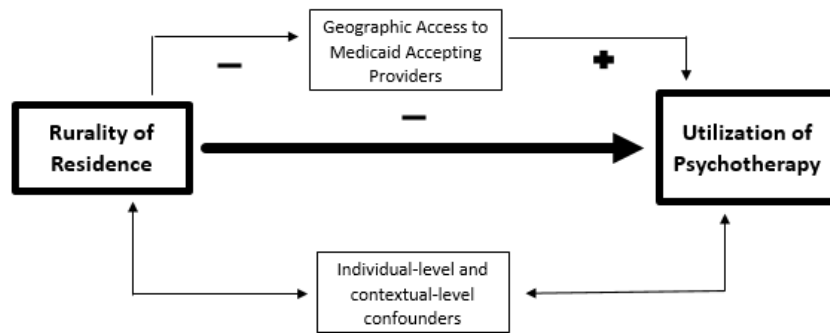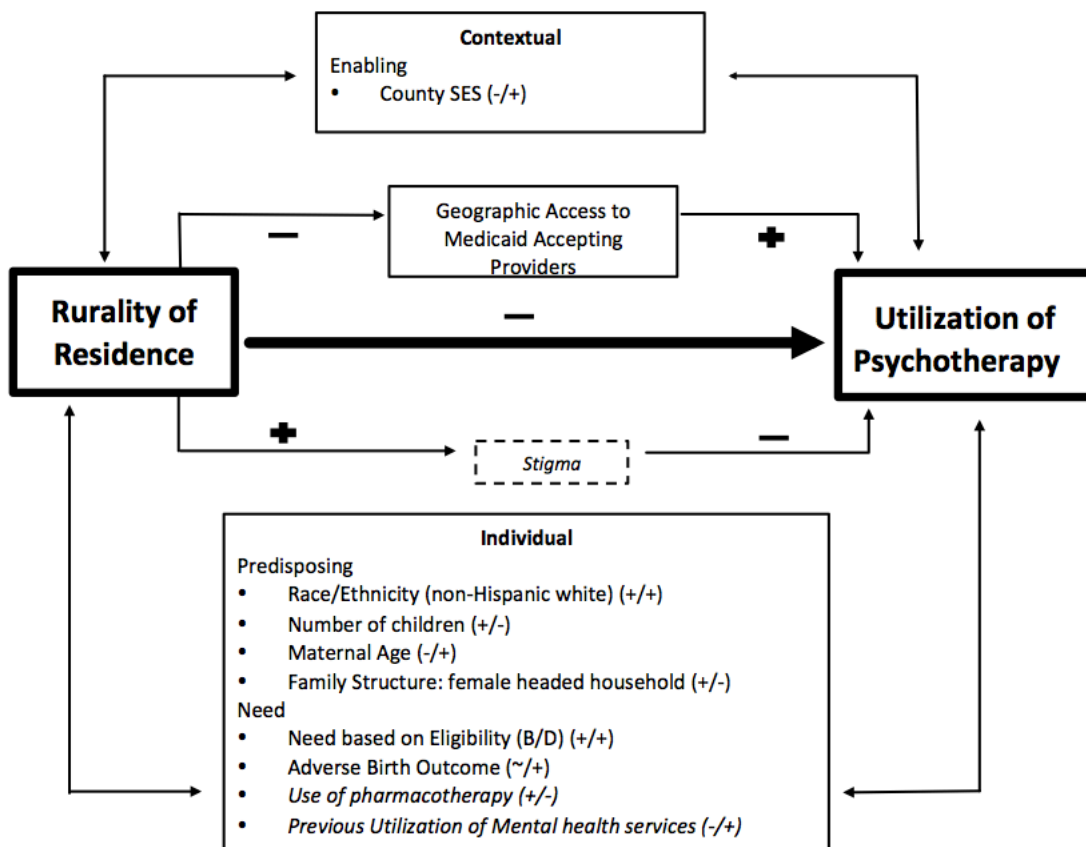
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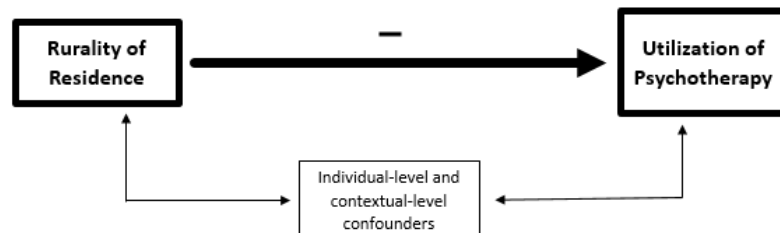
**HII:**



**Figure 1: Conceptual Model**

**Table 1: Measures in Conceptual Model**

| Construct | Operationalization | Direction of Association with Adequate use of Psychotherapy |
|---|---|---|
| *Rurality of Residence* | **County-level** percent of population living in rural area (quartiles) | Increasing rurality of Residence is negatively associated with adequate use of psychotherapy. |
| *Utilization of Psychotherapy* | Based of psychotherapy visits (CPT codes)<br><br>-None (0 session)<br>-Any (1≥ session) | N/A |
| *Geographic Access to Medicaid Accepting providers* | **County-level** Mental Health HPSA designation (2010)<br><br>0= none of the county is MHPSA<br>1=part of the county if an MHPSA<br>2=the entire county is a MHPSA | Decreasing Geographic Access is negatively associated with the dependent variable |
| *Stigma* | Unmeasured | (-) |
| *Race/ethnicity* | Women will be classified into 3 race/ethnicity categories:<br><br>-Non-Hispanic (NH) White<br>-Non-Hispanic (NH) Black<br>-Non-Hispanic (NH) Other | Not being of Non-Hispanic white race/ethnicity is negatively associated with the dependent variable. |
| *Maternal Age* | At time of birth<br>-Younger maternal age: <19<br>-Mid-maternal age those 19-35<br>-Older maternal age: 36-55 | Younger maternal age is negatively associated with the dependent variable |
| *Number of Children* | Number of deliveries experienced before current delivery between 1999-2013 (count, proxy)<br>-0<br>-1<br>-2<br>-3+ | (-) |
| *Family structure* | **County-level** % of Female Headed Households (continuous, proxy) (2010) | Increasing levels of female headed households is negatively associated with the dependent variable |

| | | |
|---|---|---|
| *SES (contextual-level)* | **County-level** Median Household Income in USD (continuous, proxy) (2010) | Increasing socioeconomic status in positively associated with adequate utilization of psychotherapy. |
| *Birth Outcomes* | Birth outcomes encompassing diagnosis of missed abortion, still birth, or live birth<br><br>-Adverse (missed abortion, still birth)<br>-Not Adverse (live birth) | Having an adverse birth outcome is positively associated with the dependent variable |
| *Eligibility Category* | Eligibility category at time of birth (proxy):<br>-Low-income adult<br>-Section 1931 adult<br>-Blind/disabled<br>-Adult/Child other | Those with the eligibility category of Blind/disabled are expected to have more adequate utilization of psychotherapy as compared to all other eligibility categories |
| *Previous utilization of Psychotherapy* | Unmeasured | (+) |

## Chapter 4: Results

**Overview of Results:** The following section reports the descriptive statistics and the logistic and multinomial regression results across 15 years from 1999 to 2013. There has been steady growth in the female Medicaid population with CHD in the state of Georgia in the years 1999 to 2013. Women with CHD who were diagnosed with PMD living in the most rural areas are significantly less likely to use psychotherapy, compared to their urban counterparts. This disparity in utilization persisted even after accounting for geographic access to Medicaid accepting providers.

## Descriptive Results

Initial descriptive statistics represent trends over time in the growth of the female Medicaid population with CHD, those experiencing a delivery, and those experiencing a delivery with a PMD diagnosis. These trends were determined in order gain a better understanding of the larger chronological context and illuminate possible driving factors for levels of delivery and PMD in this population. Further descriptive statistics report characteristics of the sample population across urban and rural counties. The characteristics include predisposing, enabling, and need factors including; race/ethnicity, birth outcome, maternal age, Medicaid eligibility categories, and number of children at the individual level and median household income, percent of female headed households, and MHPSA designation at the contextual level.
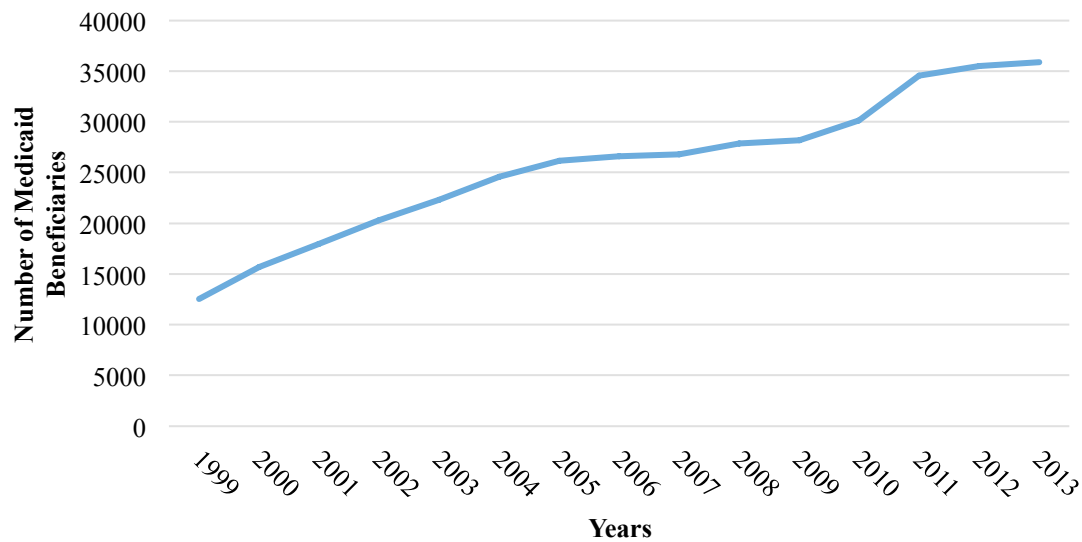
**Graph 1:** Female CHD Medicaid Beneficiaries in Georgia 1999-2013 Source: The Emory Adolescent and Adult Congenital Heart Defect (CHD) Program Data Repository, Medicaid Analytic Extract (MAX) files (1999-2013)

**Graph** 1 shows the increase in the number of female Medicaid beneficiaries with CHD in the state of Georgia from 1999-2013, with 12,510 beneficiaries in 1999 and 35,881 beneficiaries in 2013, an almost 35% increase.
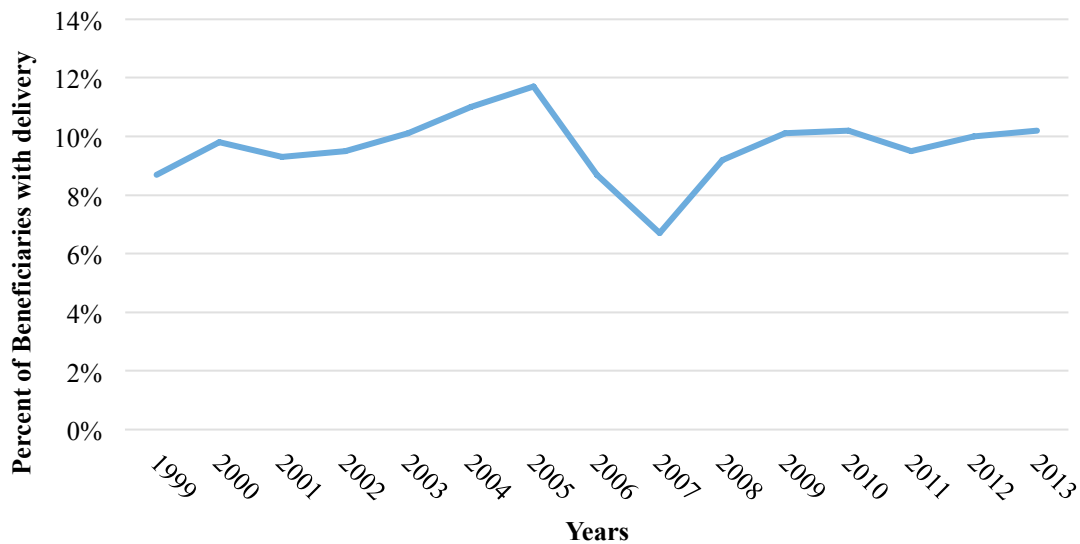


**Graph 2:** Percent of Female CHD Medicaid Beneficiaries of Childbearing Age who Experienced a Delivery 1999-2013 Source: The Emory Adolescent and Adult Congenital Heart Defect (CHD) Program Data Repository, Medicaid Analytic Extract (MAX) files (1999-2013)

Graph 2 shows the proportion of female patients with CHD of childbearing age (ages 15-55 years old) enrolled in Medicaid in the years 1999-2013 who experienced a delivery. In 1999, data revealed approximately 8.7% women with CHD had a delivery (371 women with deliveries out of 4,284 women with CHD of childbearing age), with the proportion trending upward and peaking in 2005 at 11.7% (739 women with CHD with a delivery out of 6,332 women with CHD of childbearing age).It is interesting to note that the birth rate among women in the U.S. in 2019 was estimated at 11.6% (Macrotrends, 2020). In Graph 2, in 2007, the lowest percentage of women with CHD who experienced a delivery occurred and dropped to 6.7% (392 women with CHD with a delivery out of 5,841 women with CHD of childbearing age). In 2013, the most recent year of data included in the current study, shows 10.2% of these women with CHD had a delivery (757 women with CHD with a delivery out of  7,456 women with CHD of childbearing age).
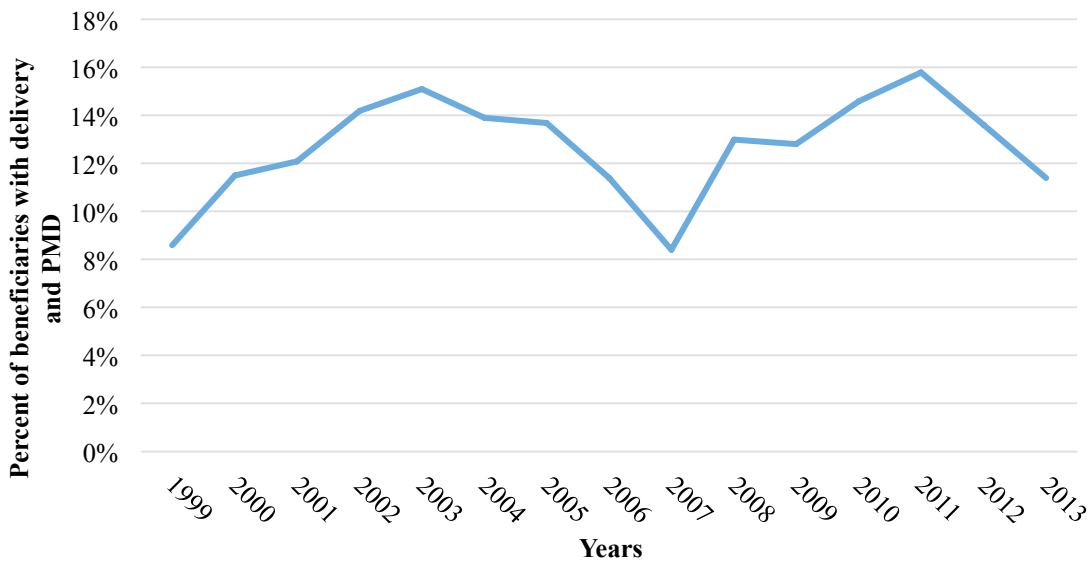


**Graph 3:** Percent of Female CHD Medicaid Beneficiaries Experiencing a Delivery Diagnosed with a PMD 1999-2013, Source: The Emory Adolescent and Adult Congenital Heart Defect (CHD) Program Data Repository, Medicaid Analytic Extract (MAX) files (1999-2013)

Graph 3 shows the proportion of women with CHD who also had a diagnosis of PMD and experienced a delivery. Over the 15 year study span, the distribution is bimodal and platykurtic meaning there are fewer positive and negative extremes in the distribution compared to a standard normal distribution.  The proportion of women with CHD with deliveries and a PMD diagnoses first peaked in 2002 at 14.2% (77 out of 543 women). From there, the lowest estimated proportion of beneficiaries with a delivery and CHD and PMD diagnoses occurred in 2007 at approximately 8.4% (33 women with CHD and deliveries out of 392 women with deliveries and CHD were also diagnosed with PMD). Following 2007 there was another upward trend peaking at 2011 at 15.8% (106 out of 673). Lastly, the proportion of women with deliveries and CHD and PMD diagnoses decreased through the years 2011-2013.

## Table 1: Patient Delivery Characteristics by Rurality Category[†] (1999-2013),

| N=1,131 Deliveries | Least rural 296 (26.2%) | Less Rural 279 (24.7%) | More Rural 275 (24.3%) | Most rural 281 (24.8%) | p-Value |
|---|---|---|---|---|---|
| **Rurality[δ] [mean%] (se)** | 1.7 (0.1) | 15.5 (0.3) | 42.6 (0.6) | 75.5 (0.8) | |
| **Race/Ethnicity (%)** | | | | | |
| Non-Hispanic White | 111 (37.5) | 161 (57.71) | 204 (74.2) | 213 (75.8) | 0.000 |
| Non-Hispanic Black | 165 (55.7) | 106 (38) | 56 (20.4) | 48 (17.1) | |
| Non-Hispanic Other | 20 (6.8) | 12 (4.3) | 15 (5.5) | 20 (7.1) | |
| **Maternal Age (%)** | | | | | |
| 15-18 | 16 (5.41) | 44 (15.8) | 40 (14.55) | 43 (15.3) | 0.000 |
| 19-35 | 255 (86.2) | 221 (79.2) | 227 (82.6) | 224 (79.7) | |
| 36-50 | 25 (8.5) | 14 (5) | 8 (2.9) | 14 (5) | |
| **Birth Outcome (%)** | | | | | |
| Adverse | 48 (16.2) | 44 (15.8) | 46 (16.7) | 41 (14.6) | 0.914 |
| Not Adverse | 248 (83.8) | 235 (84.2) | 229 (83.3) | 240 (85.4) | |
| **Eligibility Category (%)** | | | | | |
| Low-Income Adult | 149 (50.3) | 135 (48.4) | 145 (52.7) | 160 (56.9) | 0.446 |
| Sec 1931 Adult | 50 (16.9) | 55 (19.7) | 44 (16.0) | 35 (12.5) | |
| Blind/Disabled | 52 (17.6) | 43 (15.4) | 43 (15.6) | 43 (15.3) | |
| Adult/Child Other | 11 (3.7) | 19 (6.8) | 15 (5.5) | 19 (6.8) | |
| RSM | 34 (11.5) | 27 (9.7) | 28 (10.2) | 24 (8.5) | |
| **Number of Children** | | | | | |
| 0 | 216 (73) | 177 (63.4) | 195 (70.9) | 188 (66.9) | 0.042 |
| 1 | 49 (16.6) | 52 (18.6) | 53 (19.3) | 64 (22.8) | |
| 2 | 15 (5.1) | 30 (10.8) | 18 (6.4) | 18 (6.4) | |
| 3+ | 16 (5.4) | 20 (7.2) | 9 (3.3) | 11 (3.9) | |
| **Median Household income [mean] (sd)** | $53148 (8,006.9) | $48,486 (13,130.1) | $42,205 (7,743) | $40,540 (8,821) | 0.000[±] |
| **Percent of Female Headed Households [mean](sd)** | 27.2% (5.7) | 24.8% (8.3) | 22.1% (4.5) | 20.5% (5.8) | 0.000[±] |
| **MHPSA (%)** | | | | | |
| No MHPSA in County | 73 (24.7) | 80 (28.7) | 53 (19.3) | 64 (22.8) | 0.000 |
| Partial MHPSA County | 162 (54.7) | 61 (61.9) | 2 (0.7) | 11 (3.9) | |
| Complete MHPSA County | 61 (20.6) | 138 (49.5) | 220 (80) | 206 (73.3) | |
| **Number of Psychotherapy Visits (within 12 weeks)** | | | | | |
| 0 | 247 (83.5) | 227 (81.4) | 233 (84.7) | 254 (85.0) | 0.040 |
| 1 | 26 (8.8) | 20 (7.2) | 16 (5.8) | 13 (6.6) | |
| 2+ | 23 (7.8) | 32 (11.5) | 26 (9.5) | 14 (5.0) | |
| **Number of Psychotherapy Visits (within 8 weeks)** | | | | | |
| 0 | 250 (84.5) | 230 (82.4) | 236 (85.8) | 256 (91.1) | 0.068 |
| 1 | 26 (8.8) | 21 (7.5) | 20 (7.3) | 13 (4.6) | |
| 2+ | 20 (6.8) | 28 (10.0) | 19 (6.9) | 12 (4.3) | |

**Source**: The Emory Adolescent and Adult Congenital Heart Defect (CHD) Program Data Repository, Medicaid Analytic Extract (MAX) files (1999-2013). Source: Health Resources and Services Administration, Area Health Resource File 2010.

Data in Table 1 displays the descriptive statistics for deliveries of Medicaid beneficiaries with CHD who received a diagnosis of PMD in the years 1999-2013. Among these women with CHD who had deliveries, 24.8% of deliveries occurred for women residing in the most rural counties, with the remaining 24.3%, 24.7%, and 26.2% of deliveries occurring for women living in More Rural, Less Rural, and least rural counties, respectively. There were 281 deliveries to women with CHD living in counties characterized as most rural with a mean percentage of population living in a rural area of 75.5%. There were 296 deliveries to women with CHD living in least rural counties, which had a mean percent rural population of only 1.7%. Deliveries in rural categories differed significantly across race/ethnicity, maternal age, MHPSA status, SES, and family structure, and number of children.

Data revealed mean SES decreased with increasing rurality as did family structure (% female headed households). Within least rural counties, 5.4% of deliveries occurred for women with CHD who were less than 19 years of age, while 15.3% of deliveries occurred for women with CHD of this same age who resided in the most rural counties.

In addition, while only 37.5% of deliveries were to NH white women from least rural counties, more than double that, 75.8% were to their racial/ethnic counterparts residing in the most rural counties.

While approximately 20.6% of deliveries were to women who lived in the least rural counties were characterized as being within a complete MHPSA, almost three times that, 73.3%,

occurred to women who lived in the most rural counties were characterized as being within a complete MHPSA.

Furthermore, 73% of deliveries occurred for women with CHD living in the least rural counties who had no children, and 67% of deliveries occurred for their counterparts living in most rural counties who had no other children.

Number of psychotherapy visits received within 12 weeks of having a PMD diagnosis also differed significantly across rural categories. Data revealed that women with deliveries who also were diagnosed with CHD and PMD, and who lived in least rural counties received one (8/8%) or two or more psychotherapy visits (7.8%) compared to their counterparts who lived in the most rural counties (6.6%, 5.0%, respectively). Interestingly, the majority of women received no psychotherapy visits regardless of rurality.

The distribution of birth outcome, eligibility category, and number of psychotherapy visits within 8 weeks did not differ significantly across rural categories. Non-adverse outcomes are more common than adverse birth outcomes, Low-income adult eligibility is the most prominent form of Medicaid eligibility, and most women had no psychotherapy visits within 8 weeks across all categories of rurality.

## *Logistic Regression Results*

The tables below show the results of four logistic regressions for which I reported marginal effects. Two time horizons were assessed, twelve weeks and eight weeks. Twelve weeks is the primary horizon of interest given its use previous literature concerning adequate utilization psychotherapy among Medicaid populations. The focal independent and dependent variable in the regressions are the categorical variable of rurality and the dichotomous measure of no and any psychotherapy utilization respectively. Finally, the mechanism tested in these regressions in geographic access to MAP, assessed using the categorical MHPSA variable. The covariates of race/ethnicity, maternal age, birth outcome, eligibility, number of children, median household income, and percent of female headed households as well as year fixes effects are included in these models.

**Table 2: Marginal Effects for Utilization of Psychotherapy within Twelve weeks of PMD Diagnosis**

| | Marginal Effects | P-Value |
|---|---|---|
| **Rurality** | | |
| Least rural | Ref. | |
| Less Rural | 0.011 | 0.728 |
| More Rural | -0.042 | 0.314 |
| Most rural | -0.114 | 0.019 |
| **Race/Ethnicity** | | |
| Non-Hispanic White | Ref. | |
| Non-Hispanic Black | 0.003 | 0.899 |
| Non-Hispanic Other | 0.041 | 0.378 |
| **Year of Delivery** | | |
| 1999 | Ref. | |
| 2000 | 0.028 | 0.677 |
| 2001 | 0.043 | 0.532 |
| 2002 | 0.014 | 0.825 |
| 2003 | 0.026 | 0.681 |
| 2004 | -0.010 | 0.873 |
| 2005 | -0.014 | 0.821 |
| 2006 | -0.002 | 0.974 |
| 2007 | 0.105 | 0.209 |
| 2008 | 0.083 | 0.241 |
| 2009 | 0.105 | 0.146 |
| 2010 | 0.136 | 0.058 |
| 2011 | 0.089 | 0.184 |
| 2012 | 0.092 | 0.171 |
| 2013 | 0.102 | 0.145 |
| **Maternal Age** | | |
| 15-18 | -0.016 | 0.661 |
| 19-35 | Ref. | |
| 36--55 | 0.040 | 0.358 |
| **Birth Outcome** | | |
| Non-Adverse | Ref. | |
| Adverse | -0.021 | 0.443 |
| **Eligibility** | | |
| Low-Income Adult | Ref. | |
| Section 1931 Adult | -0.017 | 0.588 |
| Blind/Disabled | 0.060 | 0.047 |
| Adult/Child Other | 0.023 | 0.660 |
| RSM | -0.001 | 0.992 |
| **Number of Children** | | |
| 0 | Ref. | |
| 1 | 0.021 | 0.456 |
| 2 | 0.010 | 0.821 |
| 3+ | 0.072 | 0.220 |
| **Median Household Income** | 0.000 | 0.311 |
| **Percent of Female Headed Households** | -0.003 | 0.302 |

Table 2 presents the marginal effects calculated from a logistic regression examining the probability of receiving any psychotherapy within 12 weeks of PMD diagnosis.

Those living in the most rural areas were significantly less likely to receive any psychotherapy compared to those living in least rural areas. Specifically, those living in the most rural areas were 11.4 percentage points (pp) less likely to receive any psychotherapy (p=0.019). Those living in Less Rural and More Rural areas are not significantly more or less likely to receive any psychotherapy compared to those living in the least rural areas.

Those covered by Medicaid under the Blind/Disabled eligibility are significantly more likely to receive psychotherapy than those who are eligible as Low-Income Adults. Specifically, those with Blind/Disabled eligibility are 6 pp more likely to receive any psychotherapy (p=0.047). Those eligible for Medicaid via alternative pathways were not significantly more or less likely to receive any psychotherapy compared to those with Low-Income Adult eligibility.

Race/ethnicity, maternal age, birth outcome, number of children, median household income, percent of female headed households, and year of delivery were not significant predictors of utilization of any psychotherapy within 12 weeks of PMD diagnosis.

**Table 3: Marginal Effects for Utilization of Psychotherapy within Twelve weeks of PMD Diagnosis with inclusion of Mechanism of Geographic Access to Medicaid Accepting Providers**

|  | Marginal Effects | P-Value |
|---|---|---|
| **Rurality** | | |
| Least rural | Ref. | |
| Less Rural | 0.014 | 0.673 |
| More Rural | -0.037 | 0.422 |
| Most rural | -0.109 | 0.040 |
| **Race/Ethnicity** | | |
| Non-Hispanic White | Ref. | |
| Non-Hispanic Black | 0.003 | 0.911 |
| Non-Hispanic Other | 0.040 | 0.395 |
| **Year of Delivery** | | |
| 1999 | Ref. | |
| 2000 | 0.027 | 0.682 |
| 2001 | 0.044 | 0.526 |
| 2002 | 0.014 | 0.826 |
| 2003 | 0.027 | 0.676 |
| 2004 | -0.009 | 0.881 |
| 2005 | -0.013 | 0.827 |
| 2006 | -0.002 | 0.978 |
| 2007 | 0.105 | 0.207 |
| 2008 | 0.083 | 0.239 |
| 2009 | 0.105 | 0.144 |
| 2010 | 0.136 | 0.058 |
| 2011 | 0.090 | 0.181 |
| 2012 | 0.092 | 0.168 |
| 2013 | 0.103 | 0.142 |
| **Maternal Age** | | |
| 15-19 | -0.016 | 0.655 |
| 19-35 | Ref. | |
| 36--55 | 0.039 | 0.358 |
| **Birth Outcome** | | |
| Non-Adverse | Ref. | |
| Adverse | -0.020 | 0.448 |
| **Eligibility** | | |
| Low-Income Adult | Ref. | |
| Section 1931 Adult | -0.018 | 0.580 |
| Blind/Disabled | 0.060 | 0.046 |
| Adult/Child Other | 0.023 | 0.661 |
| RSM | 0.000 | 0.993 |
| **Number of Children** | | |
| 0 | Ref. | |
| 1 | 0.021 | 0.460 |
| 2 | 0.010 | 0.812 |
| 3+ | 0.071 | 0.221 |
| **Median Household Income** | 0.000 | 0.393 |

| | | |
|---|---|---|
| **Percent of Female Headed Households** | -0.003 | 0.322 |
| **Mental Health Provider Shortage Area** | 0.005 | 0.762 |

*p<0.05, **p<0.005

**Source**: The Emory Adolescent and Adult Congenital Heart Defect (CHD) Program Data Repository, Medicaid Analytic Extract (MAX) files (1999-2013). Source: Health Resources and Services Administration, Area Health Resource File 2010.

In Table 3, with the addition of MHPSA (mechanism) measure to the model, those living in the most rural areas remained significantly less likely to receive any psychotherapy compared to their least rural counterparts. Specifically, those living in the most rural areas were 10.9 pp less likely to receive any psychotherapy within 12 weeks of diagnosis compared to those living in the least rural areas (p=0.040).

Those who are covered by Medicaid under the Blind/Disabled eligibility remained significantly more likely to receive psychotherapy than those who are eligible as Low-Income Adults. Specifically, those with Blind/Disabled eligibility are 6 pp more likely to receive any psychotherapy (p=0.046). Those eligible for Medicaid via alternative pathways were not significantly more or less likely to receive any psychotherapy as compared to those with Low-Income Adult eligibility.

Race/ethnicity, maternal age, birth outcome, number of children, median household income, year of delivery, and percent of female headed households were not significant predictors of utilization of any psychotherapy within 12 weeks.

**Table 4: Marginal Effects for Utilization of Psychotherapy within Eight weeks of PMD Diagnosis**

| | Marginal Effects | P-Value |
|---|---|---|
| **Rurality** | | |
| Least rural | Ref. | |
| Less Rural | 0.013 | 0.668 |
| More Rural | -0.033 | 0.423 |
| Most rural | -0.099* | 0.037 |
| **Race/Ethnicity** | | |
| Non-Hispanic White | Ref. | |
| Non-Hispanic Black | 0.013 | 0.607 |
| Non-Hispanic Other | 0.023 | 0.622 |
| **Year of Delivery** | | |
| 1999 | Ref. | |
| 2000 | 0.057 | 0.339 |
| 2001 | 0.071 | 0.245 |
| 2002 | 0.042 | 0.433 |
| 2003 | 0.062 | 0.240 |
| 2004 | 0.004 | 0.923 |
| 2005 | 0.011 | 0.820 |
| 2006 | 0.033 | 0.531 |
| 2007 | 0.111 | 0.114 |
| 2008 | 0.092 | 0.116 |
| 2009 | 0.127 | 0.036 |
| 2010 | 0.151 | 0.012 |
| 2011 | 0.133 | 0.018 |
| 2012 | 0.123 | 0.026 |
| 2013 | 0.142 | 0.017 |
| **Maternal Age** | | |
| 15-19 years | -0.020 | 0.584 |
| 19-35 years | Ref. | |
| 36--55 years | 0.000 | 0.999 |
| **Birth Outcome** | | |
| Non-Adverse | Ref. | |
| Adverse | -0.020 | 0.443 |
| **Eligibility** | | |
| Low-Income Adult | Ref. | |
| Section 1931 Adult | -0.009 | 0.760 |
| Blind/Disabled | 0.060* | 0.042 |
| Child Other | 0.021 | 0.688 |
| RSM | 0.016 | 0.757 |
| **Number of Children** | | |
| 0 | Ref. | |
| 1 | 0.030 | 0.289 |
| 2 | 0.019 | 0.657 |
| 3+ | 0.086 | 0.144 |
| **Median Household Income** | 0.000 | 0.518 |
| **Percent of Female Headed Households** | -0.003 | 0.336 |
| **Rurality** | | |

Table 4 presents the marginal effects calculated from a logistic regression examining the probability of receiving any psychotherapy within eight weeks of PMD diagnosis.

Those living in the most rural areas were significantly less likely to receive any psychotherapy compared to those living in least rural areas. Specifically, those living in the most rural areas were 9.9 pp less likely to receive any psychotherapy. Those living in Less Rural and More Rural areas are not significantly more or less likely to receive any psychotherapy as compared to those living in the least rural areas.

Those with a delivery in the years 2009-2013 were significantly more likely to receive any psychotherapy (p=.036; p=.012; p=.018; p=.026; p=.017, respectively) compared to those with a delivery in 1999, with those having a delivery in 2013 being 14.2% points more likely to receive any psychotherapy than those in 1999.

Those who are covered by Medicaid under the Blind/Disabled eligibility are significantly more likely to receive psychotherapy than those who are eligible as Low-Income Adults (p=0.042). Specifically, those with Blind/Disabled eligibility are 6 pp more likely to receive any psychotherapy. Those eligible for Medicaid via alternative pathways were not significantly more or less likely to receive any psychotherapy as compared to those with low-income adult eligibility. Race/ethnicity, maternal age, birth outcome, number of children, median household income, and percent of female headed households were not significant predictors of utilization of any psychotherapy.

**Table 5: Marginal Effects for Utilization of Psychotherapy within Eight weeks of PMD Diagnosis with the inclusion of the Mechanism of Geographic Access to Medicaid Accepting Providers**

| | Marginal Effects | P-Value |
|---|---|---|
| **Rurality** | | |
| Least rural | Ref. | |
| Less Rural | 0.014 | 0.677 |
| More Rural | -0.032 | 0.476 |
| Most rural | -0.098 | 0.058 |
| **Race/Ethnicity** | | |
| Non-Hispanic White | Ref. | |
| Non-Hispanic Black | 0.013 | 0.609 |
| Non-Hispanic Other | 0.023 | 0.627 |
| **Year of Delivery** | | |
| 1999 | Ref. | |
| 2000 | 0.057 | 0.339 |
| 2001 | 0.071 | 0.246 |
| 2002 | 0.042 | 0.432 |
| 2003 | 0.062 | 0.241 |
| 2004 | 0.005 | 0.922 |
| 2005 | 0.011 | 0.819 |
| 2006 | 0.034 | 0.531 |
| 2007 | 0.111 | 0.114 |
| 2008 | 0.092 | 0.116 |
| 2009 | 0.127 | 0.036 |
| 2010 | 0.151 | 0.012 |
| 2011 | 0.133 | 0.018 |
| 2012 | 0.123 | 0.027 |
| 2013 | 0.142 | 0.018 |
| **Maternal Age** | | |
| 15-19 years | -0.020 | 0.583 |
| 19-35 years | Ref. | |
| 36--55 years | 0.000 | 0.999 |
| **Birth Outcome** | | |
| Non-Adverse | Ref. | |
| Adverse | -0.020 | 0.443 |
| **Eligibility** | | |
| Low-Income Adult | Ref. | |
| Section 1931 Adult | -0.009 | 0.759 |
| Blind/Disabled | 0.060* | 0.042 |
| Adult/Child Other | 0.021 | 0.688 |
| RSM | 0.016 | 0.757 |
| **Number of Children** | | |
| 0 | Ref. | |
| 1 | 0.030 | 0.290 |
| 2 | 0.019 | 0.656 |
| 3+ | 0.085 | 0.144 |
| **Median Household Income** | 0.000 | 0.558 |
| **Percent of Female Headed Households** | -0.003 | 0.342 |
| **Mental health Provider shortage areas** | 0.001 | 0.969 |

In Table 5, with the addition of MHPSA (mechanism) to the model, those living in the most rural areas are no longer significantly more likely to receive any psychotherapy compared to their least rural counterparts, showing that the mechanism partially explains the hypothesized negative focal relationship between Rurality and Utilization of Psychotherapy. Those with deliveries in years 2009-2013 remained significantly more likely to receive any psychotherapy (p=.036; p=.012; p=.018; p=.027; p=.018, respectively) compared to those with deliveries in 1999.

Those who are covered by Medicaid under the Blind/Disabled eligibility remained significantly more likely to receive psychotherapy than those who are eligible as Low-Income Adults. Specifically, those with blind/disabled eligibility are 6 pp more likely to receive any psychotherapy. Those eligible for Medicaid via alternative pathways were not significantly more or less likely to receive any psychotherapy compared to those with Low-Income Adult eligibility. Race/ethnicity, maternal age, birth outcome, number of children, median household income, and percent of female headed households were not significant predictors of utilization of any psychotherapy within eight weeks.

## *Multinomial Logistic Regression Results*

This section represents the results of a multinomial logistic regression analysis with marginal effects. In this regression, the independent variable is the categorical variable of rurality and the dependent variable is categorical measure of zero, one, and two or more psychotherapy visits. This analysis did not include covariates.

**Table 6: Marginal Effects for Utilization of None, One, Two or More Psychotherapy visits within Twelve weeks of PMD Diagnosis**

|  | Marginal Effect | P-Value |
|---|---|---|
| **Least rural** | Ref. | |
| **Less Rural** | | |
| 0 psychotherapy visits | -0.001 | 0.979 |
| 1 psychotherapy visits | -0.022 | 0.293 |
| 2+ psychotherapy visits | 0.023 | 0.362 |
| **More Rural** | | |
| 0 psychotherapy visits | 0.050 | 0.231 |
| 1 psychotherapy visits | -0.046 | 0.12 |
| 2+ psychotherapy visits | -0.004 | 0.906 |
| **Most rural** | | |
| 0 psychotherapy visits | 0.128** | 0.009 |
| 1 psychotherapy visits | -0.069* | 0.041 |
| 2+ psychotherapy visits | -0.060 | 0.121 |

*p<0.05, **p<0.005
**Source**: The Emory Adolescent and Adult Congenital Heart Defect (CHD) Program Data Repository, Medicaid Analytic Extract (MAX) files (1999-2013). Source: Health Resources and Services Administration, Area Health Resource File 2010.

Table 6 presents the marginal effects calculated from a multinomial logistic regression examining the probability of receiving zero, one, or two or more psychotherapy visits within twelve weeks of PMD diagnosis. This analysis was done to assess with greater detail the trends in service utilization across the rural categories, as levels of adequate treatment were negligible in this population.

Data reveal that the probability of having no psychotherapy visit within 12 weeks is on average 12.8 pp (p=0.009) higher for those living in the most rural areas compared to those living in the least rural areas. Furthermore, the probability of having one psychotherapy visit within 12 weeks is on average 6.9 pp (p=0.041) lower for those living in the most rural areas compared to those living in the least rural areas.

## Chapter 5: Discussion

### Key Findings

This study examined the effect of rurality of residence on the utilization of psychotherapy for PMD in a cohort of Medicaid-insured women diagnosed with CHD over a 15-year span from 1999 through 2013. This study used a logistic regression to compare the likelihood of utilizing any psychotherapy after PMD diagnosis across categories of rurality. At 12 weeks, pregnant women with CHD living in the most rural areas were significantly less likely to receive psychotherapy than those living in the least rural areas. These results support the primary hypotheses, H1, that after controlling for confounders, increasingly rural residence, is negatively associated with utilization of psychotherapy. Interestingly, after accounting for geographic access, this disparity in psychotherapy use persisted, suggesting that geographic access to Medicaid accepting providers is not the predominant driver of this disparity, as was hypothesized in H2.

These findings are consistent with current literature suggesting that those living in rural areas are less likely to receive mental health treatment, adequate mental health treatment, or psychotherapy as a form of mental health treatment (Hauenstein et al., 2006; Fortney, Harman, Xu, and Dong, 2010; Hauenstein et al., 2007). While residents' geographic access to mental health services providers has determined a population's use of psychotherapy in other studies, this study found that differences in geographic access to Medicaid accepting providers did not explain differences in use of psychotherapy (Fortney, Harman, Xu, and Dong, 2010).

### Importance of findings

The growth of the female Georgia Medicaid population with CHD between 1999 and 2013 is largely what would be expected given the estimated national growth of the population

with CHD over time (Bjornard et al., 2013). The overall level of pregnancy and delivery experienced in this population is surprisingly high given that pregnancy and delivery can impose serious risk to these women (Hinze et al., 2012). However, this may reflect women's access to Medicaid due to pregnancy, essentially leading to the underestimation of the denominator. Moreover, the rising delivery rate in this population trends opposite of the birth rate in the state of Georgia from 2006 to 2016. Data show that the peak birth rate in Georgia occurred in 2007 and has steadily declined since (PERISTATS, 2020). These discordant trends could highlight the higher rate of unintended pregnancy in women with incomes lower than the federal poverty level (FPL), as they are five times as high as those with incomes over 200% FPL (Guttmacher Institute, 2014). These trends could be further compounded by a lack of reproductive counseling for women with CHD in Georgia during this time period and informs the need for intentional service offering to this population in the perinatal period. PMD diagnosis in this population is expected to decrease far below the current estimates of 14 to 20%, given only a recently growing understanding of PMD and PMD diagnosis (Kendig et al., 2017; (Mathematica, 2019). Thus, the fact that up to 15.8% of Medicaid beneficiaries with CHD were diagnosed with PMD is quite surprising and may speak to the high burden of mental health issues in this population as alluded to in literature. This study addresses the gap in the literature concerning mental health burdens within the maternal CHD population (Bromberg et al., 2003; .Kourkoveli, 2015; Andonian et al., 2018).

The most significant finding of this study was that those living in the most rural counties were significantly less likely to receive any psychotherapy as compared to those living in the least rural areas, even after including the mechanism of geographic access to Medicaid accepting providers. This reveals other possible mechanisms for services use disparities. First, cultural

stigma regarding mental health and mental health treatment may explain why women in rural areas are not receiving any treatment for psychotherapy, as stigma is a commonly cited source of lack of service utilization in rural areas (Rost, Smith, and Taylor, 1993). Second, women in rural areas may be more readily prescribed pharmacotherapy to treat their mental health issue, as has been reported in previous literature (Fortney, Harman, Xu, and Dong, 2010). Pharmacotherapy is serving as a substitute service for psychotherapy in the rural healthcare market. This idea suggests that provider quality, rather than geographic quantity is a barrier to mental health treatment in this population. Mental health professionals in rural areas may not be trained to diagnose and treat PMD, essentially not fulfilling the role of a mental health provider for this study population living in these providers' service areas.

There may be a greater likelihood of receiving psychotherapy for those who are Blind/Disabled Medicaid eligible as a function of increased interaction with the medical system given this diagnosis of a disability. Moreover, as mental illness is a qualifying disability for Blind/Disabled Medicaid eligibility, this population may represent those with previous intensive use of mental health services (Taube, Goldman, Salkeyer, 1990). Moving forward, it will be important to understand the differences in services and care management provided for those with Blind/Disabled eligibility and other eligibility tracks that could inform advocacy efforts and policies that change mental health services provided to Medicaid beneficiaries with different eligibilities.

The lack of significance in some measures present in the model also provide important insights, specifically race/ethnicity, a characteristic across which disparities in mental health treatment have been commonly found (McGuire and Miranda, 2008). This finding supports increased focus of efforts on geographic access to providers, as this seems to surpass other

predictors of disparity in service use in the state of Georgia (Kozhimannil et al., 2011; Zhang, Cain, and Liao, 2019; (McGuire and Miranda, 2008).

Finally, the inability of geographic access to explain disparities at 8 weeks but not at 12 weeks may represent the role geographic access plays in patients delaying care. Rurality has been cited in previous literature as a factor in delayed treatment for health conditions in different populations (Nielsen, D'Agostino, and Gregory, 2017; Lee, Hasnain-Wynia, and Lau, 2012; (Lopes et al., 2017). Essentially, lack of geographic access may significantly contribute to the delaying of treatment, but not to the likelihood of ever receiving psychotherapy. However, given that this sample size is small, further studies need to be done to comprehensively assess this relationship.

**<u>Implications for Policy and Practice</u>**

This study provides foundational information to ultimately act a first step in informing mental health coverage, screening, and treatment practices among chronically ill, low-income, and rural perinatal women with CHD. This contribution is especially cogent within the insurance coverage context of Georgia, where Medicaid has not yet expanded, and many low-income women are left with sporadic or short-term coverage. This maternal and child health consequences of untreated PMD and Georgia's abysmal 2014 maternal mortality report that attributed a conservative 6% of maternal deaths in Georgia to mental health issues, has incited legislative movement for maternal and mental health policy. This research may fuel policy and programs aimed at improving the health outcomes for Georgian women in the perinatal period (Paschetta et al., 2014; House Budget and Research, 2019). Specifically, finding that 85% of women received no psychotherapy after PMD diagnosis may reveal the lack of consistent insurance coverage post-diagnosis, and therefore, serves as support for bills such as HB 693

*Expanding Medicaid to Improve Health Outcomes for the state of Georgia*, that will enable

women's coverage to be extended from a period of 60 days postpartum to a year postpartum.

This research also contributes to Georgia's initiative to investigate mental health, as shown in

HB 514 *Georgia Mental Health Reform and Innovation Commission*, illuminating the overall

lack of treatment in a medically needy population, the possible treatment barriers experienced by

this population such as stigma, and the possible treatment preferences represented. Again, further

investigating the services offered to those with Blind/Disabled eligibility may also inform

innovations in other types of Medicaid coverage. Though the study population is relatively small,

chronic conditions in general are quite pervasive in rural Georgia, thus, these findings may be

widely applicable (Nelson, 2016).

The lack of treatment and disparities in treatment in this study further inform the context

of maternal mortality in Georgia HR 447 *General Assembly to fund a study of the causes of*

*infant and maternal mortality in this state*. Although only 6% of deaths were attributable to

mental health conditions in the report, this study may aid in further investigating the connection

between a mental health diagnosis, treatment, and the supposed outcomes, which for PMD can

be quite serious. Additionally, the lack of significant racial disparity in this study contradict those

found in the 2014 maternal mortality report, supporting increased focus on rurality alone as a

predictor of poor health outcomes, especially among women with chronic conditions (House

Budget and Research, 2019).

This research may also support the movement for better quality of mental health care in

rural or provider shortage areas. In Georgia and the broader U.S., quality improvement measures

have taken the form of training providers in mental health diagnosis and treatment and the

implementation of a telemedicine network (DCH, n.d.). In the future, quality improvement

measures are planned to implemented through telepsychiatry, wherein trained providers lend consultation to providers virtually, essentially increasing acceptable capacity in underserved areas. Furthermore, this study informs the importance of appropriate and quality maternal mental health services not only in the CHD population, but also in more general chronically ill populations experiencing pregnancy. This organization may build off of current mental health care bundles for women in the perinatal period (Kendig et al., 2017). This study also adds urgency to initiatives within Georgia to ensure continuity of care for CHD patients transitioning form adolescence into adulthood, ensuring that Medicaid beneficiaries with CHD in the perinatal period are in consistent contact with potential screenings and treatment (Everitt et al., 2017). Due to this study's focus on PMD, these findings will also support the expansion of new measures of screening and mental healthcare during the perinatal period that are being testing in 2020 through the Healthcare Effectiveness Data and Information Set (HEDIS®). These innovative measures will enable the consistent assessment of clinical care surrounding maternal mental health, propelling evidence-based policies forward (MMHLA, n.d.).

**Recommendations for Future Research**

This research reveals multiple pathways for future research. Firstly, increasing the population to encompass several states of Medicaid beneficiaries with CHD may provide more accurate and nuanced findings on mental health in the perinatal period. This may also allow for more variation in the population's race/ethnicity makeup, elucidating disparities often found in the literature.

Secondly, future studies should examine multiple treatment modalities including pharmacotherapy and psychiatric hospitalizations. Including these measures may more fully encapsulate this population's interaction with the mental health care system, outside of solely

psychotherapy utilization. It will be important to include data on the use of prescription drugs in future studies, as it will be useful in assessing if prescription drugs truly act as a substitute good for psychotherapy for PMD among Medicaid beneficiaries diagnosed with CHD. Although this data was not available in the current study, it can be found in the CMS MAX Prescription Drug file. Research, especially in the state of Georgia, should also include the measure of tele-psychiatric capabilities as a part of the concept of access.  Importantly, in the light of the current COVID-19 pandemic, the Georgia Department of Community Health Services has waived certain limitations of telehealth for Medicaid populations in Georgia. (DCH, 2020) Future studies should look at the overall use of telepsychiatry for PMD and the changes in rural and urban mental health service utilization disparities within the presumably more robust telehealth system post-pandemic.

Moving forward it will also be important to include qualitative analysis of this issue. This type of analysis may elucidate specific types of stigma experienced by CHD patients living in rural areas, allowing more nuanced understanding of how to structure services for this population during not only the perinatal period, but throughout life. This qualitative research should be extended to understand the possible disparities in pre-conception counseling across urban and rural populations with CHD.

Finally, though this study was unable to measure severity of CHD, it may be important to look at the correlations between CHD severity and mental health diagnosis severity. Emerging findings would lend support for more targeted treatment plans for this heterogeneous at risk population.

## Strengths and Limitations

There are several limitations to acknowledge. First, the MAX claims used for this study cover years 1999-2013. Practitioner knowledge, screening practices, and treatment modalities for PMD may have likely changed in response to the growing general awareness of PMD over the past decade, possibly limiting the generalizability of these results to the current context (Byrnes, 2018; (PSI, 2019b). Second, there are several sources of endogeneity in this study, specifically omitted variable bias and measurement error. The variables of stigma, previous psychotherapy utilization, and pharmacotherapy utilization all remained unmeasured in this study. Each of these omitted variables are hypothesized to contribute to spuriousness. Therefore, the absence of these variables in the current study may result in an overestimation of the focal relationship, which may bias our result away from supporting the null hypothesis.

In addition, there is measurement error for three variables. Household structure at the individual-level is measured using a county-level proxy variable of 'percent of households with female heads' (AHRF, n.d.). This ultimately results in loss of heterogeneity of household structure in families residing in the same county. The mechanism measure of Geographic Access to MAP is also measured using a proxy. This measure uses providers accepting any insurance type as a proxy for MAP, and this could lead to an overestimation in the number of providers available in certain areas. Number of children is measured using the number of deliveries experienced by women between 1999-2013. This operationalization could lead to an underestimation of the number of children a woman may have due to the deliveries occurring outside of the study period. This could also lead to an overestimation of the number of children as some deliveries may not result in a living child.

Additionally, the sample size of the current study is small which makes this study highly subject to random error, possibly rendering the findings not meaningful. ICD-9-CM codes may not always be used appropriately in practice. In some scenarios codes may be entered to order a test or even reference a previous related healthcare event. However, the list of codes used in the current study are restrictive and thus error associated with non-concordance of coding and actual practice should be minimized.

Though the inclusion of missed abortion in the inclusion criteria is justified due to aforementioned practiced and policy reasons, it is possible that this may contribute to mismeasurement of PMD, in that it may be catching a mood disorder diagnosis outside of pregnancy if the missed abortion is not near full term.

In spite of these limitations, this study presents several strengths, including addressing key gaps in literature and the application of strong methodological approaches. This study is the first to examine perinatal health service use in a population with CHD, and it addresses a key gap in the literature concerning urban/rural disparities in utilization of psychotherapy for PMD in chronically diseased Medicaid populations. Additionally, this study is the first to test the mechanism of geographic access within the CHD population and for the treatment of PMD. This study used several years of rich Medicaid claims data to derive a cohort of Medicaid-enrolled females ages 15-55 with a diagnosis of CHD experiencing pregnancy and PMD to achieve these objectives.

## **Chapter 6: Conclusion**

This study sought to understand the effect of rurality of residence on the likelihood of utilizing psychotherapy for PMD in a Medicaid population diagnosed with CHD. This study was the first to assess mental health service use for perinatal mental health issues in a population with

CHD. In addition, this study was the first to examine urban and rural disparities in healthcare utilization in this highly burdened population.

Findings reported that Medicaid beneficiaries with CHD living in rural areas were significantly less likely to receive any psychotherapy within 12 weeks of diagnosis of PMD as compared to their urban counterparts, even after accounting for differences in geographic access.

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