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Qualitative Process Evaluation of a Community Health Worker intervention for Postpartum Hypertension at Grady Memorial Hospital

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Abstract

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By Elianna Paljug

Introduction: Hypertensive disorders of pregnancy (HDP) are a major cause of maternal morbidity and mortality in the U.S., particularly among women of color. Women who had HDP during their pregnancy can reduce their chances of negative outcomes by continuing to remain connected to health care provision and maintaining lifestyle modifications related to BP management. Community Health Workers (CHWs) have been studied as effective modalities for supporting people with hypertension.

Objective: The objective of this work is to understand the experiences of CHWs and participants in a recently initiated project at Grady Memorial Hospital (GMH) that aims to facilitate CHWs supporting women who had HDP in managing their hypertension after delivery.

Methods: Key Informant Interviews (KIIS) were conducted with program leadership and In-Depth Interviews (IDIs) were conducted with 2 CHWs and 6 program participants, 3 for each CHW. Data were analyzed using descriptive, thematic, and comparative analysis, and used to form recommendations.

Results: Participants and CHWs described very positive experiences**.** Participants defined health as including various components of blood pressure (BP) management, understood the importance of BP management, and appreciated their CHWs for their personal qualities, consistent education, and multi-faceted support. Participants described successes and challenges in modifying their diet and stress management behaviors. Variation was found in practices of BP measurement, which often were cued to action by symptoms rather than a daily habit. Gaps within participants' understandings of appropriate actions in a high BP emergency were thoroughly analyzed. CHWs were able to provide additional insight on the motivations and practices of BP management and measurement beyond the 6 participants interviewed. Programmatic processes such as recruitment, evaluation, and CHW training were described as mostly successful with some notable gaps. These findings were assembled into recommendations.

Conclusions: This project has shown the opportunities and challenges within a program aiming to use CHW to support patients with HDP manage their BP after delivery. The Health Belief Model (HBM) can be used to categorize findings and identify gaps for the program to address. Implementation of recommendations will strengthen this CHW program to be an effective model for supporting postpartum women who had HDP.

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Table of Contents

Table of Figures

Table of Tables

CHAPTER 1: INTRODUCTION

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Introduction and rationale

Hypertensive disorders of pregnancy (HDP) are a major cause of maternal morbidity and mortality in the U.S., particularly among women of color. Women who had HDP during their pregnancy often are unaware that their hypertension can continue into their postpartum period and beyond, and don't know what they can do to manage their blood pressure (BP) effectively. However, through adequate follow-up with a medical provider who can prescribe BP medication as necessary, and guidance on how to make relevant behavior changes such as those related to diet, exercise, and stress reduction, women could be able to reduce their chance of negative outcomes associated with HDP. Programs focusing on hypertension and health behaviors more broadly have found that community health worker (CHW) interventions can be effective in supporting patients to effectively manage their BP.

Problem statement

A research team out of Grady Memorial Hospital has recently begun a project to demonstrate the effectiveness of a CHW program to help women in Atlanta who had HDP manage their BP. This program involves CHW giving BP measurement devices to their

participants, visiting them in their homes, supporting them in engaging with the healthcare system such as through scheduling appointments, and teaching them about all the important tenants of BP management and measurement, including diet changes, exercise, stress reduction, and what to do in case of a high BP emergency.

The program currently has been under operation for several months, and at the time of interviewing had recruited approximately half of its participants. Although informal communication paths between the CHWs and program staff exist, no thorough analysis has been done of the opinions of the CHWs and participants on their experience in the project so far. Qualitative data is necessary to better understand the experiences of the CHWs and participants thus far, and to form recommendations for improvement of the program.

Purpose statement

The purpose of this qualitative process evaluation will be to better understand the positive and negative experiences of the CHWs in providing care to participants in this program, and to better understand the experience of participants in this program in attempting to manage their blood pressure. Through thorough evaluation of the facilitators, barriers, motivations, and other themes that arise from analysis of participants' experiences in the program, comprehensive recommendations can be made for improvement of the program.

Research Objectives:

1) Describe the experiences of CHWs in the Grady CHW Program
2) Describe the experiences of participants in the CHW program
3) Assemble recommendations based on the data collected for the project to rapidly implement following completion of the project

Significance Statement

Understanding the experiences of both CHWs and participants in this program will enable the program to rapidly modify its practices according to deep understanding of their feedback. This improvement will not only improve the experiences of current participants and CHWs, but also improve the model the project is developing for hopeful replication by the wider health care community.

Definition of Terms

ACOG - American College of Obstetricians and Gynecologists
AHA – American Heart Association
BP – Blood Pressure
CDC – Centers for Disease Control and Prevention
CHW – Community Health Worker
CVD – Cardiovascular Disease
DASH – Dietary Approaches to Stop Hypertension
EMR – Electronic Medical Record
EMS – Emergency Medical Services
GMH – Grady Memorial Hospital
HBM – Health Belief Model
HDP - Hypertensive Disorders of Pregnancy
IDI – In-depth Interview
KII – Key Informant Interview
MCO – Managed Care Organization
NVSS – National Vital Statistics System
OBYGN – Obstetrician/Gynecologist
PCP – Primary Care Provider
PMSS – Pregnancy Mortality Surveillance System
PRMR – Pregnancy Related Mortality Ratio
RCT – Randomized Controlled Trial
SCT – Social Cognitive Theory
SDOH – Social Determinants of Health

CHAPTER 2: LITERATURE REVIEW

Postpartum Hypertension

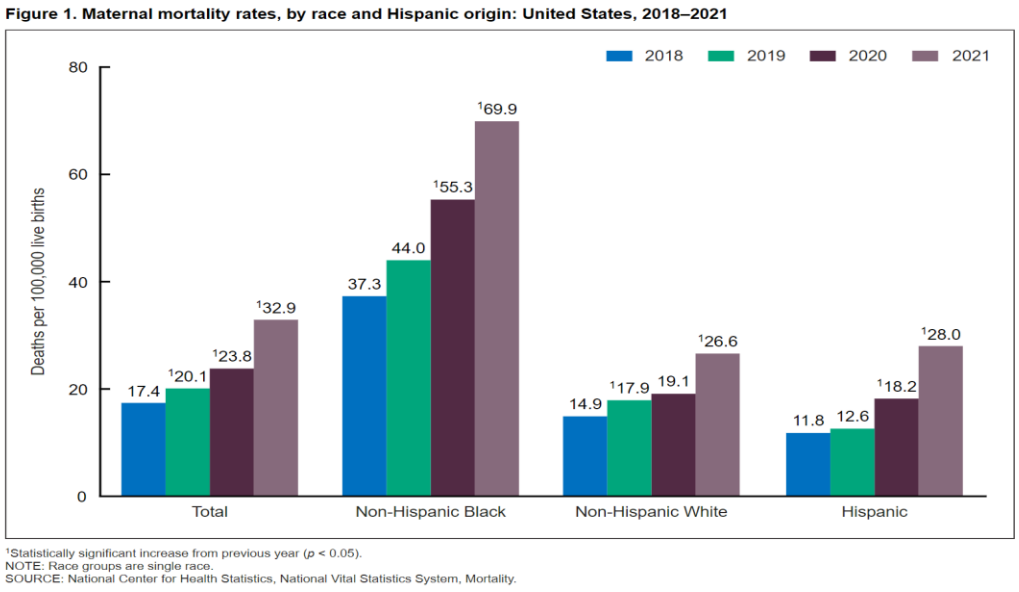
General Introduction to the U.S. Maternal Health Crisis

The United States is currently facing a maternal health crisis that particularly hurts women of color who also are harmed by the public health crisis of structural racism. These crises are particularly harmful to Black women, who between 2007-2016 had at least 3x higher likelihood of death from childbirth than White women according to a 2019 Mortality and Morbidity Weekly Report (MMWR) on the topic of racial and ethnic disparities in pregnancy related death (Petersen, Davis, Goodman, Cox, Syverson, et al., 2019). This report analyzed data from the Pregnancy Mortality Surveillance System (PMSS), which is a platform developed by the Center for Disease Control (CDC) and the American College of Obstetricians and Gynecologists (ACOG) that measures deaths both during pregnancy and up to 1 year following delivery and evaluates the cause of each case individually by a medically trained epidemiologist. According to this PMSS data, within 2007-2016, although the overall pregnancy related mortality ratio (PRMR) in the US was 16.7 pregnancy related deaths per 100,000 deaths, this value was 40.8 for Non-Hispanic Black women. The Black to White disparity ratio was higher than 1 for all age groups, all levels of education, and all annual periods, with the highest disparity among college graduates or higher with a disparity ratio of 5.2. This data shows that within the nearly ten-year time frame of this data collection, regardless of a Black woman's age or education, she is at a much higher risk of maternal death than White women.

In addition to the PMSS, the U.S. also measures maternal mortality through another platform, the National Vital Statistics System (NVSS). Unlike the PMSS data, the NVSS data only includes women who died while pregnant or within 42 days of termination of pregnancy,

which is the World Health Organization's definition of a maternal death (CDC's Division of Reproductive Health, 2023; Hoyert, 2023). Therefore these values may underestimate the true number of deaths related to maternal mortality in the US, as it does not include those who deaths which were after that 42 day period, but still were related to pregnancy complications. Nevertheless, the most recent publication of NVSS data shows that that the crisis of maternal mortality in the United States has increased dramatically across all racial groups and age groups from 2020 to 2021, with 861 maternal deaths in 2020, and 1205 maternal deaths in 2021. As shown in **Figure 1**, the disparity between White women and women of color remained extreme with a maternal mortality rate of 26.6 deaths per 100,000 live births among Non-Hispanic White women, a rate of 28.0 among Hispanic women, and a rate of 69.9 among Black women (Hoyert, 2023).

Figure 1 - Maternal Mortality Rates in the U.S. by Race and Hispanic origin from 2018-2021 (Hoyert, 2023)



Note: This data is from the NVSS data system, which includes deaths up to 42 days after delivery.

Source: CDC. This material is also available free of charge on the agency website

Black women are not the only women of color impacted by systemic inequities during pregnancy, delivery, and beyond. Although the aforementioned maternal mortality shows that non-Black Hispanic women have a comparable mortality ratio to White women, the NVSS data on births in 2021 showed that both non-Hispanic Black women and Hispanic women have lower rates of prenatal care during the first trimester, 69.7% and 72.5% respectively, compared to non-Hispanic White women at 83.2% (Hoyert, 2023; Osterman et al., 2023). The same trend holds for late or no prenatal care, with 7.9% in Hispanic women, 9.1% in Black women, and 4.6% in White women; for using WIC food for self during pregnancy, with 46.7% in Hispanic women, 45.6% in Black women, and 19.0% in White women; and for using Medicaid as the source of payment for delivery, with 58.1% in Hispanic women, 64.0% in Black women, and 28.1% in White women. Hispanic women more often used "self-pay" as source of payment for delivery than nearly any other group at 6.5%, with only 2.1% of Black women and 3.5% of White women using self-pay (Osterman et al., 2023). This data shows that Hispanic women are impacted by challenges to accessing and using maternal health care, financial pressures for food, and lack of insurance, making them an important population to target for increased postpartum support.

Among causes of death of women in 2019, one of the top ten causes was hypertensive disorders of pregnancy (HDP). Among all races, HDP was the 7th most common cause of death, but other causes related to HDP were also included in the list, including "Other cardiovascular conditions" (1st on list) and cardiomyopathy (5th on list). HDP was also the 7th most common cause for Black women, but the 5th top cause for Hispanic women. In the US, these conditions comprised a significantly higher proportion of pregnancy-related deaths in Black women compared to White women (Petersen, Davis, Goodman, Cox, Syverson, et al., 2019). Even if a woman does survive her pregnancy with HDP, her symptoms can carry over into the postpartum

period, often called the fourth trimester. The postpartum period is especially important to consider when aiming to prevent maternal death. According to the most recent PMSS data that quantifies deaths related to pregnancy up to a year after pregnancy, from 2011-2015 18.5% of maternal death occurred within 1-6 days postpartum, 21.4% of deaths occurred in 7-42 days postpartum, and 11.7% within 43-365 days postpartum. In this 43-365 days postpartum period, a shocking 45% of deaths were attributed to cardiomyopathy, which is far more than any other cause (Petersen, Davis, Goodman, Cox, Mayes, et al., 2019). As there is a higher rate of cardiomyopathy in those who had HDP, supporting women with HDP could help prevent these deaths (Rana et al., 2019). Comprehensive addressing pregnancy-related hypertension among women, especially among women of color, is a key strategy to reducing maternal death.

Hypertensive Disorders of Pregnancy

Hypertensive disorders of pregnancy (HDP) can occur during a woman's pregnancy, or during the postpartum period, or both. ACOG divides hypertensive disorders of pregnancy into two broad categories. Chronic hypertension in pregnancy occurs when a pregnant person has previous history of hypertension before their pregnancy or before 20 weeks of gestation or was diagnosed for the first time with hypertension during pregnancy and it does not resolve in the postpartum period. Gestational hypertension occurs when hypertension is diagnosed for the first time after 20 weeks of gestation, and also includes the category of preeclampsia (ACOG, 2020; Garovic et al., 2022; Vidaeff et al., 2019). Complete definitions of these terms are outlined in **Table 1**. It is important to note that there can be overlap within these conditions. For some women, HDP such as preeclampsia or eclampsia may arise without the patient having hypertension before pregnancy. For others, postpartum hypertension may be a continuation of chronic hypertension they had before pregnancy, such as when preeclampsia is superimposed on

chronic hypertension (Garovic et al., 2022). For yet another group, some develop hypertension postpartum without having any hypertension before or during pregnancy. Although more research is needed to understand the physiological differences between these, according to British Medical Journal (BMJ) guidance on postpartum management of hypertension, these patients can be often screened for and treated similarly in the hospital setting and beyond (Bramham et al., 2013).

Table 1 – Definitions of types of Chronic Hypertension in Pregnancy and Gestational Hypertension, as defined by ACOG (ACOG, 2020; Garovic et al., 2022; Vidaeff et al., 2019)

	Term	Definition
Chronic Hypertension in Pregnancy	Hypertension in pregnancy	Systolic BP ≥140 mm Hg or diastolic BP ≥90 mm Hg, or both, both measured on two occasions at least 4 hours apart
	Severe-range hypertension in pregnancy	Systolic blood pressure≥160 mm Hg or diastolic BP ≥110 mm Hg, or both, measured on two occasions at least 4 hours apart
	Chronic hypertension	Hypertension diagnosed or present before pregnancy or before 20 weeks of gestation; or hypertension that is diagnosed for the first time during pregnancy and that does not resolve in the postpartum period
	Chronic hypertension with superimposed preeclampsia	Preeclampsia in a woman with a history of hypertension before pregnancy or before 20 weeks of gestation
Gestational Hypertension	Gestational hypertension	Systolic BP ≥140, or diastolic BP ≥ 90 mm Hg, or both measured on 2 occasions at least 4 hours apart diagnosed after 20 weeks of gestation and a previously normal BP
	Preeclampsia	Systolic BP ≥140, or diastolic BP ≥ 90 mm Hg, or both measured on 2 occasions at least 4 hours apart >20 weeks of gestation and previously normal BP or severe range hypertension, in addition to at least 1 of the following: ● Proteinuria (≥300 mg/24-hour urine, or PCR ≥0.3, or dipstick 2+ only if other quantitative methods not available) ● Renal insufficiency (creatinine > 1.1 mg/dL or doubling of the serum creatinine concentration in the absence of other renal disease)

		● Thrombocytopenia (<100× 109/L) ● Impaired liver function (ALT/AST ≥ 2x upper limit of normal) ● Pulmonary edema ● New-onset headache or visual disturbances (not due to alternative diagnoses)
	Preeclampsia with severe features	● Systolic blood pressure of 160 mm Hg or more, or diastolic blood pressure of 110 mm Hg or more on two occasions at least 4 hours apart (unless antihypertensive therapy is initiated before this time) ● Thrombocytopenia (platelet count less than100,0003109/L ● Impaired liver function that is not accounted for by alternative diagnoses and as indicated by abnormally elevated blood concentrations of liver enzymes (to more than twice the upper limit normal concentrations), or by severe persistent right upper quadrant or epigastric pain unresponsive to medications ● Renal insufficiency (serum creatinine concentration more than 1.1 mg/dL or a doubling of the serum creatinine concentration in the absence of other renal disease) ● Pulmonary edema ● New-onset headache unresponsive to medication and not accounted for by alternative diagnoses ● Visual disturbances

Importance of Reducing Postpartum Hypertension

As mentioned previously, the postpartum period is especially important to consider when aiming to prevent maternal deaths because more than one half of pregnancy-related deaths occur after delivery, and a high percentage of those deaths are due to cardiovascular complications (ACOG, 2018; Petersen, Davis, Goodman, Cox, Syverson, et al., 2019). Women who experience HDP are also at higher risk for short- and long-term morbidity, such as stroke and long-term cardiovascular disease, than women who do not experience HDP. In fact, one study has reported

that HDP-associated cardiovascular disease (CVD) risk to be just as high or higher than risks more often considered for CVD such as smoking and obesity(Kern-Goldberger & Hirshberg, 2021). Preeclampsia in particular is well understood to be associated with CVD, as numerous studies have shown this relationship among diverse populations (Hauspurg et al., 2019). Studies have reported that 38% of women with early-onset preeclampsia had hypertension by age 50, and that women who had preeclampsia may have an approximately 10 mmHg higher BP on average until age 55 (Hauspurg et al., 2019). As CVD accounts for up to half of maternal deaths, it is essential that special attention is given to those who are pre-disposed to CVD because of HDP (Garovic et al., 2022). In addition to the long-term effects on health, in the short term HDP can also lead to hospital readmissions, which are extremely stressful for women not only trying to recover after birth, but also trying to care for their newborn (Kern-Goldberger & Hirshberg, 2021). It is clear that women who experience HDP need specialized attention by the health care system during the postpartum period.

Risk Factors for Hypertensive Disorders of Pregnancy

The complete list of risk factors for hypertensive disorders of pregnancy vary depending on which disorder is being focused on, and how much or what type of data is available or being analyzed to define these risk factors. For example, ACOG's 2020 report on Gestational Hypertension outlined risk factors for preeclampsia, which include prior preeclampsia, chronic stage 2 hypertension, and pregestational diabetes, maternal age above 35, among others. However, they also state that most incident cases of preeclampsia are in "healthy nulliparous women with no obvious risk factors" (ACOG, 2020). According to the American Heart Association, several additional risk factors should be added in this list, including maternal age, pre-pregnancy BMI > 30 Kg/m2, family history, and Black race. Their distinctions between

severe and moderate risk factors for preeclampsia are important because they are related to recommendations for prevention medication, as aspirin therapy is indicated when one or more high or two or more moderate risk factors are present (Garovic et al., 2022).

Management for Postpartum Hypertension

The management of postpartum hypertension begins immediately after delivery. Current clinical guidance defines postpartum hypertension as a blood pressure of 140/90 mm Hg or greater two or more times at least 4 hours apart, and severe postpartum hypertension as 160/110 mm Hg two or more times within minutes (Sharma & Kilpatrick, 2017). ACOG recommends maintaining a blood pressure of less than 150/100 mm Hg throughout the postpartum period (Hauspurg et al., 2019). BMJ recommends measuring blood pressure multiple times at least 30 seconds apart and then averaging these values and validating automated device BP measurements with sphygmomanometery (Bramham et al., 2013). They recommend checking blood pressure within six hours of delivery in all women, and within days 1-4 measuring the BP 4 times a day and following various courses of action depending on the results, as shown in the flowchart figure in their paper (Bramham et al., 2013).

If a woman's BP normalizes in the days after delivery, she will be discharged from the hospital. Any subsequent postpartum hypertension will often managed in outpatients settings, with only the most severe cases leading to hospitalization and inpatient care. Therefore, the BMJ states that all patients should be informed after delivery on the importance of measuring blood pressure postpartum, and the list of potential symptoms that might be associated with hypertension, pre-eclampsia, or eclampsia such as "severe head-ache (increasing in frequency and unrelieved by regular analgesia); visual disturbance such as blurred vision, flashing lights, double vision, or floating spots; nausea and vomiting; malaise, breathlessness caused by

pulmonary oedema; sudden swelling of the face, hands, or feet; or seizure up to four weeks post-partum." However, they recognize that some of these issues may overlap with "normal" postpartum phenomena, and therefore must be discussed with a healthcare provider to determine the appropriate course of action (Bramham et al., 2013).

It is important to note that the previously mentioned guidance from the BMJ does come from UK medical bodies and may not be the standard of care in the US. The American College of Obstetricians and Gynecologist (ACOG) published a committee opinion in 2018 on Redefining the Postpartum Visit. In this report ACOG stated the recommendation that women with HDP should have a blood pressure evaluation no later than 7-10 days after delivery, although some experts recommend follow-up at 3-5 days, and women with severe HDP should be seen within 72 hours. They particularly note the importance of managing postpartum hypertension during the first 10 days after delivery because this is when half of postpartum strokes occur (ACOG, 2018). Other clinical guidelines state that severe hypertension should be treated with fast acting antihypertension medication with nifedipine recommended, and any postpartum hypertension that persists should be treated with a long-acting antihypertensive medication with labetalol recommended (Sharma & Kilpatrick, 2017). Current management strategies instruct against discharge if symptoms resemble that of preeclampsia (Tan & de Swiet, 2002).

Although the aforementioned guidelines focus on the period immediately after delivery, the need for management of hypertension symptoms extends beyond the traditional six week postpartum period. Several studies have shown that one year after delivery, women who had HDP often still have challenges with their blood pressure. Two recent studies have found 42% - 56% of women with preeclampsia had hypertension one year after delivery, and this risk was

higher if the women was overweight, obese, had a more severe hypertensive disorder of pregnancy, or was Black (Hauspurg et al., 2019). Twenty percent of women with HDP will have chronic hypertension and need antihypertensive medication within two years after delivery (Bramham et al., 2013).

While medication is necessary for many who struggle with hypertension, programs that help participants improve their diet, exercise, or stress management habits can also be effective. The evidence for these types of programs has grown over time. Research has shown that if a person regularly consumes foods that are high in fat, sodium, refined carbohydrates, and sugar, and low in fruits and vegetables, they are at increased risk of hypertension (Ozemek et al., 2018). Therefore, it has long been hypothesized that changes to these diet habits can reduce hypertension. The DASH diet, which stands for Dietary Approaches to Stop Hypertension, has been demonstrated to have a dose-dependent effect on reducing BP (Ozemek et al., 2018). Dietary interventions have also shown efficacy when specifically targeted towards women with HDP. One recent study showed that diet quality among pregnant women in Hawaii was predictive of HDP during pregnancy, stating that “every point higher of DASH diet score portended approximately 30% reduced odds of developing HDP”(Miller et al., 2022). A Randomized Control Trial (RCT) in 2018 in Jiangsu, China among women with chronic hypertension and gestational hypertension also demonstrated the effectiveness of implementation of the DASH diet for reducing not only incidence of pre-eclampsia, but also other birth outcomes such as prematurity and low birth rate (Jiang et al., 2019). A recent Scientific Statement from the American Heart Association was published on the need to strengthen cardiovascular disease prevention efforts for pregnant women, as there is ample evidence that they can prevent adverse pregnancy outcomes. It emphasized that adopting a “heart-healthy diet” along with increased

physical activity should be recommended for women postpartum and throughout their life in order to prevent CVD risk (Parikh et al., 2021).

Stress reduction programs have also been studied for its ability to lower hypertension. In 2020, Smith et al conducted a systematic review and meta-analysis of mind-body stress reduction interventions specifically for women with HDP, and found that several interventions including relaxation, yoga, and guided imagery to lower blood pressure (Smith et al., 2020). Other systematic reviews have also been conducted among broader populations with hypertension, not specifying pregnancy-related hypertension, and have found that stress reductions interventions have been effective in BP measurements. Particularly relevant is a 2021 scoping review of stress reduction interventions to decrease hypertension for Black women specifically, which found six articles that showed evidence that stress reduction techniques can reduce blood pressure among this population (Collins & Hines, 2022). However, all researchers in these studies and reviews noted that more research needs to be done in these areas, especially with diverse populations, and in examinations of real-world effectiveness instead of just efficacy. For example, Ozemek stated that many evaluations of the DASH diets have been programs that provided food directly to participants in the intervention group (Ozemek et al., 2018). Research is still needed to understand the ways in which women who had HDP can best implement lifestyle changes such as diet, exercise, and stress reduction to address their hypertension.

Barriers to Postpartum Hypertension Management

Women face many barriers in accessing appropriate postpartum care which hinder their ability to manage their postpartum hypertension. Firstly, in order to be prescribed the medications that could help control their blood pressure, women must interact with the health sector. The aforementioned opinion on optimizing postpartum care by ACOG states that

postpartum care should be understood as an ongoing process rather than a single visit. However, they report that nationally, as many as 40% of women do not go to any postpartum visit (ACOG, 2018). There are many factors that contribute to women not seeking care. In order to manage their hypertension holistically and effectively, patients should not only be attending visits with a primary care provider (PCP), but also a cardiologist, pharmacist, and nutritionist. Due to high need, these providers often have very busy and inflexible schedules. It can be very challenging for patients to schedule, remember, and then make time to attend all these different appointments, especially when they are potentially also caring for a newborn. The combination of low supply and low ability to attend appointments often leads to patients not being able to get to the necessary follow-up care (Kern-Goldberger & Hirshberg, 2021; Ogunniyi, 2022). These factors compound when patients are unable to easily access childcare, or do not have general economic stability (Kern-Goldberger & Hirshberg, 2021). A study out of Yale New Haven Hospital found that among 109 women with HDP who were asked in a survey for reasons they did or did not follow up for care within 6-12 months after delivery, the three most common self-reported barriers to accessing care were childcare (44%), cost (25%), and inability to obtain timely care (25%) (Ackerman et al., 2021). The cost barrier is particularly prevalent in states where public insurance for pregnancy is lost within 60 days postpartum (Hauspurg et al., 2019). These factors are exacerbated by those impacted by other structural disadvantages such as financial insecurity, low job security, and structural racism (ACOG, 2018; Kumar et al., 2022).

Finally, it is vital to remember that women after delivery are in a state of physical distress, having often undergone cesarean section surgeries, perineal trauma, or other morbidity from the birthing process. They also often are sleep deprived from this physical recovery and caring for an infant on a challenging sleep schedule. Recent data has shown that post traumatic stress disorder

is higher among women with hypertensive disorders of pregnancy, sometimes because of traumatic delivery experiences (Hauspurg et al., 2019). The postpartum healthcare system needs to be redesigned to make visiting health care providers as easy as possible in recognition of the large physical and mental burden these visits can place on new parents (Kern-Goldberger & Hirshberg, 2021).

Even if patients do make it to these different appointments, the providers they meet may not properly address their needs. Firstly, there is a persistent communication challenge between health care providers. Oftentimes providers from different disciplines, such as PCPs, cardiologists, pharmacists, dieticians, and other caregivers only communicate with each other through electronic provider notes. These notes often leave out information that is vital to the success of the patient's care plan such as their social situation or personal values related to how they want their disease to be managed (Ogunniyi, 2022). Secondly, oftentimes caregivers do not focus on helping patients develop their own problem-solving and self-management skills. These vital skills are only taught if the individual provider has the time or feels equipped to do so, and this teaching is not the norm. This lack of teaching leads to patients often not able to take the necessary action to self-manage, problem-solve, and advocate for themselves (Ogunniyi, 2022). These factors are exacerbated by those impacted by other structural disadvantages such as financial insecurity, low job security, and structural racism (ACOG, 2018; Kumar et al., 2022).

The challenge of postpartum hypertension management among Black women is especially vital at Atlanta, GA's Grady Memorial Hospital (GMH), which is the safety net hospital that provides care for the most underserved populations in the city. GMH has a variety of services for pregnant women including a Women and Infants Health center that provides prenatal care for 2490 patients annually at GMH and affiliated health centers, a "Mother and Baby" unit which

performed 2,247 deliveries in 2020, and a high-risk obstetrics clinic that supported 867 women in 2020. Among deliveries between 2016-2018 at GMH, 88% of women were eligible for Medicaid, and 68% were Black, and 38% of pregnancies were impacted by HDP, which is much higher than the national average. Less than 14% of women with HDP returned to GMH for a blood pressure check within the first 10 days after delivery. Low uptake of postpartum care among women with HDP is particularly concerning because HDP was coded in over 40% of deliveries in the first quarters of 2020 and 2021 at GMH (Ogunniyi, 2022).

Solutions to Prevent and Address Postpartum Hypertension

General Introduction to Existing Solutions and Gaps

As millions of people in the United States and around the world suffer from cardiovascular issues every year, there are many different ways the public health and medical communities have tried to combat this challenge. As risk factors for hypertension include factors such as obesity, poor diet, lack of exercise, and lack of access to care, public policy and public health interventions that address these challenges and barriers can be understood to support prevention of cardiovascular disease, including HDP (Ozemek et al., 2018). However, fewer programs exist that specifically target the challenges of postpartum women who had HDP, and now are trying to navigate the healthcare landscape while also caring for a newborn baby. Fewer projects still also address the social determinants of health that impact blood pressure (Jiang et al., 2019; Miller et al., 2022; Parikh et al., 2021). However, there are many opportunities for interventions addressing HDP during the postpartum period, both in terms of addressing the immediate needs of women, and acting as preventative measures for future pregnancies or just future life in general. Women may also be more motivated to modify their lifestyle in the

postpartum period, which creates an opportunity for the introduction of behavior change interventions (Hauspurg et al., 2019; Parikh et al., 2021).

The programs that do exist to address postpartum hypertension usually have components that fall into two categories: helping women remotely monitor their blood pressure, and helping women manage their blood pressure. A recent review on the best practices for managing postpartum hypertension by Dr. Natasha Kumar and others of the University of Pennsylvania highlighted that various recent studies have already demonstrated that home BP monitoring programs for women in the postpartum period who had HDP have been proven to be "safe, efficacious, and cost-effective even before the pandemic" (Kumar et al., 2022) Their Table 2 summarizes the findings of these studies. They emphasize that BP monitoring programs are very useful because it is hard to identify which patients with HDP will develop postpartum hypertension without frequent BP measurements. Additionally, as the COVID-19 pandemic has increased patients and doctors acceptability of telehealth, programs such as these BP monitoring programs allow for increased access and reduced racial disparities in postpartum BP care. However, Kumar et al., emphasize that in order for these programs to be effective, patients must be using a validated BP measurement machine, and be properly educated on how they should communicate with a care team about their measurements. As so many women are unable to attend in-person postpartum visits, there is a current gap in the medical community's understanding of how postpartum hypertension impacts women who have HDP. Programs that enable increased data collection on BP in the postpartum period, such as those that create increased accessibility through remote monitoring, could greatly assist the field with understanding how to best help women with this condition (Kumar et al., 2022).

However, it is not only necessary to ensure that patients and physicians have more BP measurements from the postpartum period, but also that patients are educated and able to act upon the BP measurements that they obtain, and that the systems they reach out to for support – whether they be medical, food insecurity, financial insecurity, or others – are able to adequately support them. Several programs exist in which women who had hypertensive disorders of pregnancy are referred to specialized clinics or centers for follow-up appointments during their postpartum period. These clinics are often interdisciplinary, and might have OBGYNs, Cardiologists, and PCPs (Hauspurg et al., 2019). Two examples of such programs are the Maternal Health Clinic in Ontario, Canada, which has women who had HDP do a full screening for a variety of complication at 6 months postpartum, and a similar center in Boston, which has women attend several visits in the postpartum period focusing on at home blood pressure monitoring, maintenance of healthy blood pressure numbers including adjusting medication as necessary, and assisting patients with nutrition and PCP connections. As this Boston program was conducted in a racially and socioeconomically diverse area, its model may prove successful in other areas whose residents face similar barriers, such as Atlanta. As women who had HDP in one pregnancy may be looking to have another child in the future, these postpartum intervention can also be understood as prevention programs for future pregnancies. Hausburg also emphasizes that women with HDP should be supported in adopting "healthy lifestyle practices" including improved nutrition such as the "DASH" diet, moderate exercise 30 mins a day 5 days a week, weight loss if indicated, smoking cessation if necessary, and general guidance from lifestyle coaches (Hauspurg et al., 2019).

Although expansive, the table of articles listed by Kumar is not expansive of all models that have been attempted to use remote monitoring solutions to address patients with some form

of HDP. For example, a recent pilot study in York, PA focused on women who in particular had preeclampsia during their pregnancy and used the mobile app MyWellSpan to record their self-collected blood pressure measurements and share those values with their (Burgess et al., 2021). The use of e-health in this solution is supported by the fact that smartphone use is steadily increasing in the US, with 77% of adults using a smartphone in 2018. Thus, the internet has become a prime mode through which pregnant and postpartum women seek health information. This is evidenced by the fact that among health-related mobile applications, more apps are focused on pregnancy than any other topic (Burgess et al., 2021). This example shows the promising potential of linking remote solutions like remote monitoring with care-connecting solutions that link physicians to a PCP more effectively.

While promising starts have been made in some areas to create programs where remote BP monitoring is combined with care-connecting resources for postpartum women who had HDP, gaps still exist in making these programs accessible to all, primarily due to the fact that there is no widespread guidance and institutionalized support for providing this type of care on a large scale. For example, The sustainability of at-home blood pressure monitoring solution is a challenge because currently blood pressure monitoring equipment is not often reimbursed by insurance (Hauspurg et al., 2019). ACOG and the Society of Maternal Fetal Medicine have outlined recommendations for inter-pregnancy care as a mode for prevention for pregnancy related hypertension, among other complications. Hausburg recommends the creation of a clinical care model for HDP that is similar to those from the American Diabetes Association for women who had gestational diabetes during their pregnancy. These include screenings at 4-6 weeks postpartum and screening every 1 to 3 years afterwards. The recommendation of this guideline emphasizes that even if mothers control their blood pressure in the year or so following

their pregnancy, there could be great benefit from them still being screened yearly for cardiovascular issues. This is another reason why connection to a PCP postpartum is so important (Hauspurg et al., 2019). Recent policy changes that may support this type of care being provided more effectively, such as the postpartum Medicaid extension initiated in some states, and reimbursement practices for telemedicine continuing to be better developed (Kumar et al., 2022). However, at the present moment patients still need a lot of support in determining what type of care they need, and how to access the care they need despite all the aforementioned barriers to managing BP.

Community Health Workers as Providers of BP Management Care to Postpartum Women who had Hypertensive Disorders of Pregnancy

As described through this review, the challenges faced by women who had HDP and now are in the postpartum period trying to manage their BP are multifaceted and multilayered. Far too many women whose BP are at dangerous, but not life-threatening levels, are currently falling in the cracks of our healthcare system by not being indicated for hospital admittance, but instead instructed to go to outpatient services that are too difficult for them to access. Many researchers since the 1970s have proposed using community health workers (CHWs) to assist people with managing hypertension broadly. Although many of these studies were not in the specific context of postpartum hypertension, they show promise for how the model of CHWs might be also appliable in this context(Brownstein et al., 2007).

Before discussing the potential benefits and challenges with CHW based programs, it is important to define the skills and scope of work intended when researchers or programmers refer to a CHW. This is especially challenging because the definition of what a community health worker is has changed throughout time. Brownstein et al., in their 2007 review on CHW

interventions for hypertension, described CHWs as “trained laypeople” whose primary role is to bridge social and cultural gaps between community members and health and social services. A key element of a successful CHW is that they are relatable and trusted by the people they work with, so that they can effectively provide education, counseling, social support, and basic clinical services. In their review, they defined CHWs as people who were carried out the aforementioned activities, were trained for a specific intervention, had “no formal paraprofessional or professional designation”, and “had a relationship with the community being served.” They also were often women. Their training by the programs they are in may involve certifications from State or Local health departments, and training materials from national organizations like the American Heart Association (AHA) or American Red Cross. Many studies involved them being supervised by nurses or physicians (Brownstein et al., 2007)

However, the landscape of who CHWs are and what they do has undoubtedly changed since 2007. Although the U.S. Department of Health and Human Services Health Resources and Service Administration has not commissioned the Community Health Worker National Workforce Study since 2007, the National Academy for State Health Policy does have a State Community Health Worker Models interactive web page that has been updated as recently as 2021 (*Community Health Worker National Workforce Study*, 2007; *State Community Health Worker Models*, 2021). This page defines CHWs as an “umbrella term” that encompasses a variety of “front line public health workers – including Community Navigator, Promotora, Health Coach, Community Health Advisor, Community Health Aid, or Outreach Worker.” They again emphasize that CHWs are trusted members of the communities they serve, and often are responsible for care facilitation and coordination, connection to community-based services, providing education on health-related topics, and address the social determinants of health. They

also offer abundant information for every state that has it available on how CHWs are financed in each state, what services they provide, what certifications or trainings they require, and what legislation the state has regarding CHWs. The financing map displayed on their state tracker page shows that while many states do not yet reimburse for CHWs through their Medicaid programs, other ways of financing CHWs are becoming more common. Notably, Georgia is the only state in the southeast of the U.S. that has Managed Care Organizations (MCOs) MCOs reimburse for CHW services or hire CHWs directly, even though CHWs are not reimbursed through the state Medicaid program. Other states that are similarly classified are California, Nevada, Utah, Colorado, Kansas, Ohio, Pennsylvania, Massachusetts, and New Jersey (State Community Health Worker Models, 2021).

As mentioned, researchers hoping to help people with hypertension be better able to control their condition have been studying the benefit of community health worker (CHW) focused programs since the 1970s (Brownstein et al., 2007) A substantial review of evidence of CHW interventions for hypertension control was conducted in 2007 and found that seven of eight RCTs on CHW programs found significant improvement in patients' self-management behaviors. Among 14 studies they chose to focus on in their review, CHWs assisted patients and families with education on BP management, which included information about risk factors, changes to lifestyle, medication, adherence. Beyond just providing education, CHWs also were tasked with helping participants actually put this information into practice through helping them reduce the barriers preventing them from management of their condition. This could range from help with insurance, to transportation to medical appointments, to providing social support, and sometimes measuring BP. These projects studied took place among predominantly Black communities in the United States. Quantitative outcomes for these studies included behavior

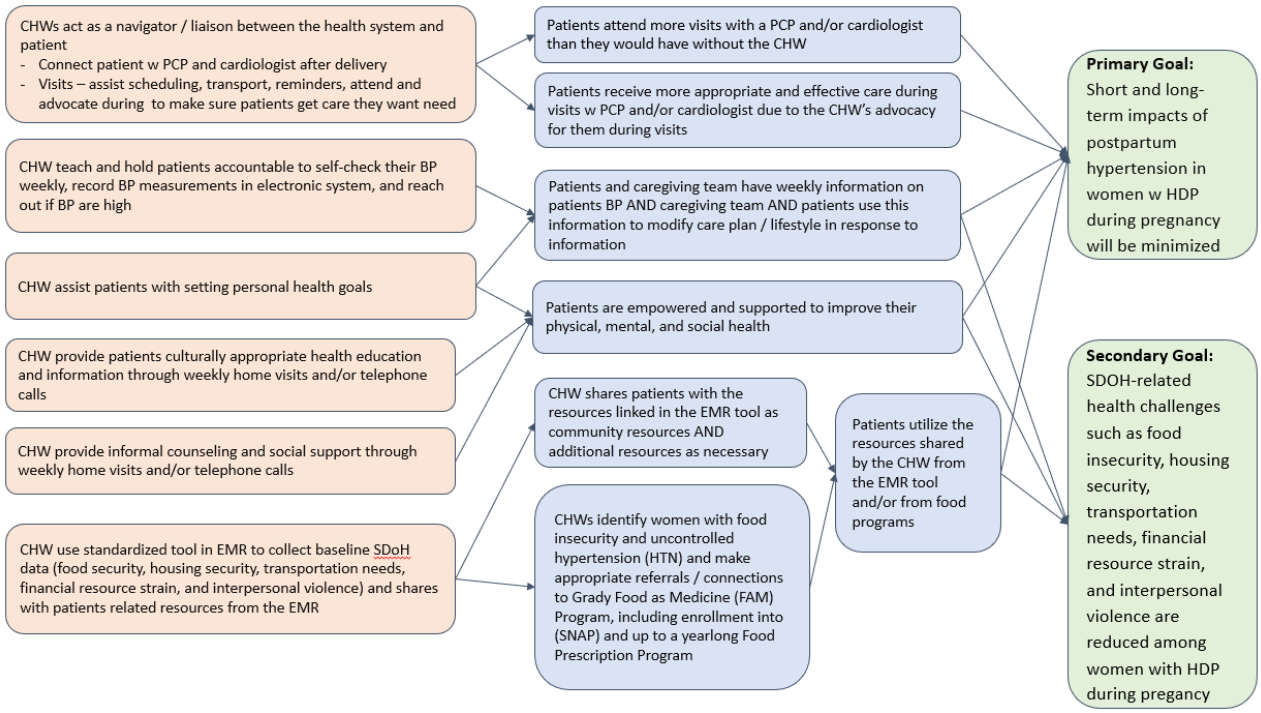
changes such as appointment keeping, adherence to medication, and the physical change of better controlled BP. Although there was some variation in results, numerous studies found the CHW interventions to be effective in all of these outcome areas in the immediate conclusion of the studies. Some follow-up studies have even found the success of these programs up to five years following the initial CHW intervention. Other areas of success included increased connection to PCPs, reduced admission to emergency rooms, and cost savings, among others. Reasons for this success put forth by the authors ranged, but Becker et al. emphasized that successful responses are due to the CHW helping participants navigating systems they must interact with to change their risk factors, such as exercise facilities, grocery shopping, and filling prescriptions (Becker et al., 2005; Brownstein et al., 2007). This result points to the importance of CHWs in addressing the social determinants of health (SDOH). As the landscape for all of these symptoms has changed greatly since the studies in this review were conducted, it is even more important now that CHWs know how to interact with the systems patients interact with today.

Project Overview: Enhanced Community Health Worker Support for Fourth Trimester and Beyond for Postpartum Women with HDP

To combat the challenge of addressing hypertension in the postpartum period, a team at GMH lead by Dr. Ogunniyi Modele of GMH has proposed that community health workers (CHW) could play an important role in helping women overcome these challenges by being culturally appropriate liaisons between new mothers and the care system (Ogunniyi, 2022). The theory of change for this project (**Figure 2**) ultimately aims to meet two goals among women who had HDP during pregnancy: primarily, to minimize the short- and long-term impacts of postpartum hypertension, and secondarily, to reduce SDOH-related health challenges such as

food insecurity, housing security, transportation needs, financial resource strain, and interpersonal violence. It is fundamentally important for the success of this project that both of these goals are addressed because they depend upon each other: participants and their care teams will not be able to maximally reduce their postpartum hypertension if their other social determinants of health are not addressed. This combination of goals recognizes that health is not just a clinical phenomenon but a state of wellbeing that addresses every aspect of the life of the patient.

Figure 2 - Theory of Change for CHW Demonstration Project



There are several categories of activities that CHWs will conduct that are intended to lead to outcomes that will meet one or both of these goals. The network between these elements is outlined in the logic model in Figure 2. The first activity of the CHWs is to act as liaisons or navigators between the patient they are assisting and the health system in all of its parts. As a part of this activity, CHWs will take on a variety of roles in ensuring patients are connected with

a PCP and cardiologist following their delivery, including assisting with scheduling the appointment, reminding the patient of their appointments, transporting patients to their appointment, and advocating for women during their appointments to ensure that patients get the care they want and need. It is expected that the coordination assistance will lead to patients attending more visits with a PCP and/or cardiologist than they would have without the CHW, and that the advocacy during appointments will lead to patients getting more appropriate and effective care during these visits. As mentioned earlier, the literature on postpartum management does point to scheduling and lack of appointment effectiveness being key causes of lack of attendance, which therefore lead to patients not managing their hypertension properly. This causal chain will be a key element of subsequent evaluation and will be measured in part by how participants perceive the CHWs role in assisting them with their appointments. It is assumed that if patients have an increased frequency and effectiveness of visits with PCP or cardiologists, then there is a higher chance their postpartum hypertension can be effectively managed. This assumption has strong support by the fact that medication needed to reduce hypertension can only be prescribed by a doctor during these visits.

In order to ensure that their hypertension is effectively being managed, patients and caregivers must be able to have a good understanding of the patient's BP trends with as much resolution as possible. CHWs address the need for BP data through this project by teaching patients how to self-check their BP and how to record their BP measurements in a paper-based BP log form, and by holding patients accountable to self-checking their BP daily. They also support patients if they learn that their BP measurements are above acceptable levels and help them determine if new actions should be taken. The assumption with this activity is that if patients and CHWs both have access to weekly BP measurements, CHWs can help patients use

this information to modify their care plan in response to the information, including reaching out to a PCP if necessary. These changes may promote improvements for how to manage BP clinically, such as modifying medication, or may address factors that are preventing patients from managing their BP, such as the SDOH-related health challenges. As mentioned in the literature previously, accurately timed medications are fundamental in controlling hypertension so it does not lead to serious health risks. Kern-Goldberg and Hirshberg specifically highlight that timely administration of antihypertensive medication is associated with reduction in rates of maternal stroke (Kern-Goldberger & Hirshberg, 2021), Timely BP measurements can ensure that timely administration of medication can occur. By addressing both medical and SDOH-related challenges in response to weekly BP data, it is assumed that both the primary and secondary goals of this project can be achieved. In addition to teaching patients how to track their BP, CHWs also assist patients with setting personal health goals and provide them weekly health education, informal counseling, and social support through home visits and/or telephone calls. These activities are designed to empower and support patients to improve their physical, mental, and social health, which therefore can lead to meeting both the primary and secondary goals of the project. As mentioned previously, there currently is a gap in health care providers' care that does not provide this education. CHWs holistically support the patient by having weekly touchpoints about both BP and broader topics. The evaluation of this project will help determine patients' attitudes towards this effort and how it might be improved.

At their initial intake meeting with the patient, CHWs use a standardized tool in their electronic medical record (EMR) system to collect baseline SDOH data related to food security, housing security, transportation needs, financial resource strain, and interpersonal violence. This EMR system is already designed to output resources corresponding to the needs input into the

form. CHWs can share these resources with the patients and assist them in utilizing these resources as necessary. For example, to address food insecurity, CHWs can connect women to the Grady Food as Medicine (FAM) program, help them enroll into Supplemental Nutrition Assistance Program (SNAP), or connect them with an up to a yearlong Food Prescription Program. It is assumed that if patients are connected with these resources, then they will utilize them, and if they utilize them then they will experience reductions in BP and SDOH related challenges, corresponding to the primary and secondary goals of the project. The evaluation can help determine if these resources are sufficient to meet patients' needs, and if the proposed pathway was sufficient for them to be able to easily access the resources.

In order to determine the effectiveness of this program, quantitative and qualitative evaluations will be conducted by the research team. This thesis focuses on the qualitative analysis that seeks to better understand the perceptions and experiences of women in the program in managing their BP. Interviews with program participants will be conducted and analyzed to inform subsequent improvements to the program.

CHAPTER 3: METHODS AND RESULTS

METHODS

Data Collection

In order to evaluate the process of this CHW project thus far, a qualitative methods approach was utilized. Following a process-evaluation based analysis of the theory of change for the project, Key Informant Interviews (KIIs) were conducted with all of the doctors who are serving as Principal Investigators (PIs) for the project. Following these discussions and analysis of the programs theory of change, an interview guide for CHWs and an interview guide for

participants were each developed based on the literature on postpartum hypertension and on the causal assumptions made within the theory of change of the project. The interview guide was reviewed and improved upon by the broader project team, including the PIs, lead evaluator, program coordinator, and CHWs for the participant interview guide. These interview guides are included in the appendix.

The interview guide for the CHWs covers an introduction, their opinions about their training and the project team performance, their opinions on the patient experience, and their overall assessment of the project. Within the training section, the CHWs are asked about their opinions on specific parts of their training, and if they wish they had had further training in any specific area. The questions about their opinions on their patient experience are categorized into their general opinions on if they think the program is meeting the participant's needs, and then several questions about the BP measurement process specifically, as this was highlighted as a key area of obstacle for the program. They also were asked about their usage of specific techniques with participants, such as motivational interviewing, and how it has been to assist participants with elements such as appointments, food resources, and any other resources that patients need. The interviews closed with their overall assessment of the project, what they need to better support their patients, and recommendations for what to ask participants.

The interview guide for the participants covers an introduction, questions about their expectations when joining the project, general opinions on the project thus far, general questions about health, BP management, BP measurement, other health topics, and closing overall perspectives on the program. The questions about expectations specifically aim to understand what the enrollment process is like for the patient perspective, and if they are getting out of the project what they expected to. The general questions about health start with "what does being

healthy mean for you" and continue probes on what helps or hinders them from being able to reach these goals of health. This approach allows the patient to guide what they define as healthy, instead of an external definition of health being dictated to them from the interviewer. The questions about BP begin with general questions about management, including what they believe is important to do to manage BP, facilitators, barriers, and motivations. This section also covers if a doctor told them to look out for specific symptoms after delivery, to assess if patients understand what indicators of a high BP emergency are. Next, several questions about BP measurement are asked, including opinions about importance, facilitators and barriers, if their opinions about BP measurement have changed, and what patients do if their BP is high. Finally, general questions about other topics include questions about appointments, and then probes for any other topic the patient finds relevant, such as food support or transportation support, and if they have any needs the program is not helping with. In the closing section the participants are asked to describe the program's overall impact on their health and share any recommendations for improving the program.

The two CHWs were interviewed first, each for approximately one hour, with one CHW preferring to conduct the interview virtually and another preferring to conduct it in person. Interviews were conducted between February 15 and February 20, 2023. The insights gained during these interviews were used to finalize the guide for the participant interviews. We aimed to purposively sample approximately six to eight participants from the larger pool of approximately 30 participants. CHWs determined eligibility for interviewing based on the criteria that participants would be willing to speak to the interviewer, had been in the program for 17 to 30 weeks (4-7 months), and represented either a "typical" experience or a "divergent" experience, without informing the interviewer of any distinctions. Each CHW was asked to

select three-four participants. Ultimately, six participants, 2 Hispanic and 4 non-Hispanic Black, were purposively sampled and consented to participate, with 3 from each of the 2 CHWs. Four of the interviewers were conducted by the author in English, and two interviews were conducted by a second researcher in Spanish, or a mix of Spanish and English. The second researcher was fluent in Spanish, was a member of the research team and familiar with the project goals and objectives, trained in qualitative interviewing and trained on the guide itself. The participant interviews all occurred remotely, with most participants opting to either call on the phone or meet through a video calling software. Participant interviews were conducted between March 8 and March 16, 2023. All participants consented to having their interview recorded. These recordings were used to create verbatim English transcripts of each interview.

Ethical Approvals

This project is considered a quality improvement project by GMH and as nonhuman subject research by Emory because it is a pilot/demonstration project, and the activities conducted within it are for program evaluation and improvement. Therefore, this project does not require IRB review. Participants in this study gave informed consent to participate in the program and have their data be used by the researchers for the purpose of the project. In order to protect participant confidentiality, audio recordings collected during interviews will be destroyed following completion of this project. All transcriptions underwent a de-identification process so that their contents cannot be linked to any specific participant.

Data Analysis

Following the completion of the interviews, a thematic and process-oriented qualitative analysis was conducted using MAXQDA (VERBI Software, 2023). A code book was developed that included deductive and inductive themes from the interviews, both in coding responses for

specific questions, and addressing overarching themes that appeared throughout the data. Basic descriptive variables about participants were also formulated. Following the coding process, the key research questions for the project were analyzed using MAXQDA's Questions, Themes, Theories (QTT) platform. Through this analysis, the investigator identified themes related to the participants experiences in the program, and assembled recommendations for the project team.

RESULTS

Enrollment

Participants were asked several questions related to enrollment specifically, how they learned about the program, why they decided to participate, how they expected the program would help them, and if the project was meeting their expectations. In response to why they wanted to participate and what they expected to get from the program, all participants mentioned that they not only generally wanted to learn about how improve their health or manage BP specifically, but also were hoping to gain information or skills in another related area, such as learning about the *"correct way of eating",* information about food give-a-ways, financial support for food expenses, receiving home visits, wanting to *"get off medication",* or better support their children. One participant highlighted that a key reason she wanted to participate in the program was due to the combination of health education and social support, mentioning she saw great benefit in being *"able to speak with someone in reference to my health, especially when you don't have a lot of people you can really speak to, in reference to the things that you're dealing with."* There were a range of responses related to if the program was meeting expectations, from expressing that the program had exceeded her expectations, to meeting the expectations, to not being sure.

Several notable gaps were found in the enrollment process through these questions. Three of the six interview participants expressed that they weren't sure what they were supposed to be getting out of the program, either at enrollment or also at present day. One participant expressed that at enrollment she *"didn't know it was an option to participate or not."* Finally, one participant may have had unrealistic or incorrect expectations of the program, sharing that she thought the program was only for during her pregnancy, and that joining meant that someone would *"come to my house and measure",* or come *"anytime"* her BP is high. These trends had no variation when data was segmented by various participant variables related to enrollment, including if participants enrolled before or after delivery, how many months they have been in the program, if the project pregnancy was their first, and if they were new to having BP issues or had a personal or familial history of BP issues.

Participant Definitions of Health

Participants were asked how they define health through the question "What does being healthy mean to you?", and through other probes throughout the interview. These responses are important because they show what patients value about different elements of health. This may reflect on what knowledge they have understood from their CHWs about health, or may be guided by what they personally prioritize even before the program. These responses may also illustrate how important they consider BP monitoring and management to their health. General topics mentioned within this category included children, food or drink, exercise, weight, BP management, and BP medication.

Four of the six interviewed participants mentioned that their definition of health included being able to care for their newborn baby, both in terms of generally being *"there for my children"* or specifying their desire to be healthy so they can have a *"long life for my baby."*

The topic of food or drink was mentioned by five of six interviewed participants when defining health. Of four of these participants, three mentioned that generally being healthy involves being aware of what you eat, with one specifying that she improves her health by limiting her salt and sugar intake, and another specifying that healthy foods *include "large amounts of vegetables, greens, all that."* One participant spoke about food in that when she feels healthy, she is able to feed her children daily. The middle quote in **Table 2** displays how this participant, who indicated food insecurity due to financial difficulties, recognizes that eating enough healthy food is essential to other aspects of health such as having energy to exercise. Further discussion of the specific diet changes mentioned by participants is detailed in the section on BP management.

One notable element of the responses to the questions about the definitions of health was that while several participants highlighted factors such as diet and exercise, several participants also recognized that health has many dimensions, such as by stating that *"being healthy is not just doing a lot of exercise, it's also eating the right foods"* or *"being health means… just having a healthy lifestyle. I won't necessarily say it's weight."* Medication similarly was described with two different perspectives, with one participant mentioning that to her being healthy meant coming off of her BP medications, while another woman mentioned that to her being healthy meant going to the doctor, receiving any medication they prescribe, and following the doctor's instructions about taking that medication.

Most participants did not directly mention BP management or measurement as a part of their definition of health, with only one participant mentioning that being healthy involved measuring her BP, and another mentioning being healthy involved keeping her BP low. However, later in the interviews, when asked about BP management and measurement, all

participants expressed the importance of BP management to their health, which is discussed further in the next section.

Table 2 – What Does Being Healthy Mean to You?				
P: Um… being healthy means… just, I don't know, just having a healthy lifestyle. I won't necessarily say it's weight or keepin (unintelligible). You know, just keeping a healthy lifestyle, what you eat, the activities you do, you know, every day. Um, I don't know. *I: Yeah.* *P: It's just the choices you make, that's all.* *I: Yeah. And what does being active mean for you? You mentioned that, being active.* *P: Um, just moving (laughs). Like, just moving. Like, if I was at work, I would be constantly*	*P: Being healthy means everything to me for one, because I want to set an example for my oldest son, because he's on , the path of trying to be healthy also. Again, I am a new mom again, my son is [redacted] months. And being healthy is going to help me be here to raise them. That was very important to me, to be healthy. I have changed a lot, with my life, trying to be healthy. Because I have always been, you know, on the obese side, my oldest son, he's on the obese side. So, you know, we recently joined a gym, we have been changed our, you know, salt intake, and*	*P: I mean. Being healthy is not just doing a lot of exercise. It's also eating the right foods. It's […] How can I say this? It's eating the right food. It's being able to walk or run without you getting tired, cause you could have a great body, cause you do a lot of exercise. But some people just by walking they get tired, or they get suffocated too much, you know. So it's being able to do normal activities without having that sensation that you can't breathe or that you get tired.* *I: Yeah. And when you say eating the right foods, what does that look like for you?* *P: Like large amounts of vegetables, foods, greens, all that. Some people just put whatever in*	*P: Yeah, health is very important. Without health you cannot do anything. And if you, if I have any concern of my health, I don't have hope for future. So health is very important for everybody, for everybody, for even everyone, for every living thing, all the living things, health is very important.* *I: Mm. Yeah. And when you think of health, what do you think of? Like how would you feel? What are you able to do? For you.* *P: Yeah, I.. yeah for us what I think to do is to take care of myself. I have to, I have to take care of myself, and look at the people who knows about health. I have to go to doctor and*	*P: Ah, this means a lot, a lot, because I feel like I'm fine. I am there for my children. I am there for myself and I am able to manage my blood pressure.* *I: And when you are healthy, how do you feel?* *P: When I am healthy, it makes me want to hold my children, to change them, to play, it makes me want to feed them daily. Everything feels all good.* *I: Good. What do you need to be as healthy*

moving. I wouldn't be at a standstill at home, you know, just chilling, eating (laughs). You know, I just, you know, would have more things to do, even though my baby, she keeps me busy. But just, you know, it's not the same type of work.	*sugar intake, and just trying to be healthy and keep my blood pressure – my blood pressure has been under 20 since leaving the hospital. So things are getting better for me… being healthy is important to me.*	*their plates, and they don't realize what they are they putting.* *I: Yeah. And when you feel healthy like, how do you feel? You know, physically, emotionally, mentally.* *P: Well, physically, when I am able to eat a good meal I get a lot of energy. I clean around the house like I am able do a lot of stuff during the day. But when we don't get to eat healthy, I feel tired […] I feel sleepy. Sometimes I feel dizzy. It's very different from when we can eat a good meal to when we don't.*	*uh, find the medicine, everything, what I have to do.* *I: Mhm, yeah. When you say "Take care of myself" what do you mean by that?* *P: I have to listen for the professional people, whatever they told me, like when they say check I have to check, and I have to be careful for my foods, to make exercise. Everything what they told me is for me, so I have to listen and do.*	*as you want to be?* *P: Well, exercising, going for a walk, going for a little run when the weather is cool.*

BP Management – Overview

The interviewed participants were asked several questions about BP management in general before they were asked about BP measurement specifically. The questions about BP management included asking what they've heard about managing BP, what helps them to manage their BP, what makes it challenging to measure their BP, what their motivations are for measuring their BP, how the CHWs are helping them with managing their BP, and if their

opinions about BP management have changed through the program. All of the interview participants' responses to these questions are summarized in **Table 3**.

Table 3 - Overview of Participants' Responses to questions about managing BP

Identification of important components of BP management Response to question "What have you heard about **managing** your BP?"	Diet ● Increasing awareness of diet ● Eating "as healthy as we can" ● Changing diet - *see "Specific Diet Changes Mentioned by Participants" table below* Relaxation/stress ● Reducing stress in general ● Increasing calmness *"not get so upset, be calm in situations"* ● Addressing the cycle of stress from fear about high BP outcomes causing higher BP BP measurement ● Importance of measuring BP ● Contacting health professional if measure high BP ● Specific BP numbers to be aiming for Other ● Rest ● Taking medication ● Contacting doctor or people who know about BP ● Outdoor activities, such as walking
Facilitators to BP management Responses to probes about what helps, or makes BP management easier	● Trying to be stress free, such as by resting by watching TV shows participant enjoys ● Baby, *"she keeps me mellow"* ● Trying to eat well ● Taking medication ● Partner helping take care of baby
Barriers to BP management Responses to probes about what makes BP management hard	● Remembering to take medication ● Difficult to stop eating unhealthy snacks, especially if foods accustomed to: *"not being able to eat the crazy things that I grew up eating"* ● Weather not being good for walks ● Lack of adequate housing, mom and baby not *"having our own space"* ● Life being stressful, and challenging to try to reduce stress when life is stressful
Motivations for wanting to manage BP	● Fear of negative outcomes: *"I don't want it to lead to other things",* reference to BP as a *"silent killer"*

	● Acknowledgement of family history of death in part due to high BP (participant's grandmother) ● Wanting to get off BP medication ● Being able to take care of baby, or baby and other children
How interviewed participants described how CHWs are helping with managing BP Not including help that is related to measuring BP, which is discussed in the following section	● Helping devise plan for how to better remember to take medication - putting pills next to toothbrush, something she sees everyday ● Checking up with participant to make sure BP is okay ● Advising when to see a doctor in regard to medication, for example helped a patient who was having extreme dizziness from BP meds by encouraging her to go to a doctor's appointment, where she was switched to a different BP medication ● Helping participant get on medication when needed ● Noticing when patient is put on a new medication and following up with them - highlighted as very appreciated and surprising by patient
If / How opinion of BP has changed through program	● More interested in measuring BP (see following section) ● Learning about negative outcomes, such as strokes ● Learning more about what BP is: *"It is not fire in the body, I didn't know this before"* (Spanish speaking participant)

BP Management – Diet

When asked the very first question about "what have you heard about managing BP?" diet was the most mentioned topic. **Table 4** summarizes the diet changes mentioned by participants. Some of these changes were mentioned as changes that they had already made, such as drinking water instead of juice or soda, but others were mentioned as changes that they are working on but find difficult to make, and as the reason why BP management was hard. Two changes particularly mentioned as challenging by participants were changing eating habits from what they were accustomed to, such as what they "grew up eating", and changing caffeine intake by drinking less coffee, which was deemed too challenging by a participant to cut completely so she instead aims to just reduce. An additional important point to note is that the changes listed in

Table 4 were not all listed by every interviewed participant, with some participants only mentioning salt, while others only mentioning fat and sugar, etc. This indicates that while all participants know that diet is important for managing their BP, they may not all value or have knowledge about all the various aspects of diet that are important for reducing their BP. Several participants mentioned that they had a desire to learn about how they can improve their diet to manage their BP as a part of the program, and one specified that meal plan delivery services or cooking classes would be helpful.

Table 4 - Specific Diet Changes Mentioned by Participants as Important for Reducing BP

Note: Some of these changes were mentioned as changes they had already implemented, while others were changes that they are working on but still struggle to consistently make.

- Drinking water instead of juice or soda
- Snacking on fruit, such as oranges, instead of candy, chips, or fried foods
- Not eating salty foods / high sodium foods, such as pork; avoiding a lot of salt
- Not eating *"bad food"* defined as fast food
- Not eating pasta
- Not eating fatty foods; avoiding greasy foods
- Avoiding a lot of seasoning
- Changing habits from what accustomed to, from *"what I grew up eating"*
- Not eating sugar, sweets
- Reducing drinking coffee / caffeine (too challenging to stop completely)

BP Management – Stress Management

Another commonly mentioned theme about BP management was managing stress. Interviewed participants expressed knowledge that BP is impacted by stress, with many mentioning that they try to reduce their stress as a way to manage their BP, as described in the table above. The quotes in **Table 5** particularly describe how two participants think about stress, relaxation, and BP management. One potentially notable element from the first quote is that this patient may believe that she needs to remove all stress from her life in order to control her BP, such as described in the statement "*If I'm crying, don't cry.*"A similar sentiment was expressed

by another participant, who described that she believes her stress about her BP being high causes her to be more stressed, which in turn raises her BP. These sentiments point to how the program might adapt their guidance about stress to ensure that it is focused on stress management rather than fear of the existence of stress. It also illustrates how she views exercise and medication as also important for her BP management. Interestingly, she did not mention measuring her BP as a cue to her actions for trying to reduce her BP, but rather that she makes these changes when she can "*feel that my blood pressure is very high.*" This quote illustrates that while all patients discussed the importance of BP measurement as a component of BP management, as described more thoroughly in the following section, they are not all always dependent on measuring their BP to shape all their actions related to BP management.

Table 5 - Quotes from Participants about BP Management and Stress

I: And how do you control your blood pressure? What things in your life can help you control this number?
P: I need to relax myself, sit down, not think or stop for a moment [laughs]. If I'm crying, don't cry. I need to relax and not think about anything or anyone.
I: And are there some activities you can do to control your blood pressure?
P: Yes, well when I feel that my blood pressure is very high, I ask myself, how I am feeling. I sit down and tell my children: well, let's exercise, I tell them here let's sing together. I forget the bad things that are happening to me. I tell myself that I need to keep taking my pills and, really, not get very angry and do my exercise.
I: Mhm. Is it important for you to manage your blood pressure?
P: It is. It is because it's a silent killer, you know it is scary, and I think that's where most of the stress come from, which can throw my blood pressure off, from stressing. So that's why it's, it's very important for me to manage my blood pressure.

BP Measurement – Overview

Participants were asked several questions about BP measurement, such as what their general experience has been measuring their BP has been like, if they find it easy or hard to do, and what makes it easy or hard, how important they find it to measure their BP, and if their opinion on BP monitoring has changed. An overview of these responses is summarized in **Table 6**. All six interviewed participants stated that the actual process of measuring their BP was easy after being taught how to do it, but they found other aspects of measuring challenging, such as remembering to take their BP, finding time to take their BP, or knowing what values are considered worrisome. In terms of remembering, multiple participants described how it is hard to find time to measure their BP because they are busy with their baby and/or other children, or busy with work, or with life in general. One participant who stated it was difficult for her to find time to measure her BP shared that when she does measure it, she *"feels good"* because *"I see good numbers, so my mind is free, because I don't have any problems."*

Table 6 - Overview of Participants' Opinions about Measuring BP

Motivations for wanting to measure / Importance of measuring BP	● Fear of outcomes ● Wanting to determine if they can stop taking BP medication ● Wanting to gauge how successful their BP management efforts have been, such as diet changes, stress reduction, activity ● Several note that the importance can change depending on presence or absence of symptoms, and if the participant feels that they managed their BP well or poorly that day (i.e. if they know they ate unhealthily, may be more motivated to measure)
Facilitators to BP measurement Responses to probes about what helps, or makes BP measurement easier	● Machine is easy to use, BP measurement is an easy process ● Easy to contact CHWs about their values ● CHWs reminders to measure ● Family support, such as mother-in-law helping with measurements ● Valuing the information gained from measuring, especially if

	numbers show their BP is in a good range, *"I see good numbers, so my mind is free"* ● Ownership of measurement responsibility, expressed through sentiment of need to "*do my part*"
Barriers to BP measurement Responses to probes about what makes BP measurement hard	● Difficult to remember to measure BP because of baby, work, or general stresses of life ● Difficult to find time to measure, also related to reasons it is difficult to remember ● Can't remember which values are high or low ● Mistrust of machine's accuracy
If / How opinion of BP measurement has changed through program	● New awareness of importance of BP measurement ● New desire to measure their BP ● More aware of their own health instead of in previous pregnancies where they just focused on their baby's health

When describing what motivates them to measure their BP, participants mentioned similar sentiments to their motivations for managing their BP in general, such as fear of outcomes, wanting to determine if they might be able to get off BP medication, and wanting to gauge if their work trying to improve their diet, manage their stress, and increase their activity was working. One participant mentioned that she has slight distrust in the BP monitoring device itself because she formerly had a different BP measuring device that was found to be faulty when she thought she had a very high reading and called 911, and the Emergency Medical Services (EMS) told her the machine was wrong. Although she now has a different machine, this distrust has carried into her current feelings towards her new machine.

Most patients stated that measuring their BP was important to them. One participant specified that the importance of measuring her BP changes day to day depending on her feelings and behavior: for example if she has any sort of symptoms or if she knows she hasn't eaten well, she is more motivated to measure her BP. This experience illustrates a larger theme around when participants are cued to measure their BP. Several participants mentioned that feeling symptoms

such as a headache would definitely be a cue for them to measure their BP, and that they often won't measure their BP if they don't have symptoms. Other participants mentioned that they do measure their BP on a regular schedule, independent of if they have symptoms or not.

Most participants stated that they did not think there was anything else the program could do to support them in measuring their BP, stating that the program has done their part and now it was up to them to *"do my part."* One participant mentioned that setting a daily reminder alarm would help her to measure her BP, but she would not want this to come from the program, but rather set up herself. Another said that the only thing that would help her was if *she "carried that machine around with me."* They expressed gratitude for the CHWs reminders and asked them for their measurements.

Participants mentioned that their opinions of BP monitoring have changed due to the program because they now have an awareness and desire to know their BP values, which most did not have before this project. One participant, whose quote is in **Table 7**, states that she thinks that measuring her BP with this project *"probably saved my life".* Participants who had other children before their most recent pregnancy expressed that with the project, they are much more aware of their own health in comparison to prior pregnancies, where they did not know if their BP was high or not, as described in the quotes in **Table 7**.

Table 7 - Quotes about BP Measurement Attitude and Behavior Change Due to Program

"I: Great, and so you mentioned that this is your second pregnancy. How has the postpartum experience been after you've given birth this time compared to your previous postpartum experience, after you had given birth the first time?
P: It's been actually much better since I have the machines to control my blood pressure. Oh, it's been way better cause with my first postpartum I would feel sometimes down, sometimes weak and I wouldn't even know why. And that day that [CHW name] came up to me and told me about the pressure that it continues after you give birth. I didn't think from our first pregnancy, that's what could have been happening with my postpartum, you know, feeling

weak, and all that. And now that I knew all that for the second pregnancy, I'm like, oh, so this is what's happening. I didn't feel like I didn't know what was going on anymore… after I gave birth to my first daughter, I didn't really take care of myself at all. I mean I just took care of my baby, and that was it. But I really didn't think that I needed to take care of myself, but more I needed to take care of my baby. Now [during this postpartum period] I'm taking care of my baby and me. Like, I said, we go for walks in the park. We try to eat more healthy, and I guess that helped me lose a lot of weight, too."
"I: And then another last question about blood pressure was how your opinion of blood pressure monitoring changed through the program? *P: Yes. Cause again, I wasn't checking at all, I didn't care about checking. You know when I've checked? When I was going to like maybe a grocery store or Walmart, or something, and you know how you walk past those machines and you just sit there and do it.* *I: Mm, yeah.* *P: That was the only time I would check, honestly. So yeah. So doing it now, because of the program, it has changed a lot. It probably saved my life because it's like, that, you know, on the regular is very important. But of course, no one thinks, oh my blood pressure is probably high, I should check. No one is going to out of the blue do that."*
"I: Mhm, Yeah. What is something new that you learned about blood pressure from [CHW name]? *P: So before. I don't check myself. I don't check myself, because even when I get my kids, I don't know, I don't know that I was normal, or I was not normal, on my blood pressure. I just get a baby, and then I just came home, and maybe even, that time, I was… Actually, I was going checkup. But I don't know this program. I don't know about myself at that time. But now, I know myself what I have to check. So this program helped me to check myself."*

BP Measurement – CHW assistance

Throughout their responses, participants mentioned several ways they appreciate their CHWs assisting them with their BP measurement process. All three of the participants of one CHW mentioned that they really appreciate her checking in with them about their BP, such as by text or call, specifying that this helps them keep track and remember to take it. Interviewed participants also mentioned an appreciation for the knowledge CHWs have taught them about BP measurement, such as instructions for how often to check their BP, how to use the BP measurement machine, and about which BP values are considered acceptable or worrisome. One participant mentioned that due to lags in her memory she coined "pregnancy brain", she

struggles to remember what BP is good or not and often asks her CHW after measuring. Another participant mentioned appreciating when the CHW takes her BP for her when she does a home visit. One participant mentioned that her CHW gave her a "watch" that is an alternative tool for measuring her BP more quickly than the larger machine.

Table 8 - Quotes about CHWs Assistance of Interviewed Participants with BP Measurement

"*She's always checking in, like sending a text message or a call, you know, reminding me to send her my numbers, or have you taken your blood pressure? So she's, [CHW name] is really good… And then, it's not always about the blood pressure, we just check in to see how I'm going and everything, how my baby is doing."*
"I: Ok, and when do you take your blood pressure? *P: I take it when I'm well. I take it every day at the same time so I have it for [CHW name] and she doesn't get mad with me […] because she has given me a lot of advice and I want to make sure I have taken the measurements."*
"I: So what has your experience been like with measuring your blood pressure? *P: Um, it's kinda difficult. I still don't have it down pat. I still have to google if that blood pressure is good or not, you know, because again, like, I lost a lot of memory, you know, so I kind of catch on a lot slower. And they said it was, you know, normal, because I was pregnant, and it was like pregnancy brain, and whatnot, they gave me another term. But I did lose a lot of memory, and things of that sort, so kind of, I'm kind of slow when it comes down to certain things, I will say. So I still have to google and make sure that it's, you know, good, or I would reach out to [CHW name] and say my blood pressure was this, how does that sound? And you know, she would ask me, you know, she will tell me, "Oh, that sounds great!" or "Oh that doesn't sound good, am I having any symptoms with that blood pressure?" and things of that sort. "*

One final interesting case to note is that one participant has her mother-in-law take all her BP measurements for her, and then inform her if the BP measurement is good or not **Table 9**. Although only one of the six interviewed participants mentioned a family member having such a crucial role in their BP measuring experience, it is important for the program to know that some participants may not be leading their BP measurement aspect of their BP management. For

example, this information could lead the CHWs to direct education not only towards the participant, but also anyone else they have involved in their BP measurements and management care.

Table 9 - Quote about Family Involvement in Measuring BP

"I: What has your experience been with measuring your blood pressure?
P: Oh, I mean, it's been easy since my mother-in-law also has to take care of high blood pressure and [CHW name] gave me the machine to keep checking on it. So since my mother in law knows how to use that machine, how it works, and everything I mean, I just go up to her room and she checks it in. That's it, and well, if she sees a high number or she sees it's too low, that's when she gets on me for not taking care of myself.

High BP Emergencies

Through analysis of this project's theory of change, it became clear that in order to reduce maternal morbidity and mortality, it is important that women not only know how to measure their BP, but also what to do if they are having a high BP emergency. Managing a high BP reading appropriately is closely related to understanding the relationship between symptoms and BP readings, and understanding what actions are recommended for what types of readings and symptoms. Patients should be able to take their BP, know if it is above normal, identify if they are having any symptoms associated with a high BP emergency, and go to the hospital if they are having those symptoms. If their BP is still high but they are not having symptoms, they should know what other actions they should take, such as ensuring they take their medications, modify their diet, exercise, or stress levels, or contacting their PCP or CHW.

Participants were asked three specific questions related to the concept of high BP emergencies. First, towards the beginning of the interview, they were asked if a doctor told them any symptoms to watch out for during the postpartum period. Participants listed a range of symptoms, but no participant listed all of them. Three of six participants listed headaches, two

listed swelling, two listed lightheadedness or dizziness, and one listed each of vision blurred or spotting, chest pain, weakness, vomiting, nose bleeds, and falling. One participant did not remember a doctor telling her any symptoms associated with high BP, but later recalled that her CHW had told her that nose bleeds could be associated with high BP. These results suggest that providers need to improve how they are communicating to patients which symptoms to watch out for after delivery, and CHWs should be sure to emphasize these symptoms to their patients.

Participants also were asked what they would do if they measured their BP and it was high. A wide range of answers were given to this question that mostly centered around two themes: either that they would relax and take it again, expecting that the relaxation would make it go down but if it did not they would go to a doctor, or that they would immediately go to the ER or contact their CHW. In the relaxation group, not all participants were probed to determine at what point they would go to the hospital, but one that was probed mentioned that if she did not have any symptoms she would not think to go to the hospital. Two participants had experiences of going to the ER or calling an ambulance because of high BP: one because she also had swelling and chest pain, so went to the ER, and another called an ambulance because her BP was very high, but when EMS came they said her BP was fine and the machine she had was faulty, as mentioned previously. One participant shared that she was not confident in her understanding of what BP values are considered high, and that she always contacts her CHW to confirm.

Finally, participants were asked how they feel when they see a high BP measurement. Participants described feeling scared, shocked, panicked, or discouraged especially if they thought they had taken their medicine, ate well, and relaxed. Several participants mentioned that they would think back on the day and try to figure out why it was high, or would take their

medicine, or would feel like they needed to go to a doctor. Despite these negative feelings, no participant mentioned not wanting to measure because they didn't want to see bad numbers.

When the CHWs were asked about what they perceive their participants to understand about high BP, both indicated that they believe their participants know what values are considered high BP, and that they would go to the hospital if it was an emergency. One CHW indicated that she has found using the example of a woman who did need to be admitted to the hospital because of high BP and swelling as an effective anecdote to help women increase their perceived risk. To this end, several participants mentioned not wanting to get outcomes or symptoms associated with high BP, such as outcomes like a heart attack or stroke, as their motivation for managing their BP.

These results show that patients have a decent understanding that certain symptoms should be cues to the action of seeking emergency care, but they do not have a full grasp of the range of symptoms they should be looking out for, or what BPs are considered “high". Interviewed participants' responses about their feelings when getting a high BP show that there is widespread understanding among these participants that they understand the risks of having a high BP. However, there is a lack of clarity on what actions they should take with what BPs. As the questions on this topic were asked in a general hypothetical manner, without specifying what values we were considering high or what symptoms were in the hypothetical situation, these responses should be understood to only describe a general summary of participants thoughts on high BP readings and associated symptoms, and not a complete prediction of their course of action. Nevertheless, participants could benefit from increased instructions from CHWs on what actions they should take from what BP measurements.

CHW Personal Qualities

The data clearly showed that one main reason for the program's success is the positive personal qualities of the CHWs conducting the program. Multiple participants mentioned how much they valued personal qualities of the CHWs, such as their lack of judgment, communication skills, respectfulness, flexibility, and honesty. Adjectives used to describe the CHWs included *"helpful", "sweet", "a great person", "easy to communicate with",* and *"positive".* One participant specified that she finds her CHW's action and the overall project to be a positive contrast to her experience with another program where she was asked to be in an interview and was told it would be 5 minutes, but then was asked questions for 30 minutes. She expressed gratitude twice during the interview to her CHW and interviewer for being honest and flexible with what time they are requesting. Two participants mentioned that it was due to their positive interactions with their CHWs that they consented to being part of the interview process.

The CHWs themselves also indicated in their interviews that they can tell that the patients are responding well to interacting with them, especially during the home visits where patients are more relaxed, engaged, and comfortable, and therefore are more honest about their health and *"what's really going on."* The CHWs also described how they both go above and beyond for their patients, such as by spending over an hour in conversation answering questions with patients about their health and helping them genuinely become motivated to make changes in their lives, to walking patients through the process, even physically accompanying, of getting financial assistance from GMH for their appointments so they do not get bills they cannot afford. One CHW particularly mentioned that the patients' trust of her is helpful when having a "follow-up session" before or after a patient's appointment at GMH, because she can help them communicate messages to the doctor that they may not feel comfortable sharing. A final quality

of both the CHWs that was apparent in their interviews is that as the program has gone on, they feel more and more empowered to speak up to the larger project team with concerns, ideas, or suggestions they have from their experience with participants in this project, and their background in working with similar populations prior to working on this project.

Table 10 - Quotes from participants and CHWs about CHW personal qualities

"I: Can you give me an example of a time where talking with her, you feel like it helped?
P: Um, I guess, like, the time when she came out to the home, you know, just, just to have someone to talk - I mean, not just like have someone, because I have people to talk to – but, just talking. It was like, having the visit after the pregnancy, and all that other coming up … it was just helpful. It would light up your day.
I: And, you mentioned, you know, you have other people, you can talk to about things. What do you think makes talking with [CHW name] unique?
P: Um, it's because, she really - you how you can talk to people that just don't know your everyday lifestyle is like, there is no judgement, nothing like that, just conversation, peaceful conversation, with no judgment." - Participant X

"Yeah, but to tell you the truth, because when I don't know, we don't need, to give address to people you don't know. But when we see her, she's very positive, so that's why we continue with her." - Participant Y

"It was very helpful to be able to talk back and forth about my blood pressure, me and [CHW name]. We also touch bases and talk more, you know, about a lot of mental health things that I was dealing with. She's very, very, she's a great person, and I was really thankful that you know she was chosen to be that person for me, because it was easy to communicate with her. She was always there when I need to call for anything, she always checked up on me because there was sometimes that I were, I was kind of distanced, and she checked in just to make sure, and stopped by to make sure that, you know my blood pressure was in order, and if it wasn't, you know, she was there to tell me hey, I think you should go in, and things of that sort. So I think it was good that I had her. " - Participant Z

"When it comes to home visit initiatives, I feel like patients really like that. I feel like you can be more engaged. I feel like they, or they are more engaged in their home environment. They don't feel like it's like in the hospital setting, 'I'm this professional, I know all these things and you are, you know, just the patient.' Because here at Grady, a lot of, we have had meetings before and patients feel like they're not heard, or they feel like they're belittled. So I feel like in the home visit pieces of it, it really gives you a chance, like when I go to home visits, I know I might wear like a Grady T-shirt or a "Choose Health" T-shirt and like jeans and sneakers. So it's like, it just feels more comfortable, and I feel like they open up more about, like any kind of

health care issues they may have had in the past, things that they're dealing with now. They're more honest about whether or not they are doing their blood pressure, if they're taking their medication. I don't know, it's just, it's a different feel than like being in the office or me going into their exam room. I feel like they're more, like, open. Cause in the doctor's office, I have had patients, not with this program, but in other programs, in the room with the doctors, they will say one thing and then when I get to their home, they'll go ahead and tell me the truth of what's really going on." - CHW A

Additional Participant Perceptions of the Program

The participants' perceptions towards the program have been described throughout this section. In general, participants were very positive about their experience with the project, expressing gratitude for the CHWs giving them guidance and checking in on them about their BP and about their life. All six interviewed participants said they would recommend the project to a friend if they were interested, describing the program's impact on their health as *"a push to want to do better"* or that it "*makes me like, more aware, of you know my health and, the things that I should do and shouldn't do, and the causes and effects of each choice I make."* Most participants did not only mention BP support, but also other elements of the project positively, such as social support, home visits, financial support from compensation from participating in data collection. One interviewed participant specified she would tell a friend that the program is *"nice"* due to its home visits because "*she don't have to go somewhere by herself, they can come her home*", showing that she may find having to go to appointments alone as a barrier to receiving care. Another participant stated she would describe the program's help to her as having *"a social worker that helps me navigate… monitoring and keeping my blood pressure at a great level"*, emphasizing that it may be the social work skills of CHW they value the most.

Table 11 - Quotes about Benefits of the Program Beyond BP Measurement

"I: And what do you think of [[the community health worker]] doing these things to help you?
P: Oh, I'm very happy with all the advice you [CHW] give me. But it's like she's giving me emotional support and making me so happy, like she is my mother. I am so happy for her support."

"I: How has it been going for you being enrolled in this program?
P: As of today it's been great, actually, like, I said, it's been very helpful with food. The last $50 card that she gave me.Yeah, so actually it has been very helpful, even more helpful than I thought. I thought they were just gonna call and do surveys, and you know, like other people that just be asking questions and being there all the time. But it's actually been very helpful."

One sentiment that came up among four of the six interviewed participants was that they felt that the program was providing everything that they needed, and now it was up to them, the participants, to "do my part". The contexts in which this sentiment was raised was brought up when probed about further help the program could provide for help with measuring or managing BP, or when specifically mentioned in terms of the help that the CHWs or other medical professionals being "their part", with the ownership now on the participants to do "my part" by following their instructions. Without using this particular phrase, one participant expressed this sentiment quote about this sentiment is in **Table 12**:

Table 12 - Quotes about "doing my part"

P: "I have to listen for the professional people, whenever they told me, like when they say check, I have to check, and I have to be careful for my foods, to make exercise. Everything what they told me is for <u>me</u>, so I have to listen and do."

CHW Assistance with Participant Appointments

In addition to the needs of participants already mentioned in this results, one other key area where they expressed need was in scheduling appointments. Participants were asked if their CHW has helped them with scheduling appointments, or doing anything else for their appointments. Several participants mentioned that the CHWs have helped them with scheduling their appointments, and that this was very helpful because they struggle to be able to schedule appointments quickly themselves, often being left on hold for a very long time. Alternatively, some participants mentioned that they had no problems scheduling appointments themselves. In the interviews with CHWs, they did mention that they help many patients with scheduling appointments. Participants mentioned gratitude for CHWs support in reminding them about their appointments and following up with them about their appointments afterwards. One CHW emphasized that she strongly instructs her participants to bring their BP log to their appointments so that their doctors can understand what is happening with their BP. Although this instruction was not specifically mentioned by the other CHW, it may be challenging for her to implement as she described that many of her patients do not use the log, but rather rely on the CHW to keep track of their BP measurements for them, which is discussed further in the next section.

Additional Needs of Participants

The participants mentioned several areas of need that they have that the program does not currently address. These included child care support, further financial support, and assistance navigating insurance challenges such as applying for life insurance. One participant, quoted in **Table 13**, described the ways that she believes her being rejected from life insurance impacted

her having a high BP. This stark example clearly illustrates how social barriers truly are determinants of health.

Table 13 - Quote about Life Insurance and BP

"When I first got pregnant I and I'll say about 5 months in, I kind of got scared, because I'm up in age. I haven't had a baby out in 17 years. And like my health was just crazy. I won blood thinners, and I was worried about delivery, and I, I was just so scared, you know?...
You hear all these bad things about how doctors are, you know, I don't wanna say they're killing people, but they're not really just focusing on your health. So I was afraid, that… I was going to die…
And I ran out. I've never had life – I had life insurance with different jobs, but this particular job I have now, I don't have life insurance. So I reached out to [Insurance company] in reference to getting some type of life insurance, and I pay deposit to get it and everything. And I spoke to the guy on terms of the things, that I was pregnant, and what I was going through, and all. He assured me that I would be covered if anything took place and all of the above. So I just want to make sure that I wasn't gonna leave my son here with no resources and things of that sort to bury me…
And I'll say about a month in, I'm at like 6, 7 months, and I received money back into my account, and I received a letter from [Insurance company] saying that basically they narrowed things down, and they could not cover me because of my health. So it was very frustrating for me, and it was, it was kind of more scary for me. So I think that kind of like, raised my blood pressure from stressing and then scared, the whole pregnancy now, because I could not get covered with life insurance from [Insurance company]. And I know I could have probably tried other people. But it's kind of disappointing, to feel like you're that sick, and they don't wanna cover you…
So life insurance on me, and you know, my kids and stuff like that would be great if this program offered that, and gave me more knowledge on how to look into that. Because I'm really not so knowledgeable in that area."

CHW insights on BP measurement

The challenge of reminding participants for regularly take their BP was discussed as a key challenge, although with different challenges identified by each of the CHWs, which aligns with the division of their participants - one CHW is focused more on participants who are Black Americans, and the other CHWs is more focused with participants who are Hispanic or immigrants to the US. One CHW mentioned that she believes home visits help participants form

personal connections with the CHWs and therefore become more motivated to send them their BP measurement. However she noted that while she was sending reminders about BP measurements, few were responding, but once they decided to incentivize patients for consistent measurements, many participants started responding more. She also expressed that participants responded well to her examining their schedule with her and identifying when they could measure their BP. Tying in to the interviewed participants responses in the previous section on BP measurement, although this CHW mentioned that participants weren't responding to her reminders about BP measurement, participants did mention that they appreciate these reminders. Similarly to participant responses, one CHW mentioned that her participants greatly link feeling symptoms of BP to their conceptualization of their BP, such as through the statement *"I feel like people get in their mind that 'I feel okay, so, you know, my blood pressure should be fine,' so they're not taking it serious as they should be."* A similar sentiment was shared by the other CHW, who stated that the patients who are motivated to take their BPs during the postpartum period often lose motivation after they go to a PCP appointment, sharing that "*they think okay, 'I'm good now', they say 'the doctor said everything is okay, I don't need more medication.'"* She noticed that in families that have a family history of strokes or death due to high BP, they are much more motivated to continue taking their BP than those who do not.

Both CHWs have adapted to having flexible expectations for how often their participants record their BP, recognizing that although the program initially was hoping to get two measurements per day from all participants, this has not been realistic for most participants. For example, one CHW stated that it is difficult for patients to measure their BP twice a day especially when caring for their baby, or babies, with her sharing that she has two participants who had two babies in one year. She described that the program's decision to lessen their

expectation of twice daily measurements made sense, but was unfortunate that it was *"too much, asking twice a day to check your blood pressure… really it shouldn't be, because some moms have some scary numbers, but I guess it could add an extra stress on them trying to get the blood pressure done."* One CHW mentioned that for some of her patients their frequency of BP measurement has dropped throughout the program, because after the 6 weeks postpartum period they feel that they are not at as high of risk.

The CHWs described different experiences in how their participants are willing or not willing to use their BP log. One CHW described that none of her patients are willing to write their measurements on their BP log provided by the program. One of her participants did make her own log, but did not include dates. Therefore she essentially manages the participants BP log herself, receiving BP measurements from the patients over text or in photos, and aggregating the data herself. The other CHW expressed that many of her patients, especially her Hispanic patients, are very motivated to measure their BP, and have high adherence to measuring their BP and recording it on their log. One patient even took their BP measurement device and BP log with her when she traveled to South America to visit her family, and continued sending her CHW measurements from there. The CHW believes that in addition to being motivated if they have a family history of high BP, this high adherence is due to the comfort they feel speaking with her in Spanish, especially when they are often overwhelmed by a health system that is not in Spanish. She emphasized that for many patients Spanish may not be their first language, but rather a more local dialect, so even engaging with the health system in Spanish is a barrier. Finally, she mentioned that although participants often are consistent with using their logs, they sometimes struggle with what values to write on the log, for example writing the heart rate that the BP machine displays instead of the systolic or diastolic BP. As mentioned previously the

CHW whose participants who do consistently complete their BP logs emphasizes to her participants to bring their BP log with their measurements to their PCP appointments, but this is not possible or not helpful if the participant's log is completed incorrectly, or if they do not complete the log at all.

In terms of what they think would help improve participants BP measurement capabilities, one CHW mentioned that BP monitoring machines that automatically save BP values with a date and time attached to the BP value data, and that even could automatically transfer BP measurements into an EMR system like Epic would be very helpful in reducing the burden on patients and herself. The other CHW stated that she thinks the current device is fine. Further examples of how the CHWs help participants with measuring their BP are in **Table 14**.

Table 14 - Examples of how CHWs help participants with measuring their BP

- **Being flexible** about how many measurements they expect - although twice daily originally requested by program, CHWs often are **making a customized plan** with participants on a more realistic expectation, and setting a phone alarm to remind for this plan
- **Reminding** them to measure their BP over call, text, or during home visits
- **Facilitating incentivization** for BP measurements
- **Managing the participant's BP log** by receiving individual BP measurements through text of the values or pictures of the machine, instead of aggregate photos of the patient's own log
- **Increase motivation** of participants by **educating** on the importance of BP monitoring, in particular about:
    - Risk of dangerous outcomes, even after 6 week postpartum period is over
    - Relationship of symptoms to high BP emergencies, and how they should take BP management seriously even without specific symptoms, but also if they feel unwell should be cued to take their BP
- **Using motivational interviewing** to help participants come up with ways they can better measure and manage their BP, such as finding times to control stress by having a personal "quiet time" in which they can also measure their BP
- **Linking requests to measure BP to other information**, such telling patients about food distribution opportunities and asking them to measure their BP in the same message

CHW Opinions on Training and Support

When asked about the training and support that they have received from the project team, both CHWs expressed that they thought their training was really good, and that they appreciate the responsiveness of the entire project team in hearing their ideas and offering support. One CHW stated that she would like to meet with the program coordinator and the other CHW more often, and really values the meetings where all three of them go through every patient and discuss how the program is doing. Specific areas of additional training requested by the interviewers included learning more about resource repositories such as the United US repository of resources, or learning more about what guidance they are allowed to give around medication. When specifically asked about the motivational interview training, both agreed that it was very useful, but one CHW stated that it was very natural to her because of her social worker background, while the other said it was new to her. The comments about training generally fit the pattern of wanting to learn more about the discipline that wasn't in their background, with the CHW with the nursing background wanting to know more social working resources and skills, and the CHW with the social worker background wanting to know more nursing resources and skills.

Key needs of participants

The CHWs also differed in their descriptions of their participants general needs outside of BP management or measurement. Both CHW's have worked for projects at GMH before, so they have experience with working with the type of population that the program might expect to enroll. However, one CHW mentioned that she believes that the recruitment process for this project is not reaching the type of people she normally interacts with through her work with GMH. For example, and all of her other work, she had participants who struggled with housing,

but none of her patients are struggling with housing at all for this project. She also found most of her participants to not request any food support, transportation support, financial support, or any other major needs, and that most of them have employment. Her description of this gap between a typical GMH patient and the participants of this project illustrates the need for the project to re-examine their recruitment process for unintentional sampling bias.

The other CHW had a very different description of her participants' needs, for example sharing that her participants struggled with access to food and often benefited from her telling them about food access opportunities. They also have general financial constraints, which has lead many of them to express worry that the project will be billing them for home visits or the CHWs general support, which she is sure to clarify. She emphasized many times throughout her interview that many of her participants struggle because they do not have health insurance. This lack of insurance causes them to not want to go to a PCP, which creates massive issues for their continuity of care. She tries to do all that she can to link them to financial services with GMH so they can afford to go to a PCP appointment but recognize that oftentimes they don't believe that the financial services will really help, so don't try. She shared that their fears about the financial services are often well-founded because they often require proof of income and other documentation that is difficult to provide if your salary is paid in cash. She also mentioned that many of her participants are not enrolled in WIC or other services that could be helping them. She shared that a lot of her time with this project is spent trying to link her participants to these resources, and emphasized that a key way the project could improve is to better support the uninsured participants.

CHAPTER 5: DISCUSSION, CONCLUSION, AND RECOMMENDATIONS

Analyzing Results through the Health Belief Model

The Health Belief Model (HBM) can be used as an initial framework to illustrate both the interviewed participants' perspectives on BP measurements and management, and the CHWs thoughts about all of their participants' perspectives on BP measurement and management more broadly(Rosenstock, 1974). A overview in terms of the HBM is shown in the following table for a variety of areas of the program:

Table 15 - Findings in terms of Health Belief Model

Perceived Susceptibility	In terms of beliefs about susceptibility to having negative outcomes associated with high BP, many participants expressed that they understood that their BP could lead to unwanted consequences, and that they were motivated to measure or manage their BP by wanting to prevent those consequences. Many noted that this realization was new because of the program. However, the CHWs did mention that they think many participants don't feel that they are susceptible to high BP outcomes, especially if their BP has gone down since they're pregnant, or if a PCP tells them that they are fine now. However, they did note that some participants do understand the importance of BP measurement and management in part due to their understanding of their susceptibility.
Perceived severity	In terms of the severity of having a high BP, all participants mentioned understanding that having a high BP can cause severe outcomes, and that they want to measure and manage their BP to avoid these outcomes. However, in terms of perceived severity of not measuring their BP, some participants often do not think that there are severe consequences to skipping a day or two of monitoring their BP, especially if they're not experiencing any symptoms.

Perceived benefits	The perceived benefits of managing BP in general were described as being able to feel healthy, be able to do everything they want to do, and lead a long life, as described in the sections about definitions of health and BP management. It was clear that interviewed participants are motivated to want to be healthy and understood that being healthy would benefit their life. However, some participants expressed that some things they can do to manage their BP may not have much benefit without others, such the sentiment that without good food, exercise does not have benefit. In terms of the benefit of BP measuring, not all participants found much benefit for measuring their BP if they did not have symptoms. However, if they did have symptoms, or were worried about their BP for any reason, such as if they were stressed or if they knew they didn't eat very healthily that day, they found benefit in measuring their BP, especially if they were then reassured that it is not high.
Perceived barriers	The barriers participants perceive in measuring and managing their BP is the main focus of the Results section, so will not be re-emphasized thoroughly here, but range from issues including not remembering to measure their BP, to not being motivated to measure their BP if they do not feel symptoms, to having other challenges in life that make prioritizing BP management challenging, such as food insecurity, financial or emotional stress, and housing challenges.
Cue to action	The cue to action to measure BP was discussed in the Results section in terms of its relationship to symptoms. While some interviewed participants were consistent about being cue to the action of measuring or managing their BP solely due to the request of the CHW, many others mentioned that their main cue to action for measuring their BP was having symptoms, or if they are particularly worried about their BP that day. Most participants did not know all the symptoms associated with high BP emergencies that should be cues to action to seek emergency care, as addressed in the Results and Recommendations section. Cues to action for BP management in general were not thoroughly collected.
Self-efficacy	In terms of self-efficacy for BP measurement, participants mentioned that they were confident in their ability to actually measure with the machine, but unconfident in their ability to remember or be able to take their BP as often as the program requested, due to busyness with children or just with life in

	general. In terms of self-efficacy for BP management, there similarly were mixed responses, with some participants mentioning that they had successfully made changes to some of their habits such as their diet, but still struggled with successfully making these positive choices consistently. Participants seemed to acknowledge that the goal is to reduce stress and eat well as often as they can, and that some success is still better than no success. However, they also expressed disappointment if they think they're doing well and their BP does not lower as they hope.

Overall, the program addressed all areas of the HBM in various ways. As expected in a project with a diverse participant population, there are a range of attitudes among participaints within each of these categories. One common theme is the gap between knowledge and practice: participants may conceptually have high perceived severity, perceived susceptibility, and perceived benefits about managing BP in a general sense, but when it comes down to the actual tasks they have to do to do that, such as remembering to regularly take their BP, or consistently eat health, or always be relaxed, they face challenges. In this way it is hard to know how much a participant really does perceive their susceptibility, severity, and benefits: it may be that even though these are high, the limits of "real life" reduce self-efficacy, such as the many elements described as perceived barriers. Examining the data from the lens of cues to action is particularly relevant for BP measurement, as the understandable cues to actions most participants shared, such as measuring only when they have symptoms, are not the cues to action that the program is hoping for. The recommendations attempt to address this concept, but more thought will be required within the project team to determine the best approach for how to properly guide participants on when to be cued to action to measure BP, or to go to hospital because of a high BP emergency.

Other researchers have also employed the HBM to understand BP monitoring and management and found similar results. A team of researchers in 2019 used both the HBM and Social-Cognitive Theory (SCT) frameworks to evaluate the effectiveness of BP intervention based on the usage of an automated SMS system intended to facilitate healthy behavior changes (Allen et al., 2019). Similarly to this study, they employed qualitative interviews to determine themes contributing to participants attitudes, although through shorter interviews (15-20 mins) and a much larger sample size (n=40) for the purpose of a content analysis instead of reaching saturation. Even though their target demographic was different than this work, in that it included people struggling with hypertension over 18 and of any gender, the quotes reported from participants responses were very similar in a variety of areas. In applying their findings to the HBM, they identified hypertension knowledge as a perceived benefit of their program, increased understanding of hypertension as a threat to health as an increase in perceived susceptibility, and high readings as a trigger for change as a cue to action. These results center around the behavior of BP management rather than measurement but are similar to the results found in this analysis. They also linked their findings to SCT in that their program increased awareness of the BP to behavior connection, BP awareness, and BP relevance in the self-observation component of SCT, and that changes in readings were also used as self-evaluation, another component of SCT (Allen et al., 2019). These themes also were present in the data from this project, with multiple women mentioning that they are happy when they see positive numbers, and are aware that poor management of their diet, exercise, or stress, or not taking their BP medication, could lead to increases in BP measurements.

Even more closely related to this project is a very recent qualitative study by Stanhope et al. on cardiometabolic risk management perceptions, strengths, and opportunities among nearly

the identical population to this work: postpartum women who had cardiometabolic conditions during pregnancy, including HDP or chronic or gestational diabetes, and were recruited out of Grady Memorial Hospital in Atlanta, Georgia, the same exact site for this work. Twenty-eight of these women were interviewed in January – May of 2021, and 86% identified as non-Hispanic Black (the % of participants who were Hispanic was not reported). This work was not an evaluation of any particular intervention, but rather a general assessment of people's attitudes without engagement of a targeted program. The results of Stanhope et al.'s work are very much in line with what participants in this study reported of their attitudes before the intervention. For instance, under the concept of perceived susceptibility, they reported that 12 of their 16 participants with HDP or gestational diabetes believed that "their condition was no longer an issue" , and 5 of 15 participants with hypertension were unconcerned about their BP. The contrast of this result compared to the responses of participants in this project highlight that the CHW program's ability to educate participants on their susceptibility to negative BP outcomes is a notable achievement. Interestingly, their doer-nondoer analysis of attendees or nonattenders of PCP visits often expressed similar attitudes towards their perceived susceptibility, indicating that the CHW model may be uniquely responsible for the improved perceived susceptibility in this program. Similar patterns exist between Stanhope et al.'s results and this project results in terms of perceived severity, with participants in the CHW project having a larger sense of perceived severity of BP. The perceived benefits and perceived barriers to managing BP were very similar within these projects, especially within the benefit being oriented towards caring for participants family members, and a main barrier being the time or energy it takes to focus on health. The CHW project addresses the barrier within this population of the cost or availability of BP monitoring devices and adds the benefit of providing additional cues to action through their

consistent follow-ups with their participants, and through improving participants' self-efficacy through individualized instruction on BP measurement and management. Ultimately, the impressive work of Stanhope et al. is a very valuable resource for this project as a kind of proxy data for what participants attitudes towards BP management might have been before prior involvement in the project and demonstrates the many benefits that the program has provided thus far to participants (Stanhope et al., 2021).

CHW Performance as Cause of Program Success

One important area to highlight for why the program is so successful is the impressive work of the CHWs hired to work on this project. As described throughout the results section, especially in the CHW personal quality section and the quotes and tables describing everything that part CHWs have done for participants, the particular people chosen to be CHWs for this project are well loved by participants, and extremely effective at their jobs. To connect back to the literature's definition of a CHW, one prominent review of CHWs described CHWs as "trained laypeople" with no paraprofessional or professional designation, and found that in most literature about CHW interventions, CHWs had no prior experience in healthcare (Brownstein et al., 2007). As discussed in the Results of this work, these descriptions are not good fits for the CHWs hired by this project, who had abundant experience working in programs out of a hospital prior to the study, and who were professionally trained as a social worker or nurse. This training was even acknowledged by participants, with one participant referring to her CHW as "a social worker" in her hypothetical description of the program to a friend. Therefore, this project shows that hiring CHWs who had former careers in closely related fields, such as nursing and social work, actually may be a huge benefit to a program, and that the CHWs personal qualities should be well-evaluated if they are expected to be successful in such a project. If the program really

had trained “lay people” with no prior professional experience in healthcare or programming with the GMH population, it may be unlikely the program would see the success that it does.

Limitations

There are several limitations to this work. Firstly, as with any interview based project, there is substantial risk for social desirability bias impacting the data. Participants and CHWs may feel hesitant to tell a stranger the realities of how they are struggling, so are not fully honest in their interviews. Many participants did mention struggles they have, which may point to an absence of complete social desirability bias. However, some discrepancies between the CHW and participants responses may be explained by social desirability bias, such as participants claiming that BP measurement is generally easy, when CHWs stated that many of their participants struggle with it. Another limitation of the interviews occurred when the participant and interviewer were not speaking in each other’s native languages. Three of the four interviewed participants did not have English as their first language, and although the interviewers made efforts to adapt the language of questions so they would be understood by all participants, there seemed to be a difference in understanding of questions between these interviews and those with participants for whom English was their first language. Finally, the very limited sampling size of this study meant that some comments the CHWs raised, such as challenges with the participants accessing insurance to pay for PCP appointments, or how a CHW shared that she helps many of her participants with breastfeeding, were not present in the participants interviews, simply because there were not enough data points to capture all of these experiences.

Next steps

Next steps of this research involve analysis of the results together with the quantitative reports obtained through baseline surveys analysis. A mixed-methods approach may give further insight into the extensiveness of the themes described by the CHWs and six interviewed participants. Next, a longitudinal qualitative follow-up to this analysis should be conducted within a few months to continue to evaluate the effectiveness of the program and determine if CHWs and participants attitudes have changed in response to modifications made to the program.

For the project, the most important next step from this work is that the project team works together to determine which of the recommendations in this report they wish to implement and develop a plan for for how to implement those solutions. Process evaluations such as this work are only as useful as the process of learning and implementing from their results, as emphasized with the Monitoring and Evaluation field often being referred to as the new acronym, MEL, for Monitoring, Evaluation, and Learning. By assessing the recommendations and acting upon them as best they can, the program can help address the challenges faced by these six participants and likely others. These improvements not only will improve the lives for those currently in the program but will help improve upon the program model that the project is developing.

Conclusion

This project has shown the opportunities and challenges within a program aiming to use CHW to support patients with HDP manage their BP after delivery. Overall, interviews with participants and project staff suggest that the program is performing very well: interviewed participants are satisfied with the program, have learned new information about their health due

to the program, and have changed their behavior as a result of this learning. The extremely positive feedback from the participants about their CHWs and their experiences shows that they know they are benefiting substantially from their participation in the program. The CHWs also echoed positive sentiments about the program, emphasizing their perceptions of how their work is benefiting patients, and that they feel supported by the program in the challenging tasks they have been assigned. These findings connect to the literature mentioned previously about how CHW based projects and BP monitoring projects can be effective interventions for BP management.

Recommendations

Enrollment and Recruitment Recommendations

1. Improve communication of what program includes during enrollment, specifically addressing two issues such as not understanding what the program includes, having unrealistic expectations ("if my blood pressure is high, anytime they can come") or incorrect expectations (One participant implied she thought it was only during pregnancy).
2. Ensure participants approached about enrollment fully understand that participation is voluntary, and that they are *not* required to participate.
3. Ensure participants know that they will not be billed for participation in the project, such as for home visits.
4. Re-examine recruitment process to ensure participants are being sampled include those most in need, as one CHW believes that her participants are generally much healthier than the cohorts of patients she worked with in prior projects out of GMH
5. Continue to make clear how long surveys take, and what is being asked of participants, as participants emphasized that they appreciate this honesty.

General BP Measurement and High BP Emergencies Recommendations

6. Improve education of which BP measurements are considered good versus not good, such as with a visual guide placed in a common spot in the house or on their machine, as one CHW suggested.
7. Increase education on complete list of symptoms that should prompt going to ER
8. Continue to emphasize what participants should do in response to measuring different BP values, such as which should prompt an emergency room visit or calling 911, versus which should prompt reflecting on diet, exercise, stress management, or medication, and contacting their CHW or PCP. A visual guiding tool with a flow chart may be helpful, and could emphasize that they can contact their CHW anytime that they're not sure what to do.
9. Continue to educate on the relationship of BP to symptoms, such as that you should still measure your BP if you don't have symptoms, and that your BP could be high and harmful to your health even without you having acute symptoms
10. Ask participants if they have anyone helping them with measuring or managing their BP, and if so to be sure to involve that person in education about both processes.
11. Clarify when to use which tool for measuring BP, as one participant mentioned she also uses a "watch" for measuring her BP.
12. Address how patients should talk to their doctors about the program, especially in a way that could address the specific situation where someone's doctor told them in an appointment that they should not measure their BP as the program instructs.
13. Clarify guidance on stress and BP management, ensuring participants understand that their goal should be to effectively manage stress rather than being required to remove all stress.

Food-related Recommendations

14. In general, determine ways to better support patients' food insecurity. One interviewed participant proposed having cooking classes for healthy meals (suggested weekend or evenings, and that in-person, phone, or zoom would be fine), or meal plan delivery vouchers.

15. Better determine if/how patients can use the Grady Food as Medicine program, as it is currently hard to do if patients don't have prescription from a PCP.
16. Ensure patients are enrolled in WIC or any other food assistance services if eligible.

Other SDOH Recommendations

17. Support CHWs to be able to connect to more resources, such as improve training on United US resources, currently underutilized according to CHWs
18. Find out ways to better support patients with no insurance, or who need financial assistance, which currently is hindering participants from going to their PCP appointments
19. Better support patients for other things like Life Insurance – quote from patient who was panicked bc rejected for it, thinks this increased her BP during her pregnancy. She asked for help with how to better get this.

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APPENDIX

CHW Interview Guide

CHW Demonstration Project - Participant Interview Guide

Introduction

1. What motivated you to want to work for this program?
2. How is your experience in the project going so far?

Training general (more on this topic is also at the end)

3. Has participating in this program met your expectations so far?
4. How prepared do you feel educating the patients in the various topics you were taught?
    a. Has any topic come up in your interactions with patients that you wish you had more training on?

Opinion on participant experience

General

5. In what ways do you think the project is meeting the participant's needs?
    a. Can you give an example of how the project has impacted a participant?
    b. In what ways could the project improve what it is offering to participants?

Blood pressure

1. I've heard from the project staff that one challenge we're facing with this project is that participants aren't regularly recording their BP. This is something I'm really trying to deeply understand. Can you walk me through how BP measures are collected for the project?
    a. *How is the data flow working for getting BP measurements from your patients?*
    b. *What do you have your patients do if they see a high value when they measure their BP?*
    c. *Do you feel that your patient is empowered to take action based on what their measurement is?*
2. In your opinion, what do you think are the main issues with BP measurement?
    a. *What do you think are the main challenges women have in this process? Probe for lots of details*
    b. *What do you see as the main challenges you all have in this process?*
3. What do you think some potential solutions could be for these challenges? What do you think patients need to succeed in measuring and reporting their BP?

Other specific topics

4. I know that one of the things you were trained on is motivational interviewing. What has using motivational interviewing been like for you, if you used it at all?

   a. Can you give an example of a time when you used motivational interviewing and you thought it went really well?
   b. Can you give me an example of a time you used motivational interviewing and it did not go so well? Why do you think it differed?
   c. *Probe on changes motivational interviewing has given to practice, barriers, facilitators, and comfort with skills*
5. Now I'd like to ask you some questions about participant's doctor's visits.
   a. What is your role in patient doctor visits?
   b. What have been your experiences so far with participant doctor's visits?
      i. *How comfortable do you feel to accompany patients to a doctor's visit?*
      ii. *What is your experience with scheduling appointments for participants*?
      iii. *Probe about transportation issues, copay issues, asking doctors for help if they don't know what to do*
6. What has been your experience linking patients with nutrition resources, such as food as medicine, or counseling on the DASH diet?
   a. *How receptive have participants' been to these resources?*
7. What has your experience been like linking patients with any other resources they may need or want?

Team performance

8. Can you describe for me how accessible the doctors and staff of this project have been for you? What could they do to better support you?
9. Is there anything the project doctors or staff can specifically do to better support you.
   a. *Probes: Any resources she could provide? Anything you would especially like her to keep doing? Anything you'd like her to do less?*
10. What has your experience been like working with the MIH team?
11. Is there anything additional the team can do to better support you in this work?
   a. *Probes: What is helpful, what isn't helpful?*

Assessment of project/ conclusion

1. What lessons have you learned from being in the project?
2. What are some other obstacles that patients face that prevent them from doing what they need to do to take care of their health? This can be outside the scope of anything related to the project.
   b. *Ask CHWs to follow up with me later on this question if they have anything more to add.*
3. In your opinion, are there opportunities for other things you or anyone in the project could be doing with these participants to better support them?
4. What questions would you like me to ask the participants when I meet with them?

Participant Interview Guide

CHW Demonstration Project - Participant Interview Guide

Introduction -

- Hello! My name is [interviewer name]. I am working with Emory's School of Public Health on this community health worker project. I am hoping to talk with you about how this project is going so far. I want to know your opinions on the project and if there is anything we can do to improve. Whatever you tell me will be used to help the project do better to support you and the other participants.
- CHWS thought you would be a great person to talk to because you have been in this program for a while.
- The interview will be about 45 minutes - 1 hour. [*insert information about compensation*]. Your participation is voluntary; you can stop the interview any time and don't have to answer any question you do not want to. If you don't want to participate, that is totally fine, and it won't hurt your participation in the project in general.
- If you do participate, everything you say will be completely anonymous. Your name and anything else that is uniquely about you won't be shared with the team or anyone else, I'll just share the general ideas that could have been shared by anyone.
- Do you have any questions about anything I've said so far? [*answer questions if there are any]*
- With all this information, would you like to participate in this interview today? [*wait for consent]*
- If it's alright with you, I'd like to record the discussion on my phone's voice recorder, just to help me with my notes. No one will hear it but me, and I will delete the recording as soon as I type up my notes. Is that okay with you? [*wait for consent to being recorded*]

Warm up / Introduction questions:

1. **How long have you been in this program?**
2. **How did you learn about this program?**
3. **Why did you want to participate?**

Expectations questions

4. **When you first joined, how did you expect the program would help you?**
    a. How much time did you think being in the program would take?
    b. What did you expect to learn?
5. **Can you tell me about your experience in this program so far? / What do you think of the program so far?**
    a. Is the program meeting your expectations so far?/ Is it what you thought it would be?

b. How does your postpartum experience this time [while in the program], compare to your previous postpartum experiences [when you were not participating in this program]? (if this is their first postpartum experience, instead "compare to postpartum experiences of other people you know?" *Probe for examples*

General health questions

6. **What does being healthy mean for you?**
    - ***a.*** *follow ups for clarification - how would you feel? what would you be able to do? etc. then follow up with…*
7. **What's going on in your life right now that influences your ability to be as healthy as you want to be?**
    a. What do you need to be as healthy as you want to be?
    b. Probe for examples as relevant

Blood pressure questions

Now I have some questions about how you keep good blood pressure numbers.

BP management

8. **Can you tell me what you've heard about managing your blood pressure?**
    a. (if need to clarify) for example - Is it important to manage your blood pressure? What can you do to manage your blood pressure? *Could probes on medication, diet, physical activity*
    b. Are there any specific symptoms a doctor told you to watch out for after delivery?
9. **What are your reasons for wanting to manage your blood pressure / keep good numbers?**
10. **What in your life helps you manage your blood pressure?**
11. **What are the main barriers you face in managing your BP?**

BP measurement

12. **What has your experience been with measuring your BP?**
    a. In your opinion, how important is it to you to measure your BP [every day / several times a week/ twice a day - whatever frequency they are trying for]?
    b. What makes it hard to measure your BP [every day / several times a week / twice a day?
    c. What would make it easier for you to measure your BP [recommended freq]?
        i. Could probe for more reminders, not having to send it to the CHWs but instead bluetooth, anything they come up with
    d. What can the program do to help make BP measurement and reporting easier?
13. **What do you do if your blood pressure is high when you measure it?**
    a. How confident do you feel taking this action (insert whatever action they mentioned)?

b. How does it make you feel when you see a high measurement?

14. **Has your opinion of blood pressure monitoring changed through this program? If so, how?**

Other health topics

Now I have some questions about other parts of this project.

15. **Can you explain to me how [name of CHW] assists you with [clinic] appointments?**
    a. When you're at doctor's appointments, what does [CHW Name] do?
    b. What did you think of her [CHW Name] [doing this] at your appointments?
16. **Has [CHW Name] helped you with anything else?**
    a. *Probe for food, transportation, coaching*
    b. If so, what has that experience been like for you? How has their assistance helped you? *Probe for a specific example of assistance and how that helped*
17. **What needs do you have that [CHW Name] are not currently helping with?**
    a. Probe on if that is something they think they should / can help with and how they think they can help

Closing questions

I have a few more last questions

18. **If a friend came to you and they were interested in being part of the program, what would you say to them?**
    a. How would you describe this program's impact on your health or other aspects of your life?
19. **Lastly, we really value participants' ideas for improving the program. What recommendations do you have to improve the program?**
    a. How could the program better support you to be your healthiest self?
    b. What changes need to be made in terms of how the program operates?
20. **Is there anything we didn't talk about that you would like me to know to help us improve this program?**

Ending

- That's all the questions I had! Thank you so much for your time. I really appreciate it, and the whole project team does too. The information you shared with me will really help improve the project for you and for other women. Thank you so much.