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NURSE HOME VISITATION PROGRAM IN HAMILTON COUNTY, OH TO INCREASE MATERNAL AND CHILD HEALTH OUTCOMES

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CAPSTONE PROJECT PAPER

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Abstract

Hamilton County Ohio currently has poor outcomes related to maternal and infant health, specifically among African Americans. Compared to the Healthy People 2020 goals, Hamilton County has higher rates of infant mortality, preterm birth, neonatal infant mortality, and conception within 18 months of previous pregnancies. These rates are disproportionate among African Americans. For instance, African American babies born in Ohio have higher infant mortality rate (14.3 per 1,000) prematurity as a cause of death (4 per 1,000) and neonatal mortality rate (9.2 per 1,000). These are compared to White babies in Ohio with infant mortality rate (5.1 per 1,000), prematurity as a cause of death (1.4 per 1,000) and neonatal mortality rate (3.4 per 1,000). Similar disparities among maternal health is seen between Black and White women. In order to address these disparities in maternal and infant health, we are proposing a 3 year evidence-based nurse home visitation program that will decrease modifiable risk factors that pertain to poor birth outcomes, decrease modifiable risk factors that pertain to child abuse and neglect, and to help with the parental life course in ways of helping maternal life development in education and the workforce, and decreasing rapid successive pregnancies. This nurse home visitation program has shown great success across the country and we hope to bring it to Hamilton County. Women in the program must be enrolled at or before 28 weeks of pregnancy, and will spend 60-90 minutes with nurses in the homes focusing on the six domains of home visitation (personal health, environmental health, life course development, maternal role, family and friends, and health and human services). Recruitment of participants will occur at the Hamilton County Health Department, Planned Parenthood, and the OBGYN offices of UC Health, Mercy Health and TriHealth. Process evaluations will occur during recruitment and implementation of the program. Outcome evaluations will include questionnaires and biometric data to access our goals of the program. Short term outcomes include having mothers complete the program, mothers receive adequate prenatal care, they deliver full term and appropriate gestational weight babies, and they have knowledge of relaxation and stress relieving techniques. Our medium term outcomes include increasing knowledge of proper prenatal care, increase the knowledge of proper childcare, and mothers better care for their children. Finally, our long term goals for this program include lowering the rates of maternal and infant mortality, lowering the rates of child abuse and neglect, and bettering the lives of the mothers.

Target Population and Need

For this grant application, our target population is Black women in Hamilton County, Ohio. We chose this population because they have higher rates of maternal and infant mortality, and specifically in Hamilton County because their rates of maternal and infant mortality are higher than Healthy People 2020 goals. In 2019, the Hamilton County Health Department reported an infant mortality rate of 8.9 deaths per 1,000 births.[1] This is significantly higher than the Healthy People 2020 goal of 6 deaths per 1,000. Regarding neonatal infant mortality, the rate in Hamilton County in 2019 was 6.2 per 1,000, compared to the Healthy People 2020 goal of 4.1 per 1,000.[1] Other data from 2019 shows that 10.6% of births in Hamilton County were preterm, and 2.9% per very preterm. These are compared to the Healthy People 2020 goals of 9.4% and 1.5% respectively.[1] Preterm birth being defined as birth before 37 weeks' gestation, and very preterm being defined as before 32 weeks' gestation. Table 1 shows the differences in maternal and child health in Hamilton County, Ohio compared to the Healthy People 2020 goals. Figure 1 and 2 below show a map of infant mortality in Ohio by county over a 5-year period and low birth weight in Ohio by county respectively. Figure 3 shows a map of low birth weight in Ohio by county specifically among African Americans. The findings from these figures show Hamilton County being near the highest category for infant mortality and low birth weight. Figure 1 shows infant mortality in Hamilton County at the 8.8-11.5 range. Figures 2 and 3 shows low birth weight in Hamilton County in the 8-9% range overall, and 13-14% specifically among African Americans. For reference, Hamilton County is located in the far southwestern corner of Ohio.

Inadequate pregnancy spacing is also a factor for complications in maternal and child health. Having another pregnancy as close as 18 months after delivery can create harmful health risks for both mother and baby. These health risks can include development of pre-eclampsia,

hypertension during pregnancy, and preterm birth.[1] In 2019, 44.6% of pregnancies were to mothers that had less than 18 months after pervious delivery.[1]

Regarding race, ethnicity, and other factors, Hamilton County's population consists of 26.6% Black.[2] The average household income across Hamilton County is $55,000, however 15.4% of the population is below the poverty line.[2] Household income stratified by race shows that the average household income for a Black household in Hamilton County is $29,989, while the average household income for a White household is $62,217 as of 2017.[40] Breakdown of unemployment shows that in Hamilton County, 11.7% of Black individuals are unemployed compared to 4.5% of white individuals.[40]

Table 1: Maternal and Child Health Issues in 2019

	Hamilton County	Healthy People 2020 Goal
Infant Mortality Rate	8.9 per 1,000	6.0 per 1,000
Preterm Babies Born	10.6%	9.4%
Very Preterm Babies	2.9%	1.5%
Conception w/in 18 months of previous birth	44.6%	29.8%
Neonatal Infant Mortality Rate	6.2 per 1,000	4.1 per 1,000

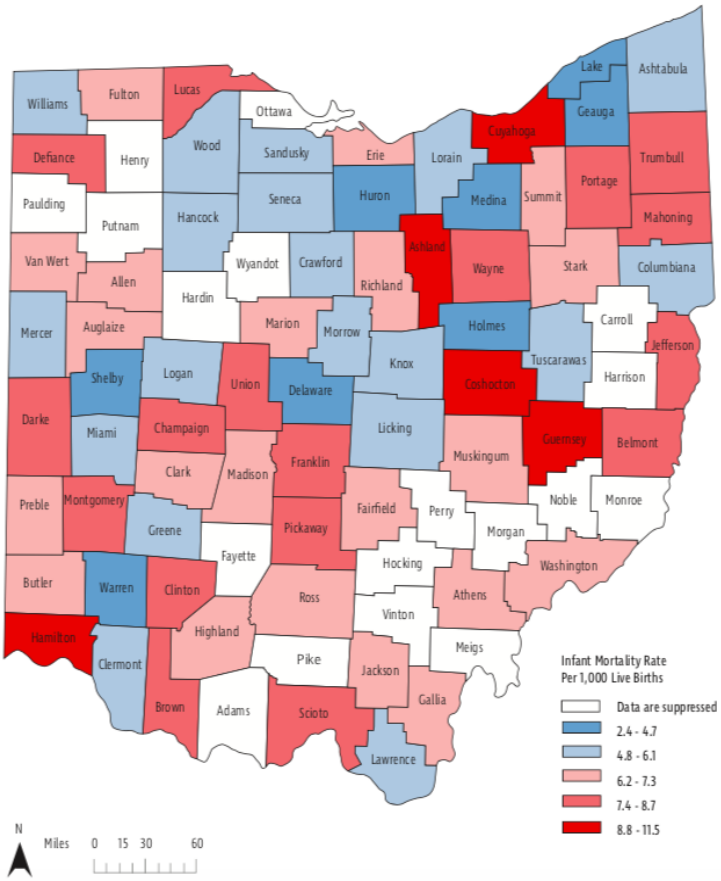
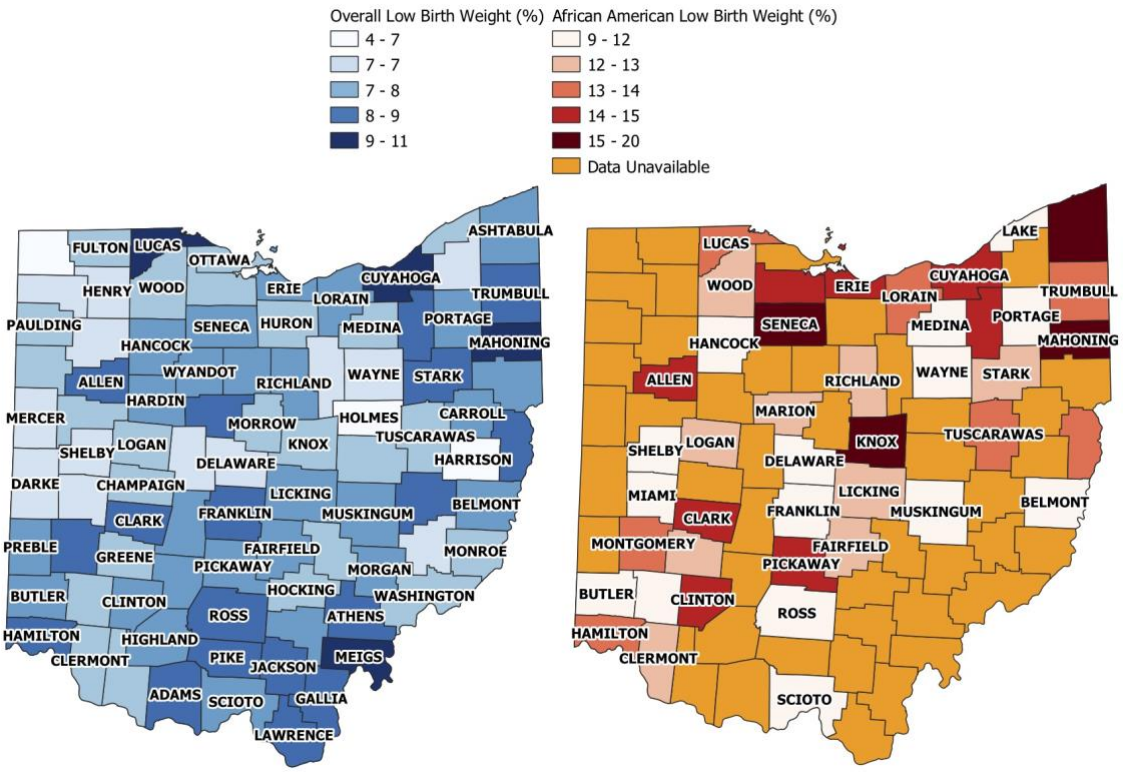


Figure 1: Infant Mortality in Ohio by County[41]



Figures 2 &3: Low Birth Weight in Ohio by County 2020

As mentioned previously, the community that will be served with this program is Black women of childbearing age, living in Hamilton County, OH. Black women have worse birth outcomes than white women in the United States.[4] These worse birth outcomes include: higher rates of pregnancy-related deaths including preventable maternal death, preeclampsia at a higher rate, and higher rates of other maternal complications.[5] Table 2 below shows the racial breakdown of maternal health and birth outcomes.

The data from this table was provided by Tucker et al. who performed an analysis of 5 pregnancy related conditions that can cause maternal death.[6] Preeclampsia, defined as high blood pressure starting after 20 weeks of gestation, which can be damaging to the body, especially the liver and kidneys. Without treatment, it can lead to death for both mother and baby.[7] Eclampsia occurs after untreated preeclampsia, and can lead to seizures and death.[8]

Placental abruption is a serious complication and occurs when the placenta detaches from the uterus. The placenta provides the fetus with oxygen and nutrients, with the detachment, the fetus is therefore deprived of those nutrients. As for the mother, blood loss and organ failure can occur if left untreated.[9] Placenta previa is when the placenta is attached to the cervix. Complications from placenta previa include maternal bleeding and fetal distress.[10] Finally, postpartum hemorrhage occurs after childbirth and is categorized by excessive blood loss. Complications that arise include shock and potential maternal death if untreated.[11] Table 2 shows the racial disparities in these causes of maternal death.

Table 2: Racial Disparities in Maternal Health Causing Death

Rates Per 100,000 Women

	Black Women	White Women
Preeclampsia	73.5	27.4
Eclampsia	1536.3	626.2
Placental abruption	58.4	21.3
Placenta Previa	40.7	17.3
Postpartum hemorrhage	68.3	21

Looking at the data from this table, it is apparent that the maternal health needs of Black women must be addressed. With this proposal, we will implement an evidence-based home visiting program designed to increase maternal and child health outcomes with the goal being to decrease adverse birth outcomes for Black women.

Along with racial disparities in maternal health, there are also racial disparities regarding infant health. The three most important factors that assess infant health include infant mortality,

preterm birth, and low birth weight. In 2019, the infant mortality rates stratified by race in Ohio show 14.3 per 1,000 deaths in Black babies, and 5.1 per 1,000 in White babies.[41] As far as preterm birth, 10% of all babies born in Ohio in 2019 were preterm.[41] Having prematurity as cause of death was seen in 4 per 1,000 Black babies and 1.4 per 1,000 White babies. Table 3 below shows a breakdown of prematurity rates by race and age in Hamilton County in 2019.[36] Finally, low birth weight was seen in 13.3% of babies born in Hamilton County in 2019.[1] Low birth weight is one of the main precursors to neonatal death, death that occurs within the first 27 days of life. In Ohio in 2019, the neonatal mortality rate for Black babies was 9.2 per 1,000 and 3.4 per 1,000 in White babies. Out of these, 57% of Black babies that died had a low birth weight, compared to 44% of White babies that died.[41]

Table 3: Prematurity Percentages in Hamilton County by Race

	Black	White
≤ 37 Weeks	13.4	9.1
≤ 28 Weeks	1.3	0.7
≤ 23 Weeks	0.3	0.1

Current Resources

Hamilton County Public Health (HCPH) has some resources for maternal and child health, but currently, there are no specific programs that are geared towards increasing maternal and child health. Hamilton County does have multiple locations for both prenatal care, as well as locations for labor and delivery. One of the largest cities in Hamilton County is Cincinnati. Cincinnati has some large hospitals, such as University of Cincinnati (UC), Mercy, and TriHealth, that have well developed labor and delivery units and neonatal intensive care units

(NICU).[12] These labor and delivery facilities can allow for better birth outcomes; however, they lack in both prenatal and postnatal care. The HCPH website has a page on maternal and newborn health, but there are no links to resources for maternal and newborn health. The website does give some helpful tips about what to do when you are pregnant, parenting advise, and a list of safe haven hospitals in the area.[12] Finding resources for maternal and child health in Hamilton County was difficult, so creating a program that is adapted for maternal and child health will benefit the community.

Along with UC, Mercy, and TriHealth, we plan to partner with the organization Queen Village. This is an organization in Hamilton County that supports and helps Black women in the community by ways of reducing stress, creating safe spaces for Black women, help create economic and professional pathways for women among other methods.[19] Collaborating with these organizations will allow this program to thrive and really help the women in the community in multiple ways regarding pregnancy and childcare.

While deciding which community to work with for this program, it was important to find a community that is not only familiar, but has a strong need for this type of program. We knew the disparities in maternal and infant health exists among the Black population. As for the resources of the community, Hamilton County already has organizations like Cradle Cincinnati and The Queens Village that work with closing the gap of racial disparities among maternal and child health. These organizations are already present in the community; therefore, the community will be more open and accepting of the program that we will be implementing. We will also partner with some of these organizations which will allow for shared resources and better outcomes for the program

Number Served

For this program, we expect to provide services to 500 women in year one. Based on data from the CDC on number of births by county and race, we know that 3,242 live births occurred to Black women in Hamilton County between 2016-2018[18], which is about 1,000 births a year. Considering average participation in home visiting programs, we will reach 500 women in year one because we expect about half the women to refuse to participate in the program. In years two and three, we expect to have 1,000 participants. This is accounting for the 500 women in year one and their children born during that year.

Program Approach

The evidence-based program that we are adapting to fit our community is a home visiting program that was implemented by David L. Olds of the University of Colorado over 27 years in three different communities[3]. Since its initial development, it has been implemented in almost every state in the United States. This program utilizes nurses to provide home visits to women at the start of their pregnancy continuing until the child is two years old. These nurse visits are performed to create an environment that allows for better maternal and child health. The focus of this program is to decrease modifiable risk factors that pertain to poor birth outcomes, decrease modifiable risks that pertain to child abuse and neglect, and also to help with the parental life course. This would include helping with maternal life development in education and workforce, decreasing rates of rapid successive pregnancies, and increasing the participation of the father and other family members.[3] This program used as its foundation research that justified why targeting those aspects during pregnancy and childhood would create a healthier environment for the mother and child.

Program Description

This program was also based on three different theories: human ecology, self-efficacy, and human attachment.[3] These theories come from Bronfenbrenner, Bandura, and Bowlby respectively.[3]Basing this program on these theories, researchers were better able to create better environments for the children (human ecology and human attachment) and increase the self-efficacy of the mothers. Adapting this program to fit our targeted population would increase maternal and child health in Hamilton County, Ohio. The logic model in Appendix 3 shows a detailed outline of our program and the specific outcomes we hope to achieve with this program.

This program is based on home visitation from nurses. Because this program follows the mother and her child from pregnancy till the child is of age two, the home visits will change throughout the program. All of these visits will focus on the six domains of a home visiting program. These domains include personal health, environmental health, life course development, maternal role, family and friends, and health and human services.[43] Each visit will be 60-90 minutes long. To be eligible for this program, women need to be ≤ 28 weeks pregnant at the time of their first home visit. Accommodations can be made for women who feel uncomfortable having nurses visit their homes. Space in the HCPH will be available for those participants to use to complete the visitations throughout this program.

While pregnant, women will receive home visits once a week during the first month in the program, and then every other week until the child is born. During these visitations, the nurses will help women get access to prenatal care, help them improve their diets, and help to reduce the use of tobacco and alcohol during pregnancy by connecting the mothers to proper resources. With these scheduled visits, women will have a regular routine of nurse visits and prenatal care occurring. This routine will help women plan out their schedules accordingly.

Following their child's birth, women will continue to receive nurse visitation weekly until the child is 6 weeks old. Following this, visits will occur every other week until the child is 20 months old. During the last four months of the program, visits will occur on a monthly basis. During this time, the nurses will help these women learn how to take care of a newborn. The nurses will give them helpful tips and tricks, be there for any medical questions, and also become a caring friend for these women. Since they have already created a strong bond with each other, the nurses will become a valued asset to the women. This allows for the women to thrive at motherhood, but also allow for help from the nurse when needed. There is a difference in visitation because within the first six months of a child's life, many things are changing. We think it is important to have more visits during that time because of the multiple developmental milestones in this time frame. If women feel like they need more visits with the nurses, extra visits will be available. This acts as a safety net for women who feel they need more help. In addition, women will receive literature and information regarding the risks associated with subsequent pregnancies within 18 months post-birth.

Adaptation

The program that is being adapted has three major parts to it: decreasing modifiable risks for birth outcomes, decreasing modifiable risks that pertain to child abuse and neglect, and helping with the life course of the parents. We plan to adapt the program in ways that will better serve the community. In decreasing modifiable risks for birth outcomes, we will focus on smoking cessation and alcohol avoidance during pregnancy. Smoking and alcohol use during pregnancy can lead to multiple negative birth outcomes, such as preterm birth and birth defects.[16,17] We will also focus on healthier lifestyles during pregnancy, such as diet and exercise. This can decrease the risk of preeclampsia and maternal risk factors mentioned

previously. For the aspect of decreasing child abuse and neglect, we will focus on parenting techniques that will help parents' bond more with their children and empathize more with them.

Another adaptation that has been made for our target population is that this program is available to all Black mothers in Hamilton County, not just first-time mothers. We believe that equal opportunity to better both the lives of their children and themselves will be more impactful in our target population. Evidence has shown success in nurse home visitation programs tailored to African American women. An example includes a nurse home visitation program for African American women in Montgomery County. Results of this study included deliveries from women that were enrolled antepartum showed 16.7% preterm deliveries and 14.6% low birthweight, compared to 36.1% and 29.5% respectively for deliveries for women who were not enrolled.[44] Home visits were also associated with at 69% reduction in the odds of preterm delivery.[44]

Evidence

There is a vast amount of evidence that supports home visitation programs. Specifically, in the program developed by Olds, there was a large improvement of maternal health during pregnancy as well as better childcare for the children.[3] This was seen across The Elmira location, which was predominately White, as well as the Memphis location which was predominately Black.

In the Elmira location, they saw 25% fewer cigarettes smoked by women during pregnancy, and of those that identified as smokers, there were 75% fewer preterm births. As for childcare and development, the Elmira location showed less punishment and restriction between 10-22 months and provided home environments that were more conductive to emotional and cognitive development between 34-36 months.[3] Following the program, they also showed 80%

fewer verified cases of child abuse and neglect, 32% fewer times in the emergency department (ED), and a 56% reduction in ED visits caused by injuries or ingestions.[3]

In the Memphis location, they saw fewer instances of pregnancy induced hypertension, and higher frequency of breast feeding attempts. In regard to the child's health, they also saw 23% fewer healthcare encounters regarding injuries and ingestions. As for parental life course, they saw fewer second pregnancies, fewer subsequent live births, and fewer therapeutic abortions.[3]

Nurse Family Partnership (NFP) also has some great statistics showing the success of home visitation programs. There 2019 annual report gives important statistics on the mothers and children both immediately following a home visitation program, as well as in the long term. For the mothers, there were 20% fewer preterm births, 35% fewer cases of pregnancy related hypertension, two times more likely to be employed at the child's second birthday, and a 10% increase in women earning their high school diploma or GED.[29] As for long term, women spent 20% less time on welfare, they were three times less likely to die from all causes of death, had 61% fewer self-reported arrests, and were 30% more likely to be married.[29]

As for the children who were born during home visitation programs, they had 50% fewer language delays, 48% decrease in incidences of abuse and neglect, 39% fewer healthcare encounters for injury or ingestions, and 5% fewer ED visits for accidents and poisonings.[29] For long term, there was 67% fewer behavioral and intellectual problems at age 6, three times more likely to graduate high school with honors, a 28% decrease in depression and anxiety by age 12, and 57% fewer lifetime arrests.[29]

Proposed Settings

This program will be implemented in three different settings. Because this program uses nurses for home visiting, the three different settings will be neighborhoods within a fifteen-mile radius of the three major hospitals in Hamilton County: Mercy Health, TriHealth, and University of Cincinnati Hospital. The surrounding locations of these hospitals include women of our target population and more socioeconomic risk factors for birth related outcomes.[42] These hospitals have fully equipped labor and delivery units and NICUs.[13,14,15] These hospitals also offer birthing classes and other prenatal care. This program will recruit nurses from labor and delivery units as well as mother-baby units from these three hospitals. The program will also recruit nurses from OBGYN and women's health clinics. These nurses are already trained on maternal and newborn care from working on these units, but additional training will be given for some specificities regarding the program.

Using these settings for the implementation of the program also aligns with the communities needs. Women in Hamilton County are experiencing worse birth outcomes than what is predicted by Healthy People 2020. Utilizing the hospitals and hospital staff in their area will hopefully increase better birth outcomes for the women in Hamilton County. All of these settings currently have some form of maternal and child health system, mainly prenatal and antenatal care. These systems include birthing classes, wellness checkups, and lactation consultations, just to name a few. Partnering with the existing systems from the hospitals, the program will train nurses on home visitations, and will implement smoking cessation, alcohol avoidance, and healthier lifestyles during pregnancy in their current prenatal programs.

Recruitment and Retention

Recruitment for this program will occur at different sites around the Hamilton County area. Forms of recruitment will include flyers and pamphlets about the program located in local

OBGYN offices, the local health department, and local Planned Parenthood locations. With the help of these organizations, we hope to get a wide range of participants. OBGYN offices would be good recruitment locations because that's where the majority of pregnant women go to receive care. The local health department is also a good organization because they give resources to the community regarding maternal and child health. We decided to use Planned Parenthood as an organization because they typically work with underprivileged and minority women. Our target population is included within this group. The OBGYN offices as well as Planned Parenthood will discuss the program to participants that meet the requirements when they visit these location. We believe that using these locations will give us the best outcome as far as enrollment because potential participants may first find out they are pregnant at these of locations and these locations are plentiful in the target 15 mile radius. With both verbal recommendations as well as visual flyers and pamphlets, our hope is to recruit our targeted population and size.

For this program, it is important to keep the participants engaged in the program for its entirety. This is a three-year program, so it is important to keep participants willing and engaged in the program. The program proposed focuses on home visitation, so a participant will not have to worry about childcare for their other children if they need it. This aspect of the program can make the women more willing to participant than in a program that requires a separate location and childcare. Another aspect that will keep the participants engaged is the fact that they are not only bettering the health and well-being of their children, but also themselves. This program helps women better their lives, by teaching them important parenting skills, relaxation techniques, and opportunities to further their education and obtain better employment. These aspects will encourage the women of the program to stick with it for its entirety. If women

decide to drop out of the program, they will complete an exit survey questioning why they are leaving. With this information we can adapt the program, as needed, to improve retention.

Community Advisory Board

For this program, it is important to ensure all program materials are medically accurate, age appropriate, culturally and linguistically appropriate, and inclusive. In order to meet these requirements, our Community Advisory Board (CAB) will meet on a quarterly basis to ensure that the program that is implemented in a safe and supportive environment for our participants. Our CAB includes representatives from our partners as well as important members of the program team from HCPH. More details regarding the CAB are below in *Partnerships and Collaborations.*

Fidelity

Since this program is adapted from an evidence-based program that was implemented with a different target community, it is important to monitor fidelity throughout the program so that the intended outcomes from the program occur. To monitor for fidelity, we will be looking at intended outcomes throughout the program process. These outcomes include biometric measures to evaluate for infant health, maternal health, child safety, and psychiatric health. These measures will be compared to others in the community that are not receiving the program. The measures will then hopefully show some changes between the two groups, showing fidelity within the program. Another meausre of fidelity includes adherence to the nineteen Nurse-Family Partnership Model Elements. These elements are listed in appendix 2.

Sustainability

Because our program goes beyond the three year grant, it is important to set up a sustainability plan for completion of our program. One of our biggest partners is Nurse Family

Partnership (NFP). Our plan for sustainability is to have incorporate our specific program in Hamilton County into their programs in Ohio. Because they will have already worked with us for the past three years, they will have a great understanding of our program and what is still needed. NFP will continue to recruit new participants and have them complete the program following the completion of the grant period.

Potential Challenges and Solutions

As with any program, some challenges could occur. Some potential challenges that may occur include lower than expected participation, and challenges related to home visits, such as safety for the workers and participants not wanting people in their houses. To combat low participation, throughout the program, surveys will be given out to participants asking how they think the program is progressing, and what changes could be made to increase their participation. This will allow for instant feedback regarding participation, and changes can be made to increase it. As for issues regarding home visits, we will ensure that the environment is safe for our workers to visit. We will also be mindful of the participants attitudes towards people being in their homes, and will adapt the location of the individual visits if need be.

Performance Measures and Evaluation

Process Evaluation

To evaluate whether the implementation of the program was successful, we intend on looking at data from three different points throughout the program: one during recruitment and two during implementation.

In the recruitment phase, we are focused on understanding the number of people referred between the different locations. As mentioned above, these locations include the local Planned Parenthood location, OBGYN offices throughout Hamilton County, and HCPH. Our goal with

this evaluation is to see if there are vastly different numbers of referrals based on the different locations. This evaluation will occur one month following initial recruitment. This allows us to change recruitment strategies between the different locations if certain locations have more or less referrals. If we find that one location is responsible for the majority of referrals (more than 50%), we may decrease recruitment resources to the other locations and send the majority to the location responsible for the referrals.

During the implementation phase of this program, we plan on evaluating both how well the recruitment strategies worked and also the retention of the participants. To measure the effectiveness of recruitment strategies, we will be looking at the proportion of how many referrals led to a nurse home visit. For a good recruitment strategy, 60% or more that were successfully recruited or referred to the program is acceptable in keeping said strategy. This will show us if we tailored our recruitment strategies to our target population and effectively recruited participants. To measure retention, we will be looking at the proportion of participants that have followed through with the home visits. Understanding the average percentage of home visits that have occurred will give us crucial information on if our program is actively being utilized by our target population. These measures will occur throughout the implementation phase of the program, so we will be able to make small changes on program content depending on the data we receive.

Along with these process evaluations, we will also be monitoring fidelity throughout the implementation of the program. Measures of fidelity will include a supervisor of the program present at home visits periodically throughout the program. This will allow us to monitor the content of the home visits, and make sure the information given to participants is what is outlined in the program.

Outcome Evaluation

In order to see how this program is working in the community, we intend to set up different forms of evaluation for different aspects of the program. These include a mixture of scales and biometric measures to evaluate for infant health, maternal health, child safety, and psychiatric health. Different aspects of evaluation will be administered at different time points of the program, which include all three trimesters in pregnancy, 0, 3, 6, 12, and 24 months post birth,

For pre-birth time points (first, second, and third trimester), we will be measuring a variety of constructs and biometrics. These include smoking cessation (21-item measure Challenges to Stopping Smoking CSS-21; Cronbach's Alpha of 0.86 and 0.82)[20], smoking related fetal defects, number of prenatal care visits, and maternal pregnancy related conditions, such as preeclampsia, placental previa, gestational diabetes, etc. We are using these measures because a large component of our program during pregnancy includes smoking cessation as well as increasing prenatal care check-ups.

The next forms of evaluation will occur post-birth, at time of birth, three months, six months, and twelve months post-birth. We will be measuring for infant mortality rate, preterm birth rate (only at time of birth), rate of Sudden Infant Death Syndrome (SIDS), maternal death from childbirth (only at time of birth). We will continue to evaluate smoking cessation using the scale mentioned previously at all time points. We will also be measuring postpartum depression using the Beck Depression Inventory (Cronbach's Alpha of 0.89)[21] at every postpartum time point.

At the end of the program, twenty-four months post birth, we will be evaluating for child abuse and neglect via rate of emergency room visits caused by nonaccidental injury or trauma. We will also be conducting surveys of childcare workers in the community asking for suspicions of child abuse and neglect.

In order to evaluate this program, we plan on performing a prospective cohort study along with the same timeline of the program to determine the effects of the program on the community. For this study, the program cohort will consist of the women received this program. As mentioned previously, this population will include Black women within a fifteen-mile radius of the following hospitals; University of Cincinnati Hospital, Mercy Health, and TriHealth. As for the control cohort, to control for confounding variables, the population will be from the same geographic location, race, age, however they will not receive the program. We have decided to use a prospective cohort study instead of a randomized control study for many reasons. Firstly, the program that is being proposed regards maternal and child health. It is not ethical to allow one population to receive maternal and child healthcare, and not give care to the other. For this program, we am also not limiting who can receive the program, the population has their own decision to participate in the program or not. This is why it makes it more ethical to perform a prospective cohort study to evaluate the program.

Because we will evaluate this program through a prospective cohort study, we will be able to determine that the health outcomes addressed in the program change due to the program. The program cohort as well as the control cohort are similar in almost every way except for the exposure to the program, so even if the health outcome changes overall, we will still be able to isolate the effect of the program group because of the control cohort being pulled from the same population. We plan on seeing changes regarding prenatal care and infant health quickly following the program, however, we will not see the programs effect on the child's long-term health until years following the program.

As mentioned earlier, data collection for evaluation will include a mixture of self-reported data and biometric data. Self-reported data will come from questionnaires addressing both

maternal and child health. As for the mothers, these questionnaires will discuss smoking cessation and depression. Biometric measures for mothers include prenatal visits, maternal pregnancy related conditions, such as preeclampsia, placental previa, gestational diabetes, etc., and maternal death from childbirth. For the children born during this program, biometric measures will include infant mortality rate, preterm birth rate (at time of birth only), and the rate of Sudden Infant Death Syndrome (SIDS).

Performance Measures

In order to account for gender and race/ethnicity of our participants, performance measures will be taken at two different time points. The first time point will come from data taken during the first trimester surveys given to the participants. This will give us data on gender and race/ethnicity regarding the women in the program. The second time point will come from a birth survey given to the mothers post birth to inquire about gender and race/ethnicity of their child. This will give us demographic data on the children born during the program. With these two time points, we will have demographic data regarding gender and race/ethnicity on all participants of the program.

Capacity of the Applicant Organization

Our organization, HCPH, is capable of implementing the proposed program. We have shown success in implementing a previous program to engage schools, businesses, churches, elected officials, and residents to address chronic disease by increasing access to healthy food options and physical activity, as well as decreasing exposure to secondhand smoke.[31] This program, WEThrive!, was implemented in 2009 and has shown great success since its implementation. Because the HCPH has shown success with program implementation previously, we are confident that the implementation of our program will be successful.

The HCPH has extensive experience in data collection for a multitude of health concerns, including maternal and infant health. We perform surveillance reports each mouth and tract the number of infant deaths; current monthly infant mortality rate; current monthly neonatal mortality rate; current monthly preterm, very preterm, and <23 weeks' gestation birth rate; current monthly small for gestational age birth rate; percentage of pregnancies spaced <18 months; maternal smoking rates; number of sleep-related deaths; and current two year infant mortality rate moving average[1]. Having this data available on a monthly basis allows us to see the needs of the community in regard to maternal and infant health.

We serve more than 480,000 residents in Hamilton County. Our staff consists of more than 100 members, all allocated to different areas in the department. We have proven to be a fiscally responsible organization, managing an annual budget of $17 million. This goes into programs, food service inspections, plumbing, vaccines, staffing, etc.[32] In concern with discrimination, the County Commissioner's office has a discrimination policy that states "Hamilton County is committed to providing all employees a workplace that is free from unfair treatment based on race, sex, sexual orientation, gender identity, religion, national origin, ancestry, age or disability so employees can focus on the job tasks at hand. Each employee has a responsibility to treat co-workers, and anyone with whom they interact on the job, fairly and equally."[33]

Program Management

The personnel that are involved with this program include a Principle Investigator (Dr. Ron Swanson), a Project Director (Ms. Hannah Widner), one Partnership Liaison, seven full time nurses, one part time nurse, one PRN nurse, one biostatistician, and one clerical staff member.

Ms. Widner will be responsible for finalizing the survey questionnaires, meeting with partners, developing ways to recruit participants, attending CAB meetings, and creating a sustainability plan. The project director will consult with the PI regarding recruitment strategies and survey questionnaires. Along with these roles, the project director and the NFP partnership will work together to train the nurses on home visitation.

The role of the partnership liaison includes keeping an open line of communication with the partners, informing them of the progress of the program, scheduling quarterly meetings with the partners, and work with the partners when needed.

We will hire seven full time nurses to complete the home visitation. These nurses will have a case load of roughly twenty-five participants per week. Our part time nurse will have a case load of roughly twelve participants per week. We are also hiring a PRN (as needed) nurse. This nurse will be in charge of the participant case load for nurses who are unable to work that day, or for vacation time. Having this extra PRN nurse available will increase retention of the nurse position. We believe that the cost of rehiring nurses throughout this program would outweigh the cost of a PRN nurse. The roles of these nurses includes the program implementation. They will be in charge of home visitation with the participants, educating them on proper prenatal care, parenting techniques, and healthy living. They will have a booklet that walks through each visitation, from the first trimester to when the child is two years old. Before the program, they will go through three months of training with NFP. In this training, they will learn about home visitation, the importance of this program, and what is completed at each visit. These nurses will also be in charge of giving out surveys and collecting biometric data for the process and outcome evaluations.

The biostatistician is in charge of analyzing the survey and biometric data from the participants. They analyze data on a regular schedule to see if we are reaching our target goals for process evaluation and outcome evaluation.

The role of the clerical staff member is to schedule the home visits between the nurses and participants. They will also schedule the CAB meetings, and print and distribute the recruitment materials such as flyers and pamphlets.

Partnerships and Collaboration

An important stakeholder that will we will be partnering with is the Nurse-Family Partnership organization. They have been around since 1996 and work across the country to better the lives of first-time mothers and their children. We chose to partner with this organization because they have years of experience with this field of work. The work they do is similar to our program, however our target population includes Black women instead of the whole population. We also are targeting all mothers, not just first-time mothers. This is because we believe it is important to give women equal opportunities to better their lives and their children's lives regardless of other children.

Nurse-Family Partnership is familiar with working with our target population. As stated above, they have locations throughout the country, including Ohio. In 2019, their participants included 59% African American, 89% unmarried, 81% enrolled in Medicaid, and an annual household income of less than or equal to $6,000.[28] With these numbers, we believe it is wise to work with this organization for our program considering they have previously worked in our targeted population and shown improvements in the health of mothers and their children. For example, in 2019 in Ohio, 86% of babies were born full term, 86% of mothers initiated

breastfeeding, 93% of babies received all immunizations by 24 months, and 62% of their clients 18+ were employed at 24 months.[28]

This organization has been financially stable since its start in 1996. According to their annual report, of their $31.6 million budget, 82% of that went to program services such as education nurses, research and evaluation, and implementation of best-in-class technology to help support families.[29] Funding comes from stakeholders as well as donations. They have an investment return of five times what is given, which in turn saves $17,000 per family in public assistance spending.[29]

Another organization that we are planning to partner with is Cradle Cincinnati. Cradle Cincinnati is an organization that started in 2012, and is "a collaborative effort between parents, caregivers, healthcare professionals, and community members with a commitment to reduce infant mortality in our community".[34] They have three main goals to combat this issue. These goals include [1] reducing the number of babies born before the end of the second trimester by 33% by 2023, [2] eliminate sleep-related deaths by 2023, and [3] promote what we know about reducing birth defects and lead the way on new scientific discovery to better understand congenital anomalies.[35] They work with other partners around the area so that the issue of infant mortality is addresses effectively. They also release annual reports of maternal and infant mortality in the county. This data comes from Hamilton County Fetal and Infant Mortality Review, Ohio Department of Health, Centers for Disease Control and Prevention, and Ohio Vital Statistics.[36] An important aspect of this partner and why we chose to work with them is their extensive research on how race/ethnicity can affect maternal and infant mortality. They have extensive reports on the racial disparities regarding maternal and infant health, especially in the

Black community. Because they work and have researched the disparities within our targeted community, we think they are a crucial partnership for our program.

Because our program focuses not only on bettering the lives of children, but also bettering the lives of mothers, we are partnering with the organization Queens Village. Their goal is to create a supportive community of powerful Black women who come together to relax, repower and take care of themselves and each other.[37] They achieve this through monthly village meetings, wellness workshops, and neighborhood gatherings. Because they focus of bettering the lives of Black women in Hamilton County, they are a perfect organization to partner with. Queens Village was an initiative of Cradle Cincinnati that has taken off and become their own organization. Because of their previous work with Cradle Cincinnati, we believe that partnering with them along with Cradle Cincinnati will allow for better recruitment within our program, but also better implementation and sustainability of the program following the grant period.

As mentioned previously, we will be partnering with Planned Parenthood for this program. Their role will be to help recruit participants for the program. In Hamilton County, there is one Planned Parenthood location. We are partnering with Planned Parenthood because of their work with our target population as well as work in maternal health. In 2013, an estimated 14% of their patients were African American.[38] They also offer a wide range of services and literature related to pregnancy. Some services that they offer include pregnancy tests, pregnancy planning services, prenatal services, and birthing classes, just to name a few.[39] Examples of literature offered include information on prenatal care, high blood pressure in pregnancy, gestational diabetes, postpartum depression, and more.[39] Our task for Planned Parenthood is to recommend our program to women in our target population that use their maternal health

services such as receiving pregnancy tests and prenatal services. With partnering with them we hope to reach our recruitment goals for this program.

Community Advisory Board

Member	Organization	Justification
Hannah Widner – Project Director	Hamilton County Public Health	Main contact for program. Ensure program is progressing accordingly. Give input on recruitment strategies at HCPH.
Full Time Nurse	Hamilton County Public Health	Will be able to give input on how home visits are progressing, and any changes needed for the home visits..
Tom Haverford – Partnership Liaison	Hamilton County Public Health	In charge of keeping open communication between HCPH and partners and progress of program.
Nurse Family Partnership - Ohio Director	Nurse Family Partnership	One of our main partners. Will further help with sustainability. Ensure program is meeting NFP Model Elements.
Nurse Family Partnership - Ohio Assistant Director	Nurse Family Partnership	Important to have more than one representative from NFP. Able to give input on home visit programs occurring nationally.
Cradle Cincinnati Director	Cradle Cincinnati	Will give input regarding target population and certain adaptations of program to fit target population. Will ensure appropriateness of the program for the target population.
Queens Village Director	Queens Village	Will give input on target population and ways to better lives of our mothers. Will work to ensure

		appropriateness of the program.
OBGYN offices representative	UC Health	Give input regarding recruitment and referrals at UC Health OBGYN offices.
OBGYN offices representative	Mercy	Give input regarding recruitment and referrals at Mercy OBGYN offices.
OBGYN offices representative	TriHealth	Give input regarding recruitment and referrals at TriHealth OBGYN offices.
Planned Parenthood representative	Planned Parenthood	Give input regarding recruitment and referrals at Planned Parenthood location.

Appendix

Appendix 1: Budget and Justification

Personnel

*Salaries increase 3% per year

Position	Annual Salary	%FTE	Salary	Fringe	Salary Requested	Total Requested
Principle Investigator	$100,000	15%	$15,000	$4,115	$19,115	$65,841
	$103,000	15%	$15,450	$4,238	$19,688	
	$106,090	20%	$21,218	$5,820	$27,038	
Project Director	$50,000	100%	$50,000	$16,805	$66,805	$171,567
	$51,500	75%	$38,625	$12,982	$51,607	
	$53,045	75%	$39,784	$13,371	$53,155	
Partnership Liaison	$32,000	50%	$16,000	$6,490	$22,490	$69,515
	$32,960	50%	$16,480	$6,685	$23,165	
	$33,949	50%	$16,974	$6,885	$23,860	
Full Time Nurse 1 X7	$52,000	100%	$52,000	$17,230	$69,230	$1,497,881
	$53,560	100%	$53,560	$17,747	$71,307	
	$55,167	100%	$555,167	$18,279	$73,446	
Part Time Nurse	$52,000	50%	$26,000	$8,615	$34,615	$106,991
	$53,560	50%	$26,780	$8,873	$35,653	
	$55,167	50%	$27,583	$9,140	$36,723	
PRN Nurse	$52,000	25%	$13,750	$4,467	$18,217	$56,306
	$53,560	25%	$14,163	$4,601	$18,763	

	$55,167	25%	$14,587	$4,739	$19,326	
Clerical	$32,000	50%	$16,000	$6,490	$22,490	
	$32,960	50%	$16,480	$6,685	$23,165	$69,514
	$33,949	50%	$16,974	$6,885	$23,860	
Biostatistician	$68,000	25%	$17,000	$5,158	$22,158	
	$70,040	25%	$17,510	$5,312	$22,822	$68,487
	$72,141	25%	$18,035	$5,472	$23,507	
						Total: $2,103,291

Dr. Ron Swanson DrPH – Principle Investigator 15%,15%,20%

Dr. Swanson is the principle investigator for this program. He received his DrPH at the University of Cincinnati. His dissertation was on maternal and child health. He currently works at the HCPH overseeing the multiple programs that occur. In the first year, his duties include hiring staff, working with the program director with recruitment strategies and survey questionnaires, and meeting with partners. In the second year, he is overseeing the program and implementing changes based on the data found. In the final year, he is in charge of reviewing data, finalizing the manuscript, and working on a sustainability plan. Throughout all three years, Dr. Swanson will attend quarterly CAB meetings to discuss the progress of the program.

Hannah Widner, MPH – Project Director 100%, 75%, 75%

Hannah Widner is the project director for this program. She received her MPH degree from the University of Kentucky, specializing in health disparities in maternal health. She is currently working at the HCPH and oversees the maternal and child health section of the department. In year one, her roles include finalizing the surveys, hiring nurses, and working with partners to increase recruitment, and oversee the program. In years 2 and 3, she is the main contact regarding progress of the program. She, along with Dr. Swanson will meet with other CAB members to discuss the program, how it is progressing, and if any changes are necessary.

Tom Haverford, MBA, MPH – Partnership Liaison 50%

To Haverford received his MBA and the University of Kentucky in Marketing and his MPH from the University of Louisville in Health Behavior. He is currently working with the HCPH marketing programs across the county. His role for this program will include working with the different partnerships. He is in charge of keeping an open line of communication with these partners and update them on the progress.

Full Time Nurses (7), BSN RN 100%

These nurses are in charge of the program implementation. They all have received a BSN degree and are currently working in Hamilton County as Labor/Delivery nurses or in an OBGYN/Midwife office. They have experience working with pregnant women and will receive further training for home visitation. These nurses will also give out the surveys and measure the biometric measures stated in the evaluation section. They are expected to see 25 participants a week.

Leslie Knope, BSN RN – Part time Nurse 50%

Ms. Knope's role is to preform home visitation with participants part time. They are expected to see 12 participants a week. Their duties include the same as full time nurses, they are just required to see less participants.

Ann Perkins, BSN RN – PRN Nurse 25%

Ms. Perkins role is to perform home visitation with participants as a needed basis. For instance, if a full time nurse needs time off, Ms. Perkins will cover that nurse's case load for a given time period.

Jerry Gergich – Clerical 50%

Mr. Gergich is in charge of scheduling the home visitation appointments as well as the quarterly CAB meeting. Mr. Gergich will also be in charge of ordering supplies.

Ben Wyatt, PhD – Biostatistician 25%

Dr. Wyatt is our biostatistician for this program. He has received a doctorate degree in biostatistics and epidemiology from Perdue University. They will compute the data from the program, and produce reports, including charts and graphs as appropriate.

Supplies

Supply	Quantity	Cost per supply	Total Cost
iPad	12	$400	$4,800
Home visitation booklets and training	13	$1,700	$22,100
Flyers	1500	$0.49	$735
Pamphlets	2000	$0.68	$1360
			Total: $28,995

In the first year, there will be eight iPads given out to the nurses. These will be used to complete the surveys. We expect to have to replace an average of two a year, bringing the three year total to twelve iPads. Each nurse will go through specific home visitation training and receive a booklet that they will use to complete the home visitation appointments. In the first year, there will be nine given out. In years two and three, we are budgeting for two each year. This is there in case we hire a new nurse. Flyers and pamphlets will be used in year one's budget. These are used as recruitment strategies and will be given out to OBGYN offices, the Planned Parenthood location, as well as in HCPH.

Travel

	Expense	Year 1	Year 2	Year 3
Annual Project Director's Meeting in Washington, DC	Airfare	$300	$300	$300
	Hotel	$400	$400	$400
	Per Diem	$72 x 3 Days = $216	$72 x 3 Days = $216	$72 x 3 Days = $216
	# of Attendees	1	1	1
	Total	$916	$916	$916

Annual Regional Meeting in Chicago, IL	Airfare Hotel Per Diem # of Attendees Total	_____ _____ _____ _____ _____	$300 $250 $72 x 3 Days = $216 2 $1,532	$300 $250 $72 x 3 Days = $216 2 $1,532
Mileage	Cost per mile Miles driven/day Total cost/year	$0.56 30 $32,760	$0.56 30 $32,760	$0.56 30 $32,760
				Total: $104,092

We will be sending our project director to the Annual Project Director's meeting in Washington, DC each year. This will allow for our program director to learn about different programs occurring throughout the country. We will also be sending two of our group members to the Annual Regional meeting in Chicago, IL in years two and three. These conferences will allow for networking and further professional development. Finally, we are also reimbursing our nurses for mileage. Despite Hamilton County being a fairly urban environment, we will still reimburse nurses for travel from HCPH to participant houses. Our scheduler will work with the nurses and schedule appointments based on geography so that they do not have to travel as far between appointments, and can even walk or take public transit.

Total Expenditures

Personnel	$2,103,291
Supplies	$28,995
Travel	$104,092
Other	$2,700
	Total: $2,239,078

This is a representation of our total expenditures for the three year program. The other category includes catered lunches for each CAB meeting. We have budgeted $100 per meeting, with three meeting occurring each year.

Appendix 2: Nurse-Family Partnership Model Elements[43]

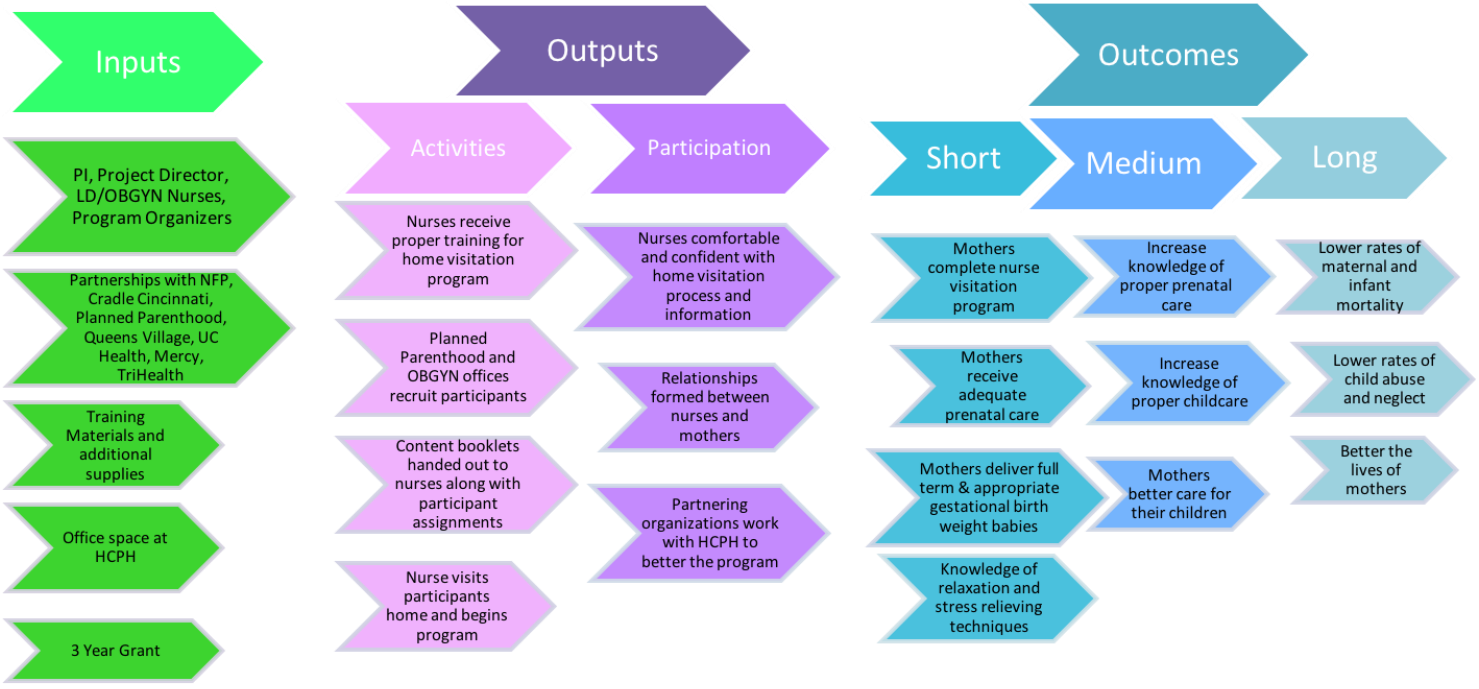
- Element 1: Client participates voluntarily in the Nurse-Family Partnership program.
- Element 2: Client is a first-time mother.
- Element 3: Client meets low-income criteria at intake.
- Element 4: Client is enrolled in the program early in her pregnancy and receives her first home visit by no later than the end of the 28th week of pregnancy.
- Element 5: Client is visited one-to-one: one nurse home visitor to one first-time mother/family.
- Element 6: Client is visited in her home as defined by the client, or in a location of the client's choice.
- Element 7: Client is visited throughout her pregnancy and the first two years of her child's life in accordance with the standard NFP visit schedule or an alternative visit schedule agreed upon between the client and nurse.
- Element 8: Nurse home visitors and nurse supervisors are registered professional nurses with a minimum of a Baccalaureate degree in nursing.
- Element 9: Nurse home visitors and nurse supervisors participate in and complete all education required by the NFP NSO. In addition, a minimum of one current NFP administrator participates in and completes the Administration Orientation required by NFP NSO.
- Element 10: Nurse home visitors use professional knowledge, nursing judgement, nursing skills, screening tools and assessments, frameworks, guidance and the NFP Visit-to-Visit Guidelines to individualize the program to the strengths and risks of each family and apportion time across the. Defined program domains.

- Element 11: Nurse home visitors and supervisors apply nursing theory, nursing process and nursing standards of practice to their clinical practice and the theoretical framework that underpins the program, emphasizing Self-Efficacy, Human Ecology and Attachment theories through current clinical models.
- Element 12: A full-time nurse home visitor carries a caseload of 25 or more active clients.
- Element 13: NFP agencies are required to employ a NFP nurse supervisor at all times.
- Element 14: Nurse supervisors provide nurse home visitors clinical supervision with reflection, demonstrate integration of the theories, and facilitate professional development essential to the nurse home visitor role through specific supervisory activities including one-to-one clinical supervision, vase conferences, team meetings and field supervision.
- Element 15: Nurse home visitors and nurse supervisors collect data as specified by the Nurse-Family Partnership National Service Office and ensure that it is accurately entered into the NFP data collection system in a timely manner.
- Element 16: NFP nurse home visitors and supervisors use data and NFP reports to assess and guide program implementation, enhance program quality, demonstrate program fidelity and inform clinical practice and supervision.
- Element 17: A Nurse-Family Partnership implementing agency is located in and operated by an organization known in the community for being a successful provider of prevention services to low-income families.
- Element 18: A Nurse-Family Partnership implementing agency convenes a long-term Community Advisory Board that reflects the community composition and meets at least

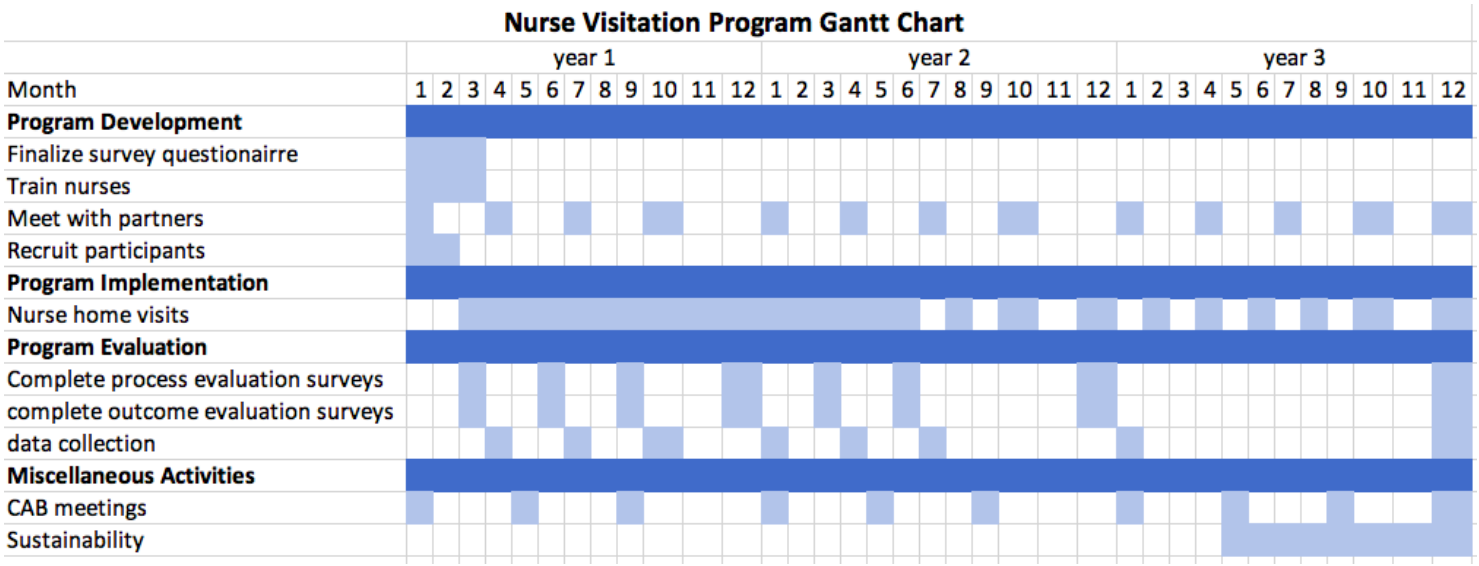
quarterly to implement a community support system for the program and to promote program quality and sustainability.

- Element 19: Adequate organizational support and structure shall be in place to support nurse home visitors and nurse supervisors to implement the program with fidelity to the model. The NFP National Service Office is a non-profit organization that provides implementing agencies with the specialized expertise and support needed to deliver NFP with fidelity to the model so that each community can see comparable outcomes.

Appendix 3: Logic Model



Appendix 4: Gantt Chart



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