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Exploring Risk Factors for Maternal Mortality: A Qualitative Study

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Abstract: Maternal mortality, the death of a woman during pregnancy or within one year of delivery, claims approximately 700 women annually in the United States. In Ohio, the rate is slightly less than 16 women each year. Knowledge and intervention of risk factors, particularly the non-medical factors for maternal mortality are crucial to preventing these deaths. This qualitative interview study with community health workers identified specific risk factors Ohio mothers face and how they are being addressed in the field by individuals who work directly with pregnant and postpartum women. The interviews uncovered various interventions that are recommended to reduce the non-medical risk factors that contribute to maternal mortality.

Dedication: In the hopes that this work may in some way contribute to lowering the maternal mortality rate, this is dedicated to the countless women who have been affected by both mortality and morbidity. Many thanks to Dr. Sabrina Neeley for the constant support, advice, and guidance through the process of completing this project.

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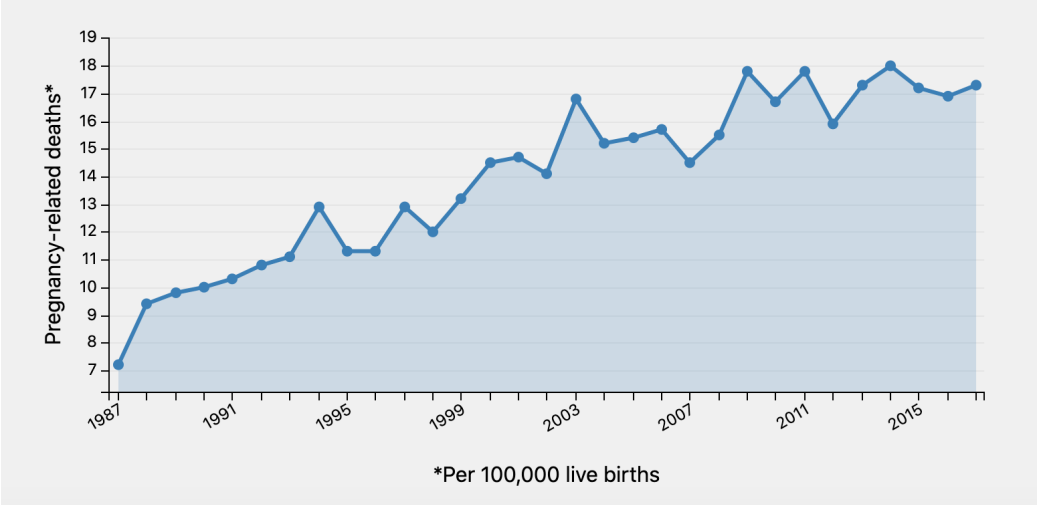
Introduction

Maternal mortality is defined by the Centers for Disease Control and Prevention as the death of a woman during pregnancy or within one year of the end of pregnancy (CDC, 2018). In the United States, each year around 700 women die at delivery or soon after delivery. Ohio has a maternal mortality rate that is slightly higher than most other states but lower than the national average with slightly under 16 women being affected each year (CDC, 2018).

Studying maternal mortality and the risk factors associated with it is important because mothers and infants are dying disproportionately in the United States than in other developed countries. Currently, the United States has a maternal mortality rate of 17.4 deaths per 100,000 live births, almost double that of the next highest rate among developed countries, France at 8.7 deaths per 100,000 live births (CDC, 2020). Ohio's maternal mortality rate is 14.7 deaths per 100,000 live births (CDC, 2018).

In a developed country like the United States, we should be expected to have the tools and resources to have a much lower maternal mortality rate; however, that is not the case. The inverse relationship between the maternal mortality rate and the abundance of resources and the growth of technology calls for an examination of how resources are allocated to identify the root causes. Although we are spending $32 billion a year on maternal mortality research, according to figure 1, we are still facing an unchanged rate of death (CDC, 2020).

Figure 1. Trends in pregnancy-related mortality in the United States: 1987-2017



In order to decrease the maternal mortality rate, it is necessary to understand the medical and non-medical risk factors that lead to these tragic outcomes. The difference between these medical and non-medical risk factors is that the medical risk factors are often addressed during pregnancy only. They are addressed almost exclusively by healthcare professionals and leave little room for error. Some of the most common medical risk factors include cardiovascular and coronary conditions, pre-eclampsia and eclampsia, hemorrhage, infections, embolisms (not amniotic fluid), cardiomyopathy, amniotic fluid embolism, cerebrovascular accidents, mental health conditions, hypertensive disorders of pregnancy, and other unknown reasons. However, the nonmedical issues are oftentimes what lead to the medical issues occurring in the first place. They are issues that a mother may face weeks, months, or even years before getting pregnant and are most likely faced after pregnancy as well. Some of the most common non-medical risk factors that lead to maternal mortality include many different psychosocial factors. The main contributors are unhealthy or abusive relationships,

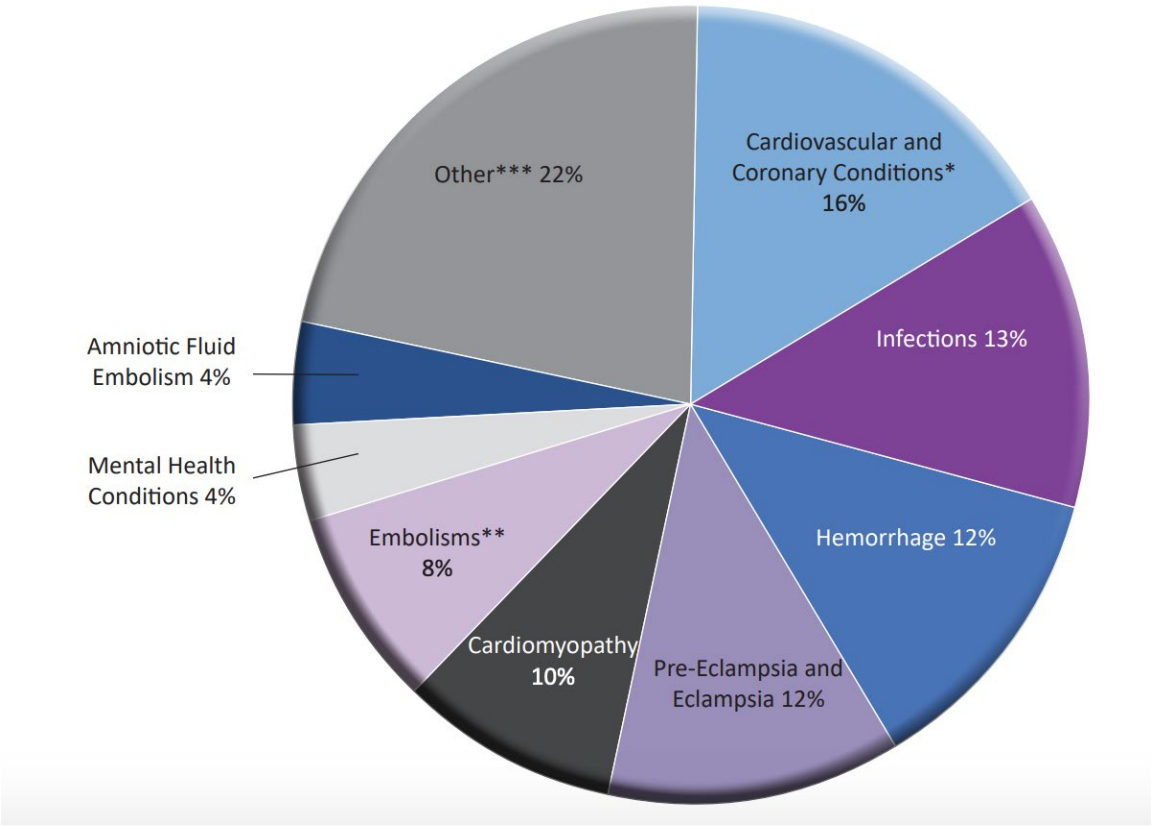
substance use, unaddressed mental illnesses, social integration, work environment, location, diet, and other psychosocial factors.

The overarching goal of this research is to explore the risk factors and interventions at the local level that are used to reduce risk factors for maternal mortality. The majority of the research stemming from the CDC and Ohio Department of Health focuses either heavily or exclusively on the medical risk factors associated with maternal mortality. This research study will address the medical risk factors, but will primarily focus on the nonmedical factors that lead to maternal mortality.

Literature Review

Maternal mortality is defined by the Centers for Disease Control and Prevention (CDC) as the death of a woman during pregnancy or within one year of the end of pregnancy (CDC). When a woman is pregnant, there are many underlying conditions and risk factors that can contribute to a negative outcome before, during, or after pregnancy. According to a recent study due by Conrey et al. (2019) as a part of the Ohio Department of Health's research into maternal mortality, the main underlying causes include cardiovascular and coronary conditions, pre-eclampsia and eclampsia, hemorrhage, infections, embolisms (not amniotic fluid), cardiomyopathy, amniotic fluid embolism, cerebrovascular accidents, mental health conditions, and other. These negative outcomes can be seen in figure 2 from the Ohio Department of Health's Report on Pregnancy-related deaths.

Figure 2. Underlying Causes of Pregnancy-Related Deaths by Leading Causes, Ohio 2008-2016



The risk factors for maternal mortality have a lot to do with race and socioeconomic status. The direct risk factors can be seen in table 1 from the same Report on Pregnancy-Related Deaths.

Table 1. Contributing Factors Among 62 Reviewed Pregnancy-Associated, but not related Deaths with Accident as the Manner of Death, Ohio 2008-2016

Factor Class	Count (%)	Representative Themes
Patient / Family Factor Level		
Substance Use Disorder	74 (23)	Substance abuse directly compromised woman's health status, illicit drugs, alcohol, multiple medications
Mental Health Conditions	39 (12)	Anxiety, depression
Adherence	28 (9)	Non-adherence with medical recommendations, no adherence due to unstable housing, lack of seatbelt use
Environmental	20 (6)	Factors related to weather or terrain, fire or stove alarms, poor weather, icy roads, fire hazards
Violence	12 (4)	Intimate partner violence, abused by brother, other history of violence
Delay	11 (3)	
Chronic Disease	11 (3)	Asthma, chronic pain, epilepsy
Knowledge	8 (3)	Lack of knowledge of treatment or follow-up, lack of knowledge leading to delayed care, lack of knowledge about seatbelt use
Childhood Abuse / Trauma	8 (3)	Childhood sexual abuse
Social Support / Isolation	7 (2)	Lack of family or friend support system
Unstable Housing	5 (2)	
SUBTOTAL	247 (76)	
Provider Factor Level		
Assessment	6 (2)	Failure to screen, inadequate assessment of risk, lack of toxicity screen
Continuity of Care / Care Coordination	5 (2)	Lack of continuity of care
Referral	5 (2)	Failure to refer or seek consultation
SUBTOTAL	27 (8)	
System / Facility		
Continuity of Care / Care Coordination	14 (4)	Lack of continuity of care, lack of or poor quality case coordination or management, lack of coordination resulting in continued access to prescription medications
Access / Financial	12 (4)	Lack of insurance, lack of transportation creating a barrier to accessing care, lack of providers, lack of facilities, difficulty getting an appointment
Outreach	7 (2)	Inadequate community outreach, inadequate resources for community outreach
Communication	6 (2)	Inadequate connection to mental health system for referral and follow-up, poor communication between providers
Policies / Procedures	5 (2)	Lack of standardized policies or procedures (e.g., no policy for provider to reach out to psych when patient presents with intense mental health issues; no procedure to check women for toxicity at birth and during prenatal care)
SUBTOTAL	53 (16)	
Total	327 (100)	

Due to rounding, some totals may not correspond with the sum of the separate figures.

Currently, the United States has a maternal mortality rate (MMR) of 20.1 deaths per 100,000 live births, which is slightly increasing each year (CDC 2020)). The MMR in the United States is the highest among developed countries (CDC 202). As a country that has endless resources, it is important to look into why this number is climbing each year and what the healthcare industry can do to help this.

There are a large number of studies on the underlying conditions leading to maternal mortality. However, since the focus of this research is on identifying risk factors associated with maternal mortality, these will not be reviewed in detail and will only be referred to as appropriate.

Social Determinants of Health

Social determinants of health "are the conditions in the places where people live, learn, work, and play that affect a wide range of health and quality of life risks and outcomes" (CDC, 2021). Social determinants include socioeconomic status and are the factors in one's life that they often do not have control over. These factors can be acquired but are mostly assumed and extra work needs to be done for people who are trying to change certain determinants. Prior research studies have failed to identify why some of these risk factors are so prevalent and how they can be addressed. Most studies focus on these underlying medical risks, but many studies fail to identify and treat the social determinants that are allowing the risk factors to appear. The research studies evaluated in this review have begun to provide insight into how socioeconomic status and race contribute to maternal mortality in the United States.

Racial Disparities

The racial disparities faced by black, non-Hispanic pregnant women in healthcare are similar to those faced by non-pregnant black, non-Hispanic patients. Race is a social determinant not because of genetic predispositions but because of racism within the medical field and society as a whole. There is inadequate access to healthcare, healthy foods, poverty, and limited personal support systems which all lead to poor health outcomes (Blackman & Garcia, 2021).

Black women are more than 3 times as likely to die from a maternal complication than are white women. Racism is a huge risk factor contributing to the increase in maternal deaths each year. In a qualitative study examining racial disparities in reproductive health outcomes Ngozi and Sutton (2003), found that there were three main ways in which the disparities can affect outcomes: (1) "differences in social, political, economic, or environmental exposures that result in differences in disease incidence; (2) differences in access to health care, including preventive and curative services; and (3) differences in the quality of care received within the health care delivery system." After analyzing each disparity, Ngozi and Sutton concluded that in order to close the MMR gap between non-Hispanic white women and non-Hispanic black women and other minority groups is to increase access to healthcare by providing transportation. This study also emphasized how healthcare providers need to be better educated in order to become more receptive to their culturally diverse patients.

Over a decade later Hollenbach et. al. (2021) began a quantitative study on the association between structural racism in the housing market and the disparate outcomes in an obstetric cohort. This cohort study matched modern obstetric outcomes with regions classified by the federal government for mortgage loan servicing based on racially discriminatory criteria from 1940. These data sets were analyzed between July to December 2019. Historically redlined zip codes were associated with an increased risk of preterm birth as well as birth viability. The findings suggest that the historic discriminatory policies are in fact associated with poor obstetrical outcomes.

In a qualitative study on implicit bias by physicians, Saluja and Bryant (2021) evaluated different responses to the Implicit Association Test (IAT) submitted by

physicians for other studies. By evaluating a large number of IATs they were able to conclude that due to these biases experienced by physicians, Black non-Hispanic and Hispanic patients received a lesser quality of care ultimately leading to a mistrust of the healthcare system.

These research studies are similar in their conclusions that non-Hispanic black and Hispanic women experience higher rates of maternal mortality due to systemic issues in the healthcare system. The most common reason for this was a decrease in the access to good quality healthcare for these women - whether that be due to a geographical disparity or a lack of trust in the healthcare system due to bias. Although each study focuses on a different aspect of racial disparities within the obstetrics field, all three studies are very relevant to the rising maternal mortality rate due to the different aspects focused on in each.

Socioeconomic Status

Along with racial disparities being a leading risk factor for maternal mortality, there are many socioeconomic factors that lead to great risks as well. In a qualitative analysis of the risk factors for maternal mortality and morbidity, Lappen et al. (2021) found that many community-level factors can increase the risks of pregnancy-associated risks. For example, women with Medicaid or without insurance as well as women in areas of lower socioeconomic status have a statistically higher severe maternal morbidity outcome (SMM) rate than women in higher-income communities. Maternal mortality refers to the death of a pregnant woman, while severe maternal morbidity refers to the short or long-term health issues faced as a result of being pregnant or giving birth. A higher SMM and MMR come from the fact that in areas where patients are in lower

socioeconomic areas, they are less likely to seek healthcare. In these same areas, there is less access to healthy food and affordable housing. This poses a threat to pregnant women who need to rely on prenatal care for the health of themselves and their babies. When a woman faces these challenges they have excess stress which can ultimately lead to a deterioration in mental health.

Mental Health

Among some of the other social determinant risk factors associated with maternal mortality, one of the leading causes of maternal mortality and morbidity is due to mental health concerns. In a qualitative study on the epidemiology of suicide and suicidal behavior among pregnant women, Zhong et al. (2017) found that the rate of suicide is increasing in groups of high-risk women. These researchers identified suicide-related behavior using the International Classification of Diseases (ICD) within all maternal hospitalization during the years 2006 to 2012. The ICD is a diagnostic tool that is used globally for epidemiology, health management, and clinical purposes. Their finding suggests that there are many racial differences in suicidal ideation. Along with an increased risk of suicide for minorities, there is also an increase in women who are of lower socioeconomic status as well as women who are experiencing teen pregnancy.

In a similar study on post-traumatic stress disorder (PTSD) in the year after birth (perinatal period), Vignato et al. (2017) found that PTSD occurring during this period presented itself in a different way than most other cases of PTSD. This study used a database to compare articles published between 2006 and 2015 to find the relationship between PTSD and the perinatal period. This study also found that there was a higher prevalence of PTSD among ethnically diverse groups of women. Vignato et al. (2017)

implied that greater education for nurses and physicians on PTSD during the perinatal period would be crucial to decreasing its prevalence.

In a qualitative study more focused on postpartum depression and suicidality in women, similar results were found. Paris et al. (2009) used a mixed-methods study that researched past data on the topic but they also analyzed the effects of postpartum depression on 32 first-time mothers using different surveys. This study found that women who were predisposed to mood disorders were more likely to experience postpartum depression. It also found that women who were experiencing high levels of postpartum depression felt like they were not prepared before giving birth and felt as though they had no connection with their newborn infants.

The studies done by Zhong et al. and Vignato et al were based on mental health within the obstetrical field and emphasized the fact that minority women experience greater mental health concerns than the majority of women. The main objective of the studies done by Zhong et al. and Vignato et al. was to identify how mental health becomes a risk factor for maternal mortality. Upon completion of both the studies done by Zhong et al. and Vignato et al., the findings confirmed that there need to be more initiatives on educating healthcare providers on how to discuss these issues with all patients. The study done by Paris et al. differed from the prior ones because it used a mainly Caucasian demographic to analyze postpartum depression. Through surveys, it was emphasized that psychotherapy from healthcare providers helped in the reduction of the depressive feelings that these patients were facing. Healthcare providers should be more adequately trained and educated on the different stressors their ethnically diverse

patients face, but it is vital to also educate healthcare providers on how to provide an explanation of the feelings each patient is experiencing in lay terms.

Programs Addressing Social Determinants

Due to the high MMR in the United States, lots of time and resources have been allocated to solving this issue. Healthcare systems have created programs to decrease the proximate causes of maternal mortality, like hemorrhaging and postpartum depression. There have also been many government interventions, including providing mothers with resources for affordable housing, healthcare, and education surrounding navigating pregnancy.

In one qualitative study on a North Carolina program called the MATTERS model addressing mental health Kimmel (2020), found that implementing greater accessibility to women during their pregnancy and postpartum period would help to decrease the maternal mortality rate due to suicide. The program is centered around creating greater access and affordability to therapy for pregnant women as well as women in the postpartum period. This program implements more counseling, which has been proven to decrease perinatal depression. Another characteristic of the MATTERS model is that it implements more telepsychiatry and telepsychotherapy so that it can be more accessible to people who may not have the time or resources for in-person therapy. The final component of this model was to educate providers on counseling interventions so that they could better treat their patients and know when to ask for help from a specialist.

In Ohio, a similar program is being implemented through the State Health Improvement plan (Akah, et al., 2022). This program includes paid family leave, tobacco cessation programs for pregnant mothers, and added safety screenings and quality

improvements. In order to address maternal suicide, there will be early childhood home visits and group prenatal care. Maternal suicide will also be addressed through greater access to well-woman care through the use of telehealth visits and greater resources to assist during the postpartum period. One final addition will be to implement provider and cultural competency training in order to train healthcare providers to better assist their patients.

Similar to the programs implemented in North Carolina, the new programs being implemented in Ohio address some of the main concerns of social determinant issues that lead to a higher maternal mortality rate. Addressing issues such as racial disparities by implementing programs that train providers on cultural competency will decrease the number of deaths. This is very similar to addressing the mental health concerns during the pregnancy and postpartum period that will decrease with added resources.

Although lower than the United States rate, the MMR for Ohio is not the lowest in the country, which has caused the Ohio Health Department as well as physicians across the state to implement similar programs to those mentioned in other states. The purpose of this research is to explore the programs that Ohio has implemented and how they are addressing the issue of maternal mortality.

Methods

The purpose of this project was to explore risk factors for maternal mortality and to better understand how local organizations are working to reduce or prevent those risks. Previous studies have identified and quantified the medical and non-medical risk factors for maternal mortality; however, this qualitative study gives a richer picture of how

community health workers who work daily with pregnant women identify and view these risk factors and how they intervene.

Data Collection

In order to identify the risk factors for maternal mortality, seven semi-structured interviews with community health workers were conducted to gather information about what they were seeing in the field and the programs they have implemented to address the risk factors. The following interview questions were used to prompt participants to think about specific topics/issues, but participants were also encouraged to provide information that was not prompted by the interviewer:

1. In your opinion as a CHW, what factors do you believe put pregnant women at the greatest risk for maternal mortality?
2. (If mental health is not mentioned in Q1) What role do you believe the pregnant woman's mental health plays in increasing the risk of maternal mortality? How do you address it?
3. (If home life is not mentioned in Q1) What role do you believe home life plays in increasing risk to pregnant women? How do you address it?
4. (If stress is not mentioned in Q1) What role do you think stress plays in increasing risk to pregnant women? How do you address it?
5. Are there any other underlying factors that you think increase the risk of maternal mortality that we haven't discussed? If so, how do you address these?
6. As a CHW, are there any preventative screens you believe should be implemented and why?
7. How is the issue of healthcare availability addressed with your pregnant clients?

Participants

Community health workers in the birth outcomes department of the Public Health Dayton and Montgomery County (PHDMC) were selected as participants because they focus primarily on infant mortality, but have vast knowledge and work with each of their clients on maternal mortality as well. The sample of community health workers was purposive in only choosing and reaching out to health workers in the birth outcomes department in order to make sure they had a vast knowledge of the subject prior to the interview. The community health workers were identified through a collaborative initiative between the Greater Dayton Area Hospital Association's Dayton Regional Pathways Hub program and PHDMC.

Procedure

This study protocol was reviewed and determined to be exempt by the University of Dayton Institutional Review Board. Each community health worker was connected via email. The research project was explained as well as what was necessary for them to do if they chose to participate. Interviews were conducted via email, phone call, or zoom video call according to the participant's preference. Each participant provided their availability and a zoom link was sent by the researcher. Once on the call, each participant verbally consented to a recording and transcription of their interview.

Data Analysis

Participants provided five virtual zoom interviews and 2 email interviews. The virtual interviews utilized the zoom recording feature which allowed for automatic transcription. The email interviews were not transcribed since they were already in text form. The transcriptions were then reviewed for identification of major themes as well as

any major outliers. The transcripts were also read and analyzed in the same way by a retired public health physician and a retired English teacher. Both the interview analyzers were instructed to pick out any major themes as well as identify any major outliers to make sure they were the same main ideas identified in the original analysis. Throughout this analysis, if there were any discrepancies, the theme that was identified by the majority was selected. On the only occasion, this happened the outlying theme was just slightly different and further integrated into the theme identified by the other two reviewers.

Results

The purpose of this research is to explore the interventions at the local level in order to identify the causes and risk factors for maternal mortality in Ohio. In this section, the main themes and ideas across seven interviews will be presented for each question. Any outliers will also be presented from each question. All of the themes will be presented with evidence from the interview. Within the analysis section, if there were any differences between what each analyst found, that will be presented as well.

Question One: In your opinion as a CHW, what factors do you believe put pregnant women at the greatest risk for maternal mortality?

From this question, there were two main themes that arose during the analysis: one being an uncoordinated health system and the second being social determinants. The uncoordinated health system is due to the lack of knowledge surrounding programs and care available as well as an overall lack of outreach to the women who need help most. Interviewee two mentioned “not knowing and not being prepared at all” as well as “not being aware of the resources available.” Interviewee five stated that there are some

programs put in place to address the "lack of affordable housing, childcare, and healthy food," but many women are unaware of these programs.

The second theme that was identified was social determinants, specifically racism, with black women most at risk. Interviewee six mentioned that "black women are far more likely to die from pregnancy-related complications than their white counterparts." This same idea was also mentioned by interviewee 1 (both) as well as interviewee five. The interviewees expressed that there are racial inequalities such as thinking black women cannot experience pain which becomes worse when the provider fails to listen to the patient. Mentioned by interviewee three that "doctors will brush over bleeding after birth as normal" and the patient does not know any better than to trust the doctor, "even if she feels like something is wrong." Interviewee six also mentioned that doctors will identify black women "as 'at risk,' but not listen to their concerns which leads to poor maternal outcomes." This also becomes worse if the patient lacks the knowledge to ask questions and has to advocate for themselves, which is challenging for many. Interviewee 1 mentioned that "nobody has told them the correct questions to ask, so when asked by the doctor they just say they have none." One outlying theme that was identified as mental health, however, is addressed later on in question two.

Question Two: (If mental health is not mentioned in Q1) What role do you believe the pregnant woman's mental health plays in increasing the risk of maternal mortality? How do you address it?

Questions two, three, and four all had intertwined answers, so each section will be shorter and only include the part that was spoken about. For mental health specifically, the main themes that were identified are the lack of understanding surrounding

postpartum depression and the lack of screenings as well as available resources. All interviewees except for five mentioned that identification of hopelessness and depression is necessary, especially for women who may not understand what postpartum depression is. Interviewee two mentioned specifically that "mental health needs to be addressed before birth" because women may have "past traumas that have not been addressed and can cause extra stress." Interviewees three and six both mentioned that "financial stress, home life stress, and lack of being able to provide adequate food" can all lead to poor mental health which then can lead to death. The only outlying theme was from interviewee six, who mentioned that "mental health drives decision making" and poor mental health can lead to poor decision making and result in poor maternal outcomes.

Question Three: (If home life is not mentioned in Q1) What role do you believe home life plays in increasing risk to pregnant women? How do you address it?

The main themes that came out of this question were the environmental and personal roles home life plays on a woman and her levels of stress which in turn deteriorate mental health. Interviewee six mentioned that "social determinants of health may be challenging based on where a pregnant person lives." Almost all interviewees mentioned violence in the home as well as lack of support as a huge factor in creating an unsafe home life. Interviewee five said that "although it is hard to screen for domestic violence over the phone, identifying it and providing resources is crucial to the survival of the mother and baby." Interviewee two mentioned that "domestic violence and mental health go hand in hand" when affecting a woman and her health during pregnancy. In terms of environmental home life challenges, the interviewees mentioned lack of inadequate housing, transportation, and access to food as affecting pregnancy.

Interviewee four said that without adequate housing a woman may “fall into survival mode and that puts you in a panic/stressed state which can lead to a deep depression” where one may not be feeding themselves correctly. She mentioned this becoming unhealthy for the mother and in turn the baby as well. Interviewees one (and two) mentioned that stable housing is necessary for a woman to be able to have a safe and healthy pregnancy. She also mentioned food deserts being a big factor affecting a pregnant woman's health because if all they can get is food that is not nutritious, their whole pregnancy becomes affected. She said she sees a lot of women who provide for their other children first before providing for themselves so the pregnant woman suffers a lot in that sense too.

Question Four: (If stress is not mentioned in Q1) What role do you think stress plays in increasing risk to pregnant women? How do you address it?

As mentioned in the previous two questions, stress is a huge factor in increasing the risk of maternal mortality because of the effects it has on mental health. Most of the interviewees noted that they had already addressed stress and chose to move directly onto question five; however, interviewee four mentioned cortisol levels rising when a person is stressed out and how that can lead to preterm labor. The main theme that came out of this question was that environmental stress needs to be addressed in two ways. The first way was by providing affordable housing, transportation, and access to good food would all decrease the role of stress. The second way that the interviewees mentioned is by explaining what is happening to a woman during pregnancy. Interviewee 3 mentioned that a lot of these women do not know “what is happening to their body” and need a “roadmap provided by the physician” to fully understand how their body is changing and

what to expect. She mentioned that the unknown of having a baby without support can cause stress and make the woman feel unheard when presenting issues to her physician if the physician just "brushes it off as normal." These ideas were expressed throughout all the interviews as each interviewee felt that there should be more resources given to the pregnant woman to help her understand what is happening and what to expect. This is what would decrease the stress a pregnant woman is facing.

Question Five: Are there any other underlying factors that you think increase the risk of maternal mortality that we haven't discussed? If so, how do you address these?

This question was addressed by most interviewees in other questions so most of them took this time to reiterate their most important points made throughout the interview. The main themes they chose to reiterate were the social/behavioral, environmental, and healthcare aspects as underlying risk factors. Again, almost all interviewees spoke about a failure to communicate with the patients. This could be addressed through "understanding a patient's ethnic/racial background" and although they will never have the same experiences, "try to understand the challenges black women face" (Interviewee 4). Interviewee three also mentioned patient advocacy and how that needs to be taught in a program in order to receive the best care possible and not have things brushed "off as normal." Similar to question four, the environmental factors need to be addressed by providing resources like affordable housing, adequate transportation, employment, and affordable food. The final theme was health care which is where there needs to be better coordination in order to make the patient fully aware and allow them to feel they know the questions to ask.

Question Six: As a CHW, are there any preventative screens you believe should be implemented and why?

This question had a few themes addressed by all interviewees and two themes that were more outlying. The main themes were screenings for domestic violence, housing situations, and support systems. Interviewee four mentioned that "domestic violence needs to be screened for with a more extensive screen" than the one being used now. Similarly, interviewees five and six mentioned that screening for support systems is needed in order to "see if any extra resources can be provided to help the women with extra support." Interviewee six mentioned that screens need to be implemented about housing to see in what ways they can be supported. Interviewee one mentioned that "there's a lot of programs and resources many women do not know about," and if there were proper screens in place, the provider would be able to share the resources with the patient. The two outlying themes mentioned were by interviewee one and how the provider should screen to see how educated the client is on pregnancy and then "the provider can use more lay language" when speaking with the patient and take more time to make sure she understands. The second outlying answer was from interviewee two who said mental health needs to be "screened before and after pregnancy," to try and combat postpartum depression.

Question Seven: How is the issue of healthcare availability addressed with your pregnant clients?

The main theme that came from this question was based on insurance. Interviewees one, three, five, and six all mentioned that the first thing they do is ask if the patient has insurance or is on Medicaid and if they are not they will immediately assist

them with it. Interviewees two, three, and four mentioned transportation as an important factor to address. Interviewee four mentioned that they "ask about transportation and then can provide transportation or funds to get to the appointments because the care throughout pregnancy is" important. For this question, there were no outlying themes because all interviewees spoke about either insurance, transportation, or both.

Overarching Themes

Racial Inequalities

The main theme that was found across all interviews was racial inequalities leading to maternal mortality. Within this theme, the leading causes are a lack of understanding on the patient side which is due to physician assumptions and a lack of patience from the physician. These results are comparable to the ones found within the literature review. Interviewee one said that "black women are far more likely to die from pregnancy-related complications than their white counterparts." This was emphasized by every other interviewee with information as to why following it up. One interviewee mentioned that physicians in the past have had a false understanding of black women and the struggles they face, which can lead to excess stress that other women do not face. Referred to by interviewee six as the "black experience," that a white provider will never be able to experience but needs to try and understand. This point of understanding was mentioned by interviewees two, three, and four as well.

Mental Health

The second theme that was identified as a risk factor for maternal mortality by all community health workers was mental health. This risk factor was also tied to stress and home life almost every time. All interviewees mentioned some sort of mental health

being a risk factor during question one which was before mental health was mentioned in question two. Interviewee four specifically mentioned that higher stress can lead to higher cortisol levels which can eventually lead to preterm birth and negative medical outcomes for both the mother and the infant. Although no other interviewees mentioned why stress is bad they all mentioned that it can lead to negative mental health effects. Interviewee four mentioned that she tries to teach her mothers how to implement self-care as a coping strategy in order for them to lower their stress levels and have better mental health. She mentioned this is good for the mother and her health as well as the baby. Most of the interviewees also made similar connections when speaking about home life as it relates to mental health.

In most of the cases, the community health workers identified home life causing stress, which causes depleted mental health in the women they are treating. Most interviewees mentioned domestic violence as one of the main themes of home life as a risk factor. They identified that pregnant women and new mothers needed a strong support system and interviewee two mentioned that "domestic violence and mental health go hand in hand." When a woman is in an abusive relationship, which is quite common for a lot of the women the interviewees work with, they are at a greater risk for maternal mortality. Within home life, every interviewee also mentioned affordable housing and access to food. The affordable housing aspect was identified as being a risk factor because without a place to feel safe the women are immediately in "survival mode," as interviewee four mentioned. This is an issue because she becomes more stressed and her mental health begins to suffer. Interviewee one explained that the food deserts most of her clients are in make it challenging for them to provide healthy foods for their children

as well as for themselves making them more prone to high blood pressure and gestational diabetes. The mental health aspect which encompasses the home life and stresses a mother faces are all nonmedical risk factors for the medical risk factors seen in so many.

Lack of Education about Government Assistance Programs

The third theme that was identified while doing the analysis of the interviews was the lack of education surrounding government assistance programs. Most of the interviewees mentioned that they had programs in place to assist the women with the struggles they were facing, but a lot of the women did not know they existed. Interviewee one mentioned that they put flyers in grocery stores and OB/GYN clinics in areas where there may be women in need. Interviewees two and three also mentioned that there are a lot of women who do not know how to apply or use their insurance so they just choose not to go. Without prenatal care, they then lack a lot of knowledge in regards to other sorts of issues surrounding their health, like family planning. This then continues the cycle according to interviewee three of "babies having babies."

Discussion

The maternal mortality rate in the United States is very high compared to other developed countries and over the past couple of years has not changed significantly. Ohio specifically has one of the higher MMR in the United States. It is important to look into the reasons why the maternal mortality rate is so high because it is taking countless lives and many resources that federal and state governments could allocate to other health issues. This study chose to explore the high rate by looking at the risk factors for maternal mortality. This study focuses on the nonmedical risk factors that lead to medical issues during or after childbirth. The research was conducted by completing six

interviews with seven different community health workers in which risk factors and themes were identified. This will help to see what is affecting pregnant women in Ohio, as well as some of the programs that are being implemented to try and fix this issue. Analysis of the interviews identified three main themes that can contribute to maternal mortality: racial inequalities, mental health, and lack of education about government assistance programs.

Racial Inequalities

Almost all interviewees mentioned some form of racial inequality as a main contributing factor to maternal mortality. This has been talked about in some of the research done, for example, the study done by Ngozi and Sutton (2003) identified that the MMR rate is much higher for black, non-Hispanic individuals. These results are consistent with what was found prior to beginning this study; however, the community health workers provided insight into patient advocacy and how some of these nonmedical issues lead to medical ones. The most common way this was brought up was when mentioning the physician and the lack of patience and understanding they had for the patient. Most interviewees said it needed to be addressed by taking more time with each patient and really understanding their needs, stressors, and education level in order for them to be able to communicate clearly with the patient. One way to address this on the physician's end is by providing a health literacy questionnaire to any new patient. By doing this, the physician could better understand the patient's education level on certain medical issues and therefore explain pregnancy and the new symptoms the woman may be feeling in more lay terms. This questionnaire would allow physicians to spend less time with patients who may know exactly what is happening and how to advocate for

themselves while giving them more time to explain to patients who may not have a grasp of the changes their body is facing. By doing this survey and allowing the physician to have the time to be more patient with each patient, it may also provide a more safe environment for the women to advocate for themselves and ask questions.

Along with more time with each patient, another way patient advocacy could be addressed is by having more programs like the one these community health workers are a part of (Mom's and Baby's First) that teach women how to advocate for themselves. As interviewee three mentioned about the doctors "brushing bleeding under the rug," the patient did not know any better than to listen to the provider. However, community health workers can teach their patients to advocate for themselves which is why this nonmedical risk of health literacy and advocacy did not turn into a bigger medical issue like hemorrhaging.

Another way the unknown could be addressed is by providing the patient with a pamphlet of what is going to happen to them and some of the most common issues and their warning signs so that if/when a woman began to experience these symptoms, they would be familiar with them and would feel confident advocating for themselves to get the care that is needed.

Mental Health

The second theme that the analysis identified as being a risk factor for maternal mortality is mental health. Mental health is oftentimes screened for but not nearly enough with usually little follow-up done, which leads to many other issues. Stress and home life also play into the mental health aspect so these issues will be looked at as proximate causes of maternal mortality with the ultimate cause being mental health. Before

beginning this research, mental health was a known risk factor due to the postpartum depression a lot of women face. For example, the research done by Vignato et al. (2017) identified that PTSD can lead to depression and many other mental health disorders in the period after birth. However, previous studies did not mention home life and stress as a factor that contributed to mental health. This study investigated all three risk factors and through the analysis of the interviews found that mental health is the biggest factor with stress and home life contributing to either good or poor mental health.

Prior to this research, many studies such as Zhong t al. (2009) mention suicide among new moms as a large population of maternal deaths each year. Suicide rates were never mentioned by the interviewees in this study; however, with the amount of focus on mental health their program seems to have, it can be assumed that those programs are implemented to decrease the suicide rates. Mental health can be tied to those suicide rates so treating the nonmedical risk factor of mental health is also treating the medical cause, of suicide, for maternal mortality.

One way to address mental health could be through programs like the one the community health workers who were interviewed work for (Mothers and Baby's First). The community health workers are able to be an outside source that can help the women identify any areas they may be struggling with and then get them the help they need. They also have the ability to help each woman learn some coping skills and ways they can implement self-care as a way to better their mental health. Each community health worker also has the resources to refer each woman to a psychologist if more care is needed than what they can offer.

Another way that mental health can be addressed is in the physician's office. Currently, more physicians provide a survey for postpartum depression, but according to the community health workers and studies from Paris et al., the surveys are never truly discussed with the patient. In order to bridge the mental health gap, physicians could explain what postpartum depression is and how common it is in hopes of de-stigmatizing it. After the explanation, the survey could then be implemented so that the patient has a grasp on why the questions they are answering are so important. Creating a transparent response to postpartum depression and mental health following childbirth is crucial to lowering the MMR.

Lack of Education about Government Assistance Programs

The third theme that the analysis identified as being a risk factor for maternal mortality is the lack of education about government assistance programs. The lack of knowledge surrounding these programs in many cases leads to the stress and home life mentioned previously.

This lack of knowledge will keep them from going to get any sort of care exacerbating the stress surrounding pregnancy and can then decrease the women's mental health. It is crucial that a pregnant woman get prenatal care and check-ups and the interviewees all made it clear that their program allows for assistance as long as the woman seeks it out. The emphasis from each interviewee that they had programs to help these women but a lot of the women did not know about them solidified that this is a huge risk factor for maternal mortality.

One of the ways that this could be addressed is by making more providers aware of these programs. By giving the information to an OB/GYN, they would be able to share

it with their patients and let the other issues like advocacy and mental health be addressed more thoroughly by the community health workers. This would also be helpful because it would give the patient more resources and tools to address their own health when going to the OB/GYN instead of going in without any understanding of mental health or advocacy.

Another way the programs could be marketed is by giving more resources to a marketing team solely dedicated to getting the word out about these programs to women who may need them. Currently, the community health workers are the only team of marketers and they go out themselves to place the pamphlets and fliers they have made. However, if a team was hired that was trained in how best to advertise these programs to women who need them most, it could allow for many more women to be helped.

Limitations

Due to the interviewing aspect during Covid-19, there were some limitations to this study. One limitation is that the only community health workers that were interviewed worked out of Dayton, Ohio and although they treat a large part of southwest Ohio, this study cannot be blindly applied to other populations of women. The community health workers also have the main focus on infant mortality within their programs. While they were very helpful in answering the questions and have a vast knowledge of the risk factors for maternal mortality, that is not their primary goal when helping their clients. This research would have also benefited from interviews with other providers who work with pregnant patients. For example, an OB/GYN, social worker, or another sort of provider would have provided additional information. This study emphasizes the importance of paying attention to the nonmedical risk factors that can

spiral into the medical risk factors that are often seen in contribution to maternal mortality.

This study is useful to try and decrease maternal mortality rates in Ohio specifically. This study only addresses the nonmedical risk factors; however, because those risk factors lead to the medical risk factors, it is important to address both. Providers can use this research to address some of the nonmedical risk factors to better assist their patients and care plans.

Future Research

Although the research done in this study will be useful to some providers, it will be more useful to identify areas for future research. Future studies can look into questionnaires, programs, and training and then find what is helpful in actually treating these nonmedical issues. By treating the proximate nonmedical issue, future research could see if it reduces the ultimate medical issues. This would be very helpful in lowering the maternal mortality rate and would also give the provider more insight into treatment before a medical risk factor threatens the patient's life.

This study aimed to look at the nonmedical risk factors for maternal mortality and what interventions were being done at the local level to help stop this issue. Through analyzing interviews with seven different community health workers, there were three main themes were found. The first is racial inequalities and a lack of understanding and empathy from the provider. The second risk factor was bad mental health which often was a result of high stress or negative home life. All of these issues had programs the community health workers used to intervene; however, the third risk factor was the lack of knowledge regarding these programs and interventions. With proper education on

these programs, a lot of women would be able to be helped and decrease the rate of maternal mortality in Ohio.

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Tables

Table 1. Contributing Factors Among 62 Reviewed Pregnancy-Associated, but not related Deaths with Accident as the Manner of Death, Ohio 2008-2016

Factor Class	Count (%)	Representative Themes
Patient / Family Factor Level		
Substance Use Disorder	74 (23)	Substance abuse directly compromised woman's health status, illicit drugs, alcohol, multiple medications
Mental Health Conditions	39 (12)	Anxiety, depression
Adherence	28 (9)	Non-adherence with medical recommendations, no adherence due to unstable housing, lack of seatbelt use
Environmental	20 (6)	Factors related to weather or terrain, fire or stove alarms, poor weather, icy roads, fire hazards
Violence	12 (4)	Intimate partner violence, abused by brother, other history of violence
Delay	11 (3)	
Chronic Disease	11 (3)	Asthma, chronic pain, epilepsy
Knowledge	8 (3)	Lack of knowledge of treatment or follow-up, lack of knowledge leading to delayed care, lack of knowledge about seatbelt use
Childhood Abuse / Trauma	8 (3)	Childhood sexual abuse
Social Support / Isolation	7 (2)	Lack of family or friend support system
Unstable Housing	5 (2)	
SUBTOTAL	247 (76)	
Provider Factor Level		
Assessment	6 (2)	Failure to screen, inadequate assessment of risk, lack of toxicity screen
Continuity of Care / Care Coordination	5 (2)	Lack of continuity of care
Referral	5 (2)	Failure to refer or seek consultation
SUBTOTAL	27 (8)	
System / Facility		
Continuity of Care / Care Coordination	14 (4)	Lack of continuity of care, lack of or poor quality case coordination or management, lack of coordination resulting in continued access to prescription medications
Access / Financial	12 (4)	Lack of insurance, lack of transportation creating a barrier to accessing care, lack of providers, lack of facilities, difficulty getting an appointment
Outreach	7 (2)	Inadequate community outreach, inadequate resources for community outreach
Communication	6 (2)	Inadequate connection to mental health system for referral and follow-up, poor communication between providers
Policies / Procedures	5 (2)	Lack of standardized policies or procedures (e.g., no policy for provider to reach out to psych when patient presents with intense mental health issues; no procedure to check women for toxicity at birth and during prenatal care)
SUBTOTAL	53 (16)	
Total	327 (100)	

Due to rounding, some totals may not correspond with the sum of the separate figures.

Figures

Figure 1. Trends in pregnancy-related mortality in the United States: 1987-2017

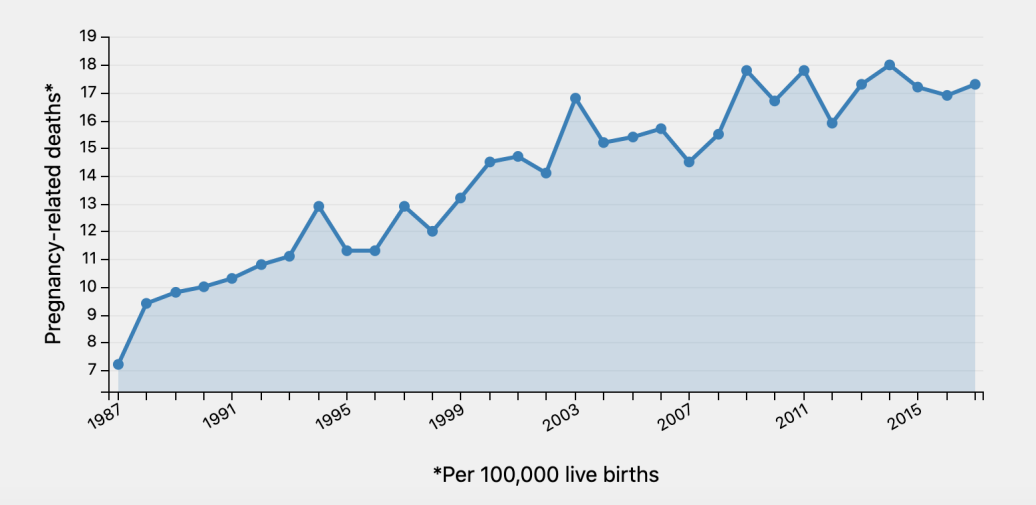

Figure 2. Underlying Causes of Pregnancy-Related Deaths by Leading Causes, Ohio 2008-2016