THE ROLE OF SOCIO-ECONOMIC ISSUES IN THE MATERNAL MORTALITY RATES OF BLACK WOMEN

By

Jaianna Lee Smith

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Faculty Mentor: Prof. Veronica Sovero
Department of Economics

Dr. Richard Cardullo, Howard H Hays Jr. Chair
University Honors

ABSTRACT

In the proposed research, the correlation between racial/economic disparities and the high maternal mortality rate among black women will be examined. Despite advancements in medical technology and practices, maternal mortality rates in the US have more than doubled in the past twenty years and black women are disproportionately affected the most. Research shows that black women are 3 - 4 times more likely to die during childbirth compared to other races of women. One of the lingering results of institutionalized racism in the US is the economic disparities that have produced inadequate treatment and care for black communities. Due to decades of racial discrimination and biases, the wealth gap between black and white families remains very distant. Lack of access to resources like healthcare, insurance, housing, transportation, etc is because of the socio-economic issues within black communities that the government has yet to provide proper solutions to. It's important to note that black women, regardless of economic class, are often not believed or understood by medical professionals leading to a mutual level of distrust. Data will be analyzed to provide insight into economic differences between black families and nonblack families and evaluate the various experiences black women endure during their childbearing experience compared to other races of women. This data will provide the necessary evidence showing the relation in the mortality rates of black women during pregnancy. It is through this research that solutions can be raised, hopefully resulting in an improvement of the preventable experiences pregnant black women face.

ACKNOWLEDGEMENTS

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I would also like to extend thanks to the faculty director of the honors department at UCR, Dr. Richard Cardullo, without whom I would not have been able to pursue this research. He created the opportunity for students to engage in research of our choice and interest, and for that, I am incredibly grateful. Special thanks to David Cocker and Riya Yadav because their efficient instruction during the HNPG 150 course allowed me to stay on track with my project and important deadlines as well.

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INTRODUCTION

Medical practice and technology have seen progression within the past century, however, the maternal mortality rates in the U.S. continue to reach high levels with black women having exceedingly high maternal mortality rates. Black women in the U.S. have a 3-4 times more likely chance of dying during childbirth compared to white women and overall higher than any other race of women (Howell 2018). Why is it that black women are subjected to more fatal experiences in pregnancy?

One of the residual results of institutionalized racism in the US is the domino effect it has in every aspect of the structure within our society and it severely impacts the quality of life for black Americans. Historically, black communities face socio-economic disadvantages from the effects of racism and slavery which in turn influences the available access that black women have to adequate healthcare and service from the medical system. This research examined the link between possible socioeconomic disparities in black communities and high maternal mortality rates among black women. Statistics reveal the social and economic inequities that stem from racial disparities. According to the 2020 CDC statistics on the maternal mortality rates in the United States, Hispanic women experience 18 deaths out of 100,000 live births, white women 19 deaths out of 100,000 live births, and black women 55 deaths out of 100,000 live births (Hoyert 2020). Consistent medical attention is necessary for pregnant women before, during, and after childbirth. Preeclampsia/eclampsia, sepsis, myocardiopathy, hemorrhages, embolisms, and gestational diabetes are major causes of maternal mortality and black women are likely to develop and die from these conditions (Louis 2015). The objective of the research was to prove that social and economic issues in the black community are a direct result of institutionalized racism in the United States, which in effect has caused dangerous and even fatal

experiences for black women during pregnancy. There is clear racial discrimination and biases in finances between black and white families and the wealth gap continues to widen. Limitations in access to necessary resources that black women need throughout pregnancy can be attributed to the lack of a response from the government regarding racial inequities influencing socio-economic conditions. Social and economic factors are also leading to an increase in stress/mental illness, poverty, and food insecurity among pregnant black women. The medical field has seen growing numbers of distrust from black women as maternal mortality rates continue to be high despite black women achieving greater amounts of economic success than ever before. The focal problem is that pregnant black women are dying at high rates from very preventable deaths.

Data analysis included literary research in conjunction with public health data collected from online reporting databases. Various socioeconomic conditions in the U.S. were measured by county and paired with MMR by race in graphs to determine if there was any relationship. If there is a relationship, literary analysis dives further into why this relationship exists. Connecting these socioeconomic variables influenced by racial disparities to the MMR of black women can prove there is inequity in the way black women receive medical care as well as not having the same opportunities to fully support a pregnancy. One of the main findings conclude that black women have the highest maternal mortality rate in relation to every socioeconomic variable chosen to analyze regardless if there was an incline or decline in trend for the specific state/county. The conclusions of this study bear great significance in that black women have high MMR even if their socioeconomic conditions are trending in a positive direction, signifying that there are clear racial factors that should be studied and reported further in each county of the

U.S. When issues that are deeply affecting black communities or black women are investigated, solutions will naturally follow but it first has to be addressed as a problem.

BACKGROUND

Knowing the history of black women's sexual and reproductive health in the U.S. is necessary to understand why the trends in MMR for black women exist today. "Racism, African American Women, and Their Sexual and Reproductive Health: A Review of Historical and Contemporary Evidence and Implications for Health Equity" (Prather et al. 2018) is a study that analyzes how historical events in the U.S. between African American women and their sexual and reproductive health have instructed the lack of care black women receive in hospital settings. Methods of racial superiority have continued to pervade the negative narrative of black women and issue inferiority over African Americans in general. They used peer-reviewed studies to establish a connection between historical events from the past and the health outcomes of black women in the present, including maternal mortality rates.

The research implies that history has to be acknowledged to instill effective changes on the basis that systematic racism stems from hundreds of years ago, and even still, systematic racism is in effect today. This research argues that strategies to fix the inequalities in healthcare for black women can only have positive results if the history of black women's sexual and reproductive history in the U.S. is addressed. In their research, they detail how events like the Civil Rights Era, slavery, Jim Crow, and the Post Civil Rights Era have influenced the mistreatment of black women and their sexual/reproductive health today. The period of slavery was the beginning of the misunderstanding and racial biases of black women and reproduction. Black women were often oversexualized and deemed as breeders for more slaves to stimulate the economy for white slave owners. There have even been false scientific narratives on black

women's sexual biology to advance white superiority. Being categorized as different from other women has only popularized false beliefs that the anatomy of black women is different and therefore black women have to be treated as such.

This research can be helpful because anyone who studies Biology has to understand that even in the scientific text there can be biases and discrimination. Some well-respected scientists wrote false narratives surrounding the anatomy and behavior of black women to spread eugenic ideas. The foundation of most systems in the U.S. was founded at a time when black people were not considered human. Progress can't be officially made until those same foundations have been directly uprooted. Future medical professionals can gain insight from this study because they can learn to reestablish trust and safety for black people in need of aid for their health. One limitation of this study is the lack of sufficient data evidence, as the research is mostly a literature review with little to no data.

In this research, socioeconomic factors influencing the maternal mortality rates of black women will be emphasized, including the wealth gap by race, lack of income, and social status. Systematic racism established a racialized wealth gap that caused more black people to live in poverty-stricken neighborhoods. According to 2019 statistics from the Federal Reserve Survey of Consumer Finances, White Americans in the U.S. earn a wealth of $188,000, whereas Black Americans earn a wealth of $24,000 (Bhutta 2020). In the study, "Income inequality and racial disparities in pregnancy-related mortality in the US", the author's objectives in the study were to examine the relationship between state income level based on race and the pregnancy mortality ratios in the U.S. They hypothesized that the mortality rates would predominantly affect the black community because black people are directly impacted by racial inequality that influences a lack of high income in the community. They determine that structural racism results in income

inequality for black families and black women face high exposure to mortality during pregnancy because of low socioeconomic status in resourceless neighborhoods. Income disparities not only place black women and their children at risk for death but also the health of the entire black population.

Through their data analysis and linear regression models, they were able to determine that income by the state was associated with racial disparities as well as an increase in pregnancy-related deaths according to race. States that were composed of mainly black people had a lower state income level and higher maternal mortality rates, while states with a higher income consisted of a white population with lower maternal mortality. With a 95% confidence interval, they were able to concisely establish a relationship between income levels and MMR (Vilda 2019).

The contributions of this research to the medical profession contain an unequivocal linkage to an economic factor affected by racism that leads to repercussions in the health of pregnant black women. Large percentages of students majoring in Biology are pursuing medical careers, however, one aspect that is absent from medical studies is the continuance of racial inequities in medicine and how it influences the inadequate care that a black person might receive from medical professionals. People from lower-income states are likely to have less funding for hospitals and worse experiences in their treatment of illnesses. Some variances in the health of different races are more influenced by systematic racism and not due to individual personal choices. One limitation of the research is possible miscalculations and inadequate statistics to successfully represent the population and maternal mortality ratios. It might be difficult to accurately identify or determine a reason for individual cases of maternal mortality and establish correlations between the two variables.

The approach they take to the research is focused on linking maternal mortality of black women to the economic aspect of institutionalized racism. This characteristic of their research is one of the main focuses of this Capstone project. In the research, data analysis of state income and population statistics concerning maternal mortality rates will also be included. It would enhance the research if access can be gained to some of the same data sources they utilized in their research and expand upon it by relating income to the lack of healthcare or transportation, which are direct factors in maternal mortality.

In another study, "Oh gosh, why go?' cause they are going to look at me and not hire": intersectional experiences of black women navigating employment during pregnancy and parenting.", the authors discuss how being denied job opportunities because of race will cause black women to struggle with housing, transportation, food, etc (Mehra et al. 2023). 2019 U.S. Census Bureau statistics show that the annual income statistics for White Families is $76,000 and for Black Families, it is $45,000 (Semega et al. 2019). Linked factors that directly result from low socioeconomic status will be highlighted throughout the research. These factors include food insecurity, lack of transportation, access to healthcare, stress/mental illness, and poverty rates. Access to nutritional food is important during pregnancy and pregnant black women that are experiencing low income won't have access to nutritious food or food at all. Not having a source of transportation can dictate whether a pregnant black woman can receive medical attention before, during, or after labor. According to 2018 statistics from the U.S. Census Bureau, 5.4% of White Americans lack access to healthcare and 9.7% of Black Americans lack access to healthcare (Semega et al. 2019). Having to work 2 to 3 jobs just to survive can leave a pregnant woman with no time to care for their mental health, leading to health issues during pregnancy. Also, medical care in poverty-stricken neighborhoods is less than

adequate and because of the racialized wealth gaps, these are the medical systems that pregnant black women have access to.

Elizabeth A. Howell conducted a research named, "Reducing Disparities in Severe Maternal Morbidity and Mortality", that analyzed the racial and ethnic disparities in the maternal mortality rates of women in the United States. They investigated the trends of black women dying at higher rates of maternal mortality and associated with the complex effects of racism on the medical system. In their study, they determined that pregnant women needed medical attention during preconception, antenatal, delivery, and postpartum phases to have the most successful outcomes in pregnancy. One of the points they emphasized in their research is that some factors like socio-demographics, geographical neighborhoods, and access to adequate care and providers can be influenced by racial inequalities and injustice which can then impact the maternal mortality of black women. It highlights the disparities in the medical system but also indicates that the problem will not be easily solved by the individuals that are affected, instead, it can only be remedied by medical boards and government officials. Without quality treatment throughout all phases of pregnancy, black women will continue to be subject to preventable mortality (Howell 2018).

The significance of this study exhibits an inquiry into the racialized and ethnic inequities that black women and other women of color are confronted with in medical care. Biology is a field of study that many undergraduates pursue to work in the medical field. This research provides future and present medical professionals with insight into the consequences of disparities that directly impact their patients. Limitations of the study include the lack of strategies that include government intervention because while there are changes to be made in

medical practices, there is an extensive reformation that needs to occur on a government level to cause a mass effect in communities across the country. The proposed research is connected to the role of socioeconomic factors in the morbidity and mortality of black women during pregnancy. Within the study, they created a conceptual model that organizes the need for various resources in every phase of one's pregnancy. This model provides this study with additional information that can be researched regarding preconception, antenatal, delivery, and postpartum care.

METHODS

The research analyzes the maternal mortality rates of black women in the U.S. in the context of various socioeconomic disparities that have resulted from systemic racism. This study includes basic research: a literature review and data analysis. The literature review consists of reviewing articles and other research studies on related topics that helped build an understanding of the material. Scholarly articles were reviewed from JSTOR, PubMed, Elsevier, ScienceDirect, and many other websites containing articles relevant to the main topic, and information from the literature search was included previously in this paper. One aspect of the literature review has a basis in historical analysis of the sexual reproductive history of black women, as well as comparing it to the present day. During the data analysis process, the research draws connections between socioeconomic issues by race with the aggregated data, then links it to the MMR of black women. Aggregated data is a summary of multiple sources of data; for example, county and state statistics. For the data collection process, literature articles and data sources were found through the Internet and other online databases. Many county and state statistics are publicly available through websites such as the U.S. Census Bureau or the National Vital Statistics System. R' Tutorial is a coding program that was used to compile data into various charts and graphs. For this research, conducting interviews or surveys on a case-by-case basis would have

been too difficult and extensive to acquire information, instead, the data was aggregated and collected through other peer-reviewed sources.

CDC Wonder is an online database that publishes public health information in the U.S. regarding mortality and population statistics at the state and county levels. The first step of the data collection process was to use Wonder and acquire the number of maternal mortality cases of Black, Hispanic, and White women in the U.S. for comparison. One aspect of the research was to demonstrate the increase in maternal mortality over the past 2 decades. To accomplish this, conditions were set from the years 1999-2009 and 2010-2016 to filter out data. Then, the race and background information was specified to provide county and state maternal mortality cases per race. The reporting by race provided limited statistics in that it only included white, black, and Hispanic as racial categories; ethnicity was not an option but could have resulted in more detailed information. Education level was set to nonspecific, age range from 15-44, and cause of death detailing any condition related to pregnancy, childbirth, perinatal period, etc. Natality data was also collected at the county and state levels to acquire population numbers per county. This data was then implemented into an Excel spreadsheet, along with the natality data by race; afterward, the maternal mortality rates were calculated. Then, a training course was completed to have the appropriate knowledge of coding to use R' Studio. R' Studio is a coding software that is commonly used for data analysis and visual models or graphics. These spreadsheets were imported into R' Studio for further analysis. Data from County Health Rankings and Roadmaps containing socioeconomic conditions by race for the county and state level was also uploaded into R' Studio and combined with the MMR of each race to determine if there is a correlation.

Original data containing the MMR from the years 1999-2009 had to be excluded from the final data analysis since there was no data from County Health Rankings within this timeframe.

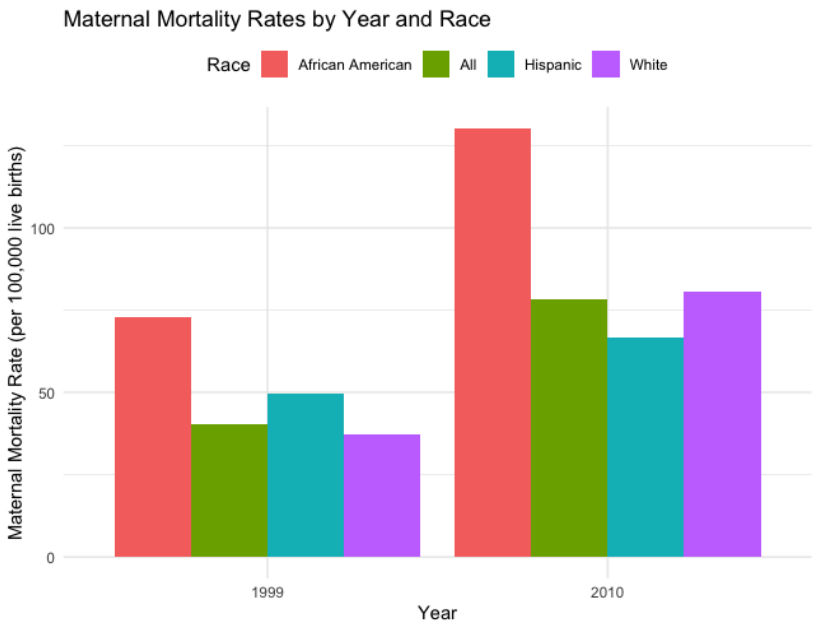
Linear regression analysis was used to evaluate the relationship between dependent and independent variables. This method is utilized to estimate the strength of the correlation of both variables.

Graphs were then created to show the association between each socioeconomic variable by race with a linear fit line to visualize the correlation. At first, there was an extensive process to include county data individually regarding each variable onto the graphs but the graphs were too crowded to be a sufficient visualization. Each dot represents different counties and greater sizes of the dots are meant to depict a greater number of MMR for each county. The red line represents black women, the green line represents white women, and the blue line represents Hispanic women. Then, bar graphs were created per race to demonstrate a top 10 county ranking of maternal mortality rates, the darker the bar signifies a higher ranking. Graphs and plots were also created showing the MMR of all women in combination with each variable to get an idea as to whether the trends were similar in all women or just black women; proving a connection with the racialized aspect of the research. Lastly, a correlation table was made with values stemming from each socioeconomic disparity and the maternal mortality rates of county and state. The importance of this data is to identify whether these socioeconomic issues are influenced by race and if they have a connection to black women's high maternal mortality, state and county conditions can also determine if black women will see a higher probability of mortality during pregnancy. Most of the data acquired for the research did not need special approvals. IRB approval wasn't necessary because the data did not include any personal information. To gain access to materials, creators of data were emailed personally to get permission to use data, or from UCR librarians. In addition to presenting this research at the Symposium, presenting in

front of a medical board would prove beneficial as the information in this research pertains to the medical field.

RESULTS

Figure 1



One of the first topics to be analyzed during this research was the jump in maternal mortality rates between different demographics of women over the past two decades. Using the data collected on the maternal mortality rates from 1999-2016, Figure 1 shows a bar plot illustrating that there is a near doubling of the numbers of maternal mortality. It also demonstrates that black women have been subjected to a higher percentage of maternal mortality cases. Understanding why these cases have increased significantly over the past 20 years, as well as why black women in both timeframes have an exceedingly higher MMR than other races of women is studied further throughout the analysis.

Figure 2A

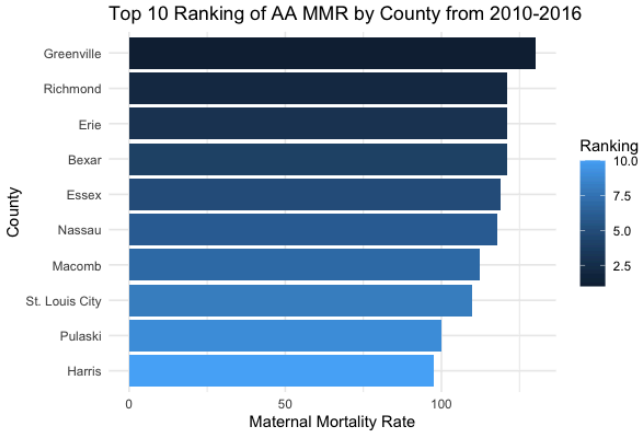


Figure 2B

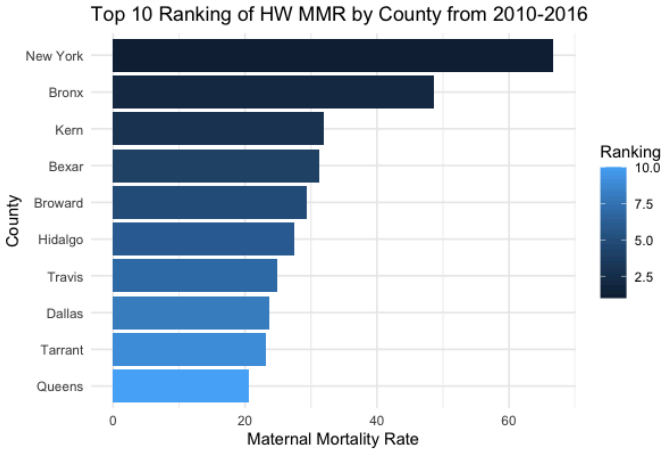
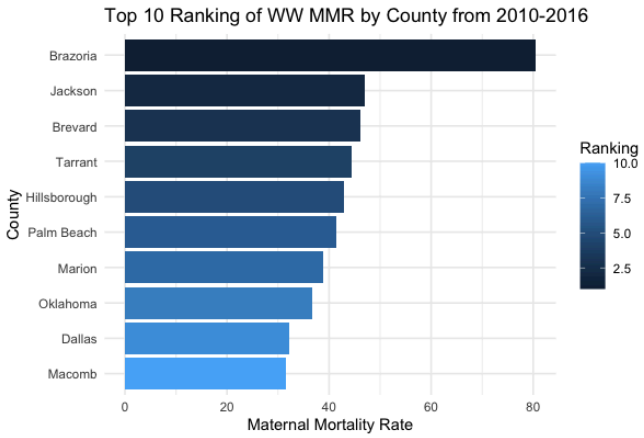


Figure 2C



Figures 2A, 2B, and 2C are bar plots that show the top 10 county rankings of the MMR of black, white, and Hispanic women in the U.S. In Figure 2A, it depicts the top 10 county rankings for black women in the U.S., evident within the plot is how much the maternal mortality rates exceed that of the other races of women in comparison, signaling that there are possible disparities to cause the MMR of black women to especially be higher. Of the 10 counties, 7 of them have populations where black people are not the majority, and in some cases, black people make up a small percentage of the population, including Greenville (South Carolina), Erie (New York), Bexar (Texas), Nassau (New York), Macomb (Michigan), Pulaski

(Arkansas), and Harris (Texas) (U.S. Census Bureau). Given that many of the counties in this ranked list have a lower percentage of a black population and there is still a higher percentage of black women dying from maternal mortality could signify that there are racialized aspects that influence this outcome within the counties. Logistically, the race with the highest population should correlate to higher rates of maternal mortality, but the data in this plot doesn't corroborate this. Greenville has the highest ranking for the maternal mortality of black women and this could be due to a variety of racial inequities within the county itself. According to the United Way of Greenville County, Greenville seems to have issues with income disparities, higher poverty rates within black communities, greater unemployment in black communities, etc (United Way of Greenville County 2020). Figure 2B shows the top 10 county MMR of Hispanic women in the U.S., showing that they seem to have lower overall maternal mortality rates than black or white women. This could be due to a lack of reporting in the Wonder database as the reporting for Hispanic women by county was significantly lower than that of the other two races. The plot for Hispanic women has a similarity in the county to black women, which is Bexar, Texas. However, Hispanic women have a larger majority in this county as opposed to black women, so it would make sense for Hispanic women to have this county in their top 10 rankings. Black women make up a lesser percentage of the population, yet, the numbers for maternal mortality exceed that of Hispanic women. In a report by the San Antonio Area African American Community Fund, they discussed the number of racial inequalities in the county of Bexar including inequities in housing, disparities in the education system, criminal justice system, and unemployment (SAAAACF 2021). Figure 2C demonstrates the top 10 county rankings for the maternal mortality rates of white women in the U.S. The plot appears to show a higher percentage of MMR for white women compared to Hispanic women but remains lower than the MMR for

black women. Most of the counties within this list are counties that have a majority white population, which aligns with the idea that their MMR would be higher. Macomb (Michigan) seems to be a county that white women share with black women on the top 10 MMR rankings list, however, a closer look into the demographics of the county shows that black women have a significantly higher maternal mortality rate despite white women making up most of the population. Upon further examination, a report by Public Sector Consultants identified that black people were predisposed to poverty, unemployment, lack of equity in education, and other challenges that showed racial inequality (PSC 2023). These 3 plots provide a clear visualization of the discrimination within the U.S. and how it penetrates the lives of black women because to have such high maternal mortality rates even within counties that don't have a high population of black people signifies a clear problem.

Figure 3

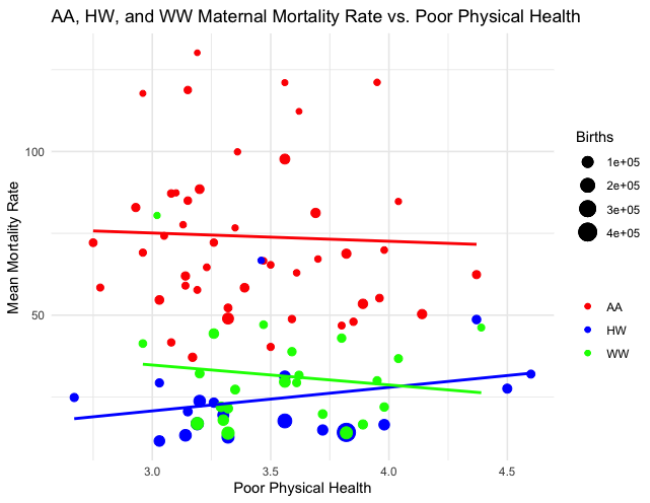
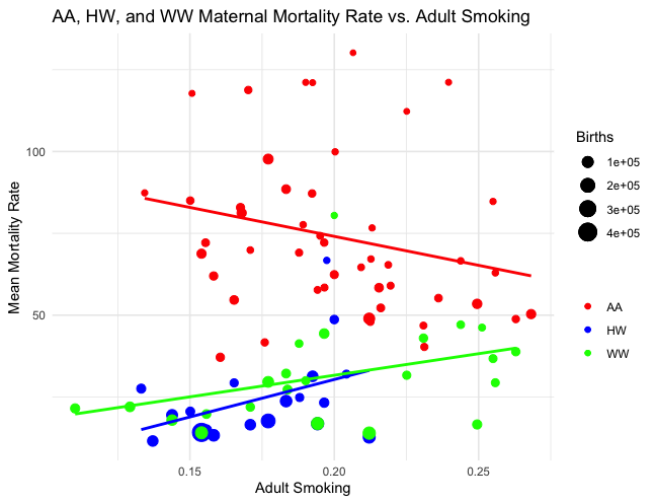


Figure 4



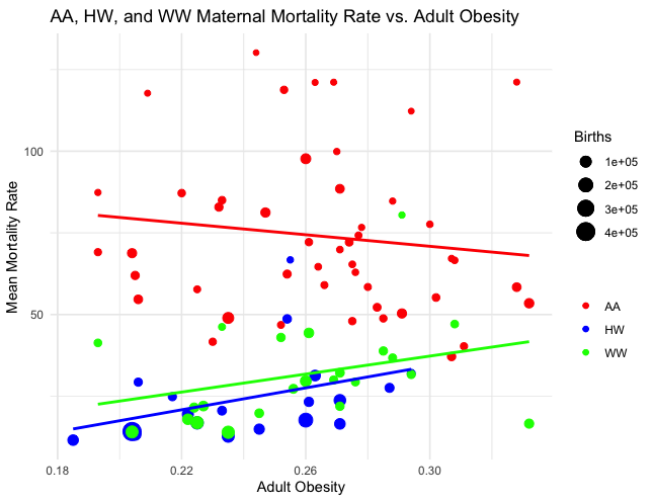


Figure 5

Figures 3, 4, and 5 show a relation between MMR and physical choices or decisions that can impact a woman's pregnancy. Personal decisions made regarding a woman's health should have a direct linkage to that woman's disposition to maternal mortality during pregnancy. According to the graphs, the trends show that black (corr: -0.0398) and white women (corr: -0.1440) have a decrease in MMR for poor physical health, while Hispanic women are seen with an increase (corr: 0.2800). These trends don't align with what is expected because if a person has an increase in physical health issues it should correlate to a higher percentage of MMR, not the opposite. Based on the correlation values, the relationship between the variables that are shown on the trend lines of black women and white women might be inaccurate. Graphs that are in association with MMR and adult smoking and adult obesity demonstrate a decrease in black women (adlt_smoking_corr: -0.239, adlt_obesity_corr: -0.130) and an increase in Hispanic (adlt_smoking_corr: 0.410, adlt_obesity_corr: 0.374) and white women (adlt_smoking_corr: 0.378, adlt_obesity_corr: 0.312). Once again, the trend line for black women depicts the opposite of what would be expected in that an increase in these variables should produce higher rates of

maternal mortality. Correlation values are negative again for the relationships in the trend line for black women, signifying that this is another inadequate depiction of the relationship between the two variables. It is likely that the information collected from the Wonder database either lacked enough reporting on behalf of black women or reporting was inaccurate. However, assuming that the data is correct, these results may show that black women's MMR is driven by other factors and not personal health choices that could influence their pregnancy. Often, maternal mortality is placed on the decisions of the mother due to most of these deaths occurring because of health issues, but these graphs could show that black women's health choices do not seem to be a driving factor in their MMR. However, the correlation values for each of these variables are negative meaning that the data given might not be adequate to prove a relationship or lack thereof. Despite the trends going in the opposite direction of what is expected, the graphs still prove that black women have a higher overall maternal mortality in comparison to the other races of women.

Figure 6

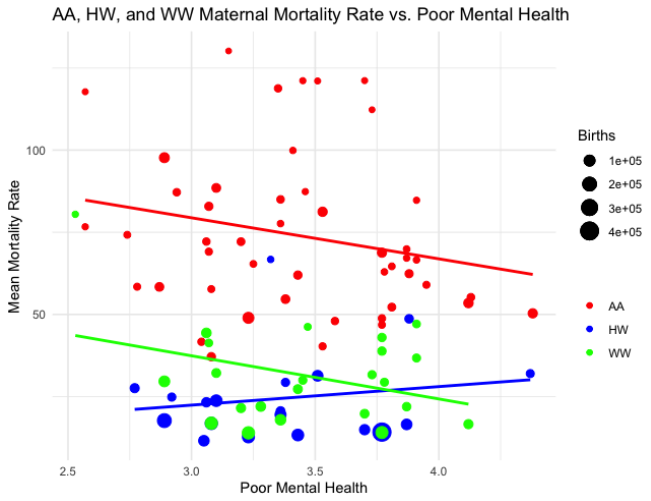


Figure 6 confers a connection between MMR and poor mental health, with black women (corr: -0.219) and white women (corr: -0.345) having a decrease in MMR due to this variable

while Hispanic women have seen an increase (corr: 0.168). This is another graph that goes against the expected trend line because poor mental health should relate to higher MMR by normal standards. Correlation values for both black and white women are negative so it potentially means that the data collected to connect these variables was not adequate to provide a reliable relationship. Given the fact that black women receive significantly less mental help nor have access to the same mental resources, this lack of association could be due to not having a history of mental attention or a diagnosis, making it unlikely to be reported in MMR cases. In a blog by the Psychiatric Times, the author, who is a doctor, analyzes the stigma of mental illness in the black community as well as the inequities on display in mental health care. The author attributes higher rates of maternal mortality to black women having less access to mental health resources or black therapists/psychologists, as well as being less likely to take medication after being diagnosed with postpartum depression. Levels of distrust have been established between mental help professionals and black women due to the disparities in how black people are treated and diagnosed by professionals compared to other races (Richards 2021).

Figure 7

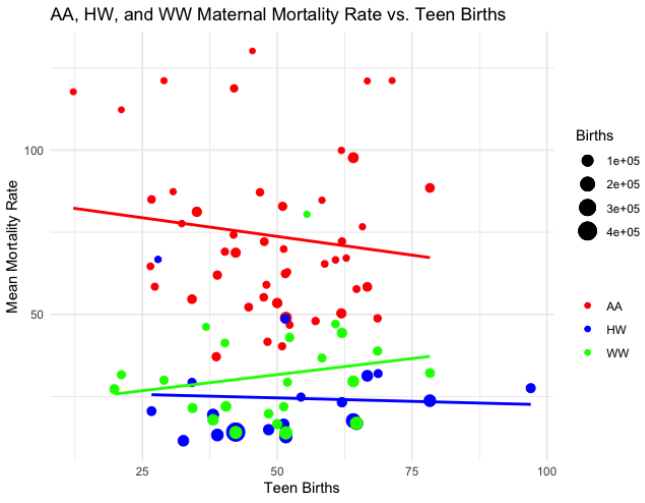


Figure 8

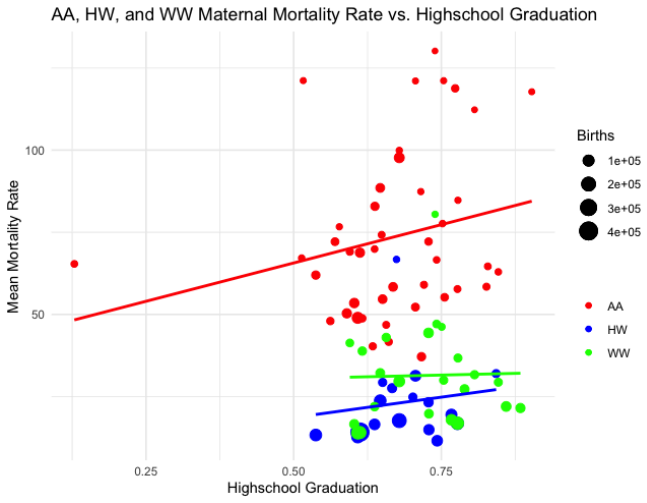
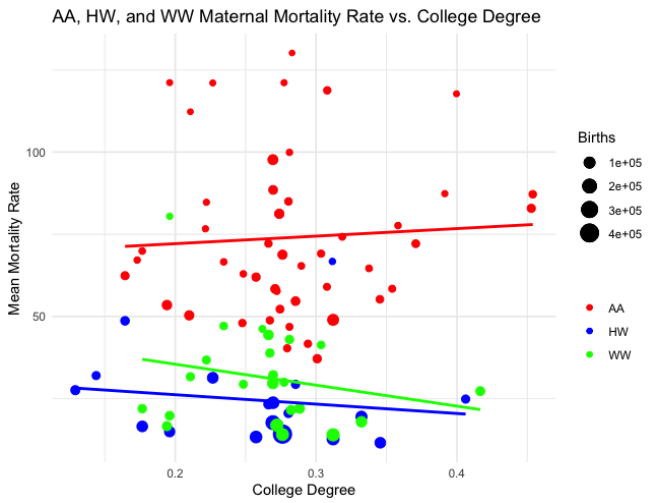


Figure 9



In figure 7, it shows that black women (corr: -0.135) and Hispanic women (corr: -0.056) have a decrease in their relationship with MMR and the increase in teen births, whereas white women see an incline (corr: 0.193). Teen births can lead to death during pregnancy because it usually means that the underaged person's body is not developed enough to sustain a pregnancy or that there might be a lack of sexual education and education regarding health during pregnancy. In a research study, the authors discuss how adolescent girls are likely to develop medical conditions that contribute to maternal mortality, as well as be subjected to financial constraints, limited education, and exclusion from their community (Maheshwari 2022). Given the correlation values this seems to be another case of the data not being accurate enough to create a relationship between the two variables, resulting in an unreliable trend. The trends in Figures 8 and 9 show an association between MMR and increasing numbers of high school graduation and college degrees. Black women have positive correlation values with these variables (high_grad_corr: 0.229, coll_deg_corr: 0.061), whereas Hispanic (high_grad_corr: 0.140, coll_deg_corr: -0.150) and white women (high_grad_corr: 0.024, coll_deg_corr: -0.222)

have both positive and negative correlation values. The correlation values show a slightly positive correlation for the trend line of black women but are still overall a weak relationship. According to a study, data was collected from 200,000 participants who were giving birth and the researchers were able to determine that when women did not have access to education or maternal education resources they were 2-3 times more likely to die from maternal mortality (Karlsen 2011). Negative outcomes of pregnancy occur typically because of sexual education not being included in the education system generally; despite the racialized differences in the education that black people receive compared to other races, black women's MMR still increases when higher forms of education are achieved. Black women over the years have received higher forms of education at greater rates than ever before in history. Before the Civil Rights era, black people were not allowed the opportunity to seek an education that had proper funding and resources. This change in education throughout generations has likely led to more black women pursuing education before starting families and therefore providing their families with better resources and financial support, however, black women's maternal mortality rates remain unaffected by this change.

Figure 10

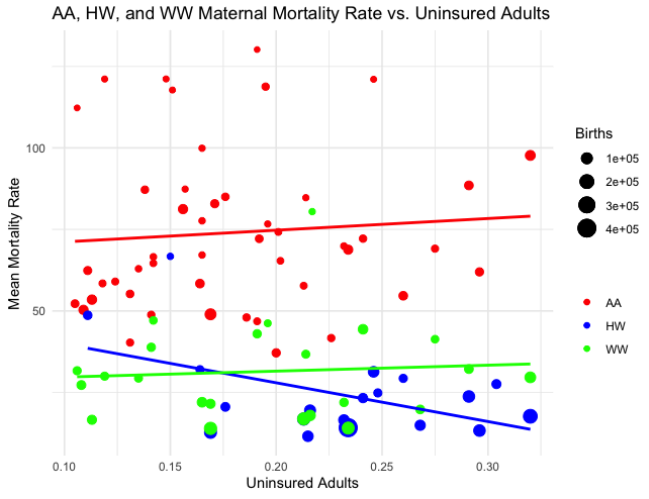


Figure 11

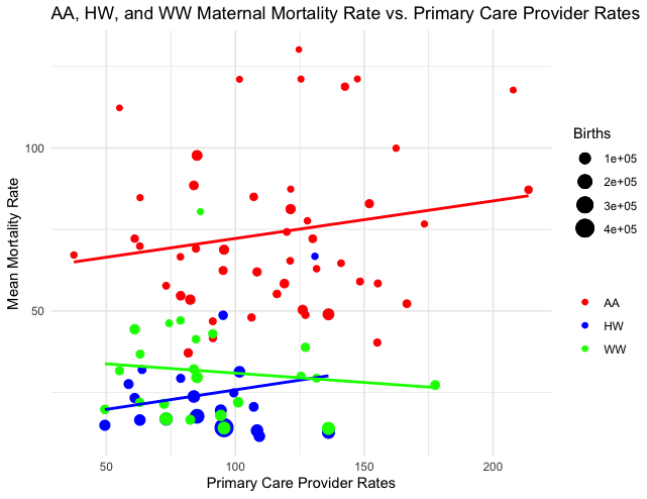
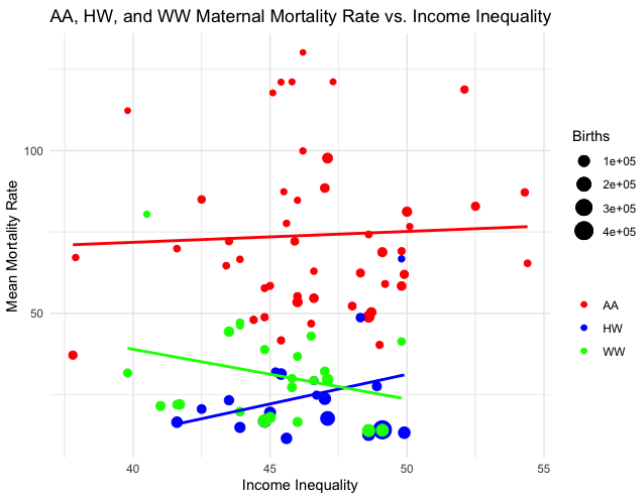


Figure 12



Figures 10, 11, and 12 involve systematic policies that have been affected by institutional racism, showing an upward trend between these factors and the MMR in black women. There seems to be more of an increase in MMR with black women involving institutional factors that can affect black women and black communities in different ways that are likely due to racism instilled into the structure of government and society. Figure 10 shows the relation between MMR and the number of uninsured people. Black (corr: 0.079) and white women (corr: 0.074) have a slight increase with this variable as opposed to a decrease with Hispanic women (corr: -0.491). Primary care provider rates in Figure 11 seem to be the most noticeable condition that provides an increase in MMR of black women with a positive correlation (corr: 0.178), Hispanic women (corr: 0.211), and white women (corr: -0.115). These factors are likely contributing to the MMR crisis with black women. Having insurance leads to connecting with a primary care provider, which is necessary for ensuring the survival of the mother and child that is being carried. Knowing that black women do not have as much access to a provider is critical to the health of the mother throughout her pregnancy. In a report by Solomons, the relationship

between the expansion of Medicaid benefits and maternal mortality rates is analyzed. States that are typically Democratic-led have made Medicaid more accessible to individuals and as a result, women can have medical care and providers throughout their pregnancies to maintain their health. In comparison to states that were Republican-led where there wasn't an expansion in Medicaid benefits, women living in poverty who don't have access to insurance or providers are more at risk for maternal mortality (Solomons 2021). Per the graph, it seems that even when primary care provider rates have increased, the maternal mortality rates for black women are at an incline too. Therefore, it points to a problem within the healthcare system and how black women are treated as opposed to women of other races. Figure 12 illustrates the relation between income inequality and MMR showing that black (corr: 0.048) and Hispanic (corr: 0.326) women see an incline in association between the two, whereas white women see a decline (corr: -0.274). This trend does align with what is expected given that women of color experience income inequality at high rates and are at risk of experiencing morbidity during pregnancy when finances are limited. Having a financial burden or instability can suppress a woman's ability to support themselves and their family during pregnancy; leading to decreased physical and mental health.

Figure 13

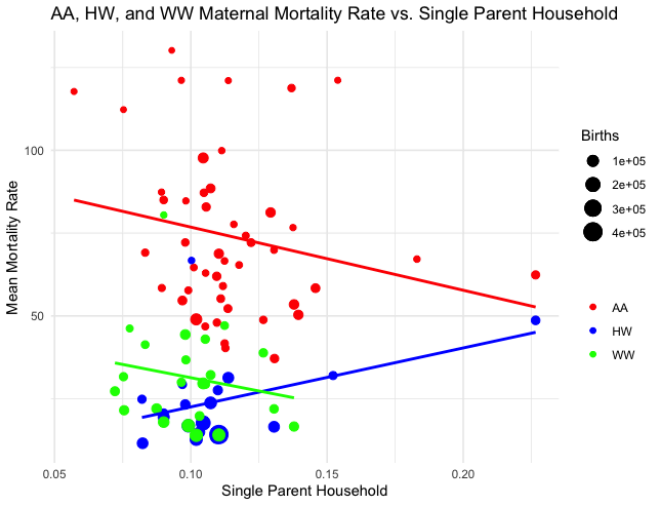
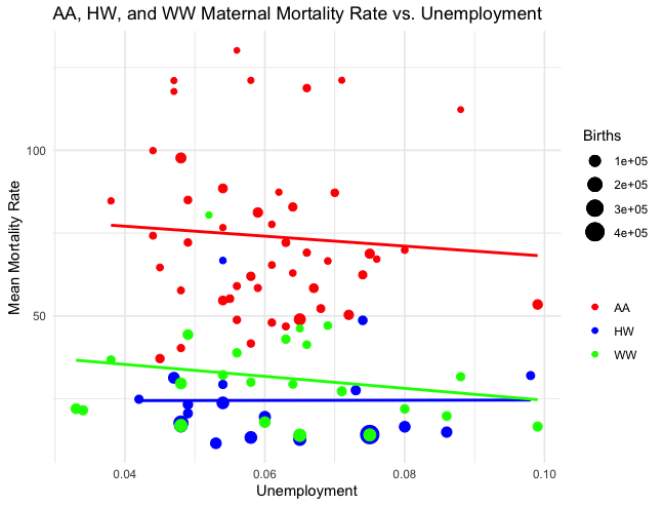
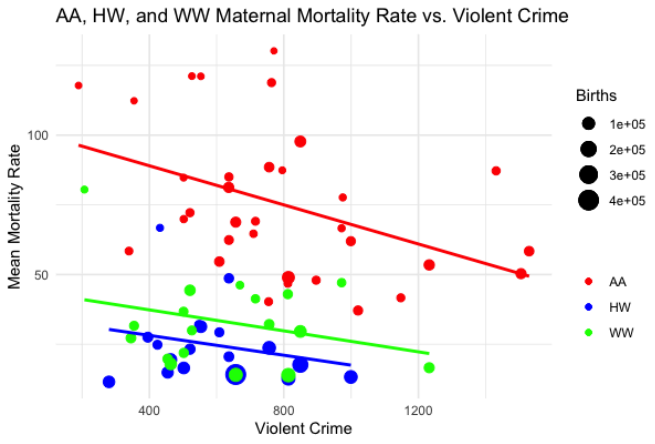


Figure 14



Figures 13 and 14 include unemployment and single-parent households which deeply impacts the finances a woman might have during pregnancy. Without financial support, women are at a higher risk of mortality during their pregnancy. Black (s_p_house_corr: - 0.210, unemp_corr: - 0.074) and white (s_p_house_corr: 0.422, unemp_corr: 0.003) women have seen a decrease in MMR concerning these conditions but, this could be due to the rise in finances for black women over the years. The trend lines seem to be the opposite of what is expected, typically when there is a reduction in finances from either a single-parent household or unemployment it leads to fewer opportunities to afford appropriate medical care. There was a study done in 2006 regarding the impacts of unemployment and finances on maternal mortality rates, the results determined that women or girls subjected to unemployment had a higher chance of maternal mortality or developing maternal health conditions that could place them at risk for mortality (Raatikainen 2006). The correlation values do suggest that the trend line for black women might not be reliable enough as the correlation is negative.

Figure 15



Lastly, in figure 15 it shows the correlation between MMR of all races and violent crimes. The outcome of this plot is the opposite of what is expected as violent crime in

neighborhoods creates unsafe environments for women during pregnancy and should result in higher numbers of mortality. However, the relationship shows that the greater the violent crime is, the likelier it is that maternal mortality decreases. All three correlation values per race were negative, which hints at the idea that the data collected from the database is not reliable enough to form strong relationships. Assuming the data is reliable, it's possible that increased violence in neighborhoods could potentially result in the increased deaths of women before they have the chance to have children, therefore, increased violent crimes lead to a decrease in maternal mortality

	Race	Violent Crime	Single Parent Household	Income Inequality	Unemployment	College Degree	Highschool Graduation	Primary Care Provider Rates	Uninsured Adults	Teen Births	Adult Obesity	Adult Smoking	Poor Mental Health	Poor Physical Health
1	AA	-0.422	-0.210	0.048	-0.074	0.061	0.229	0.178	0.079	-0.135	-0.130	-0.239	-0.219	-0.0398
2	HW	-0.232	0.422	0.326	0.003	-0.150	0.140	0.211	-0.491	-0.056	0.374	0.410	0.168	0.2800
3	WW	-0.289	-0.184	-0.274	-0.202	-0.222	0.024	-0.115	0.074	0.193	0.312	0.378	-0.345	-0.1440

CONCLUSION

Data analysis throughout this research was limited due to the lack of specific socioeconomic conditions set per each race of women. Socioeconomic data included numbers based on the entire population for each county; this data could have been more helpful if it provided separate statistics based on race. Knowing that socioeconomic conditions are not the same for each race of people, it would have a varying effect that should have been included in the reporting. Recent updates to the County Health Ranking and Roadmaps show that there have been additions to the reports that now include more detailed data based on race; this latest addition was after the data collection process of this project. Another limitation of this project includes the linear regression analysis used to build the graphs for visualization. Two variables were used, independent and dependent, with maternal mortality rates set as dependent and the

socioeconomic condition set as the independent variable. The problem is that a multiple regression analysis should have been used to account for underlying conditions that contribute to the maternal mortality rates. This form of regression analysis would have likely caused data that skewed in a direction opposite of what was expected to shift to normal conditions.

Results from the graphs and plots show that there might be an improvement in socioeconomic conditions that are prevalent within black communities as an effect of the racial history of black people in this country. Despite the downtrends of black women's MMR in certain graphs, it is still apparent that the MMR of black women is noticeably higher than that of the other races of women in every graph and plot created. This data alone proves that black women do have a greater likelihood of dying during pregnancy, however, more research needs to be done regarding the reasons as to why. The socioeconomic issues chosen in this study are a great starting point for research and reporting to the U.S. Census or the public Wonder database regarding these conditions in relation to MMR of black women are crucial for gaining a better understanding as to what is driving these disparities in mortality. Evidence suggests that in any condition of a black woman's life, there seems to be a higher risk of death during pregnancy regardless. Overall, there is a lack of personal health data and socioeconomic data specified to race that is being reported on a county and state level, with many counties not contributing entirely to the reporting system.

ANTICIPATED RESULTS

It was anticipated that the results of the study would show a clear correlation between the maternal mortality rates of black women and the oppressive socio-economic issues that remain prevalent in black communities. Black history in the U.S. began with slavery and racial discrimination that had lasting effects on future generations of black people. Without proper

addressment by the U.S. government or widespread change in law and policies after the abolition of slavery; or even after the Civil Rights era, black communities have been forced to persist with no equality in resources. Racial prejudice and discrimination can invade every aspect of American society because it was instilled in the very beginnings of the U.S. government. Black women are often victims of this society with no adjustments being made to create equity. As a result of inadequate change in laws, policies, etc; black women are subjected to insufficient socioeconomic conditions along with mistreatment towards their health. Over the decades, black people have been able to achieve high levels of success that wasn't possible before, this has created wealth and access to opportunities that black people have not had in the past. Despite this improvement, black women are still facing negative outcomes regarding their lives, as well as their children. Strong evidence supporting the idea that black women of any social status can experience malpractice or mistreatment in hospitals throughout their pregnancy demonstrates the racial biases in medical care.

FUTURE DIRECTIONS

If some of the key points mentioned were solved or at least addressed by the federal or state government then these rates would significantly decrease. Some strategies include: fixing the racialized wealth gap, reparations, free universal healthcare, medical boards collaborating with activist groups in black neighborhoods to receive direct needs from black citizens, diversity training, house loans or stable housing for black families, and grants for pregnant black women pursuing degrees. One gap in other research is the lack of data that links the causes of MMR in black women to socioeconomic issues. Another gap in research is that they mostly don't contain solutions to socioeconomic issues to lower MMR in black women because these are issues that can only be resolved by government officials or upper-level individuals on medical boards. One

limitation of this research is possible miscalculations and inadequate statistics to successfully represent the population and maternal mortality ratios. Only confirmed cases of maternal mortality as the cause of death were used. In more recent years, after the data collection process of this research, the County Health Rankings and Roadmaps database published more information about socioeconomic conditions that were specified by race. The data included in this research could have shown more accurate trends in association with maternal mortality if the socioeconomic data was defined by race. Without doing interviews or surveys, data might have been too geared to more succinct comparisons between only white and black individuals/families and not enough comparisons of black individuals to other non-white races. Even with Hispanic women being included in the data, there seemed to be low numbers of inclusion shared in the database. Lack of reporting is most likely the reason why there was an overall lower number of MMR in Hispanic women. Reporting on individual cases, while the data would have been limited in size, it also would have been concise enough to form definitive arguments surrounding the counties that they live in and the conditions of their environment. Then, each county could have been inspected as to what conditions are causing such high numbers of MMR in black women. Solutions with what policies or laws can then be implemented to create a decline in these numbers, possibly investigating at the city-wide level too. If a law can be passed that requires the medical field to gain permission from patients regarding their personal history and related information, reporting this info to databases can allow researchers to provide the necessary evidence to lawmakers and advocate for change in policies or government. It is also important to note that efforts have to be made to ensure trust and transparency between black communities and the government, as well as the medical field. Black women might not feel comfortable enough to provide the necessary information about their socioeconomic standing if

they do not feel that they can trust the system or healthcare providers. Without this data, researchers will continue to lack the data that is required for policy changes or a restructuring of government systems. Furthering this research will hopefully transform the socioeconomic conditions that influence black women's experience with pregnancy and potentially benefit black women's future with medical care in the U.S.

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