



Is Maternal Morbidity & Mortality in African American Women Affected More by Preventable Causes or Non-preventable Causes: A Systematic Review

N. De La Paz, PA-S; F. Onigbinde, PA-S; E. Rodriguez-Vela, PA-S; V. Ward, PA-S; M. Bazargan , Ph.D

Charles R. Drew University of Medicine and Science, Los Angeles, CA



PA Program

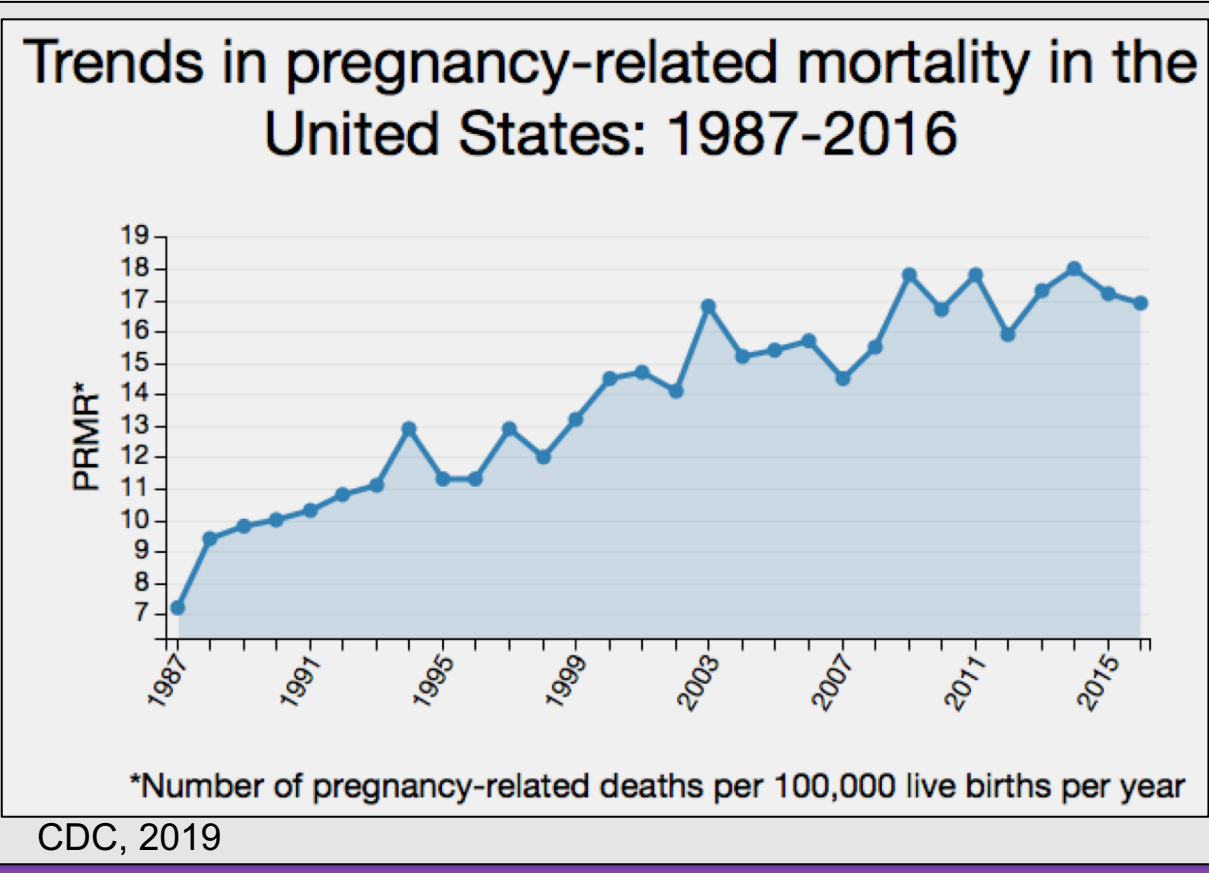
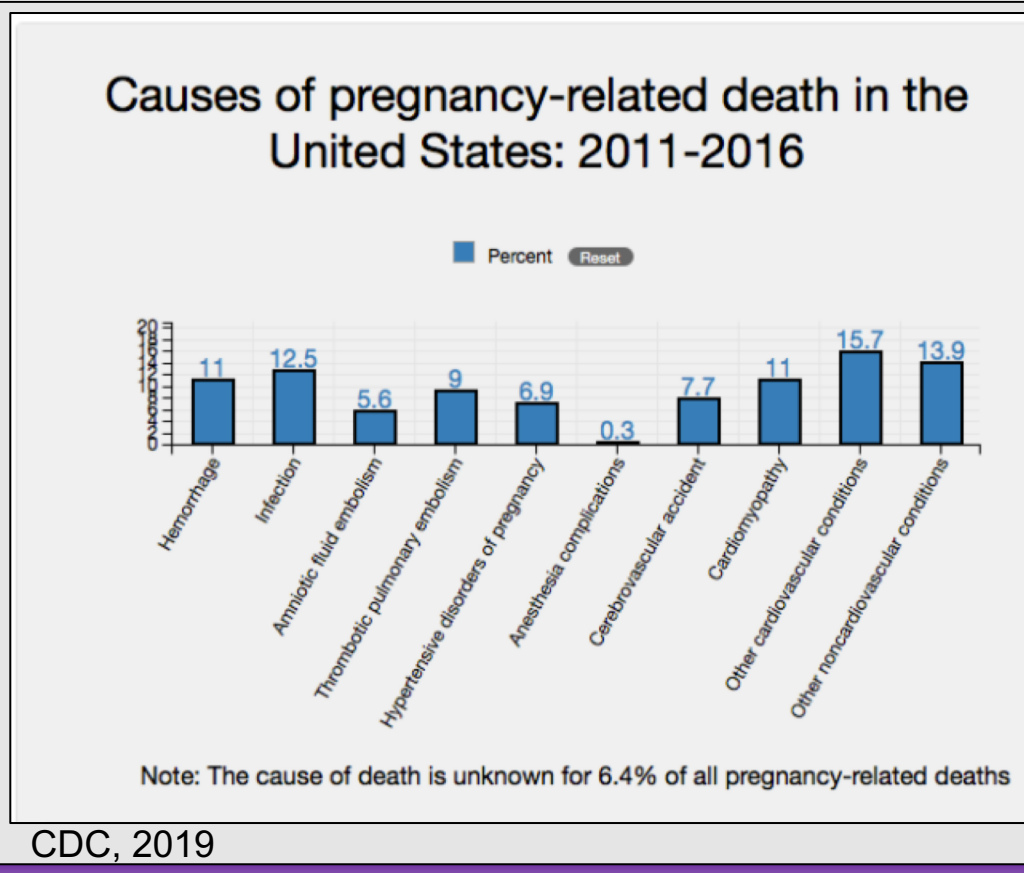
Objective

This study aimed to perform a systematic review to determine whether maternal morbidity and mortality in African American woman, in the United States, is primarily due to preventable or non-preventable causes.

Background

Maternal healthcare is essential to achieve acceptable intrapartum, peripartum, and postpartum maternal health outcomes. While maternal morbidity and mortality rate in other developed countries has decreased by 30%, we continue to see an increase in the United States [1, 2] The risk of developing complications and dying from pregnancy decreased dramatically in the United States during the 20th century due to medical and technological advances [3], but recent data has shown an increase in the maternal morbidity and mortality rate. During 2011–2016, the pregnancy-related mortality ratios were 42.4, 30.4, 14.1, 13.0, and 11.3 deaths per 100,000 live births for non-Hispanic black, non-Hispanic American Indian/Alaskan Native, non-Hispanic Asian/Pacific Islander, non-Hispanic white, and Hispanic women respectively (CDC). For the past 50 years, African American women have continuously been at 3-4 times greater risk of pregnancy complications, with the possibility of leading to death, compared to their white counterparts.

To better understand the reasons for higher pregnancy-related complications and death rate amongst African American women, we investigated the causes to determine if the morbidity and/or mortality could have been prevented. Many obstetric providers are aware of the risk factors contributing to maternal death, however crucial steps are not being implemented to impede fatal conditions such as cardiomyopathy, hemorrhage, pregnancy induced hypertension, and infection [4]. Overall, African Americans are less likely to be offered and to receive many types of medical services and procedures [5]. With this in mind, we hypothesized that racial disparities amongst African American women contribute to the higher incidence of preventable pregnancy-related morbidity and mortality, compared to non-preventable causes.

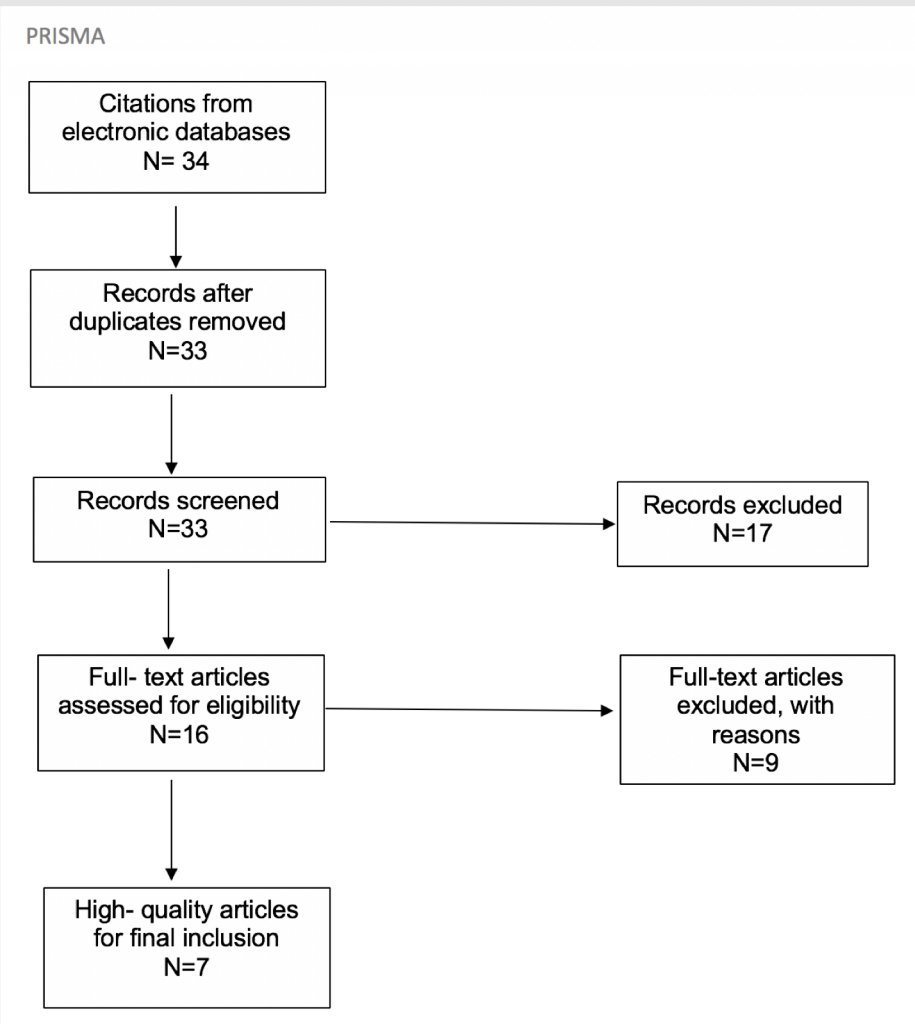


Methods

This systematic review of the literature consists of data that was extracted from existing published research reports. The literature used for this review was identified through PubMed, Google Scholar, and ProQuest Public Health search engines. Searches were conducted using terms such as "maternal mortality", "maternal morbidity" "African American women", "pregnancy-related death". Reference lists of retrieved articles were screened to check whether all pertinent studies follow the PICO criteria and methods.

The figure outlines the selection process. Three independent reviewers examined each article for inclusion. If the reviewers disagreed on whether an article should be included, they repeated the review of inclusion/exclusion criteria and met to discuss the criteria in regards to all articles in question. A fourth reviewer was available to resolve any disagreements that could not be resolved by the first 3 reviewers. However, all disagreements were resolved without the need of the fourth reviewer.

We first identified articles by examining titles and abstracts for relevance and retrieved the full text of the relevant abstracts for further assessment. We defined pregnancy-related deaths as deaths that occurred during pregnancy or within 1 year after delivery and that are caused by complications of the pregnancy, the aggravation of an unrelated condition by the effects of pregnancy, or a chain of events initiated by the pregnancy [4]. For this review, the causes of death are grouped into 12 categories, which were created by the Maternal Mortality and Morbidity Review Committee of the Massachusetts Department of Public Health, Bureau of Family and Community Health. We added an additional category of mental and substance disorders in order to make our review more inclusive [3].



Preventable	Non- Preventable
Cardiomyopathy	Cerebrovascular Accident
Hemorrhage	Amniotic Fluid Embolism
Pregnancy Induced Hypertension	Microangiopathic Hemolytic Syndrome
Medically manageable chronic conditions such as Asthma, COPD, HIV,	Autoimmune diseases such as Antiphospholipid Syndrome, SLE
Hospital acquired Infection	Anesthesia complications
Pulmonary Embolism	Hereditary disorders
Other Cardiovascular Conditions	Miscellaneous
Choriocarcinoma	
Mental disorders leading to suicide or drug overdose	

Results

In a study conducted by Harper, [5] it was discovered that even though the overall pregnancy-related mortality for the nation had been declining, there was still a great racial disparity, with African American women having a 3-4 fold increased risk of pregnancy-related morbidity/mortality. This study focused on pregnancy related hypertension, puerperal infection, and postpartum hemorrhage in both African American and non-Hispanic White women that delivered in the state of North Carolina. When it came to pregnancy related hypertension there was a higher percentage that had a systolic blood pressure over 160 and diastolic blood pressure over 105 compared to their white counterparts. In terms of postpartum hemorrhage, no difference was observed in the severity of the condition. However, African American women were less likely to receive surgical intervention other than curettage, such as uterine artery ligation, exploratory laparotomies, and hysterectomies. However, a study conducted by Grobman stated that African American women were more likely to experience severe postpartum hemorrhage. Additionally, the rate and initiation of prenatal care, which is a protective factor, was examined in both African American and white women. African American women had lower rates of prenatal care and of those that did receive it, the mean gestational age at first visit was 13.5 weeks versus 9.8 weeks for white women.

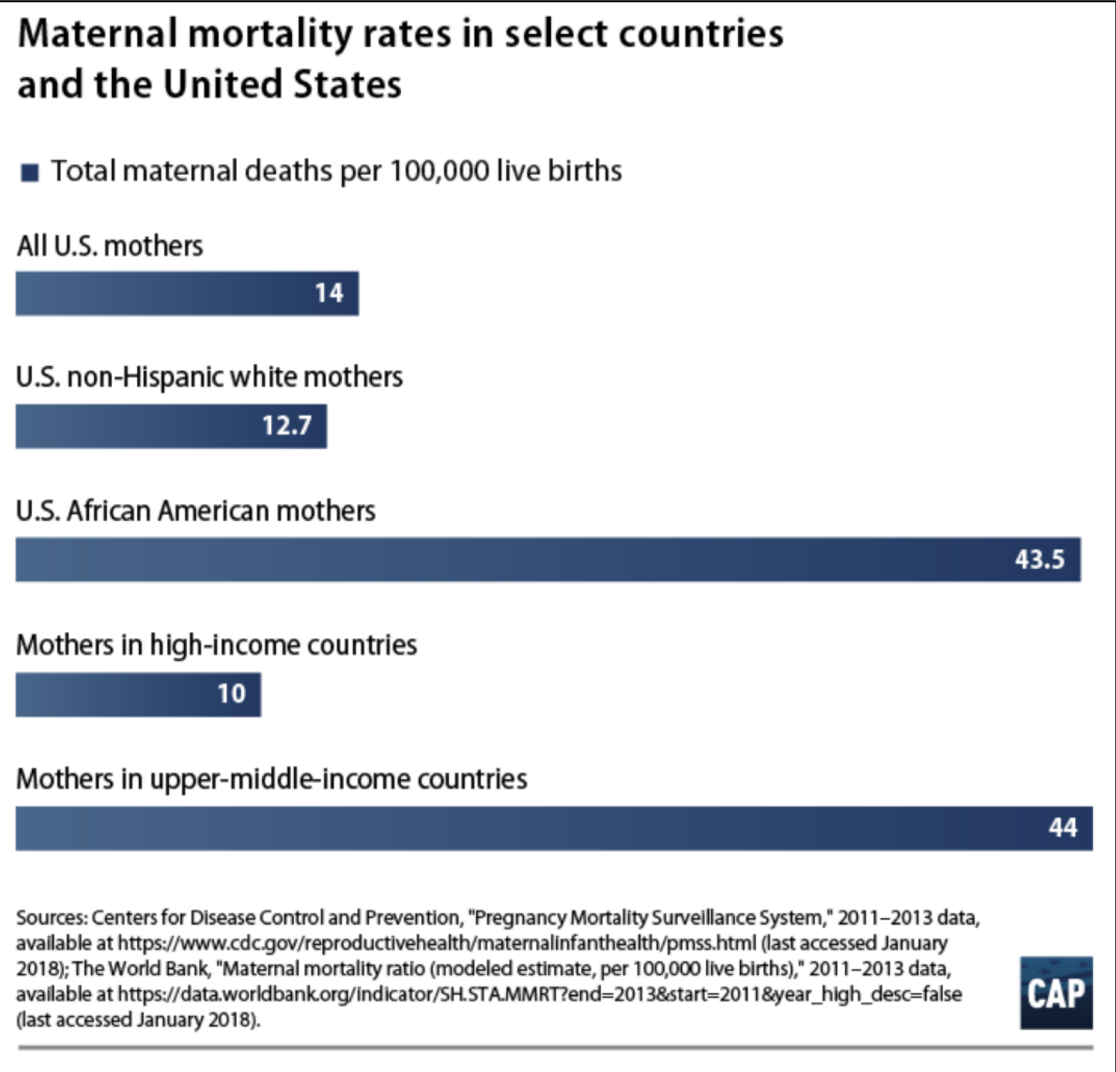
Kendle conducted a study that examined more than 55 million delivery hospitalizations during a 14-year period. The study focused on the rate of sepsis as a cause of pregnancy mortality amongst different races. Out of the 55 million hospital deliveries 13,124 women met the criteria for sepsis. This meant that there was one case of sepsis in every 4196 deliveries, or a rate of 2.4 per 10,000 delivery hospitalizations [7]. It was discovered that there were more African American women with sepsis at delivery than White women; 4.6 out of 10,000 women versus 1.9 out of 10,000 [7].

Mogos conducted a study from 2002-2014 that focused on maternal mortality during the antepartum, intrapartum, and postpartum period. It was found that the postpartum period had the highest rate of maternal mortality, which is the also the period with the least amount of surveillance. African Americans died at a significantly higher rate of 47, 17, 379 per 100,000 maternal hospitalizations during antepartum, intrapartum, and postpartum period respectively compared to 30, 5, 160 per 100,000 maternal hospitalizations for Whites [1]. The Berg study utilized the North Carolina Pregnancy-Related Mortality Review Committee, which also found that most deaths were occurring in African American women in the postpartum period. The most common cause of death was cardiomyopathy making up 21% of deaths (Berg). The study classified death due to cardiomyopathy as preventable based on known functional cardiac status and compliance with treatment. However, the study failed to explain what exactly lead to this high rate of cardiomyopathy. The study instead discussed resolutions such as greater awareness among clinicians and utilization of implantable cardioverter-defibrillators to decrease mortality. Genetic background, lifestyle, culture, and socioeconomic factors did not make a great impact on the overall results.

Another study focused on conditions such as preeclampsia, eclampsia, abruptio placentae, placenta previa, and postpartum hemorrhage, and attempted to determine how they each contributed to morbidity and mortality in African American women [4]. This study chose these 5 conditions due to the fact that they make up 26% of all pregnancy-related deaths. The case-fatality rates were statistically significant in African American women showing a 3.3 Black-White fatality ratio in postpartum hemorrhage.

Table 2 Characteristics of included studies and their categories of death with maternal mortality and morbidity rates. MMR- Maternal mortality rate, AA- African American, HTN- Hypertension, DM- Diabetes Mellitus, MI- Myocardial Infarction, PRMR- pregnancy related mortality ratios, CVA- Cerebrovascular accident

No	Author	No. of subjects	Pregnancy related mortality rates or ratios	Preventable Causes of Death Studied	Non-preventable Causes of Death Studied	Rates of Preventable Causes of Death	Rates of Maternal Morbidities
1	Tucker, 2007	Total: 1162 AA: 461 White: 701	Black-white ratios: Preeclampsia- 2.7, Eclampsia- 2.5, Abrupton- 2.8, Placenta previa- 2.4 Postpartum hemorrhage-3.3	Preeclampsia, Eclampsia, Abrupton, Placenta previa, Postpartum hemorrhage	None discussed	N/A, other causes of death were not discussed	Black-white ratios: Preeclampsia- 1.2 Eclampsia- 1.6 Abrupton- 1.1 Placenta previa- 1.1 Postpartum hemorrhage- 0.8
2	Berg, 2005	Total: 108 AA: 58 White: 44	Ratio: AA: 42 White: 12.3	Cardiomyopathy, Hemorrhage, Pregnancy induced HTN, infection, Pulmonary embolism, cardiovascular, choriocarcinoma	Amniotic fluid embolism, microangiopathy e hemolytic syndrome, CVA	40% overall preventable cause of death AA: 46% White: 33%	Not defined
3	Harper, 2007	Total: 608 AA: 304 White: 304	Rate: 3-4x higher than white	infection, hemorrhage, pregnancy related HTN	None discussed	N/A, causes of death were not defined	Prenatal care- AA: 97%, White: 100% Mean gestational age of first prenatal visit- AA: 13.5, white: 9.8 Gestational Diabetes- AA: 3.9%, White: 5.3% Smoking- AA: 0.16% , White:0.28% Cocaine use- AA: 0.037%, white: 0.007%
4	Grobman, 2015	Total: 109,208 AA: 23,878 White: 52,040 Other: 33,290	Not discussed	HTN, DM, infection, Postpartum hemorrhage	None discussed	N/A, causes of death were not defined	Hemorrhage- AA= 3.0%, White= 1.6% Prenatal care- AA= 95.7%, White= 98.8% Govt assisted Insurance- AA= 69%, White= 22% Cocaine/ Meth use- AA= 1.2%, White= 0.8% Cigarette use- AA= 15.6%, White= 12.3%
5	Creanga, 2014	Total: 3,476,392 AA: 434,451 White: 1,485,280 Other: 1,556,681	Rate per 10,000: AA= 1.6 White= 0.5	Eclampsia, Sepsis, MI, thrombotic embolism	Amniotic fluid embolism, CVA, Anesthesia complications	N/A, causes of death were not defined	Rates per 10,000 deliveries: Eclampsia- AA= 10.4, White= 3.6 Sepsis- AA= 5.9, White= 2.6 Amniotic fluid embolism- AA= 0.65, White= 0.28 Anesthesia comp- AA= 1.96, White= 0.82
6	Kendle, 2019	Total: 55 million w/ 13,124 sepsis cases (AA: 2899, white: 4507, other: 5718)	Not discussed	Sepsis	None discussed	N/A, causes of death were not defined	Rate of sepsis per 10,000 deliveries: AA= 4.6 White=1.9
7	Petersen, 2019	Total: 3410 w/ 2360 defined causes of death AA: 1252, White: 1385 White, Other: 773	Ratio: Black= 42.8 White= 13.0	Hemorrhage, Infection, Pulmonary embolism, Anesthesia complications, CVA	Amniotic fluid embolism, Anesthesia complications, CVA	60% preventable, race not differentiated	Not discussed



Characteristic	No. of pregnancy-related deaths	Pregnancy-related mortality ratio*
Total	3,410	17.2
Race/Ethnicity [†] (N = 3,400)		
White	1,385	13.0
Black	1,252	42.8
American Indian/Alaska Native	62	32.5
Asian/Pacific Islander	182	14.2
Hispanic	519	11.4

Petersen, 2019

Discussion & Conclusions

The morbidity and mortality appeared to be very similar amongst all of the studies that we evaluated, with African American women being affected more often. However, the studies failed to identify the root cause of these conditions, which instead led to us differentiate if the morbidity/mortality was preventable or non-preventable. We found that in many of the studies the comorbidities were taken into consideration, but were not fully evaluated in terms of how they affected conditions such as post-partum hemorrhage, puerperal infection, or pregnancy related hypertension. Some of the comorbidities mentioned included chronic essential hypertension, severe and morbid obesity, pre-gestational diabetes, and gestational diabetes. Although some of these comorbidities were more prevalent amongst African American women, we did not get an answer as to whether they made a great impact on developing pregnancy related complications. Additionally, we did find that in some cases tobacco, methamphetamine, and cocaine use was higher amongst African American women, but this was not the case in all of the studies that we evaluated. Once again, even though drug use was mentioned, and it is understood that these substances are harmful, it does not explain the higher morbidity/mortality within the African American population.

The systematic review demonstrated that African American maternal morbidity and mortality is greatly caused by preventable causes. Even though there are a small number of studies that identify the causes of pregnancy-related complications and death amongst African American women, most studies fail to identify what is leading African American women to be affected the most. However, we can conclude that there are disparities although we don't know the root cause. This has important policy implications, particularly for the United States healthcare system and the quality of care provided by healthcare professionals. Accessibility and education on the importance of preconception care are essential factors to solve the problem, however these factors do not directly affect all African American women of the childbearing age. Moreover, maternal healthcare providers should provide exceptional care to decrease and treat modifiable conditions in order to prevent pregnancy-related complications and death. To conclude, more research needs to be done to answer why African American women are the most likely to be affected, especially considering the fact that the conditions are largely preventable.

Limitations & Future Studies

This study has several limitations. First and foremost, information analyzing maternal mortality and morbidity in African American women is scarce. Many studies considered preventable risk factors such as smoking or drug use as the explanation of increased pregnancy-related maternal morbidity and mortality seen in African American women. However, these risk factors appear prevalent in various demographics increasing the incidence of complications and possibility of death, in many other races other than African Americans. Moreover, even if the prevalence of comorbidities and drug use was higher in African American women, not one of the studies that we came across evaluated the direct effect that it could have on pregnancy morbidity and mortality.

Secondly, in the history of the United States, when it comes to medical research, racism has yet to be taken into full consideration. Many of the studies that we found showed small sample sizes of African American women compared to their White counterparts. We understand that this may be due to mistrust seen in the African American community as a result of controversial studies such as the Tuskegee study or the creation of the HeLa cell. In addition, the quality of care that is being provided by medical personnel is essential to analyze. A randomized clinical trial of surveys conveying the compassion, work ethic, professionalism and humility of the providers would aid in our understanding of how these patients are treated and how it is affecting their health.

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