Structural Racism and its Effect on Infant Mortality in Black and White Mothers

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Abstract

The purpose of this study is to investigate if systematic racism is a contributor to infant mortality based on where one lives. Previous research has said that race affects infant mortality due to access to healthcare, education, employment, and environment. We hypothesized that counties in Pennsylvania and Ohio with a large proportion of black people may have a higher black infant mortality rate. Information about race, population by county, and infant mortality was collected from the CDC and the 2019 U.S Census. We found that counties with high black populations have higher infant mortality rates, but not higher white rates. Our data suggests that where one lives as a black person matters as the child is at greater risk of infant mortality if they live in a highly-populated black area, possibly due to structural racism.

Introduction

In the United States, Black women are twice as likely as white women to give birth to a premature baby (1). Additionally, the black-white infant mortality gap has doubled over the last few years (1). The major factors for infant mortality, or an infant who dies before their first birthday, are premature birth, low birth weight, birth defects, SIDS, and complications of maternal pregnancy. Structural racism may be an underlying explanation for differences in infant mortality in America (2). Infant mortality affects so many families in the United States, yet, we do not give enough attention to black women's treatment from the forces in society that keep them disadvantaged. Understanding and predicting how these socioeconomic and geographic factors affect black women would help address this problem.

Socioeconomic Factors

In a study done by Finch et al., researchers determined behavioral factors only explain a small percentage of infant mortality rates (3). Using a national survey of mothers, researchers surveyed black mothers who had delivered an infant with low birth weights. The survey consisted of 35 questions regarding the pregnancy itself, sociodemographic factors & health behaviors of the mother. Through this study, it was determined that behavioral factors cannot explain the racial differences in infant mortality and environmental factors like income, the type of neighborhood, insurance, welfare, education are more likely the reason. Researchers investigated the impact of social inequality, institutional racism, and income inequality in a study conducted to assess if there is a correlation to low birth weight (2). Where there are high rates of income inequality and racial bias, black babies are 2.11 times more likely than white infants to be born with low birth weight.

The influence of community income as a cofactor with low birth weight, race, and maternal nativity was evaluated by researchers in New York (4). From 1988 to 1994, researchers used New York birth reports and analyzed both maternal and infant characteristics. Among the participants were 271,121 white mothers and 279, 826 black mothers. Low birth weight has been determined to be more prominent among black mothers relative to whites. In one study researchers examined maternal reports about advice received to care for an infant (5). To determine factors correlated with the receipt of consistent advice recommendations, surveys on advice obtained from medical practitioners, family, and peers were given to 1031 mothers with

infants between 2 and 6 months. Mothers often report receiving either no advice or a suggestion that is inconsistent with the advice of other studied sources. Black mothers indicated that clear advice was received. Either no advice or inaccurate advice on SIDS, breastfeeding, sleep location, and sleep positions were mentioned by many mothers.

Geographic Factors

In Pennsylvania, a study was conducted to determine if the environment or location of living affected the outcome of birth (6). Participants included women who delivered single births & resided in 28 county regions. It was determined that there were differences between premature & low birth weights among women residing in different areas. Overall, mothers living in rural cities had better birth outcomes compared to those in urban areas or rural areas. This suggests that race is less important than where one lives.

Researchers investigate how environmental exposures influence the outcomes of pregnancy and how these factors contribute to stress in social and host factors (7). Environmental exposures including air quality, water quality, metals, environmental tobacco use, and pesticide use were examined by researchers. Environmental exposures have been determined to lead to maternal immune distress. The quality of the environment where one lives might influence the outcome for the mother and child. Because lower-income people as well as black Americans tend to live in places with worse environments, this may be evidence for environmental racism.

In a study conducted between 2000-2002, researchers analyzed 677,777 black births in the United States and compared them to how segregated the neighborhood was (8). There was no evidence to suggest that unnecessary mortality was caused by neighborhood segregation, although black infants are far more likely to be at risk of death. Researchers do not claim that segregation does not matter, only that it is difficult to distinguish from individual features.

Study Hypotheses

Premature birth weight & high risk of infant mortality is more common among Black women due to limited access to health care, poor socioeconomic factors, poor environmental conditions, and other issues related to structural racism (2). In this paper, we examine the impact of systematic oppression on women and the correlation with infant mortality in the states of Pennsylvania and Ohio. We examined the percentage of Black residents in a county to determine

if this is a way to approximate structural racism. In this study, we want to find out if the number of black people in a county would or would not provide more protection against structural racism. Therefore, we predict that there is a relationship between the percent of black people in a county in Pennsylvania, and the infant mortality rate in that county.

Methods

A CDC Multiple Cause of Death database containing infant death and birth reports from 1999-2019 was used to find county reports in Pennsylvania and Ohio (9). The demographics selected were based on infants less than the age of one and race both black and white. Records were focused on counties located in Pennsylvania and Ohio. Initially, the intention was to cover only Pennsylvania but too many counties were suppressed making it possible to classify private records. Sixty counties were included in the sample with 40 counties in Pennsylvania and 55 counties in Ohio being suppressed. To measure the infant mortality rate, we divided our infant death rate by our infant population and multiplied it by 1,000. We then used the 2019 U.S Census to classify the black and white population of Pennsylvania and Ohio counties (10).

Results

In this study, the infant mortality rate of both black and white was found to determine if where a mother and the proportion of black residents where they live affects the outcome of the infant. We expected to find a relationship between the proportion of a county's residents who are black and the outcome of an infant.

To find the total overall Black and white infant mortality rate we added the total births and deaths of each race for all 60 counties. The Black infant mortality rate is nearly tripled compared to white peers. Per 1,000 black births, 14 black mothers lost their infant before the age of one. Compared to white whereas only six mothers lost their infant (Figure 1).

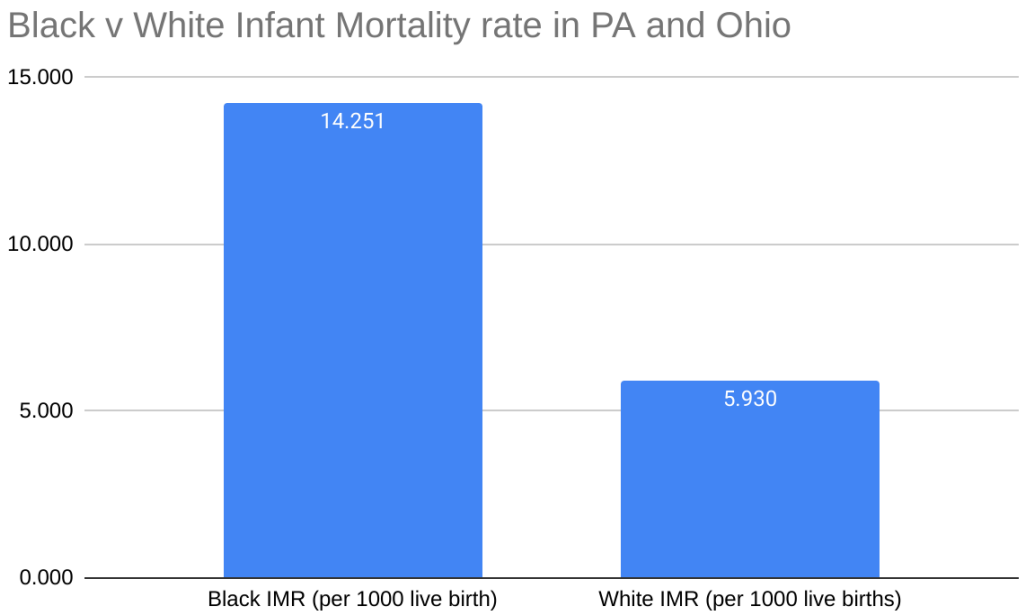

Figure 1. Black vs. White Infant Mortality Rates in PA and Ohio Counties. *Per 1000 births, 14 black infants have died, which is 2.4 times higher than the white rate. Data is from the CDC database of deaths, 1999-2019, for 60 counties that had at least 10 infant deaths.*

To observe the black to white infant mortality rate, of each county we utilized a histogram to compare these rates (Figure 2). Each square of the frequency distribution is the infant mortality rate of each county one for each race. The second interval represents the white infant mortality rate showing that it's more frequent for white mothers to have a death rate of just over 5.00. White mothers have experienced a more typical set of numbers ranging from about 3.50 to no more than 8.00. Black mothers have a wide range from 6.50 to 18.50, this means that the result of their infant will be determined by where they live. In the case of white mothers where they live, it has little effect on the outcome of their infant and they would have a comparable outcome relative to other white mothers. Black mothers need to be aware that their infants' survival is dependent on where they live.

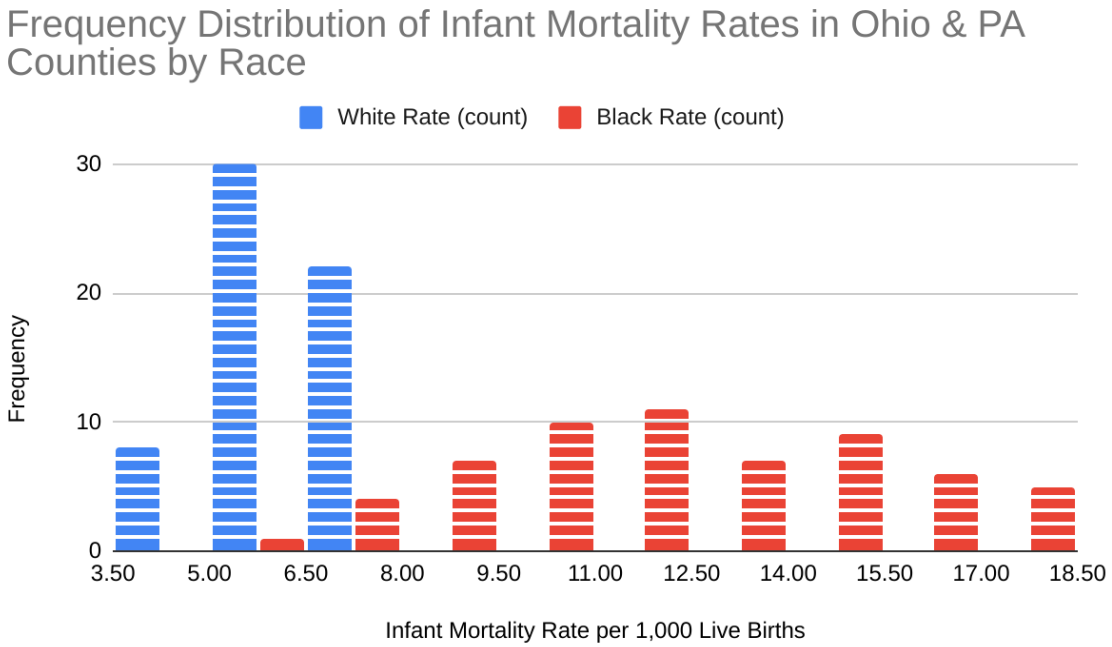

Figure 2. Frequency Distribution of Infant Mortality Rates in Ohio and Pennsylvania Counties by Race. There are two bars per county, one for black, one for white infant mortality rates. In general, nearly all counties have a higher black infant mortality rate than the white rate.

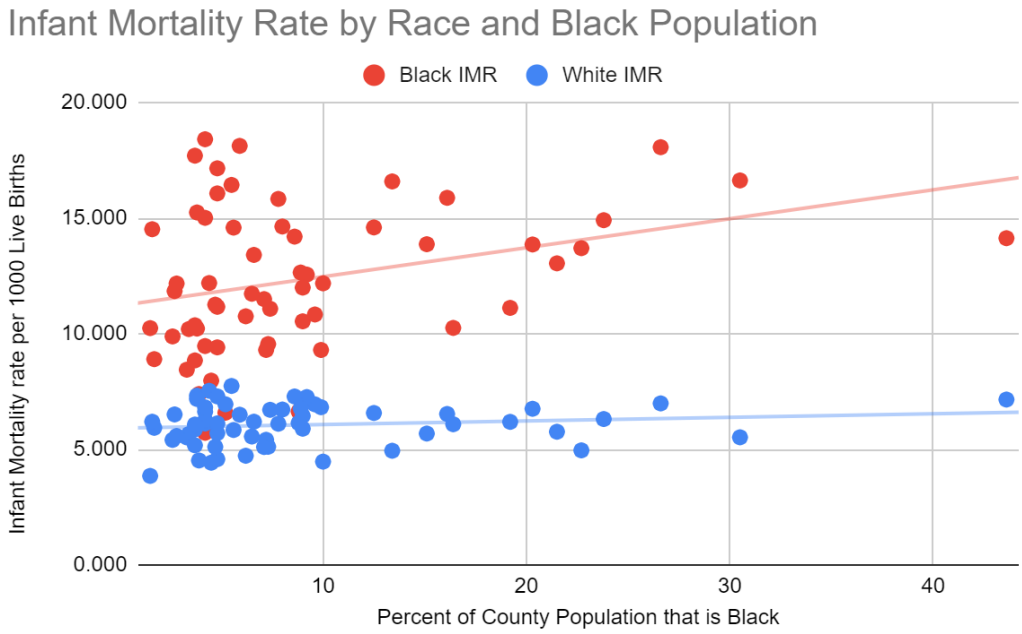

Figure 3. Infant Mortality Rate by Race and Black Population. Each county is represented twice. The higher the black population in a county, the larger the infant mortality rate, while for white residents, the black population in a county does not affect, as the rate is constant and low.

We predicted there is a relationship between the percent of black people in a county in Pennsylvania and Ohio and the black infant mortality rate. This is because we are suspect in places with a larger percentage of black people, there may be higher levels of structural racism. We looked at 60 counties in Pennsylvania and Ohio that had infant death statistics available to investigate this. There were 95 counties excluded because the deaths were suppressed by the CDC. A correlation coefficient r-test found a significant relationship between the percent of black people in a county and the black infant mortality rate ($r(58) = 0.32$, $p = 0.0065$, Figure 3). We found that there was a weak, nonsignificant relationship between the percent of black people in a county and the white infant mortality rate ($r(58) = 0.14$, $p = 0.14$, Figure 3).

Additionally, there is a significant relationship between the white infant mortality rate and the black infant mortality rate, separate from the black population ($r(58) = 0.3297$, $p = 0.005$). This may be a red flag, if black and white mothers have similar outcomes, then systemic racism may not be the issue. To check this, we did a partial correlation test, which removes the effect of a third variable, to establish there is a relationship between the black population and the black infant mortality rate. Our third variable, the white infant mortality rate, was controlled for in a partial correlation. The partial correlation remained statistically significant for the relationship between the proportion of black people in a county and the black infant mortality rate ($r(58) = 0.29$, $p = 0.01$).

Discussion

In our research, we examined the infant death rates and births in 60 counties in Ohio and Pennsylvania. Black infants die at a rate of 14.3 per 1,000 births, compared to 5.9 for white infants (Figure 1). We predicted that there is a relationship between the percent of black people in a county in PA, and the infant mortality rate in that county. Based on our research our hypothesis was supported. According to our findings, the percentage of black residents in a county harms the black infant mortality rate but has little effect on the white rate (Figure 3). There is a significant relationship between the percentage of black people and the black infant mortality rate, even when the white infant mortality rate is controlled.

Our results are consistent with previous research on racial bias and inequality. Researchers found “There are complex interactions of biological, behavioral, health care access, social and political factors that make some infants more vulnerable. When these factors

consistently affect infants of specific races and ethnicities, racial disparities result" (2). In previous research, black infants were found to be 2.11 times more likely to experience low birth weight, which puts them at greater risk of death as a result.

Likewise, we found counties with high black populations have higher black infant mortality rates, but not higher white rates. We think that this is evidence for the impact of systemic racism to influence the outcomes of births based on this relationship. Our partial correlation eliminated the influence of the white infant mortality rate, and this had little effect on the total black infant mortality pattern. Hauck describes these interactions as "complex interactions" of healthcare, social factors, etc, which we argue are examples of racism. We suggest that highly black populated counties in Pennsylvania and Ohio, are counties that face more systemic racism, which leads to worse results for black infants.

Second, our results are partially consistent with research on segregation, housing, and infant mortality rates. One researcher found that across 64 cities (with 250k+ people), residential segregation did not explain differences among the black infant mortality rate (8). Researchers suggest that it is a mixture of causes that lead to differences in infant mortality, rather than a particular source. In our study, we looked at counties (not cities), both rural and urban, and found the population of blacks in an area matters. Segregation, we conclude, may play a greater role. Segregation (and systematic racism) may be less prevalent in regions with few black residents than in cities with "black areas." Segregation of towns might play a greater role in infant mortality in states like Pennsylvania and Ohio than was found in other research (8).

In a study conducted by Hillmeier, researchers concluded that infants in rural cities have the best outcomes compared to urban and rural babies when race is controlled from the data. According to our findings, the black infant mortality rate is higher in regions with a large black population. In our research, counties were used to evaluate the impact of race, while Hillmeier used cities. Nine of the ten cities in Pennsylvania with the largest black population are in the Pittsburgh and Philadelphia suburbs, so they are urban. Based on this, we can infer that black populations are higher in urban areas in Ohio and Pennsylvania. We are wondering if these two results agree or disagree: does where you live matter more than your race, or is structural racism the main explanation for the differences in infant mortality rates? Future research is needed to look into this.

The number of suppressed counties in Pennsylvania was a weakness in our research. Since there were so many suppressed counties in Pennsylvania, Ohio was added to our study to provide us with more data. Because of the number of suppressed counties, the loss of areas with smaller black populations may have potentially influenced our findings. While this may seem like a shortfall, it provides us with more quality information to better support our argument. Tiny changes in a county over 20 years may have a significant impact on the infant mortality rate in that area. A single event will misrepresent a county, altering the outcome and making it an outlier in our study. Looking at smaller units than counties would be nice (city, or zip code), but that would also be a challenge, as it would increase the suppression of data, and weaken the argument.

Our study assumed that places that are highly populated by blacks face more racism and segregation. Areas with large black populations can be discriminated against easily by way of black neighborhoods, schools, clinics as they are not as nice as areas surrounding them. While we do not know 100% that this is a cause of systematic racism we believe that future researchers should measure systematic racism concerning the black population. Potential things to research are differences in housing, income inequality, access to insurance, educational background, and life expectancy differences.

Our research shows that where you live as a black person matters, as your child is at a greater risk of infant mortality if you live in a highly-populated black city. Parents and the general public should be worried about the possibility of infant mortality related to uncontrollable outcomes. The problem of infant mortality should not be recognized as ordinary as it is a societal issue.

Acknowledgments

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