

Infant Mortality in the United States and Its Correlation to Healthcare Access

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By
Taiya Hakes
Nursing Major

SUNY Brockport, State University of New York
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Thesis Director: Dr. Danielle Stratton DNP, APRN, PPCNP-BC

Abstract

Introduction: Infant Mortality is a continuing problem in the United States of America. Multiple different factors play a contributing role in the risk of experiencing infant mortality. Infant mortality has been found to have a strong correlation with race and socioeconomic status.

Objective: The objective of this research is to look at the different demographics that increase risk of infant mortality and see if there is a specific factor that is contributing to the United States having such a high infant mortality rate.

Methods: A literature review was conducted for this undergraduate scholarly research project. Multiple different studies and their results were analyzed, in turn tying them together to compare, show correlation, and form a conclusion.

Conclusion: In conclusion, there is no one demographic that is the leading contributor to high infant mortality rates in the United States. Demographics that were researched included race, location, socioeconomic status, and the labor and delivery aspect of a pregnancy. It was concluded that no singular demographic was the leading contributor to infant mortality. Rather, it was found that all of these demographics are connected, and it is a larger systemic issue.

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Introduction

Topic Description

Infant mortality is defined as the “death of an infant before his or her first birthday” according to the Centers for Disease Control and Prevention (Infant Mortality, 2020) It is typically discussed in rates, which is indicated by how many deaths there are for every 1,000 live births. The United States has a collective infant mortality rate of 5.58 for the year of 2019 (Elly & Driscoll, 2021, p. #1). While this number itself does not seem too high, it is important to delve deeper into the demographics within the United States. For example, southern states have some of the highest infant mortality rates (IMRs) in the country (Menifield, 2008). The state of Mississippi has the highest IMR in the whole country with an 8.71. Another demographic that plays a role is race, Non-Hispanic Blacks have an alarmingly high rate (Elly & Driscoll, 2021, p. #5). It has been found that the Non-Hispanic Black race greatly correlates with lower socioeconomic status (SES). This implies those in this race subgroup have a large population that lie near or below the poverty line (Boen, 2016). Unavoidable characteristics like SES, race, location, etc. are the groups that are experiencing the higher IMRs around the country (Bonfim et al., 2020). While some infant deaths in the African American community are linked to low SES and less access to healthcare, some of the infant deaths are also linked to a higher risk for pregnancy complications. It is proven that African Americans are at higher risk for complications during pregnancy, labor, and birth than Caucasians. This is partly due to the fact that African Americans are typically at higher risk for cesarian sections (Holmes Jr., et al., 2020). Caesarian sections tend to lead to many more complications than a natural birth does.

There are many things that can cause infant mortality including but not limited to; birth defects, preterm birth, pregnancy complications, low birth weight, sudden infant death syndrome

(SIDS), and suffocation (Mcloughlin et al., 2020). These were some of the top causes of infant deaths in 2018 according to the CDC. Most of these are factors that are out of the healthcare teams' control. These are things that can occur to any baby. However, some of these things can be prevented or the chance of them happening can be minimized with basic doctor appointments throughout your pregnancy and even prior. A healthy pregnancy and baby depend on a healthy mom, and that happens by attending doctor appointments for both your own health and your baby's health. The United States spent 16.9% of gross domestic product (GDP) on health care in 2018 (Tikkanen & Abrams, 2020). This is approximately double of what the average Organization for Economic Co-Operation and Development (OECD) country spends. This indicates the United States (U.S.) is spending twice as much as what most countries are on health care, yet still having the worst health outcomes globally.

Research Question & Methodology

The primary research question focused on in this scholarly undergraduate project was if the United States is so advanced in their medical technology and medical spending, why is infant mortality so high? Focusing on the criteria noted above like SES, race, and location, to research why these specific demographics are at higher risk. The purpose is to research the correlation between all these characteristics and access to healthcare. It is well known that the United States has a poorly set up healthcare system, which is very costly, in turn making it difficult for many individuals to get the care they need. Often many individuals and families decide not to get care, because they cannot afford it. The hope of this investigation is to shed some light on if this is a leading contributor as to why the infant mortality rate is so high in the United States.

The methodology of this scholarly project chosen for this thesis is a literature review. It will be analyzing primary research studies their chosen data collection, data analysis, comparing

the different methods and techniques that have been found to form a conclusion on why the United States has such a high infant mortality rate.

Limitations

There are many limitations that should be considered when doing research using literature review. The largest limitation this research has is the fact that none of the research studies were conducted by me. Research was done by pulling research from other studies and applying it to the overall research question. The purpose is to see how different studies could be connected and put together to find the overall problem behind infant mortality rates. This is a limitation in that since the researcher did not conduct any of the individual research studies, there is more room for misinterpretation. The researcher was not present for the research being conducted therefore it was only possible to gather information from what the authors wrote about their study. A good researcher will write a very detailed article to go with their research, but it can be hard to include everything they experienced. Since nobody conducting this research was present for the research, those small things that might not get included in the article, are things that the study will not be able to include. Another limitation that comes with not conducting any research is if it is not possible to find research on a specific topic within infant mortality, there is no possible way to form a conclusion regarding that topic. If there are certain topics that would be relevant to include, but others have not done research on it yet, there is no possible way for these topics to be included.

A limitation found to be present throughout the research process was the fact that; it was difficult to find data that was all from the same year. Data for each individual sub-topic of this research was extracted, compared, and then tied all of it together. It was rather difficult to find research across the board for the same year. Much of this data is from the year 2019, but a lot of

the data is from surrounding years. The data is close enough in time that it is still relevant and can still be used to connect everything together. But for this research to be the most accurate, data should have been collected from all the same year for every aspect of the research.

Review of Literature

Race

The United States of America is a very diverse country that has communities of all races and ethnicities. While the country has had many advancements in terms of racism, there still seems to be many discrepancies in healthcare and its relation to race. It has been proven that African Americans typically have higher health disparities. They are at higher risk for specific health conditions and health outcomes like diabetes, hypertension, cardiac conditions, and much more (Amuta—Jimenez, et al., 2019). This in turn also indicates that African American's unfortunately struggle with infant mortality more frequently.

Race has proven to play a large role in infant mortality rates (IMR). Between 2007 and 2016, 40,445,070 babies were born in the United States. Of those babies, 249,135 were fetal deaths (Holmes et al., 2020). Data from the National Center for Health Statistics (NCHS) between 2007 and 2016 was used by Laurens Holmes Jr and their fellow research partners to look at all the birth data from those years. They aimed to discuss what factors played a role in any infant death that occurred, specifically race. This study found that the cumulative IMR for these years was 6.16. That is 6.16 fetal demises for every 1,000 births (Holmes et al., 2020, p. #4). They then further broke it down into individual rates for every race that was studied. It was found that the highest IMR in relation to race was among Black/African American which was 11.41 per 1,000 (Holmes et al., 2020, p. #4). The next highest was American Indian/Alaskan Natives where the rate was 8.32 per 1,000 (Holmes et al., 2020, p. #4). Whites and Asian/ Pacific

Islanders were among those with the lowest rates. Whites were found to have 5.19 per 1,000 and Asian/Pacific Islanders were found to have 4.24 per 1,000 (Holmes et al., 2020, p. #4)

Black/African Americans have almost double the infant mortality that Whites have. This can be related to a multitude of different risk factors. Cesarean sections have been shown to put an infant at higher risk for death within the first year of life (Ely & Driscoll, 2021). Approximately 36% of non-Hispanic black women have cesarean sections when giving birth, whereas only 30.9% of non-Hispanic white women have cesarean sections (Holmes et al., 2020, p. #3). This could be one of many contributing factors as to why infant mortality is so much higher in African American's.

The United States is a very diverse country that has different races and ethnicities present in every single state. Some states however have much more prevalence of specific races. For the purpose of this study, the researcher has chosen to focus primarily on the comparison of African Americans to Caucasians. The census helps researchers look at many different break downs of each household in each state. On the census, race is asked and that allows us to study race around the country and allows us to see which states have the highest diversity, and the lowest. Some states that have the largest percentage of Whites is New Hampshire, Wyoming, Maine, and Iowa all in which have 90% or more of their population as being White. On the contrary, the states with the largest percentage of African Americans are Mississippi, Louisiana, Georgia, and the District of Columbia all with over 30% of African Americans in the population (World Population Review, 2020). There is clearly a trend that can be seen.

Labor & Delivery

A factor that plays one of the largest roles in infant mortality is the event of the birth. There is an extensive list of complications that could occur during the labor and delivery part of

a pregnancy. If the infant dies before it has been birthed, it does *not* count towards the infant mortality rate. IMR only includes deaths that occur after birth has taken place. However, this does not mean that events that happen during the labor and birth can't lead to infant mortality. Different factors like the type of birth you have, the age at which your infant is born, the age of the conditions the mother has at birth, and even how many babies a mother will be birthing.

An infant is considered full term if they are born at 40-weeks gestation. An infant is considered premature, or pre-term if they are born any time before 37-weeks. A child that is born premature has much higher health disparities since their bodies are not fully developed. Multiple complications can occur during the labor, after birth, and even years into life when a child is born prematurely which is why the healthcare team works so hard to avoid this in every way they can. Unfortunately, it is not always possible to keep a baby in the mother for the full 40-weeks. Sometimes complications arise where the mother and/or baby's lives are at risk and the baby needs to be delivered early for the best possible outcome. One risk factor that is present when a baby is born prematurely is higher chance of infant mortality. The CDC creates a statistical report in relation to infant mortality at the end of every year. In the year of 2019, this report found that babies that were born full term had an IMR of 1.58 (Ely & Driscoll, 2021, p. #9). The rates then continued to grow the earlier the baby was born. The IMR was 8.21 for those born between weeks 34 and 36, 42.13 at weeks 28 through 31, and 374.46 at less than 28 weeks (Ely & Driscoll, 2021, p. #9). These numbers are huge which is why it can be so critical that the healthcare team does everything in their power to prevent a neonate from arriving any earlier than full gestational age.

There are two methods of delivery used for births, cesarean section, and vaginal birth. A vaginal birth is often referred to as a "natural birth". This is when a mother is able to give birth to

her baby through her vaginal canal. However, often complications occur, and a cesarean section is required. This is when the mother is brought into an operating room and the doctor surgically removes the baby from an incision in the mother's abdomen and uterus. During the years of 1998 and 2001, 6,073,964 babies were born and classified as low risk, meaning their birth certificate had no complications listed on it (MacDorman et al., 2006, p. #175). There is an extensive list of medical complications that can occur during a birth, and multiple risk factors that can lead to those complications. This study chose to only look at births with no complications to ensure that their results were correlated directly to the method of birth they endured, rather than a complication that occurred. Out of the 6,073,964 low risk births that occurred in these years, 13,009 of them resulted in infant mortalities (MacDorman et al., 2006, p. #175). This means for the overall low risk birth population at this time, the IMR was 6.99 (MacDorman et al, 2006, p. #176). It was then further broken down into mortality rates for each method of birth individually. The infant mortality rate for vaginal births was found to be 2.06 per 1,000 whereas the infant mortality rate for cesarean sections was found to be 3.56 per 1,000 (MacDorman et al., 2006, p. #176). This indicates that cesarean sections are found to lead to a higher chance of infant mortality. This study excluded all complications, therefore it can be concluded that these results are directly related to the method of delivery.

The CDC National Vital Statistics Report (2019) investigated multiple factors that relate to infant mortality. One factor that showed to play a role in risk for infant mortality is maternal age. The studies showed that mothers who are less than 20 at the time of birth have the highest risk. In 2019 the IMR for infants with a mother who is less than 20 years of age was 8.68 (Ely & Driscoll, 2021, p. #3). The next highest rates occurred for mothers between the ages of 20 and 24, and for mothers over the age of 40. For mothers between the age of 20 and 24, the IMR was

6.76 and for mothers over the age of 40, the IMR was 7.01 (Ely & Driscoll, 2021, p. #3). A group of researchers studied maternal risks in relation to age by looking at hospital billing records from the labor and delivery floor. The study found that mothers that are younger are at higher risk for preeclampsia, hemorrhage, poor fetal growth, and fetal distress. The study then looked at older mothers as well and it found that older mothers are at higher risk for preterm births, preeclampsia, and fetal distress (Cavazos-Rehg et al., 2014). Due to their age and the increased risk for these complications, it then leads them to an increased risk for infant mortality. Any complication that might be present at birth has the potential to cause infant mortality or at the very least, infant distress.

Any pregnancy has the possibility to have multiple fertilized eggs which leads to multiple infants being present. Some people have twins, which can be two fertilized eggs or one fertilized egg that split in two. Some people have the same thing but with three eggs and even four or more. This has been shown to contribute to infant mortality as well. Those that had a single birth in 2019 had an IMR of 5.0 (Ely & Driscoll, 2021, p. #9). Those who had twins had an IMR of 21.77 and those with three or more babies had a rate of 62.69 (Ely & Driscoll, 2021, p. #9). This shows that even just having twins puts you four times more likely to experience infant mortality compared to just having one birth.

Location

Infant mortality is something that is present all over world. There is an organization called the Organization for Economic Cooperation and Development (OECD) that has 36 countries that are members. Researchers are able to analyze data from these countries to make conclusions about the economy, the social aspects, and many health-related topics. Out of these 36 countries, the United States is ranked 33rd for infant mortality. That means out of all 36

countries, 32 countries are doing better at combatting infant mortality and only three countries are doing worse (Findings International Comparison: 2018 Annual Report). The average IMR for the country as a whole was 5.58 in 2019 (Ely & Driscoll, 2021, p. #1). In comparison, the average IMR for the entire world is 28 (United Nations, 2019). The OECD countries may only be 36 countries, so it is not looking at the data for the entire world, it still has a lot of data that can be useful when looking into infant mortality. Out of all the members in the OECD, Iceland has the lowest IMR at 0.7 (Findings International Comparison: 2018 Annual Report). The highest out of the OECD countries is Mexico with an IMR of 12.1 (Findings International Comparison: 2018 Annual Report). Most of the countries sit between 2.0 and 4.0. Most of these countries that fall between these rates are westernized countries that have similar advancements as the United States does. Some of these countries include Spain, Ireland, Germany, Portugal, and many more (Findings International Comparison: 2018 Annual Report). The United States spent 16.9% of gross domestic product (GDP) on health care in 2018 (Hostetter & Klein, 2021). This is approximately half of what the average Organization for Economic Co-Operation and Development (OECD) country spends. This indicates that the United States is spending nearly double on their healthcare in comparison to the other countries. The United States is spending more and has a higher rate than most of these countries. This leads one to believe that medical advancement and the actual medical care we provide is not the issue.

Location within the United States has shown to play an interesting role in infant mortality as well. There are some trends that are seen when looking at infant mortality around the country. The southeast has some of the highest rates in the country whereas some of the lowest rates are in the northeast and northwest. The state with the highest infant mortality is Mississippi with a rate of 8.71, which is in the southern part of the country. A lot of the neighboring states to

Mississippi have very similar rates. Louisiana, Alabama, Arkansas are all bordering states to Mississippi and have very similar rates (Ely & Driscoll, 2021). The state with the lowest infant mortality rate is New Hampshire, which is located in the exact opposite part of the country up in the northeast. New Hampshire's IMR is only 3.21. The neighboring states of New Hampshire include Massachusetts, Vermont, and New York, all of which have rates lower than 5.0 (Ely & Driscoll, 2021, p. #2).

Looking at the state with the largest infant mortality rate, and the state with the lowest, we can correlate location with race. As previously discussed above, the highest prevalence of White Americans is in the northeast of the country where the highest prevalence of African Americans is in the south of the country. Looking at Mississippi, the state with the highest IMR, and looking at New Hampshire, the state with the lowest IMR, we can further break these states down by race. Mississippi has one of the highest percentages of African Americans in their population compared to other states. In Mississippi, African Americans make up 37.71% of their population and 58.41% of their population is White (World Population Review, 2020). If we then look at New Hampshire, only 1.90% of their population is comprised of African Americans and 92.88% of their population is comprised of White Americans (World Population Review, 2020). There is nearly 30 times more African Americans present in the state of Mississippi compared to the state of New Hampshire. Looking at our data from previously regarding African Americans having such a high IMR, this could be a contributing factor as to why these states have the mortality rates that they do.

There are many communities around the country that are incredibly rural and show an increase in infant mortality. A study was done that looked at rural counties versus metropolitan counties in the United States. This study concluded that out of the counties and areas that were

studied, it was shown that the rural counties had an increase in IMR in comparison to the metropolitan areas (Mohamoud et al., 2019). One of the big factors contributing to this could be how close the nearest maternal care is. A separate study looked at maternal care in relation to rural United States and the study found that more than half of the rural communities in the United States are what is considered to be a 'maternal desert.' A maternal desert is a location that does not have a hospital based obstetric service in proximity to the community (Hostetter & Klein, 2021). This is a huge issue because that means mothers are traveling hours away to get to the closest hospital that provides maternal care. There are so many complications that can occur during a pregnancy and often times mothers are sent to the hospital for these complications. The best outcome occurs from the quickest medical intervention and monitoring so mothers who cannot get to a facility in the case of an emergency in a timely manner are at a huge increased risk for complications.

Socioeconomic Status

Poverty has been an ongoing issue for our country for decades. Those that live below the poverty line struggle in so many aspects of life, including maternal care. The official poverty rate for the United States in 2020 was 11.4% (Shrider et al., 2021). This means that 11.4% of the entire United States population lived below the poverty line in the year of 2020. This can then be broken down and analyzed in many different ways. One thing that is very often discussed in relation to poverty is race. For the same year, the overall poverty rate for Whites was 8.2% whereas the poverty rate for African Americans was 17.0% (Shrider et al., 2021). That indicates that double the number of African Americans are living below the poverty line just in comparison to Whites. It is also possible to look at the poverty rates within individual states as well. The state with the highest poverty rate in the entire continental United States is Mississippi

at 19.5% of their population living below the poverty line for the year of 2019. The state with the lowest poverty rate was New Hampshire with a rate of 7.5% of the population living below the poverty line (United States Department of Agriculture, 2021). There is now clearly a correlation with IMR and poverty. It is no coincidence that the state with the highest infant mortality rate also has the highest percentage of poverty and the state with the lowest infant mortality rate also happens to have the lowest percentage of poverty.

The same study that studied rural communities and relation to infant mortality also looked at rural communities and the relationship they have with poverty levels. The study concluded that rural communities have higher percentages of poverty present. Many times, people will associate big cities with poverty levels due to the presence of homeless people. Something to consider is while you may see more homeless people in a city, if you consider the entire population of that city, the amount of people that are actually below the poverty line in comparison to those above it is not what one might think. Rural areas show a much larger proportion of individuals below the poverty line (Mohamoud et al., 2019). This can then be broken down into smaller statistics that were found to be true within these rural communities that could also help us correlate exactly why infant mortality is so high in relation to poverty.

These researchers investigated so many different aspects of these rural communities that could contribute to infant mortality. One thing they looked at was maternal age and relation to poverty. An interesting thing that was concluded in this study was that the counties that had higher poverty rates showed an increase in pregnancies in teenagers (Mohamoud et al., 2019). This can now be correlated back to maternal age that was discussed above. The research that I had done with maternal age found that mothers less than 20 years old have an increased risk in infant mortality due to the higher likelihood of complications occurring (Ely & Driscoll, 2021).

We can now begin to correlate that it could be likely that the reason there is an increased infant mortality rate in teenaged mothers could be in part due to poverty levels.

Another thing this study looked at was prenatal care in the third trimester. The communities that showed to have higher poverty rates also showed an increase in mothers admitting that they stopped attending prenatal care visits in the third trimester (Mohamoud et al., 2019). Healthcare in the United States is well known for its outrageous costs. The United States has some of the most expensive health care in the world and mothers that are expecting have quite a lot of expenses to be preparing for. Mothers were asked about their prenatal visits and a very large portion of mothers admitted that they felt by the third trimester, their babies were the safest and they opted on not paying for, therefore not attending, any prenatal visits in the entire third trimester (Mohamoud et al., 2019). While the first trimester is the trimester that the child is developing the most, and is one of the most critical trimesters, every trimester is still just as important. The schedule for prenatal visits has been thought out carefully by many healthcare professionals and if evidence-based practice has shown an importance in prenatal visits in the third trimester, there is significance to that, and mothers should be attending these appointments. This also adds correlation with poverty level and access to care. If one is less likely to attend all the recommended appointments, they are more likely to miss complications that might occur.

Access to Healthcare

Access to Healthcare has been widely debated all over the United States. The United States has some of the worst access to healthcare in the entire world. It is incredibly expensive for health insurance, and even more expensive for those without insurance at all. Those who have less access to healthcare have a large increased risk for multiple health concerns, infant

mortality included. If you do not have access to even just routine healthcare visits, your health will not be as well maintained and monitored, and many serious illnesses can go unseen.

Maternal care deserts have been discussed in relation to location but let's go further and look at the relation to access to healthcare. As discussed previously, a maternal care desert implies that there are minimal to no maternal care facilities in proximity to community members. That means that pregnant women that are living in these rural communities where there is no hospital based maternal centers nearby have, less access to appropriate healthcare in comparison to those who live in metropolitan areas that have multiple hospitals close by to where they are residing. Having multiple hospital and maternal care facilities within close distance allows any complications to be discovered in a timely manner which can make a huge difference in outcome.

Healthcare professionals have worked for centuries in providing care for pregnant women. These professionals have used evidence-based practice to deem when appointments are most necessary for pregnant women. Many factors will play a role in how often appointments should be made like maternal risk factors and previous pregnancies, but every pregnant woman will have a routine of appointments that will be recommended by their doctors. It has been proven that women who attend even one less appointment than recommended is automatically put at higher risk for infant mortality (Tekelab et al., 2019). These appointments can be critical to the success of a pregnancy. Even just one appointment can find a risk factor or a complication. Time is key in medicine. It would be significantly easier if these appointments were easier for women to access not only in terms of location, but also cost. The average cost of prenatal care is nearly \$2,000 and that does not include any optional tests (Price, 2022). An amniocentesis alone can cost \$2,500 just on its own (Price, 2022). This is a test that can find abnormalities that are

present in your child that helps you prepare for what is to come. It is an optional test, but it can be incredibly beneficial to pregnant moms and at a cost like that, it is arguably not even an option that is available for those who cannot afford it.

With the way the United States health system works, a person has the highest access to healthcare if they hold a medical insurance plan. Most Americans get their health insurance from their employers, but people can get a personal plan as well. Without medical insurance, medical bills all need to be paid out of pocket which can be tens of thousands depending on the care you need. An interview was conducted around the entire United States where people were asked if they had a medical insurance plan or not. Mississippi fell in the largest category with 21.5-29.1% of the population not having any means of medical insurance (Centers of Disease Control and Prevention, 2020). New Hampshire however fell in the smallest category with only 6.2-13.8% of the population not having medical insurance (Centers of Disease Control and Prevention, 2020). This means that Mississippi has one of the highest percentages of uninsured and New Hampshire has one of the lowest.

Another correlation that has been found with insurance is also race. A study was done that found that African Americans had a much higher likelihood of being uninsured when it comes to medical insurance in comparison to Whites. African Americans across the entire country had an average of about 10.4% who were not medically insured whereas Whites had an average of about 7.6% that were uninsured (Barnett & Berchick, 2017). We are now beginning to see a correlation with almost every aspect that can contribute to infant mortality with race. Looking at the data that showed that African Americans showed a higher percentage of poverty as well, it can be inferred that one big factor that contributes to African Americans showing a lower percentage of insurance could be cost. Medical insurance can be incredibly expensive so it

would make sense that the subgroup that shows more poverty would also show less insurance due to not being able to afford medical insurance.

Conclusion

All this this research can be tied together to form a rather long conclusion that working on racial disparities would help correct the infant mortality problem in the United States. This is a much bigger issue than just racism. This research led us to conclude that the largest factors that are involved are poverty, access to care, race, and pregnancy complications. An interesting thing that this research found was that each and every individual characteristic we looked into however has some sort of correlation with one other factor. As a country, the United States has an ongoing issue with poverty, an ongoing issue with healthcare not being accessible to all, and an ongoing issue with racism. This is not just one singular issue; this is a systemic issue. So, what do we fix first? Poverty, racism, or our healthcare? It could be argued that any one of these factors could be deemed the “most important” at fixing first. While if we delved much deeper, that may be true, but at the end of the research it has been concluded that it does not necessarily need to start with any *specific* factor, it just needs to start with one *singular* factor. If the United States could work to fix just one of these issues, the others would be reduced slightly. These factors all need attention but if we work to eliminate just one, aspects of the others will be reduced. For example, if we correct the racism our country continues to face, we would then reduce some of the issues that are involved with poverty as we have learned now that poverty rates actually correlate greatly to race.

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