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Analyzing Social Determinants of Health: Asthma Morbidity and Mortality of Black Americans

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Philadelphia College of Osteopathic Medicine
Graduate Program in Biomedical Sciences
School of Health Sciences

Analyzing Social Determinants of Health: Asthma Morbidity and Mortality of Black Americans

A Capstone in Public and Population Health Leadership by Jeremiah Kinsey
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ABSTRACT

Asthma is the most common respiratory disease in the United States with over 20 million Americans living with the disease in 2019. Black Americans share a disproportionate amount of these cases, having a higher incidence of asthma morbidity and a higher prevalence of asthmatic episodes. In addition, Black American asthma mortality rates are 75% higher than that of White counterparts according to the Center for Disease Control and Prevention (CDC). This study investigates the social determinants of health (SDOH) associated with asthma mortality of Black Americans.

Unfortunately, SDOH and socioeconomic status (SES) can paint an asthmatic patient's outcome. Exposure and risk factors become more prevalent as SES decreases. Increased exposure to poor housing, stress, and air pollution significantly affects the rate of asthma in all races and ethnicities. However, in the U.S, Black Americans are among the few race groups that have disproportionate representation in neighborhoods with lower SES. Despite the development and treatment of asthma with corticosteroid inhalants, Black Americans are still five times as likely to visit the ER due to asthma.

By acknowledging and understanding the key factors that enable this disparity, steps can be taken to mitigate negative effects and ensure better patient outcomes for this population.

INTRODUCTION

Asthma, characterized as an epidemic that disproportionately affects children and underserved minorities, is the most common respiratory disease in the United States affecting over 25 million people (Akinbami, 2015). Black Americans are disproportionately diagnosed with asthma at 1.25 times the asthma prevalence rate and experience twice the asthmatic mortality rate of the U.S. general population. Black Americans are also more likely to visit the emergency department, experience hospitalization, and/or die from asthma complications than the general population. These experiences lead to higher healthcare costs, more days missed from school and work, higher mortality rates, and a combined economic impact of more than $80 billion annually (Inserro, 2018). Common triggers of asthmatic episodes include allergens or irritants, environmental exposures, food allergens, certain medications, hyperventilation, and physical exertion (Goseva et al., 2015). The increasing prevalence of Asthma in Black communities highlights a growing public health disparity in the United States.

Asthma can be classified as a complex multifactorial disease influenced by biological, environmental, and social factors. Race and ethnicity may cause variable severities of asthma in patients due to certain race and/or ethnicities (e.g., Blacks, Puerto Ricans) disproportionally having lower socioeconomic status (SES) in the United States. Populations with low SES endure a prevalence of asthma 1.5 times that of populations with high SES (Sullivan et al., 2020). These populations are also more susceptible to developing asthmatic complications due to lack of healthcare access, poor environmental factors, genetic variability, stress, and cultural factors. Poverty is associated with an increase in asthma morbidity rates; with 20% of children in the U.S living in poverty and 38.2% of them being Black.

The United States Department of Health and Human Services (HHS) groups Social Determinants of Health (SDOH) into 5 domains: Economic stability, education access and quality, healthcare access and quality, neighborhood and built environment, and social and community context. This literature review will examine each SDOH domain, as outlined by HHS, and draw conclusions to their effects on the prevalence of asthma in Black American communities.

BACKGROUND

Economic Stability

Black households have the lowest average median household income of any race group in the United States, with an average of $45,438 in 2019 (Semega et al.). This is well below the national average household income of $68,703 of the same year. In comparison, in 2019, the average median income of white families in the US was $72,204 (Semega et al.). This staggering $26,766 difference can be attributed to discriminatory policies established in the late-19th century to the mid-20th century. The Jim Crow laws, which saw Blacks segregated from White counterparts in almost every aspect of life, and redlining, which disallowed Blacks from gaining financial wealth through homeownership, are examples of policies implemented to limit the influence and wealth of Black Americans. Black schools segregated during the Jim Crow era received considerably less educational funding and resources than White schools, leading to less educational attainment within the Black community. Similarly, redlining in the US disallowed Blacks from receiving loans from banks to own homes or invest in businesses.

Education and homeownership are seen as a safe, consistent, and reliable investments that can build intergenerational wealth for many Americans. However, Black Americans were not privy to these wealth building opportunities. Even with the emergence of Historically Black

Colleges and Universities (HBCUs), college educated Blacks received less resources and opportunities than college educated, and non-college educated Whites. Additionally, the U.S department of housing and urban development outlined the major barriers of homeownership in the United States to include (HUD Archives, 2010):

- lack of capital for the down payment and closing costs;
- lack of access to credit and poor credit history;
- lack of understanding and information about the homebuying process, especially for families for whom English is a second language;
- regulatory burdens imposed on the production of housing;
- continued housing discrimination.

These major barriers are more evident when noting past discriminatory laws and policies that made it difficult for Blacks to own wealth in the United States. The wealth gap between Black and White Americans is credited to the lasting impact that these practices had on Black Americans as there continues to be a negative downstream effect. Data from Survey of Consumer Finances (SCF) suggests that a primary residence represented 62% of the median homeowner's total assets and 42% of the median homeowner's wealth (Neal, 2010). Additionally, White households are more likely to receive inheritances or financial gifts and in greater value than inheritances or financial gifts received by Black Americans (Shapiro et al., 2013). Among these inheritances and financial gifts are homes left by grandparents and parents to be passed down to grandchildren and children, thus contributing to intergenerational assets and wealth.

Devaluation of home values is a reality for many Black homeowners. After controlling for house build type and neighborhood amenities Perry et al. determined than Black homes are valued at 23% less than White homes and the devaluation of Black neighborhoods

amounts to an average of $48,000 loss per home with a cumulative loss of $156 billion (2018). The undervaluation of Black homes has other social consequences, as Black homeowners may have less wealth accumulation over time compared to White counterparts. Lack of accrued wealth may significantly alter life decisions such as starting a business or affording college tuition for offspring, two scenarios that allow for upward SES mobility.

It is hypothesized that undervaluation of Black neighborhoods may stem from phycological factors such as conscious and subconscious racial bias. Slavery reduced Blacks to property and, after being freed, internalized stereotypes and dehumanizing ideals were used to justify discriminatory laws and practices. The aftermath of these discriminatory laws contributes to the lack of quality education and housing (two factors used to assess home value) in many Black neighborhoods. It is unsure whether these evaluating factors (education and housing quality), bias, or both have led to the undervaluation of Black neighborhoods, but it is certain that past discriminatory laws continue to effect equitable valuation of Black neighborhoods and attainment of wealth.

SES in America can paint a pleasant or grim picture, as populations with higher SES can resource safe and sustainable housing, quality healthcare, higher education, and higher quality food and produce. Low SES populations are subjected to poorer housing, inadequate healthcare, education limitations (due to financial burdens), and food insecurity. Financial stability can influence many aspects of SDOH and can have either positive or negative effects on them. The interplay between low SES and disease has been studied and it is believed that illnesses, such as asthma, are mediated through environmental factors, access to health care, stress, and phycological/cultural variables (Wright et al., 2004).

Neighborhood and Built Environment

Environmental factors, including indoor and outdoor pollutants, can contribute to an increase in asthma prevalence. Populations residing in housing with a history of housing code violations (due to asthma related exposures, such as cockroaches, mice, and mold) correlated with population-level asthma morbidity regardless of poverty level. Many of these housing code violations occur in neighborhoods of low SES who have experienced the downstream effects of redlining in the 1930's (Sullivan et al., 2020). Redlining or credit rationing was a discriminatory practice that allowed private and federal banks to limit the amount of mortgage credit made available to racial and ethnic minorities. By not being able to secure loans, many Black Americans could not buy homes or fund developmental projects and businesses to contribute to personal wealth.[6] Without financial support, many of these neighborhoods were unable to keep up costly repairs or make upgrades to preexisting structures that eventually decayed with time.

When analyzing the neighborhood build environment there must be inclusion of physical and social variables, as they both determine the risk for asthma-related outcomes. Former neighborhoods subjected to "redlining" are still occupied by majority Black populations which have an increase in asthma morbidity. Housing in these areas identify as "poor housing" and usually accrue more housing violations than housing in other areas. Beck et al. found that children who lived in areas of the highest quartile of housing violation codes were 1.84 times more likely to experience asthma related hospitalizations compared to children that lived in the lowest quartile (Beck et al., 2014). In a national survey, poor housing quality was independently associated with asthma diagnosis, and ED visits. In comparison, home ownership was associated with lower incidence of asthma-related ED visits (Hughes et al., 2017).

The rate of neighborhood violence, a social variable, is associated with a higher prevalence of Asthma morbidity in children (Wright et al., 2004). In a study conducted by Wright et al., the stress of child caretakers was evaluated and analyzed (2004). Neighborhood violence showed positive correlation to amount of physiological stress on caretakers and modified caretaker behaviors (keeping children inside, smoking, decreased medication adherence). Minority caretakers were exposed to more violence and their modified behaviors due to the exposure of violence is linked to asthma morbidity in children. After controlling for income, employment status, caretaker education, housing problems, and other adverse life events it was found that violence was independently associated with asthma morbidity. Exposure to violence , a phycological stressor, can erode feelings of self-control and motivation to overcome adverse life events. Children who are kept indoors, due to violence, have more exposure to indoor allergens and more likely to develop obesity, which is linked to asthma morbidity (Wright et al., 2004). Additionally, violent and unpredictable environments are a barrier to drug adherence. Phycological stress may induce fear and cause inability to travel to the pharmacy or medical facility which in turn leads to a decrease in drug adherence and an increase in asthmatic symptoms in children.

Air pollution, a physical variable, is associated with a higher prevalence of asthma in children. In urban metropolitans, heavy traffic contributes to air pollution and diminished air quality for many people. These areas are usually characterized by a mix of people from different racial backgrounds and ethnicities. However, people of low SES within these urban metros are disproportionally subjected to the ramifications of air pollution. Furthermore, poorer communities are more likely to endure more environmental hazards due to their proximity to landfills, medical waste incinerators, diesel bus depots, and Superfund sites (Gwynn et al., 2001).

Prolonged exposure to pollutants is associated with an increase of asthma morbidity rates and many populations with low SES bear a disproportioned burden of air pollution. More so, disparities in healthcare access within low SES populations may play a role in the susceptibility of air pollution on health.

Healthcare Access and Quality

Racial disparities exist in healthcare access and quality between Blacks and Whites (HHS, 2011). Racial and ethnic minorities are also more likely to differ in insurance type and healthcare quality than non-Hispanic Whites. Whereas non-Whites are more likely to be uninsured or have public insurance (e.g., Medicare, Medicaid, State child health insurance program, state sponsored, or government sponsored health plans). Holsey et al.(2013) provides support to the idea that non-Whites are more likely to be uninsured or have non-privatized insurance. Uninsured patients and patients with non-privatized insurance are also more likely unable to afford prescriptions thus leading to an elevated severity of illness upon clinical presentation and higher hospitalization rates due to lack of drug adherence. Differences in types of drug interventions can also be accounted for as well, where racial and ethnic minority children are more likely to use short acting bronchodilator drugs rather than long-acting anti-inflammatory medicine, a more effective mediator for asthma. Additionally, uninsured populations are more likely to receive treatment in emergency departments settings than from primary care physicians. For example, between 2001 and 2003, Black children had higher hospitalization rates and mortality rates, due to asthma, than non-Hispanic Whites (Moorman et al., 2007). Asthma is the most common chronic respiratory disease in children and disproportionately impacts communities of color and low socioeconomic communities.

In a study conducted by Brown et al., Black Americans were two times as likely to select the emergency department as their primary source of health care. The Emergency Department (ED) has become a safety net for many underinsured and uninsured populations. Medicaid patients are more likely to use emergency services than primary services due minimal copayment amounts and the ability to receive care for simultaneous concerns (Kim et al., 2017). This may appeal to patients who struggle with securing transportation to routine primary care visits (Kim et al., 2017). Without insurance, primary care can become extremely costly and health care is often inconsistent. In 2010, Black Americans used the emergency department 53.6% of the time when seeking healthcare in comparison to White Americans, who used the ED significantly less at 48.9%.

Blacks remain highly segregated, with 70% of Black Americans living in neighborhoods where the Black population is 50% or more (Perry et al., 2018). This in turn creates residential segregation which exacerbates the lack of physicians in majority Black neighborhoods. Due to the higher prevalence of families with lower SES in Black neighborhoods, there may be financial barriers that keep healthcare services from entering Black neighborhoods. The demand for healthcare is correlated to populations that can afford to pay for it (Gaskin et al., 2012). Physicians that do choose to operate in Black neighborhoods are more likely to have more patients on Medicaid or uninsured than in more diverse neighborhoods. In turn, this can create a financial constraint that inhibits physicians from providing high quality care and referring patients for specialty care. The current national shortage of primary care physicians (PCP) may amplify the lack of PCP in Black neighborhoods, as Blacks are more likely to live in PCP shortage areas than Whites, at 24.8% and 13.2%, respectively (Gaskin et al., 2012).

Education Access and Quality

Socioeconomic position (SEP) relates to “social class” which is measured by education, occupation, and income on individual, household, and/or neighborhood levels. SEP correlates to SES and determines risk factors associated with asthma morbidity and mortality. A study conducted by Wolla et al. finds that education level and income are strongly correlated in the Unites States, as households with higher levels of education have more financial stability to withstand sudden life changes or financial hardships (2017). Therefore, individuals with higher educational attainment are more likely to have higher SES than the general population. This theory works vice-versa as well, with children of high SES families obtaining post-secondary education at greater rates than children of families with low SES.

Historically, post-secondary education has allowed for more accessible class mobility. Obtaining a more specialized education can increase individual capital through demand for skillful services. Generally, more demand of specialized skills positively correlates to a higher salary for individuals with them. Therefore, post-secondary education is associated with a higher average income and greater job security. In fact, college graduates earn an average of $32,000 more annually than high school graduates without college education and the incidence of receiving workers compensation is 2.4 times lower when compared to those who only obtained a high school diploma (Trostel, 2012)

However, not all populations were able to pursue post-secondary education as readily as others. The formation of Historically Black College and Universities (HBCUs) enabled more Black Americans to receive a college education. These institutions were created for the sole purpose of educating freed slaves and their children. Funded by White missionary groups, HBCUs had no control over taught curriculum which was deprived of information regarding

African culture and ideals, and instead focused on White, European, and Western values.[27] HBCUs lacked in financial resources and many public HBCUs received land grants which limited education to vocational training, which, at the time, was regarded as a lower-level education. The 1896 court case of Plessy vs Ferguson ruled that all educational institutions should remain, “separate but equal”, however public White institutions received 26 times more state funding than public HBCUs (Daring-Hammond, 1998). In 1954, the United States Supreme Court’s historic decision in Brown vs Board of Education ruled segregation of education institutions unconstitutional and restricted the distribution of federal funds to segregated schools. This monumental decision was thought to increase the quality of education afforded to Blacks, however a high percentage of Blacks still attended racially segregated schools and integration occurred at a slow rate.

In contrast, in an analysis of primary and secondary educational institutions, two-thirds of minority students attend schools that are predominantly minority and located in urban areas. Class sizes in urban areas are generally larger than schools in the suburbs and the qualifications of teachers vary greatly. For example, students in poorer school districts are less likely to have a teacher that has a higher-level degree in their area of teaching(Daring-Hammond, 1998). Inconsistencies in education, lower-tier curriculum, and inadequate funding of schools in urban areas continues to make the transition to post-education difficult and in may cases unattainable. (Daring-Hammond, 1998).

Social and Community Context

Injustices stemming from systemic racism have been at the forefront of political and social debates about police reform for some time. Disproportional efforts of policing, pre-trail detention, sentencing, parole, and post-parole are made onto Black communities. These

inequitable processes see that Black Americans are incarcerated at a rate 5 times that of White Americans and receive longer sentences (Maness et al., 2021). In addition to inconsistencies in policing, Blacks are more likely to experience excessive police force than any other race group (Maness et al., 2021). In fact, Black men face a 1:1000 risk of being killed by a police officer in comparison to 1:2000 for all race groups (Edwards et al., 2019). Police practices such as the "Stop and Frisk" laws are disproportionately administered on Blacks and the perpetration of black equaling deviance has caused continued trauma and phycological stress on Black communities. Mass incarnations of Black Americans has caused a phycological, economical, and emotional difficulties for the families experience it and the Black community as a whole.

DISCUSSION

Asthma is characterized as a multivariable disease that is influenced by the social determinants of health (SDOH) outlined by the Health and Human Services (HHS): economic stability, education access and quality, healthcare access and quality, neighborhood and built environment, and social and community context. By conducting a literature review in regard to SDOH it can be determined that each domain plays a large role in the shaping of asthmatic disease outcomes. Additionally, analyzing existing SDOH commonly experienced by Black Americans, a population disproportionally effected by asthma morbidity and mortality, allows for a deeper dive into past discriminatory laws and policies that ultimately shaped the present experiences of many Blacks today. This analysis supports the theory that these discriminatory policies and laws have negatively impacted the present socio-economic status (SES) of many Black Americans. SES has major effects on the SDOH experienced by an individual and/or

population. Many Black Americans disproportionally experience low SES, more than other race group, which negatively impacts the SDOH experienced by this population. The cumulation of these SDOH can have a stark impact on asthma morbidity and mortality in Black Americans.

Research supports the idea of past discriminatory laws and policies effecting wealth trajectories of Black Americans. The effects of segregation and redlining deprived Black communities of access to education and homeownership causing a gap in wealth in comparison to White counterparts. The ramifications of inequality can be seen presently, as a disproportionate number of Black Americans live-in low-quality housing and/or neighborhoods with poor air quality due to proximity to large urban centers, industrialized zones, and/or landfills. Above average rates of violence coupled with disproportional policing of Black neighborhoods may induce daily physiological stressors which in turn decrease drug adherence and contribute to gaps in primary care. Lack of resources and funding discourage many medical facilities from operating in Black neighborhoods, making healthcare access less accessible for people without secure transportation. Obtaining a higher education is often thought as a way to transcend into higher SES, however many Blacks have difficulty funding a college education and must rely on loans and minimal, if any, family support to do so (Meschede et al., 2017). In addition, a longitudinal study by Meschede et al. (2017) concluded that White-college educated households gained wealth and Black-college educated households lost wealth after controlling for number of years post-graduation (Meschede et al., 2017). This information supports the idea that college educated Blacks may experience lower SES than that of non-college educated Blacks. It is likely that college educated Blacks supply financial assistance to family members of lower SES, thus hindering their own wealth accruement (Meschede et al., 2017) Compounding negative factors such as financial barriers, poor housing, air pollution, stress, lack of medical

care, and inaccessibility to post-secondary education serve as compounding factors that can exacerbate underlying disparities in asthma morbidity and mortality in Black Americans.

This review contributes to a clearer understanding of the factors contributing to Black Americans having 1.25 the asthma prevalence rate and twice the mortality rate of the US general population. The understanding of the SDOH factors that effect Blacks should be taken into consideration when constructing public health policies. More recently, The New Green Deal, submitted by Alexandria Ocasio-Cortez, outlines the need for improvement in pre-existing infrastructure throughout the country, ensuring housing equity for all Americans. The document explicitly calls for the promotion of justice and equity in poor and minority communities through upgrades in preexisting infrastructure. Additionally, it also aims to address climate change, a factor to consider when discussing air pollution and O_3 levels in areas of urban sprawl, which is likely to reduce overall asthma morbidity and mortality. In a way the New Green Deal addresses the ramifications of redlining and segregation in the United States by acknowledging the need for safe, affordable, and adequate housing and the need to strengthen economic, social, and environmental well-being in vulnerable communities. Anti-discrimination clauses are scattered throughout the proposal, with emphasis on creating high quality jobs and advancement opportunities for all Americans.

Until the utopian ideals of the New Green Deal are implemented, there should be continued focus on the pursuit of equity for all Americans. When discussing the outcomes of Black patients in regard to SDOH, it is clear that there is much work to be done. Public Health officials can help propose policy that will mitigate the disparities in SDOH that Black Americans may face throughout a life course, thus lowering rates of asthma morbidity and mortality within this population. With regards to health care, there should be change in the way care is

administered to vulnerable populations. The quality and accessibility of healthcare should not waiver base on the location of a facility. Furthermore, there should be adequate funding for facilities that disproportionally see more patients with public health insurance. The increase of primary care physicians (PCPs) in Black neighborhoods is likely to drastically improve the health of all residents. The current lack of medical facilities within Black neighborhoods creates an alienation of medicine within the community, which in turn builds distrust and skepticism within this population. Combating the growth of "medical deserts" in Black neighborhoods will increase economic growth and improve the health outcomes for asthmatic patients.[8]

Although much of the literature provided adequate analyzations of data, there were limitations when controlling for compounding variables. There was no account of class transitions from high to low SES or rates of asthma morbidity and mortality among Blacks with high SES. Additionally, the studies reviewed did not compare the outcomes of Blacks with low SES to those of high SES. This supporting data would help express commonalties, treatment, and etiology of disease regardless of SES. This may include shared access to social networks, similar quality of healthcare treatment, and similarities in quality of environment. Therefore, it is beyond the scope of this study to infer the health outcomes of Asthmatic Blacks with high SES.

Immunological genetic factors were also not examined. The etiology of disease may play a more profound role in asthma morbidity and mortality in Black patients. If controlling for all confounding variables, there could still be underlying genetic factors that attribute to the formation and worsening of asthma.

RECOMMENDATIONS FOR FUTURE STUDIES

Further studies should analyze associations of medical bias in the care of Black patients and distrust of the medical community in Black populations. Qualitative data, such as surveys, should be used as inclusion or exclusion criteria to control for other variables influencing Asthma morbidity and mortality in Black Americans. Larger samples sizes and more exclusion variables can help narrow inequalities of health to specific SDOH in Black populations. Albeit this would not allow for generalizations on the disparities in all Black communities, but rather a specific geographical area.

The results of the New Green Deal are likely to bring major changes in housing, environmental quality and economic opportunity for many Americans. Future studies will benefit by drafting data and comparing past variable outcomes to future variable outcomes. It would be interesting to draw comparisons on trends before and after these large changes take place and how they have effects on Black communities in America.

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