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Opportunity and life-long health outcomes: A review of the effects and proposed solutions of
hypersegregation on health disparities

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Abstract

Hypersegregation, the overrepresentation of a racial group in a metropolitan area, is defined by evenness, exposure, concentration, centralization, and clustering. Hypersegregated communities are subjected to bias and have few resources and opportunities, which compounds the negative impact on one's health and socioeconomic outcomes. This study aims to describe the effects of hypersegregation on health risks, chronic disease, violence, and compare the differences between hypersegregated and non-hypersegregated cities. Data were collected for Montgomery County, Ohio (MC) for low birth weight, infant mortality, diabetes, heart disease, and violent crime, and compared with data from Summit County (SC). There is a larger Black population and population below the poverty level in MC than SC. SC had increased bachelor's degree attainment overall (6.5%) and for Whites (5%) but decreased attainment for Blacks (-1.1%) and increased low birth rate overall (0.1%) and for Blacks (1%) compared to MC. MC had increased infant mortality rates for Blacks (1.4%) and decreased for Whites (-1.2 per 1,000 births) and a larger age-adjusted diabetes mellitus and heart disease death rate per 100,000 for all races and genders in comparison to SC. SC had a larger burden of violent crime in comparison to MC. While increased burdens of health disparities exist for Black Americans in both counties, the hypersegregated county had a larger burden of health disparities for people of all races. Plans to improve health disparities may not target the specific needs of hypersegregated communities. Further research is needed to adequately address these specific health disparities.

Keywords: Hypersegregation, Underserved Medicine, Health Disparities, Montgomery County, Summit County

Opportunity and life-long health outcomes: A review of the effects and proposed solutions of
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Public health entities across the country are working earnestly to conquer health disparities. The Surgeon General's National Prevention Strategy named eliminating health disparities as one of its four strategic directions. Their recommendations included strategic foci for areas at risk and expanding the manpower to conquer health disparities (Centers for Disease Control and Prevention, 2013). Healthy People 2020 also identified health disparities as a foundation health measure in improving the health of all people (U.S. Department of Health & Human Services, Public Health Service, Office of the Surgeon General, 2010). Programmatic initiatives have been created to mitigate the social determinants of health observed in many of these communities but one may wonder what role hypersegregation plays in the war on health disparities. Hypersegregation is the overrepresentation of a racial group in a metropolitan area. This phenomenon has been studied in many facets to explain disparities viewed in these communities. Hypersegregation encompasses five areas: 1) Evenness, the amount of people from a certain racial group seen across communities, is measured by the percentage of the surrounding population that must relocate into the urban center to equal the percentage of the minority group in the city; 2) Exposure, the interaction between racial groups, is measured by the area where the average person of a minority group lives; 3) Concentration, the amount of space the population resides in, is measured by the physical area that the population takes up; 4) Centralization, proximity to the city center, is measured by the distribution of population around the city; 5) Clustering, the presence of people from the population living in neighborhoods nearby is measured by the extent that minority communities adjoin each other (Wilkes & Iceland, 2004).

There are 29 communities across the country classified as hypersegregated including New York City, Philadelphia, Chicago, and Indianapolis. Ohio is home to three, Dayton, Cincinnati, and Cleveland. Surprisingly, it was not until the year 2000 that Dayton was included in this list. Discriminatory housing and lending practices have been linked to hypersegregation as it is most commonly seen in large Black populations in the Midwest. Wilkes and Iceland (2004) commented on the positive correlations found between the number of associated factors in a hypersegregated population and the size of the city.

Hypersegregation is a major public health concern. Yang and Matthews (2015) found lack of exposure, as described by spatial filtering models, to have the strongest increase in mortality for all racial groups. Lack of opportunity and the Jim Crow era “residential sorting process” were cited as major influences in the creation of high crime, impoverished areas that lack access to innovative health care and hospitals yielding health disparities (Yang & Matthews, 2015, p. 3). Further, the practice of “redlining” preferentially loaned money to allow the purchase of homes in areas deemed to have less minorities (Domonoske, 2016, p. 1).

Yang and Matthews (2015) also mentions higher centralization as a key factor in lower access to care for African Americans as physician shortage areas are most often in city centers. Of the few studies examining the effects of hypersegregation on specific health outcomes, researchers have shown various negative implications on health for minority populations, even while still in the womb. Dr. Biello and colleagues (2012) described the magnitude of this issue in the Black population, “Nearly two-thirds of Black persons live in highly segregated areas” (p. 1370). These researchers continue to name the health risks impacting the entire population from neonates to the elderly including low birth weight babies, poor mental health, and increased mortality (Biello et al., 2012). When matched with the implicit bias, opportunity mapping, and

redlining in these communities, the infrastructure of the American public health system will be challenged to meet the demands of caring for these patients.

The effects of hypersegregation on access to care, social determinants of health, treatment, epidemics, and social supports complicates both the care of individual patients and entire communities. Hardeman, Medina, and Kozhimannil (2016) argue that structural racism, implicit bias, and thus hypersegregation are the wall that stands between the ability to care for patients and communities. They note:

It's crucial to 'center at the margins' - that is, to shift our view point from a majority group's perspective to that of the marginalized group or groups...requiring re-anchoring our academic and health care delivery systems- specifically diversifying the work force, developing community-driven programs and research... by using critical self-consciousness -the ability to understand how society and history have influences and determined the opportunities that define our lives" (Hardeman, Medina, & Kozhimannil, 2016, p. 2114).

It is imperative in the fight against health disparities that we begin to look at the communities that we serve and create interventions that encompass the specific concerns of hypersegregated communities and their specific health challenges.

This study utilized the following framework of relationships to examine the effects of hypersegregation on health disparities (see Figure 1). Structural racism perpetuates implicit bias and creates a lack of opportunity, a lack of resources, and housing disadvantages in underserved areas, which then create an environment supporting the development of the characteristics of hypersegregation (evenness, exposure, concentration, centralization, and clustering).

Hypersegregation acts on the individuals in the community to create chronic stress, which

manifests itself physiologically, and thus physically and mentally, creating increased risks for children and adolescents, increases in chronic disease, and increases in violence. These three outcomes are interdependent - increased risks for children and adolescents increase both chronic disease and violence in communities; chronic disease increases risk for children and adolescents, as well as violence; and violence increases chronic disease and risks for children and adolescents.

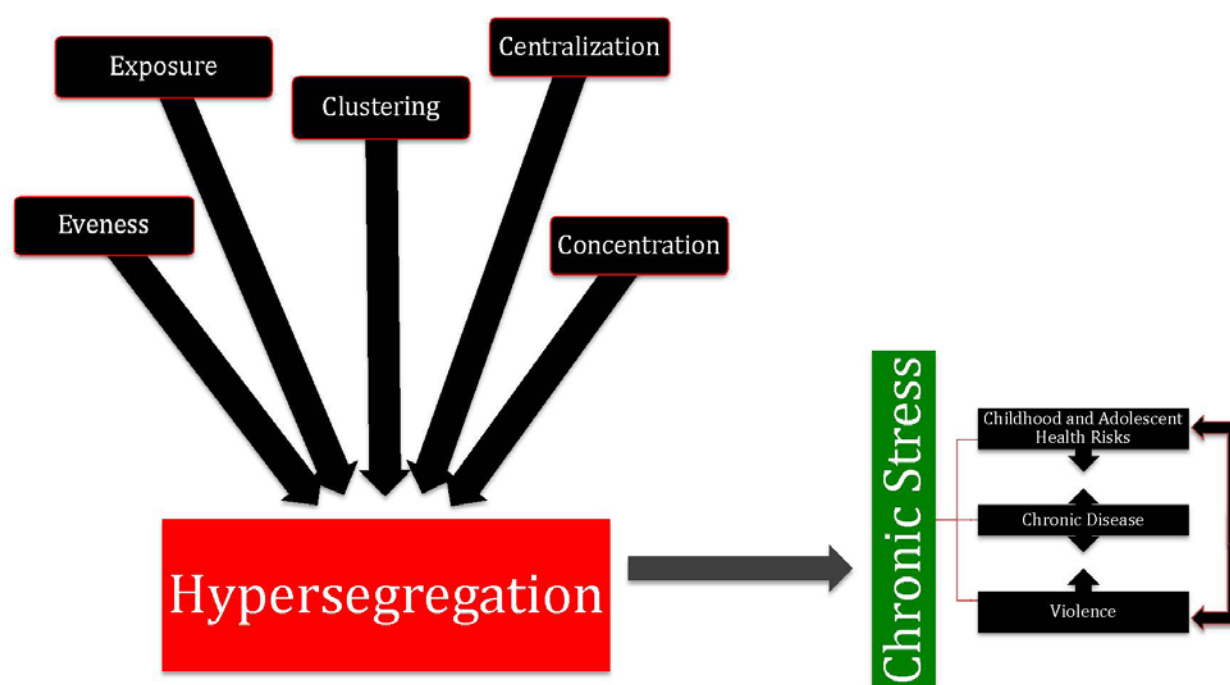


Figure 1. Hypersegregation framework utilized in the study (created by C. Johnson, 2017).

Statement of Purpose

This study aims to describe the disparities in childhood and adolescent health risks, chronic disease, and violence in the presence of hypersegregation in Ohio through comparing one hypersegregated county and one non-hypersegregated county. With this information, areas of potential intervention can be identified and pursued in the future.

Review of Literature

Hypersegregation has been under researched as a potential reason for the health disparities and public health crises seen today (Yang & Matthews, 2015). With the current concerns about fighting health disparities, as mentioned in Healthy People 2020, understanding the implications of the causes of the social determinants of health in communities is pivotal in targeting appropriate interventions. Wilkes and Iceland (2004) found that socioeconomic status has a positive correlation with poor health outcomes and negative correlation with morbidity and mortality. Affluence increases health outcomes and decreases illness in communities. This division in health between the rich and the poor has been ever present in society.

These disparities, seen between racial groups and in areas of geographical variance have been examined, but according to a study by Yang and Matthews (2015), there is very little literature directly examining racial segregation and health. Implicit bias, or involuntary and unconscious assessments of groups of people, was seen to negatively impact one's ability to receive interviews for job opportunities, performance evaluations, and opportunities for promotion (Staats, Capatosto, Wright, & Contractor, 2015), further increasing the risks for violence and health disparities due to economic instability. It is no secret that hypersegregated areas have increased financial challenges and a lack of opportunities that can contribute to stressing those who live there.

Chronic Stress

Chronic stress, both physical and psychological, has been described as a risk to physical and mental wellbeing (Zandstra et al., 2015). Osypuk and Acevedo-Garcia (2008) noted increases in stress may lead to unfavorable health behaviors, decreased access to care, and mental health concerns that may increase physiological hormones triggering stress responses.

Zhao and colleagues (2015) also note that increases in the internalization of stress in African American populations is associated with the endurance of life long experiences including discrimination and stigma. Hypersegregated communities provide the perfect storm of factors and influences to encourage chronic stress and its negative sequelae-child and adolescent health risks, chronic disease, and violence.

Child and Adolescent Health Risks

Preterm birth and low birth weight. Research by Saigal and Doyle (2008) reports that preterm birth, or birth before 37 weeks of gestational age, while improving, has a long list of complicated sequelae that are not well understood. While the specific triggers for preterm birth are currently being studied the physical manifestations have been very well described (Saigal & Doyle, 2008; Osypuk & Acevedo-Garcia, 2008). The world of medicine has been able to design interventions to decrease infant mortality; however, the mental, social, and long-term effects are still a mystery (Saigal & Doyle, 2008). Neurological, cognitive, and developmental challenges including behavioral abnormalities may plague patients for their lifetime. Long-term cardiac and metabolic conditions have been described as well (Saigal & Doyle, 2008).

Williams (2013) suggests that stressors and environment, like those seen in hypersegregated communities, play a very large role in birth outcomes. Preterm infants are noted to be especially vulnerable as their bodies are still developing. Osypuk and Acevedo-Garcia (2008) examined the racial disparities in preterm birth rates seen in hypersegregated areas. Stress hormones may lower immunity and lead to preterm labor, especially in Black women of increased age attributed to “the cumulative effects of psychosocial and environmental hazards associated with population-level patterns of racial and social inequity” (Osypuk & Acevedo-Garcia, 2008, p. 1296). Examining a sample of 1,944,703 births across 237

metropolitan areas, 22 hypersegregated, Osypuk and Acevedo-Garcia (2008) found Black infants had double the odds of being born pre-term. Further those in hypersegregated areas had significantly worse rates of preterm birth than did those born to older mothers (Osypuk & Acevedo-Garcia, 2008).

These disparities are also reported in babies with low birth weights or weighing less than 2,500g when delivered. With numerous risk factors like race, age, maternal health, tobacco and alcohol exposures, rates of low birth weight babies are known to be correlated with maternal life and experiences. Food and housing security as well as socioeconomic insecurity can alter a woman's ability to care for herself and thus her developing baby, slowing growth and development, which can then lower birth weight. Studies comparing maternal stresses suggest that stressors affect Black American and White mothers differently--creating a special niche of health disparities for hypersegregated areas. By using the Los Angeles Mommy and Baby survey, Zhao and colleagues (2015) demonstrated that financial stress was associated with a significantly higher risk for low birth weight in the African American population alone. They describe chronic stress, altered physiological responses, and differences in partner support as factors that may further increase these risks.

Infant mortality. The Centers for Disease Control and Prevention (CDC) reports that infant mortality rates are two fold higher in the African-American community than in the White population (U.S. Department of Health & Human Services, 2013). This disparity has been attributed to increases in preterm birth rates in the past but has most recently been correlated with socioeconomic factors, much like those seen in hypersegregated communities (Williams, 2013). When coupled with the lack of social supports and unique social determinants of health, infant

mortality in hypersegregated areas is a very difficult challenge to overcome (Jackson et al., 2014).

The relationships described in the literature between stress, preterm births, low birth weight, and infant mortality highlight the importance of developing interventions that are both relevant to, and effective in, hypersegregated communities. Many programmatic solutions have been offered to decrease these disparities across the country. Access to care has been noted as one of the major barriers in lowering preterm birth and infant mortality rates. Poor insurance coverage and lack of access to primary care providers create difficult challenges for those living in underserved communities, especially in areas that are hypersegregated. For those with health risks, care is essential as much of fetal development happens prior to the mother knowing that she is pregnant. Williams (2013) describes the Early Start Program in California as an example of a programmatic solution. The program aims to increase early prenatal care and has shown positive outcomes including lower preterm birth and infant mortality rates. Additionally, the Save 100 Babies program described by Jackson and colleagues (2014) suggests that by utilizing the practice of community engagement one may be able to increase the social supports needed and create innovative stress-reduction and resiliency programs that reach the community effectively. The study identified the church as a culturally important pillar, allowing for programming to be solidified into the community and to influence socioeconomic concerns (Jackson et al., 2014).

Chronic Disease

Implicit bias and its consequence, hypersegregation, have also been seen to negatively impact rates of chronic disease. Hardeman et al. (2016) discuss the historical context of health disparities. Just as implicit bias and housing discrimination have been born out of structural

racism or systems of oppression left behind from the days of slavery, racial health disparities are also deeply rooted in these systems. They note that the medical community identify disparities but cannot consider the complete “structural factors and social determinates of health” of a patient without “shift[ing] our clinical and research focus from race to racism” in hopes of “spur[ring] collective action” (Hardeman et al., 2016, p. 2114). The Kirwin Institute, a leader in the study of implicit bias, conveyed the implications of these longstanding challenges in a review of the state of the research. Waytz, Hoffman, and Trawalter (2014) found that both superhuman rhetoric such as, “ghost, spirit, wizard”, and subhuman rhetoric such as, “monster, devil, beast”, were most often associated with Black people, further complicating the ability to care for the health concerns of Black patients effectively as physicians often diminish their concerns (Staats et al., 2015, p. 22).

Chronic stress and chronic disease. Research has shown that chronic stress has a negative influence on physical health. Hu and Lu (2015) cite dietary changes, sedentary conditions, and substance use as key factors associated with chronic stress that impact chronic disease progression. In their study, self-reported health status was used to assess potential physiological changes that influence the progression of chronic disease including hypertension and cardiovascular disease, diabetes, cancer, and other gastrointestinal, respiratory, and arthritic conditions. Lower self-reported health status was significantly positively correlated with having experiences financial difficulty (Hu & Lu, 2015).

Apolipoprotein E4 (APOE4), which has been associated with early onset neurologic disease was also studied with the aim of finding a physiologic tie between ones’ self-reported health status and cognitive health under chronic stress. Hu and Lu (2015) described a significant positive correlation between the altered functioning of APOE4 and lower cognitive health scores

with lower self-reported health status, suggesting a physiological predisposition in the population for increased chronic disease with chronic stress within these individuals (Hu & Lu, 2015).

Studies by Howard, Gidding, and Liu (1998) found an elevated prevalence of the APOE4 allele in the Black population. When examining the APOE4 effects on blood lipids, they found that regardless of race and sex, those with APOE4 have, “higher total and low density lipoprotein cholesterol”, which increases risks for obesity, cardiovascular diseases, and for complications of other chronic diseases (Howard, Gidding, & Liu, 1998, p. 864).

Diabetes. Type 2 Diabetes Mellitus and its complications have a higher prevalence in both minority communities and communities of lower socioeconomic status (Chow, Foster, Gonzalez, & McIver, 2012). The disease is a perfect storm of lifestyle factors like diet and exercise matched with genetics and comorbid health factors. According to Chow, Foster, Gonzalez, and McIver (2012), Black Americans have a 77% higher risk of being diabetic, 1.5 times more likely to be admitted to a hospital, 2.2 times more likely to develop kidney complications, 50% more likely to develop complications that affect their eyesight, and 2.3 times more likely to die from diabetes. Wu, Threatt, and Lu (2017) further describe the disparities seen in the progression of diabetes in lower income and minority populations. They report that socioeconomic status has also been associated with the success of interventions to treat diabetes. In their study, the risk of progressing from pre-diabetes, or a state of sustained blood sugar elevation, to a diagnosis of diabetes was 12% higher in Black Americans. Further, low-income patients with Medicaid had a higher rate of diabetes at the conclusion of the study (Wu, Threatt, & Lu, 2017).

Chow and colleagues (2012) describe a host of policy interventions aimed at amending this disparity, which include increases in research, grant funding, and public education

programming that is culturally competent and community focused. At this time, these measures have not been adopted but government programming in other minority groups have been successful. The Special Diabetes Program was created to serve the Native American population as it has the highest prevalence of diabetes for all races. The program has shown improvements in meeting the needs of the population. Provisions have been added to the Affordable Care Act in hopes of improving outcomes for all patients with diabetes until more programs like the Special Diabetes Program can be implemented for minority and low income patients across the country (Chow et al., 2012).

Heart disease and cardiovascular care. Bias can be seen in caring for other aspects of chronic medical conditions. Capers and Sharalya (2014) conducted a review of the literature to describe the disparities in cardiac care. Cardiac disease is most often the manifestation of a myriad of chronic health conditions and social factors. Groeneveld, Heidenreich, and Garger (2005) examined the placement of automatic implantable cardioverter defibrillators, a life-saving device for those with risks for sudden cardiac death and found that Black patients were half as likely to receive the implants. Peterson, Wright, Daley, and Thibault (1994) found that 47% of Black patients needing reperfusion therapies, or interventions to open the arteries of the heart while having heart attacks did not receive any therapy. Black patients were 33% less likely to be taken for a cardiac catheterization therapy or surgical reopening of the arteries. Black patients were also 54% less likely to have coronary bypass surgery, where the arteries are rerouted around the site of blockage, even with the same medical history. Napoli, Choo, Dai, and Desroches (2013) showed discrepancies in Black patients' likelihood to have stress tests with chest pain.

Capers and Sharalya (2014) also describe differences in treatment for Black patients with peripheral vascular diseases. While amputation is most often a preventable last resort for disease, Eslami, Zayaruzny, and Fitzgerald (2007) reported that Black patients and patients of lower socioeconomic status made up a much more significant portion of their study population for patients receiving amputations. Surprisingly, in this study, solely being Black almost doubled one's odds of having an amputation rather than other less invasive procedures.

Violence

Most recently, violence both in communities and on communities has been supported as a public health issue by the American Public Health Association (Benjamin, 2016), the American Medical Association (2016), the Student National Medical Association (Brummer, Valentin, Fisher, Mitchell, & Garrett, 2001), and the Centers for Disease Control and Prevention (Dahlberg & Mercy, 2009). Xie (2010) found that exposure and centralization increased homicides rates in African-American hypersegregated communities. Xie also reported that multiple factors leading to economic and political challenges affect violence in communities with lesser exposure. First, the lack of job opportunities was cited as a major contributor to economic challenges, which not only contributes to barriers in access to care but also to social challenges. Second, bias and discrimination, when matched with job opportunities that are outside of the community and that exclude those living in hypersegregated communities further the distress seen in these communities (Xie, 2010).

Implicit bias also correlates with initial reactions to people in communities of color and the outcome of interactions with police officers. These reactions include a perception of danger in situations where there may be none and further, negatively impacts the treatment of those accused as they move through the judicial process (Staats et al., 2015). James, Klinger, and Vila

(2014) reported that police officers have increased perception of threat when encountering Black persons than when encountering White or Hispanic persons. Hardeman et al. (2016) highlighted the “disproportionate use of lethal force” seen in minority communities across the nation as an example of the impact of structural racism and bias that is being undervalued in the fields of public health and medicine (p. 2113). They argue that, “It is a threat to the physical, emotional, and social well-being of every person... causing widespread suffering not only for Black people and other communities of color but for our society as a whole” (Hardeman et al., 2016, p. 2113).

Violent crime. Xie (2010) found that decreases in exposure were the strongest predictors of increased violent crime. Decreasing exposure by one standard deviation in Black hypersegregated communities increased the homicide rate by 13%. In Hispanic hypersegregated communities, the increase was 18% (Xie, 2010).

Research directly aimed at studying the true morbidity and mortality of specifically gun violence in communities is lacking. A congressional bill passed in 1996 prevents the CDC from funding any study that could have implications on gun control bills. Although gun violence kills almost as many people as sepsis, Stark and Shah (2017) found that gun violence research had 1.6% of the funding and 4.5% of the publications that it should have based upon the funding and publications of the other leading causes of death (Stark & Shah, 2017). This highlights the need for policy reform in the fight against health disparities.

Methods

In examining the effects of hypersegregation locally, data for Montgomery County, Ohio were used for the following variables: low birth weight, infant mortality, diabetes, heart disease, and violent crime. These data were compared with data from the non-hypersegregated index county Summit County. Descriptive data were found through the United States Census Bureau

(2013). Data for low birth weight were compiled from the CDC National Vital Statistics and the Child Health and Family Services (CHFS) and Reproductive Health and Wellness Program (RHWP) Health Status Profiles for Montgomery and Summit counties. Infant mortality data were compiled from the 2015 Ohio Infant Mortality Data (Ohio Department of Health, 2016), the 2015 Infant Mortality Data for Montgomery County (Public Health – Dayton & Montgomery County, 2016), and the 2016 Summit County Community Health Assessment. Diabetes and heart disease data were compiled from the CDC National Center for Health Statistics (2016) underlying cause of death files in the WONDER online database. Violent crime data were compiled from the 2014 Montgomery County Community Health Assessment (Public Health – Dayton & Montgomery County, 2014) and the 2016 Summit County Community Health Assessment. The State of Ohio was used for reference.

Results

Demographics

Montgomery County has a total population of 532,258 people. The population is 21% Black, 72% White, and 7% other. Summit County has a population of 541,968 people that is 14% Black, 79% White, and 7% other (Figure 2).

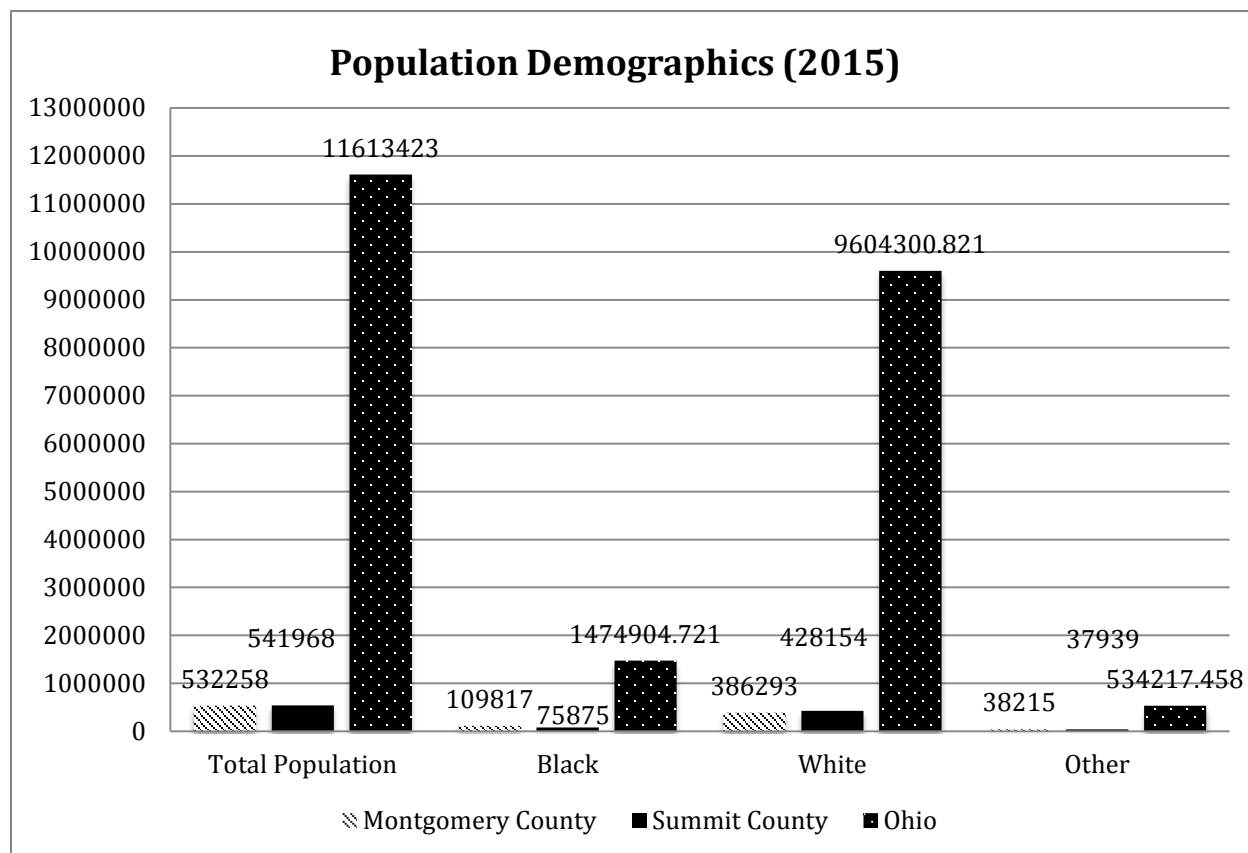


Figure 2. Population demographics by race for Montgomery County, Summit County, and Ohio using data collected from the United States Census Bureau (2013).

Eighteen percent of the population lives below the poverty line in Montgomery County; 34% percent of the Black population and 13% of the White population. In Summit County, 14.8% of the population lives below the poverty line, 4% less than Montgomery County and 1% less than the State of Ohio. This includes 33.6% of the Black population, less than both Montgomery County and the State of Ohio. Less than 11% of the White population lives below the poverty line, which is less than both Montgomery County and the State of Ohio (Figure 3).

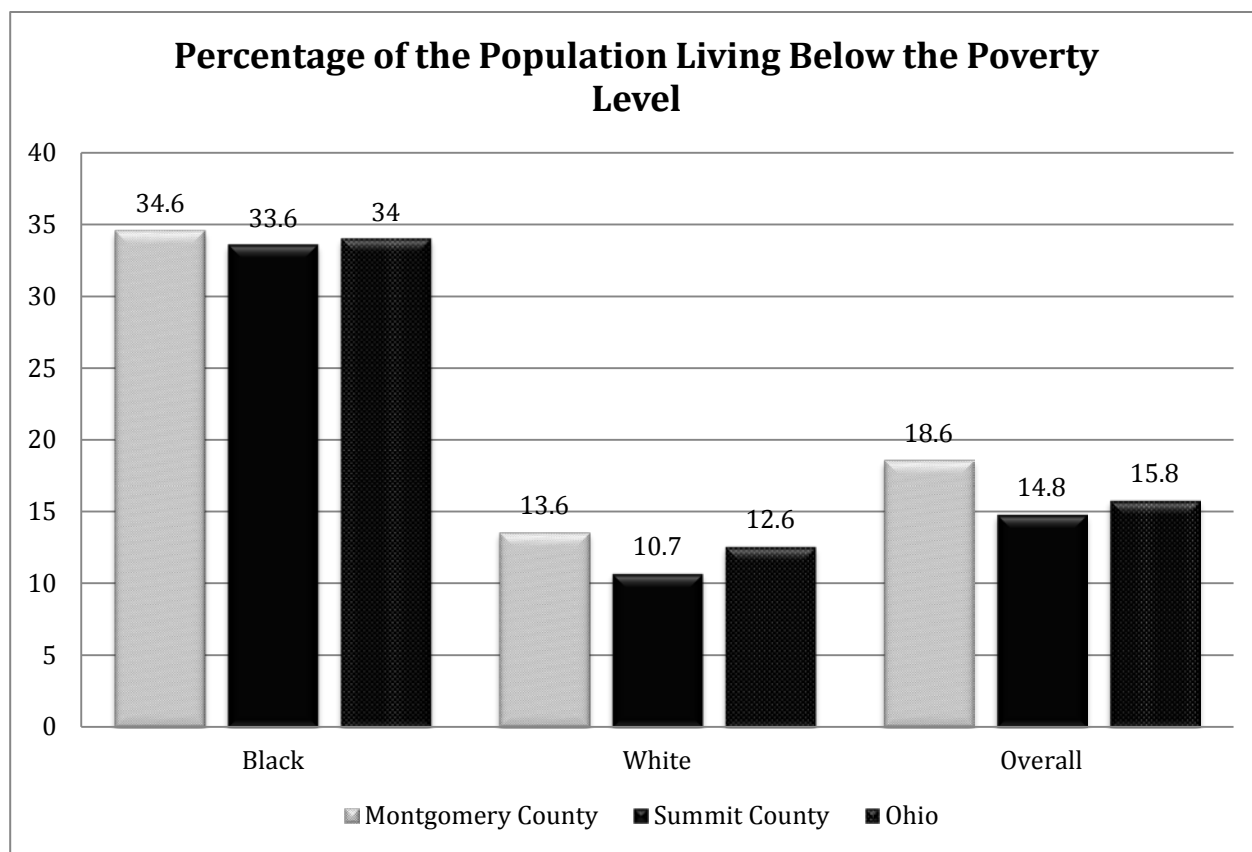


Figure 3. Percentage of the population living below the poverty level by race for Montgomery County, Summit County, and Ohio using data collected from the United States Census Bureau (2013).

Educationally, almost 90% of the population of Montgomery County has achieved a high school diploma or GED or greater including 85% of the Black population and 90% of the White population. Twenty-five percent of the population has achieved a bachelor's degree or more including 16.9% of the Black population and 27.2% of the White population. Ninety percent of the population in Summit County has a high school diploma or GED or greater, including 85% of the black population and 92.5% of the White population. Thirty-six percent of the population has achieved a bachelor's degree or greater, which is a 10% more than Montgomery County and

Ohio. This includes 15.8% of the Black population, 1% more than Montgomery County, and 32.2 percent of the White population, 10% more than Montgomery county (Figure 4).

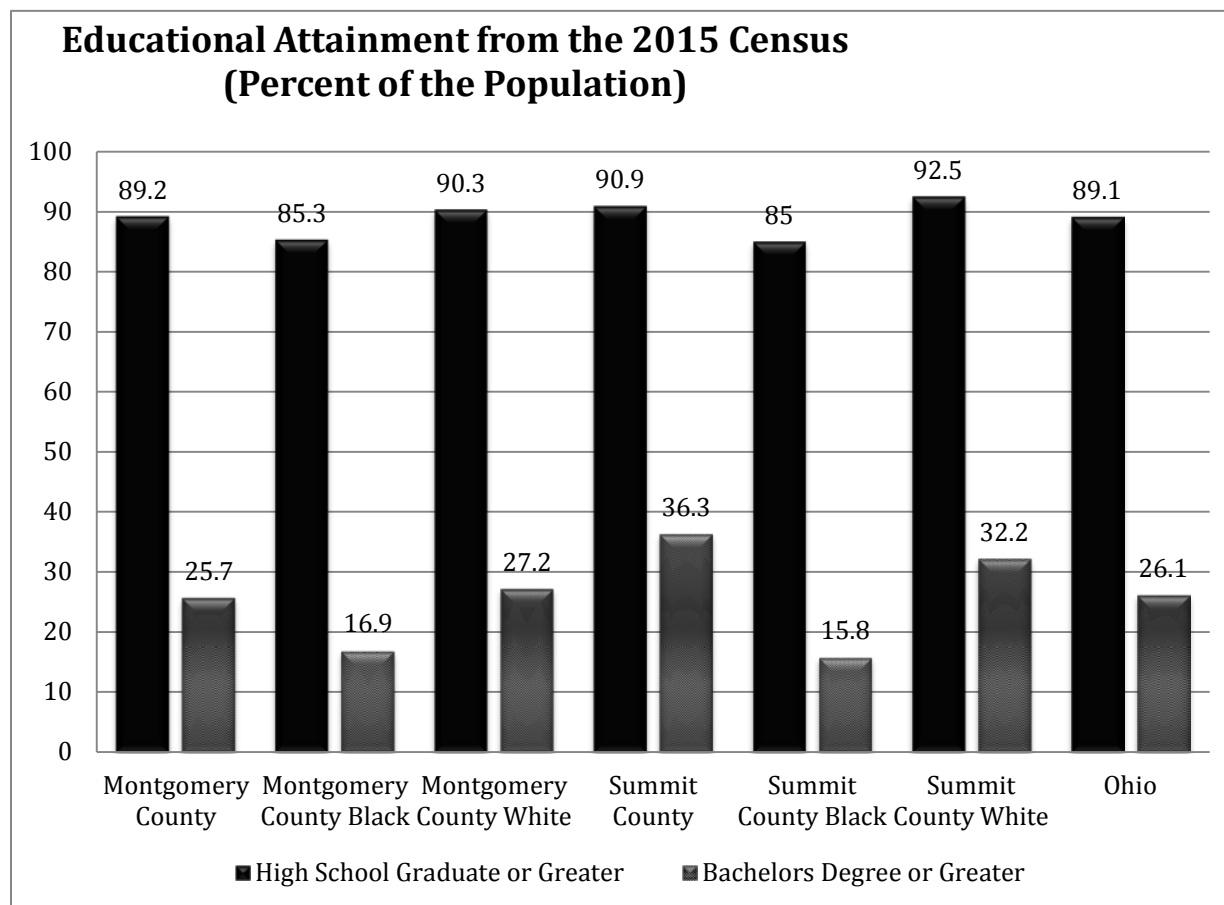


Figure 4. Educational attainment by race for Montgomery County, Summit County, and Ohio using data collected from the United States Census Bureau (2013).

Low Birth Weight and Infant Mortality

The percentage of low birth weight and very low birth weight babies in Montgomery County was 9.7%, including 16.3% of Black babies and 9% of White babies born. In Summit County, 9.8% of babies are born low birth weight or very low birth weight including 17.3% of Black babies, 1% more than Montgomery County and 4% more than the State of Ohio and includes 9% of White babies, equal to Montgomery County and 1.6% higher than the State of Ohio (Figure 5).

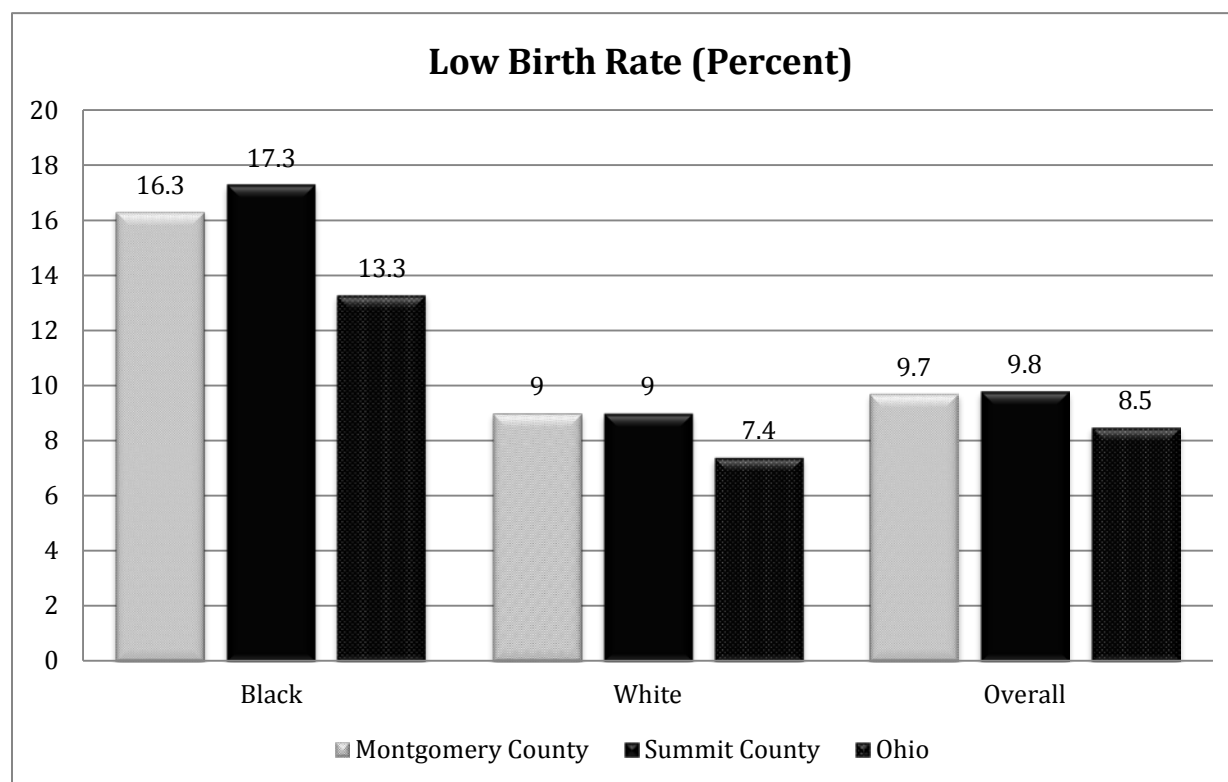


Figure 5. Low birth weight rate by race for Montgomery County, Summit County, and Ohio using data collected from the CDC National Vital Statistics and the Child Health and Family Services (CHFS) and Reproductive Health and Wellness Program (RHWP) Health Status Profiles for Montgomery and Summit Counties.

The infant mortality rate for Montgomery County is 7.5 per 1,000 babies born. For Black infants the rate is 14 per 1,000 Black babies. For White infants the rate is 4.5 per 1,000 babies. In Summit County the infant mortality rate is 7.4 per 1,000 babies. For Black infants the rate is 12.6 per 1,000 babies, 1.4 less than Montgomery County and 2.5 less than the State of Ohio. For White babies the rate is 5.7 per 1,000 babies, 1.2 higher than Montgomery County and 0.2 higher than the State of Ohio (Figure 6).

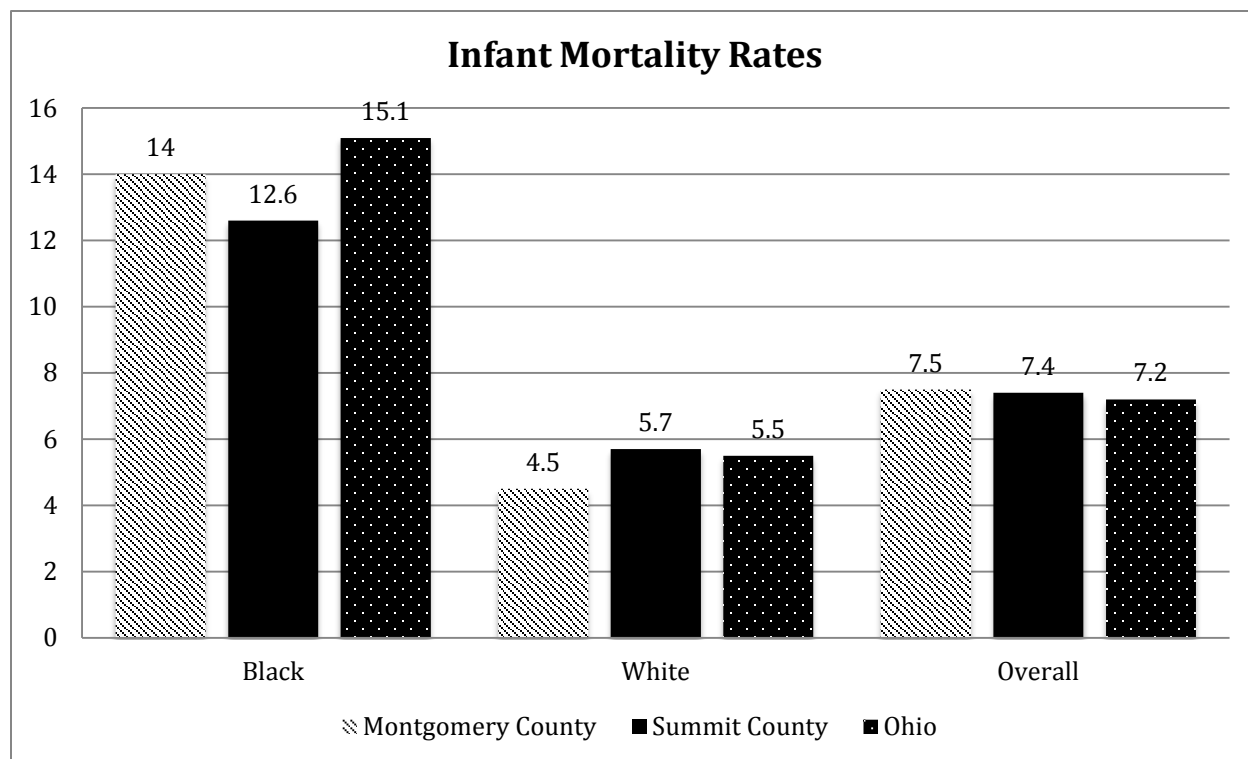


Figure 6. Infant mortality rates per 1,000 births by race for Montgomery County, Summit County, and Ohio using data collected from the 2015 Ohio Infant Mortality Data, the 2015 Infant Mortality Data for Montgomery County and the 2016 Summit County Community Health Assessment.

Chronic Disease: Diabetes and Heart Disease

The age-adjusted diabetes mellitus death rate included all deaths between 2011 and 2015 with ICD10 codes of diabetes mellitus as a primary cause of death. The Montgomery County age-adjusted diabetes mellitus death rate is 29.6 per 100,000 deaths overall. For Black men the rate is 60 and for Black women the rate is 43.6 compared to 32.5 for White men and 19.7 for White women. In Summit County, the age-adjusted diabetes mellitus death rate is 24.3 per 100,000 deaths overall, 5.1 less than Montgomery County and 1.8 less than the State of Ohio. For Black men the age-adjusted diabetes mellitus death rate is 56.6 per 100,000 deaths, which is 3.4 less than Montgomery County and 4.5 more than the State of Ohio. For Black women the age-adjusted diabetes mellitus death rate is 39.4 per 100,000 deaths, 4.2 less than Montgomery

County and 1.8 greater than the State of Ohio. For White men the age-adjusted diabetes mellitus death rate is 25.8 per 100,000 deaths, which is 6.7 less than Montgomery County and 3.6 more than the State of Ohio. For White women the age-adjusted diabetes mellitus death rate is 18 per 100,000 deaths, which is 1.7 less than Montgomery County and 2.0 less than the State of Ohio (Figure 7).

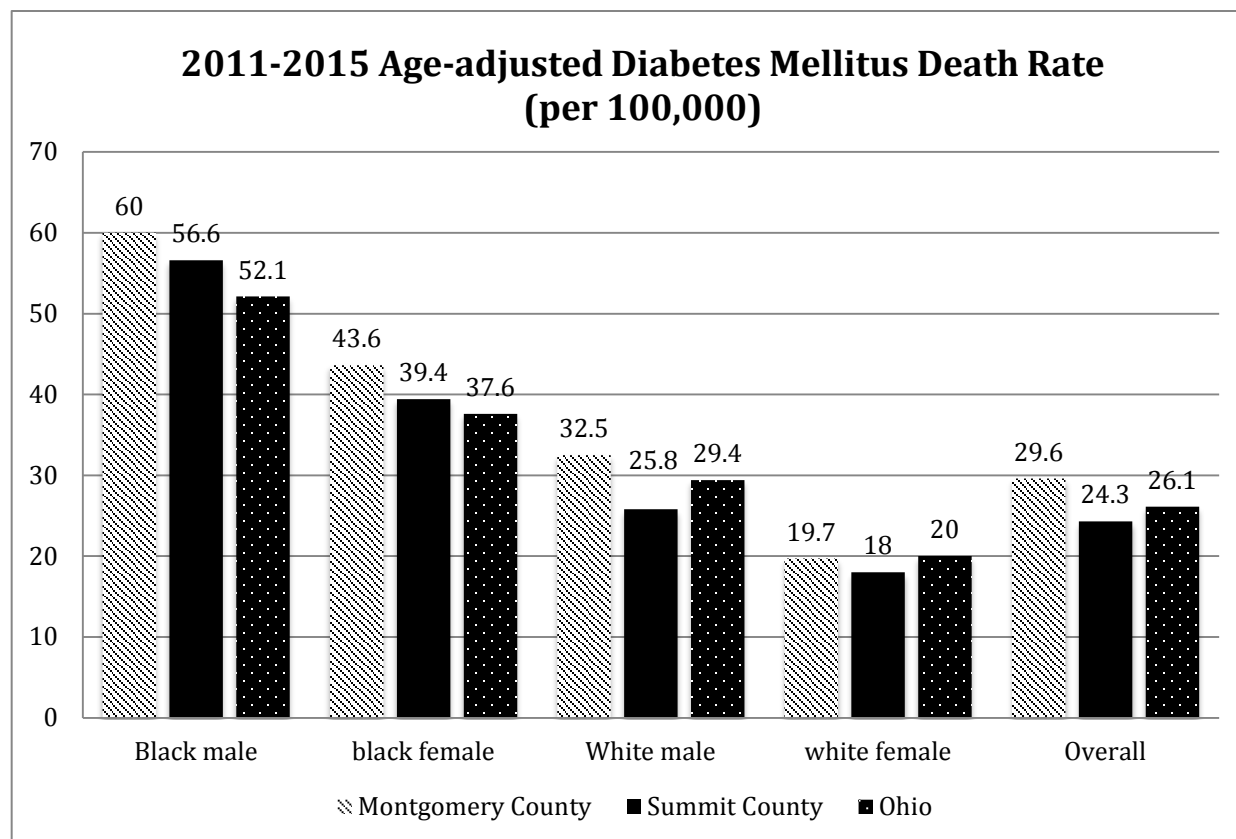


Figure 7. Age-adjusted diabetes mellitus death rate by race and gender for Montgomery County, Summit County, and Ohio using data collected from the CDC National Center for Health Statistics (2016) underlying cause of death files in the WONDER online database.

The age-adjusted heart disease death rate included all deaths between 2011 and 2015 with ICD10 codes of hypertensive and ischemic heart diseases as a primary cause of death. The Montgomery County age-adjusted heart disease death rate is 137.6 per 100,000 deaths overall. For Black men the rate is 237.7 and for Black women the rate is 152.2 compared to 171.2 for

White men and 90.4 for White women. In Summit County, the age-adjusted heart disease death rate is 124.9 per 100,000 deaths overall, 12.7 less than Montgomery County and 13 less than the State of Ohio. For Black men the age-adjusted heart disease death rate is 190.8 per 100,000 deaths, which is 46.9 less than Montgomery County and 20.6 less than the State of Ohio. For Black women the age-adjusted heart disease death rate is 128.2 per 100,000 deaths, 24 less than Montgomery County and 0.4 less than the State of Ohio. For White men the age-adjusted heart disease death rate is 161.2 per 100,000 deaths, which is 10 less than Montgomery county and 15 less than the State of Ohio. For White women the age-adjusted heart disease death rate is 89.4 per 100,000 deaths, which is 1.0 less than Montgomery County and 12.5 less than the State of Ohio (Figure 8).

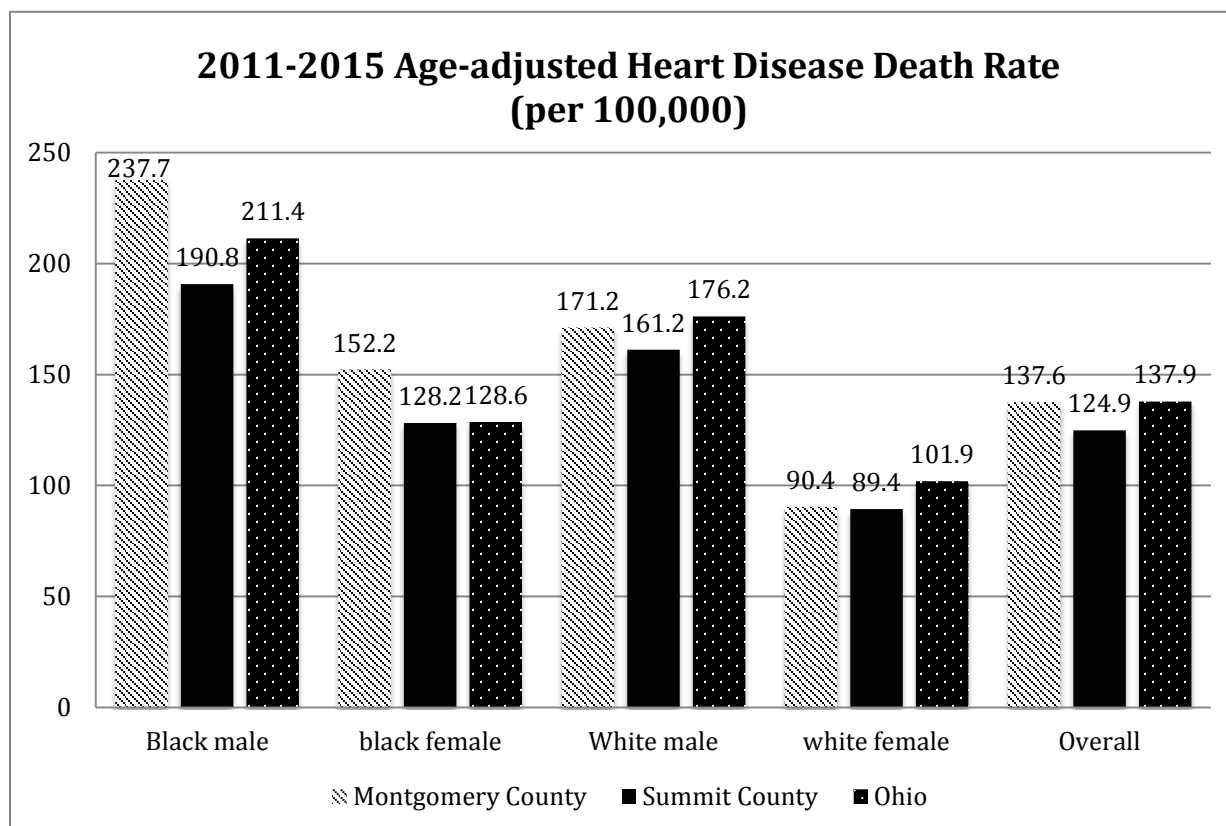


Figure 8. Age-adjusted heart disease death rate by race and gender for Montgomery County, Summit County, and Ohio using data collected from the CDC National Center for Health Statistics (2016) underlying cause of death files in the WONDER online database.

Violent Crime

The Montgomery County violent crime rate is 404.4 per 100,000 people. In Summit County, the violent crime rate is 862 per 100,000 people, 457.6 more than Montgomery County and 554.9 more than the State of Ohio (Figure 9).

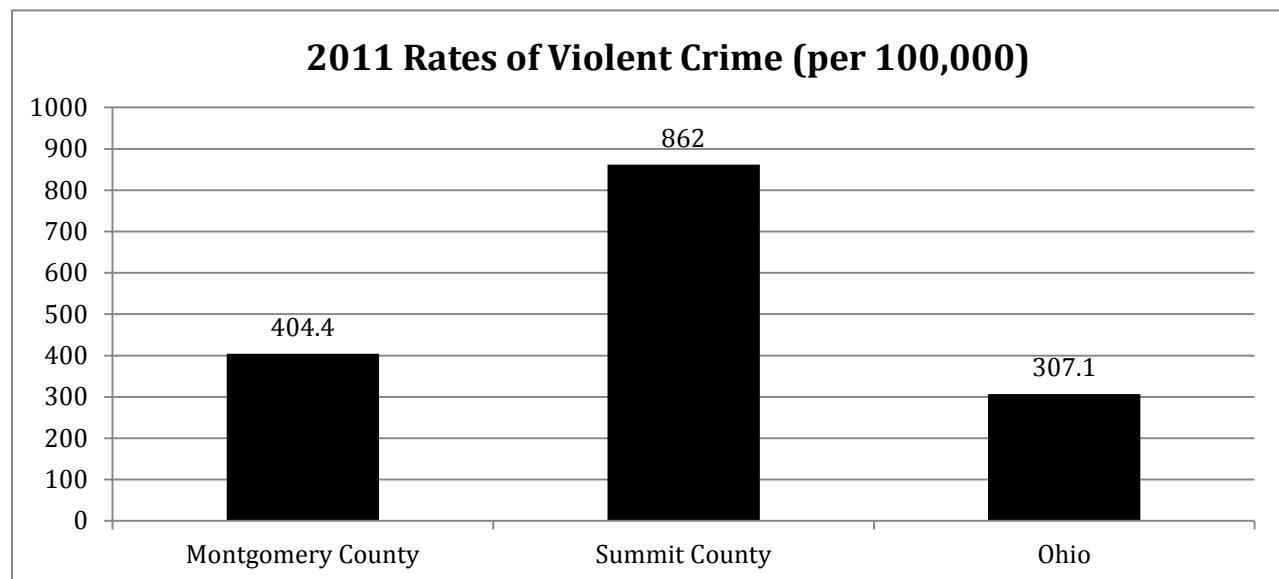


Figure 9. Rates of violent crime for Montgomery County, Summit County, and Ohio using data collected from the 2014 Montgomery County Community Health Assessment and the 2016 Summit County Community Health Assessment.

Discussion

The comparison between the hypersegregated area of Montgomery County, Ohio and the non-hypersegregated area of Summit County, Ohio highlights multiple disparities in both opportunity and health outcomes. While the population between the two counties only differed by 9,000 people, the percentage of people living below the poverty line in Summit County was about the same for Black people but 4% lower for Whites, equating to an additional 21,000 people living above the poverty line. Educationally, 11% or almost 60,000 more of Summit County citizens have earned a bachelor's degree or higher. Only about 6,000 of those degrees belong to Black citizens. This finding was as expected as Wilkes and Iceland (2004) described hypersegregated communities as “undermin[ing] the social and economic well-being of Blacks in the United States...where educational failure prevails, and where social and physical;

deterioration abound” (p. 24). These findings are a clear example of the deficiencies in educational and economic opportunity seen in Montgomery County.

Disparities in birth outcomes and chronic disease were described as well. Black babies have a 1.4 per 1,000 decrease in infant mortality in Summit County in reference to Montgomery County. In the adult population, the disparities of chronic disease are sizeable. The disparities seen for age-adjusted diabetes death rate overall, for each race, and gender are only slightly below those seen in Montgomery County. However, the disparities seen for the age-adjusted heart disease death rate were much worse in Montgomery County. While the differences were marginal for White males and White females, the disparities for Black males and Black females were over 46 per 100,000 and 24 per 100,000 more in Montgomery County than Summit County. This disparity, whether associated with chronic stressors, alterations in physiologic means, or limited access to food and resources, is a testament to the increase in mortality seen in hypersegregated areas.

The literature described some hypersegregated areas as potentially protective for a variety of factors. Xie (2010) described “Ethnic Enclaves” or areas with homogenous groups of people with the same cultural background as way to both increase socioeconomic dynamics and support familial support (p. 243). Xie makes some harsh generalizations of Black culture in many areas and questions if this can be shown in Black populations in the same way as Hispanic population; however, this protection can be seen in the results above. Montgomery County showed less of a disparity than Summit County. Summit County had an increase in the rate of low birth weight for Black babies as compared to Montgomery County, as well as increases in infant mortality for White babies showing a surprising disparity for White babies in the non-hypersegregated community. The violent crime rate was also seen to be better in the hypersegregated area

Montgomery County had a violent crime rate less than half of that in Summit County, again demonstrating that ethnic enclaves may very well positively impact Black communities.

Public Health Implications

In hopes of mitigating the disparities seen in public health outcomes and social determinants of health, county health departments publish a Community Health Improvement Plan (CHIP) for the areas of disparity most needing improvement. These areas known as areas of opportunity allow for measurable goals to be created to improve the health of the population and to target outcomes where the county is performing the least. Both Montgomery County and Summit County have community health improvement plans in place to target some of the findings in this study. These were released in 2014 and 2015 respectively.

Montgomery County. Montgomery County has identified three priorities: birth outcomes, chronic disease prevention, and behavioral health. The goals associated with birth outcomes include decreasing preterm births by 10%, reducing substance use in pregnant women and mothers, and decreasing the Black disparities in infant mortality. When compared to the results from this study, the goals are very timely and would in turn decrease both the percentage of babies born with low birth weights and the infant mortality rates overall. Further, if achieved, these goals would begin to address the disparity seen in the data presented.

Montgomery County has also described four goals to assist in chronic disease prevention. These include increasing areas for citizens to exercise safely, decreasing food deserts and adult cigarette use by 10%, and increasing healthy lifestyles through diet and exercise in children. This also aligns with the results of this study as heart disease and diabetes were seen to present great challenges in the morbidity of Black persons in Montgomery County.

The three goals outlined to solve the challenges faced by Montgomery County with behavioral health include increasing access to care by 10% through lowering wait times, increasing programs and providers, and increasing care coordination. While mental health outcomes were not directly researched in this study, the effects of chronic stress and concerns of violence in communities are very much mental health disparities associated with hypersegregated communities and need attention (Public Health - Dayton & Montgomery County, 2014).

Summit County. Summit County has described four interdisciplinary goals that encompass some of the aims of Montgomery County. The first goal, improving health behaviors mentions reducing tobacco use and increasing exercise like goals two and three in Montgomery County. Summit County also aims to decrease alcoholism, STD rates, and the Black adolescent birth rate. The CHIP names key strategies as well including utilizing culturally competent methods, expanding access to care, increasing STD education, and partnering with minority health organizations that can reach minority populations. They also site initiatives such as the Accountable Care Community and the County of Summit Alcohol, Drug, and Mental Health Services Board, which will assist in facilitating their success through ensuring the entire community is involved and that services are accessible to all.

The second goal, which aims to improve access to care, includes outcomes like decreasing the uninsured and health professional shortage areas and increasing prenatal care rates. As the results showed a disparity in infant mortality for both Black and White infants, this points to a pervasive disparity in access to prenatal care and access to care overall. Osypuk and Acevedo-Garcia (2008) described “Neighborhood quality” including lack of access to care, healthy food, and increased access to addictive substances as a major influence on birth

outcomes, prenatal care, and thus health outcomes further supporting the need for this goal (p. 1300). The plan outlines opportunities like the Million Hearts Campaign to address the disparity in heart disease, as demonstrated in the results above, through community resources increasing the quality of the care given, and improvements in coordinating care. Lack of access to care creates health disparities without any influence from social determinants of health or other outside factors and thus, access to care is imperative to discuss in respect to health disparities.

The third goal centers on improving the social determinants of health through increasing educational attainment, reducing poverty rates, and decreasing the number of violent crimes. Summit County has a surprisingly high burden of violent crimes in comparison to Montgomery County even with higher educational attainment. While the plan discussed ways to increase educational opportunities cross-culturally and to combat poverty, the CHIP does not mention an action plan to lessen crime in Summit County.

The final goal includes the elimination of food deserts and increasing opportunities for exercise like Montgomery County along with decreasing pollution and optimizing housing areas. The plan names tax incentives for grocery stores and community gardens among other promising opportunities to combat this issue of food and resource insecurity. The CHIP also mentions opportunities to partner with schools and other areas to increase opportunities for exercise, both concerns that directly impact the health disparities of chronic disease.

Both plans outline tangible goals that target the disparities outlined in the results above. While Summit County details current projects and partners that are able to assist in the successful completion of the goals mentioned, Montgomery County has defined more specific and targeted goals that directly influence the most direct needs of the population. Montgomery

County also involved community work-groups in creating the plan and specifically outlined target areas by zip code to facilitate their success.

Recommendations

Based upon the literature, best practices for creating and implementing initiatives to solve health disparities in underserved populations include community involvement and engagement, culturally competent delivery, and targeted goals. Community involvement is necessary for the development of programming that both truly serves the needs of the community and creates ownership of the program by the community. The engagement of the community allows for programmatic survival. This also allows for programmatic leadership from within the community, enabling the program to maintain relevance and fluidity over time. The necessity of cultural competency also allows for the program to serve the needs of the community but makes the program one with the community and addresses challenges unique to the population at hand. Targeted programmatic goals allow for a program that is able to assess progress and reassess which challenges arise.

This approach was best described in the literature through the Save 100 Babies initiative mentioned above. The program was designed to address the issue of Black infant mortality in the Atlanta metro area, also a hypersegregated city. Through PhotoVoice or using photography to elicit exchange of ideas, and appreciative inquiry, or the emphasis of positive thinking and available resources to solve problems, the team was able to recruit information from over 100 community members across many different professional backgrounds. After viewing the documentary *When the Bough Breaks*, the community members were broken into small groups where they discussed four photos displaying different aspects of life for pregnant women and mothers in the area (California Newsreels & Vital Pictures, 2008). Participants discussed life

experiences, goals, and personal commitments to solving the Black infant mortality crisis. They then utilized these ideas to create large group targeted goals and individual action plans for next steps in increasing community education, political involvement, and health outcomes as they pertain to infant mortality in the Black population.

Further Research

This study was limited by the availability of data. Data were sought from multiple sources due to the limited availability of data from the public sources of Summit County, which may have introduced some variability into the results above. While Montgomery County provided the data in their community needs assessment, little if any data were provided from Summit County. For all variables with the exception of violent crime rates, alternative data sources were sought. Further research may include the direct assessment of an intervention aimed at one of the five variables above in both hypersegregated and non-hypersegregated communities.

Conclusion

The disparities noted describe a universal issue across the nation. Hypersegregated or not, Black citizens are less likely to have educational and economic opportunities as well as are more likely to have poorer health outcomes. The effects of hypersegregation, when added, further increase risks for the Black population and thus negatively impact morbidity and mortality rates of a host of health issues as well as impact years of life lost and disability rates in the population. While these risks are more pronounced in the Black population, disparities are also seen in the White population. This demonstrates that hypersegregation is not only an issue for the Black population or other minority populations but negatively affects the health outcomes of all.

Solutions for hypersegregation and its effects on health outcomes are incredibly complex and intersectional in nature. In hopes of ending hypersegregation, communities must break the impossible cycle of lacking opportunities in education and socioeconomic growth, disparities in housing and resources necessary for life (i.e., grocery stores, banks, etc.), and community bias through continued political engagement and community involvement. Initiatives that focus on cultural competency and community engagement are most likely to mitigate the health disparities associated.

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Appendix A: List of Competencies Met in CE

Wright State Program Public Health Competencies

Assess and utilize quantitative and qualitative data.
Apply analytical reasoning and methods in data analysis to describe the health of a community.
Describe how policies, systems, and environment affect the health of populations.
Communicate public health information to lay and/or professional audiences with linguistic and cultural sensitivity.
Demonstrate ethical standards in research, data collection and management, data analysis, and communication.
Explain public health as part of a larger inter-related system of organizations that influence the health of populations at local, national, and global levels.