A Comprehensive Data-Driven Analysis Of Healthcare Disparities In The United States

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ABSTRACT

Health disparities encompass a range of factors, including race, ethnicity, gender, age, disability status, and socioeconomic conditions. This project highlights disparities in healthcare access, quality of care, and health outcomes, with a particular focus on racial and ethnic disparities in health insurance coverage, prenatal care, and maternal morbidity. Gender disparities are also evident. Addressing these issues requires a multifaceted approach, including addressing social determinants of health, promoting equitable healthcare policies, and fostering cultural competence. Equitable access to healthcare services, quality care, and improved data collection are essential in eliminating disparities. Initiatives to support underserved communities, improve healthcare quality, and enhance cultural competence are recommended. Research and evidence-based approaches, along with policy reforms at various levels, such as anti-discrimination laws and increased funding for public health, are crucial. Collaboration among healthcare organizations, community groups, government agencies, and advocacy organizations is essential for effective interventions.

KEYWORDS

Healthcare disparities, Race, Ethnicity, Socioeconomic status, Gender, socially disadvantaged group, Cultural competence, Access to healthcare.

1. INTRODUCTION

reasons behind these systematic and potentially avoidable health disparities include a range of factors such as race, ethnicity, skin color, religion, nationality, gender, sexual orientation, gender identity, age, location, disability, illness, political affiliation, and socioeconomic status (including income, wealth, education, or occupation). These categories reflect whether an individual or group holds a position of social advantage or disadvantage within a hierarchy. Health disparities are not a broad reference to all health differences but specifically pertain to those relevant to social justice, as they may result from deliberate or unintentional discrimination or marginalization, reinforcing social disadvantage and vulnerability. Assessing health equity, the foundation of addressing health disparities, involves evaluating disparities in health and their underlying determinants, aligning with the principle of social justice in healthcare [17].

The term "health disparities" describes differences in the capacity to reach optimal health among particular population groups in the United States. These disparities can be quantified through differences in factors such as disease incidence, prevalence, mortality rates, disease burden, and

the presence of other adverse health conditions [12]. It's crucial to remember that disparities can appear along many other dimensions, such as gender, sexual orientation, age, disability status, socioeconomic status, and geographic location, even though the term "disparities" is frequently linked to differences between racial or ethnic groups. [7] highlights the impact of these variables on an individual's ability to achieve optimal health, in addition to race and ethnicity. [7]. In fact, the evidence that is currently available on health disparities shows that all of the identity groups mentioned have different health outcomes.

Health disparities can arise from health inequities, which are regular variations in a group's health and communities that occupy unequal positions in society. Importantly, these inequities are avoidable and unjust [5]. These are precisely the kinds of disparities that are the focus of the committee's mandate and will be addressed in the remainder of this report. In this section, we will delineate health disparities that impact populations across multiple dimensions.

The significant disparities in health status and premature mortality within various segments of the United States population, frequently called health inequalities, have been extensively documented for over two centuries. Numerous studies have highlighted the pervasive racial and ethnic disparities in health status, along with the multiple contributing factors such as income and educational disparities, environmental and economic conditions, specific health behaviors and lifestyles, access to healthcare, and even the quality of healthcare services. These disparities based on race and ethnicity have been noticeable in both life expectancy and healthy life expectancy, with records dating as far back as 1900 and as recently as 2015, as reported by the National Center for Health Statistics in 2017. Furthermore, health disparities have also been noted in other population segments distinguished by geographic location, age, gender, disability status, and sexual orientation. [6].

Disparities in healthcare are essentially manifestations of the larger quality gaps and difficulties within our healthcare system, as pointed out by [4]. In essence, they serve as warnings, particularly from the most vulnerable individuals, highlighting the broader challenges we face. For example, recent evidence indicates that even in the most favorable circumstances, the average level of recommended medical care received by all Americans for major illnesses is only about 55% [10]. However, when researchers delve into outcomes related to race, ethnicity, socioeconomic status (SES), or geographic factors, these systemic quality issues become even more pronounced. Specific demographics face significant challenges in accessing affordable healthcare, including issues such as lacking insurance, financial means to afford insurance or medical services, and limited access to healthcare providers due to factors like the absence of local hospitals or transportation options. Additionally, these specific groups experience disparities in the treatment they receive, the standard of care given, and the resulting health outcomes. This paper therefore analyzes the various disparities in healthcare in the US.

2. LITERATURE REVIEW

In recent times, an increasing worry has emerged regarding potential disparities in the quality of healthcare services for racial and ethnic minorities compared to White Americans, despite their equivalent healthcare access. For example, studies have indicated that Black individuals with end-stage renal disease are less likely to receive peritoneal dialysis and kidney transplantation, Black and Hispanic patients experiencing bone fractures in hospital emergency departments receive less frequent pain relief than White patients, and Black Medicare patients diagnosed with congestive heart failure or pneumonia tend to receive lower-quality care when compared to their White counterparts [6]. Moreover, a growing body of research has detected racial inequalities in the access to significant therapeutic interventions for a range of medical conditions, even when variables such as insurance status and disease severity are considered. These disparities endure in

healthcare environments where distinctions in economic status and insurance coverage are reduced, as seen in the Veterans Health Administration System and the Medicare program [11]. In response to the mounting reports of healthcare disparities, Congress in 1999 requested that the Institute of Medicine (now the National Academies of Sciences, Engineering, and Medicine) assess disparities in the types and quality of healthcare received by racial and ethnic minorities and non-minorities in the United States. The Institute of Medicine's Committee on Understanding and Eliminating Racial and Ethnic Disparities in Health Care provided a definition for healthcare disparities as "variations in healthcare quality based on race and ethnicity that cannot be explained by factors related to healthcare access, clinical requirements, patient choices, or the suitability of interventions." The committee analyzed multiple data sources to assess the scope of healthcare disparities, delve into their origins, and formulate approaches to tackle these disparities. These sources included a review of recent literature, commissioned research papers, input from professional societies and organizations, feedback from technical liaison panels as well as insights gathered from focus groups and roundtable discussion.

The committee's conclusion was that racial and ethnic healthcare disparities are consistently observed across a range of illnesses and healthcare services, with some exceptions. These disparities are often linked to socioeconomic differences and tend to decrease significantly, and in a few cases disappear, when socioeconomic factors are taken into consideration. Nevertheless, the majority of studies reviewed by the committee found that racial and ethnic disparities in healthcare persisted even after adjusting for socioeconomic differences and other factors related to healthcare access (Nelson , 2002). [12]

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our solutions effectively accomplish their intended goal: securing the health of all individuals, regardless of their socioeconomic characteristics.
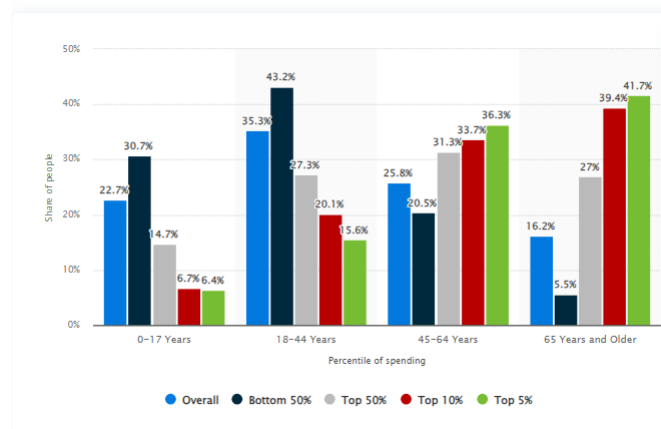
3. METHODOLOGY

3.1. Health Disparities: Age

Figure 1: Share of people in the U.S. by age group and percentile of healthcare spending.

In 2017, when examining the top five percent of Americans in terms of healthcare spending, it becomes evident that the majority of these individuals were aged 65 or older. Specifically, nearly 42 percent of them fell into this age bracket. This data offers a glimpse into how individuals are distributed across age groups in the United States, considering their position within the top percentile of healthcare spending.
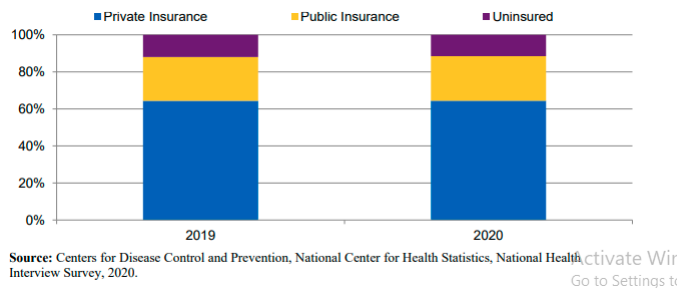

Figure 2: People under 65 years of age with public, private, or no health insurance, 2020

In the year 2020, it's approximated that around 88.5% of individuals under the age of 65 were covered by some type of health insurance, as depicted in the Figure above.

Among those with health insurance, approximately 27% were beneficiaries of public insurance, such as Medicaid or a blend of Medicare and Medicaid. On the other hand, just under three-fourths of the insured population held private insurance plans, frequently provided through their employers. This data underscores the diverse sources of health insurance coverage among individuals under the age of 65 in 2020.

3.2. Health Disparities: Gender

When examining health disparities between genders, it's crucial to recognize that while some disparities are rooted in biological differences (such as the incidence of ovarian and prostate cancers), the majority of disparities discussed in this section are not primarily attributable to biological mechanisms unless explicitly stated. Non-biological health disparities are primarily shaped by socioeconomic conditions that can influence gender-based variations in health outcomes, including mortality rates, alcohol and substance abuse, mental health disorders, and experiences of violence.

In 2014, the average life expectancy at birth was 81.2 years for women and 76.4 years for men. Over the course of a decade, from 2004 to 2014, the life expectancy gap between men and women decreased from 5.1 years to 4.8 years. While the narrowing of this life expectancy gap might initially appear as a positive trend, it is, in fact, a concerning development. This shift arises from an increase in mortality rates among women in many regions over the past two decades [1]. [9] research identified that from 1992 to 2006, as mortality rates decreased in most U.S. counties, mortality rates for women increased in 42.8 percent of those counties. In contrast, during the same period, only 3.4 percent of counties witnessed an increase in male mortality rate.

More specifically, recent data reveals an unprecedented rise in death rates among white women, resulting in a decline in their life expectancy, a trend not experienced by white men [1]. Investigations into the causes of death among white women point to factors such as accidental poisonings (linked to the surge in prescription opioid use), suicides, obesity, and smoking related diseases [2].
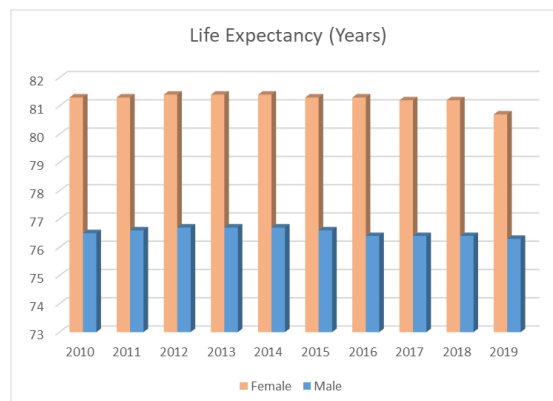

Figure 3: Life Expectancy of Male and Female

In US, over the years, women have longer life expectancy than men. Women maintained life expectancy of about 81 years from 2010 to 2018. In 2019, this ratio dropped to about 80.5 years. Among the men, life expectancy range between 76 years and less than 77 years all through the years (2010 and 2019). In 2019, life expectancy of men was the least (76.2 years).

3.3. Health Disparities: Ethnicity

Race and ethnicity, socially constructed identities, have profound effects on individuals' lives and health outcomes. Understanding their social construction is crucial as it shapes definitions and societal attitudes. Racial and ethnic disparities persist in the U.S., affecting health outcomes. Some minority groups, like Hispanic immigrants, experience better health initially, but disparities often grow over time. While progress has been made in narrowing gaps, disparities persist, notably in infant mortality, obesity, and chronic diseases. African Americans face higher risks of

premature death from heart disease and stroke. Solutions for health equity must consider the evolving demographics and address persistent disparities.

Race and ethnicity, socially constructed identities, significantly impact individuals' lives and are shaped by societal perceptions, historical policies, and practices. Acknowledging this social construction is vital, as it influences how race is measured and evolved over time. The concept of race is intricate, with a rich history of scientific and philosophical debate [8]. Despite progress in improving healthcare in the U.S., racial and ethnic disparities remain persistent, making them crucial factors in addressing health inequities [13]. The criteria for classifying race and ethnicity, as well as attitudes toward them, have evolved significantly in the early 21st century. In 2014, 37.9 percent of the population were racial or ethnic minorities, projected to become the majority within 30 years, emphasizing the importance of considering evolving demographics in health equity solutions [3].
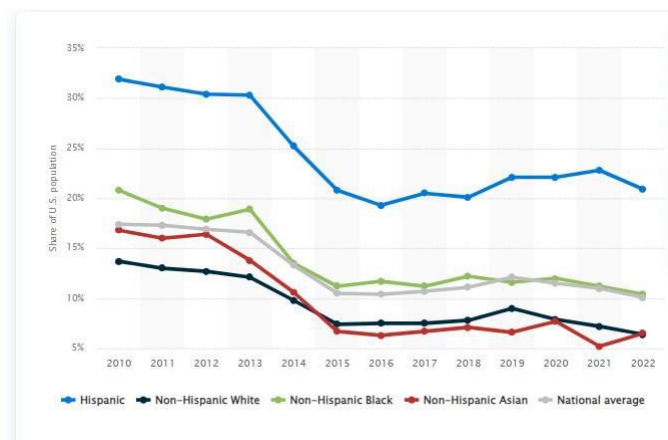
Source: [14]
Figure 4: Percentage of people without health insurance in the United States from 2010 to 2022, by ethnicity.

The graph above shows that throughout the period (2010 and 2022), the majority of individuals of Hispanic race do not have health insurance. In 2013, more than about 30% of the Hispanic race did not have health insurance, this figure further dropped to 20% in 2018, and from 2018 to 2021, the proportion increased to close to 25% while it declines to over 20% in 2022.

Over the years, the proportion of non-Hispanic Asians without health insurance was on continuous decline until 2019 when the ethnic division have least percentage of people without insurance which stood at about 6%. As of 2022, Asian ethnic have the least proportion who are not without health insurance.

Over the years, less than 15% of Non-Hispanic White are without health insurance. The proportion was on continuous decline from about 14% in 2022 to about 6% in 2022.
In 2022, the absence of health insurance affected around 21 percent of the Hispanic population in the United States, marking an increase from the previous low of 19.3 percent observed in 2016. In the same year, the national average for uninsured individuals stood at 10.1 percent. White Americans exhibited a lower-than-average rate of only 6.5 percent lacking health insurance coverage, while 10.4 percent of Black Americans were without health insurance.
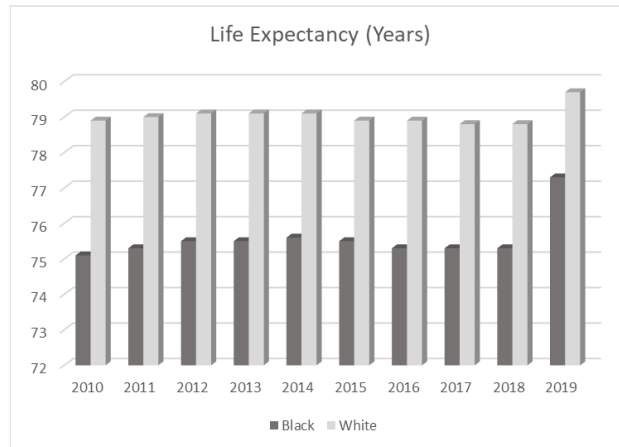
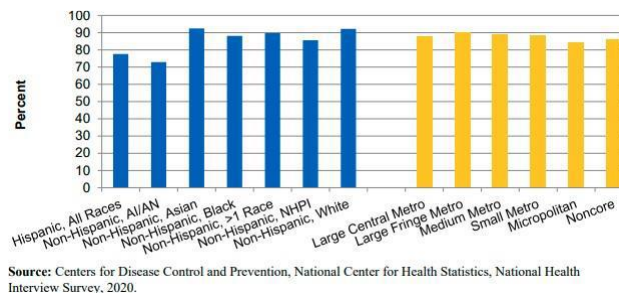Figure 5: Life Expectancy of Black and White Persons in US

Source: Centers for Disease Control and Prevention, National Center for Health Statistics, National Health Interview Survey, 2020.

Figure 6: People with any health insurance, by race, ethnicity, and location of residence, 2020

4. RESULT AND DISCUSSION

Across various racial and ethnic groups, we can observe differences in the likelihood of having health insurance. Non-Hispanic Asian groups had the highest percentage of individuals with any health insurance coverage at 92.4%, followed closely by non-Hispanic White individuals at 92.2%. Non-Hispanic Multiracial individuals also had relatively high insurance coverage at 89.7%, while non-Hispanic Black individuals had an insurance coverage rate of 88.1%. Non-Hispanic NHPI (Native Hawaiian/Pacific Islander) individuals had an insurance coverage rate of 85.6%, and Hispanic individuals had a slightly lower rate at 77.6%. Non-Hispanic AI/AN (American Indian/Alaska Native) groups had the lowest insurance coverage rate among these groups, with only 72.9% having any health insurance coverage (as shown in Figure 11).

When we consider the location of residence, we find that people living in large fringe metro counties, often referred to as "suburbs," had the highest likelihood of having any health insurance, with a coverage rate of 90.1%. This was followed by individuals in medium metro areas at 89.3%, small metro areas at 88.5%, large central metro areas, often referred to as "cities," at 88.0%, noncore counties, which are typically rural areas, at 85.9%, and micropolitan areas, known as "small towns," at 84.5%. These variations in health insurance coverage rates based on both racial and ethnic backgrounds and geographic locations highlight disparities in access to healthcare resources and insurance across different population groups and regions.

Key: AI/AN = American Indian or Alaska Native; NHPI = Native Hawaiian/Pacific Islander.
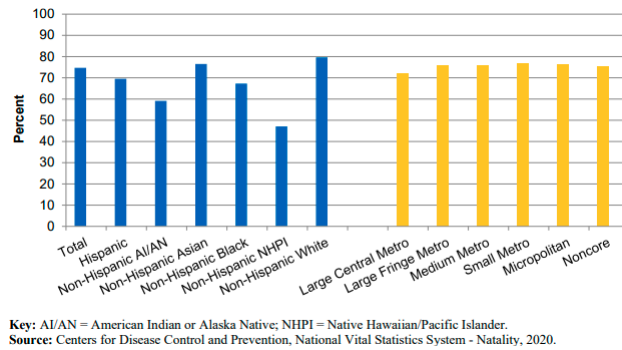**Source:** Centers for Disease Control and Prevention, National Vital Statistics System - Natality, 2020.

Figure 7: Individuals with a live birth in the last 12 months who received early and at least adequate prenatal care, by race/ethnicity and geographic location, 2020.

In 2020, there were significant disparities in the percentage of individuals who had given birth within the last 12 months and received early and adequate prenatal care, and these disparities were particularly pronounced when considering racial and ethnic differences (as illustrated in Figure 7). Additionally, there were variations in prenatal care by geographic location, but these differences were comparatively smaller. The disparities based on race and ethnicity showed a relative difference of 41% between the groups with the highest and lowest percentages, whereas the differences based on geographic location had a relative difference of 6% between the groups with the highest and lowest percentages.

Specifically, in 2020, the percentage of individuals who had a live birth in the last 12 months and received early and adequate prenatal care was lower for several racial and ethnic groups compared to non-Hispanic White individuals. Hispanic individuals had a rate of 69.5%, non-Hispanic AI/AN (American Indian/Alaska Native) individuals had a rate of 59.1%, non-Hispanic Asian individuals had a rate of 76.5%, non-Hispanic Black individuals had a rate of 67.3%, and non-Hispanic Native Hawaiian/Pacific Islander individuals had the lowest rate at 47.1%. In contrast, non-Hispanic White individuals had a higher rate of 79.6%.

Furthermore, in 2020, individuals in large central metro areas had a lower percentage of receiving early and adequate prenatal care (71.9%) compared to individuals in large fringe metro areas, which are often suburbs, with a higher rate of 75.9%. This indicates that while there were disparities in prenatal care by geographic location, these differences were relatively minor compared to the significant disparities observed across racial and ethnic groups.

Key: AI/AN = American Indian or Alaska Native; NHPI = Native Hawaiian/Pacific Islander.
Source: Centers for Disease Control and Prevention, National Vital Statistics System - Natality, 2020.
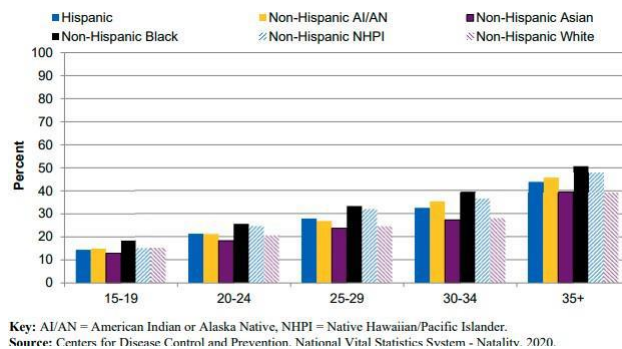
Figure 8: Cesarean deliveries of low-risk births among individuals giving birth for the first time, by age and race/ethnicity, 2020 (lower rates are better)

In 2020, for first-time births among all age groups, the proportion of cesarean deliveries in low-risk situations was higher among non-Hispanic Black individuals compared to non-Hispanic White individuals (as depicted in Figure 8). Furthermore, this disparity between non-Hispanic Black and non-Hispanic White individuals was more pronounced in older age groups. Specifically, the relative difference in cesarean delivery rates between these groups was 22% for individuals aged 15-19 years, 41% for individuals aged 30-34 years, and 30% for individuals aged 35 years and older.

In 2020, across all racial and ethnic groups, the percentage of cesarean deliveries in low-risk births was lower among individuals aged 15-19 years than among those aged 20-24 years. However, within all racial and ethnic groups, this percentage increased in individuals aged 25-29 years, 30- 34 years, and 35 years and older compared to those aged 20-24 years.

Additionally, in 2020, the percentage of cesarean deliveries in low-risk births for first-time mothers was lower in various geographic areas, including large central metro areas (26.2%), medium metro areas (25.6%), small metro areas (24.5%), micropolitan areas (25.0%), and noncore areas (25.5%), when compared to individuals in large fringe metro areas (26.6%).

In summary, the data from 2020 shows disparities in cesarean delivery rates for low-risk births, with differences based on age, race/ethnicity, and geographic location. Notably, cesarean delivery rates were higher for non- Hispanic Black individuals, particularly in older age groups, and lower for teenagers across all racial and ethnic groups. Moreover, cesarean delivery rates varied by geographic location, with large fringe metro areas having slightly higher rates.

Key: API = Asian or Pacific Islander.
Source: Agency for Healthcare Research and Quality, Healthcare Cost and Utilization Project (HCUP), State Inpatient Databases weighted to provide national estimates, 2016-2019.
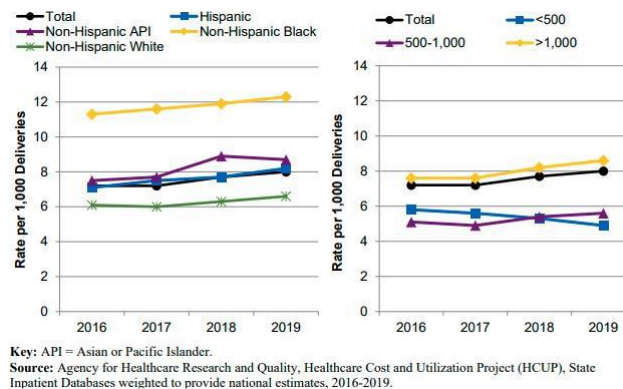
Figure 9: Severe maternal morbidity per 1,000 deliveries, by race/ethnicity (left) and hospital delivery volume (right), 2016-2019 (lower rates are better)

In 2019, the incidence of severe maternal morbidity during deliveries was significantly higher among non-Hispanic Black individuals compared to non-Hispanic White individuals, with a 87% increase (as illustrated in the Figure 9, left).

Furthermore, in 2019, the rate of severe maternal morbidity during deliveries was higher for Hispanic individuals (8.2 per 1,000 deliveries), non-Hispanic Asian and Pacific Islander (API) individuals (8.7 per 1,000 deliveries), and non-Hispanic Black individuals (12.3 per 1,000 deliveries) when compared to non-Hispanic White individuals (6.6 per 1,000 deliveries).

Over the span of three years, from 2016 to 2019, there was an increase in the rate of severe maternal morbidity during deliveries for Hispanic individuals (from 7.1 per 1,000 deliveries to

8.2 per 1,000 deliveries) and non-Hispanic Black individuals (from 11.3 per 1,000 deliveries to 12.3 per 1,000 deliveries).

Moreover, in 2019, the rate of severe maternal morbidity during deliveries was lower in hospitals with fewer than 500 deliveries (4.9 per 1,000 deliveries) and 500 to 1,000 deliveries (5.6 per 1,000 deliveries) compared to hospitals with more than 1,000 deliveries (8.6 per 1,000 deliveries) (as shown in the right image).

Over the same three-year period (2016 to 2019), the rate of severe maternal morbidity during deliveries increased for hospitals with more than 1,000 deliveries (from 7.6 per 1,000 deliveries to 8.6 per 1,000 deliveries).

Lastly, in 2019, the rate of severe maternal morbidity during deliveries was higher for individuals from large central metro areas (9.8 per 1,000 deliveries) when compared to large fringe metro areas (7.2 per 1,000 deliveries). Conversely, the rate of severe maternal morbidity during deliveries was lower for individuals from small metro areas (6.0 per 1,000 deliveries), micropolitan areas (5.2 per 1,000 deliveries), and noncore areas (5.1 per 1,000 deliveries) in comparison to large fringe metro areas (7.2 per 1,000 deliveries).

In summary, the data from 2019 reveals significant disparities in severe maternal morbidity rates during deliveries based on race/ethnicity, hospital size, and geographic location. Notably, non-Hispanic Black individuals experienced higher rates of severe maternal morbidity, and larger hospitals and central metro areas exhibited higher rates as well.

5. CONCLUSION AND RECOMMENDATIONS

In conclusion, health disparities in the United States represent significant inequalities in health outcomes that primarily affect socially disadvantaged groups. The existence of these disparities can be ascribed to an intricate interaction of elements like race, ethnicity, socioeconomic status, gender, age, geographic location, and other traits linked to discrimination or marginalization. They result in systematic and often preventable health differences, particularly relevant to social justice in healthcare. Health disparities exhibit non-uniform patterns, manifesting across different dimensions such as race, ethnicity, gender, socioeconomic status, and geography. These discrepancies may impact access to healthcare, quality of care, and health outcomes. Racial and ethnic disparities are significant, with non-Hispanic Black individuals and Hispanic individuals often experiencing poorer health outcomes compared to non-Hispanic White individuals. These disparities extend to factors like insurance coverage, prenatal care, and maternal morbidity. Gender disparities exist, with women experiencing differential health outcomes compared to men. While some disparities are rooted in biological differences, many are influenced by socioeconomic conditions and behaviors. Ethnicity-based disparities in health insurance coverage reveal that Hispanic populations have historically faced challenges in accessing health insurance, although the situation has improved over time.

Life expectancy disparities exist between racial groups, with non-Hispanic White individuals generally having longer life expectancies compared to non-Hispanic Black individuals.

Prenatal care disparities were observed based on race and ethnicity, highlighting the need for targeted efforts to ensure equitable access to care for expectant mothers. Cesarean delivery disparities were noted, particularly among non-Hispanic Black individuals, with variations by age and geographic location. Severe maternal morbidity disparities were also observed, with higher rates among non-Hispanic Black individuals and in larger hospitals and central metro areas.

These disparities in healthcare reflect broader systemic issues within the healthcare system, including quality of care and access to services. Addressing health disparities requires a multi-faceted approach that considers social determinants of health, healthcare access, cultural competence, and equitable healthcare policies.

Health disparities encompass differences in health outcomes among specific population groups in the United States, quantified by various factors such as disease rates, mortality, and disease burden. These disparities are not limited to race and ethnicity but extend to gender, age, disability status, socioeconomic factors, and geographic location. Achieving health equity involves addressing these disparities, which often stem from avoidable and unjust systemic differences in health.

Factors contributing to disparities are multifaceted, including demographics, income disparities, environmental conditions, health behaviors, access to care, and quality of care. Eliminating healthcare disparities requires equitable access to healthcare services and high-quality care. Recognizing the evolving demographics and persisting disparities is crucial for developing effective solutions. The data also highlights differences in health insurance coverage among ethnic groups, emphasizing the need for policies to ensure healthcare access for all.

To eliminate disparities and improve health services, it is necessary to improve data collection methods and monitoring systems to track health disparities across various dimensions, including race, ethnicity, gender, age, disability status, socioeconomic status, and geographic location. Regularly updated and accurate data are essential for identifying disparities and evaluating interventions.

It is also necessary to ensure equitable access to healthcare services for all population groups, irrespective of their demographic characteristics. This includes improving access to affordable health insurance, primary care, and specialty services in underserved communities.

Strategies should be introduced and implemented to enhance the quality of healthcare services, particularly in areas where disparities are prevalent. Encourage healthcare providers to follow evidence-based guidelines and practices that prioritize patient outcomes.

The health ministry should support community-based initiatives that address the social determinants of health, such as housing, employment, and education. These programs can help reduce disparities by improving overall living conditions. Government should also implement policies and programs aimed at reducing income and educational disparities. This includes increasing the minimum wage, expanding access to affordable education, and creating job opportunities in disadvantaged communities.

It is recommended that healthcare providers should be encouraged to offer culturally competent care that respects the diverse backgrounds and beliefs of patients. This includes language access services and culturally sensitive healthcare practices.

The health ministry should invest in research to better understand the root causes of health disparities and evaluate the effectiveness of interventions. Evidence-based approaches should inform policymaking and resource allocation.

There should be policy reforms at the federal, state, and local levels that aim to eliminate health disparities. These reforms may include strengthening anti-discrimination laws, expanding Medicaid, and increasing funding for public health initiatives. Collaboration among healthcare organizations, community groups, government agencies, and advocacy organizations should be

fostered to address health disparities collectively. These partnerships can leverage resources and expertise to implement effective interventions.

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AUTHORS

Babatunde Y. Yusuf, driven by an enduring passion for data analysis, graduated with a bachelor's degree in computer science from the University of Ibadan. Presently pursuing a Master of Science (MSc.) degree in Computer Science and Quantitative Methods at Austin Peay State University, whose focus lies in Predictive Analytics, covering skills like Python, R, and Machine Learning. Outside of this realm, he's been a loving husband since 2019 and takes pride in parenthood with his son, illustrating his commitment to both data and family.

Olalekan M. Durojaiye is a dedicated and results-driven professional with a passion for leveraging. data to drive informed business decisions. With a strong foundation in machine learning, artificial intelligence, and deep learning. He holds a Bachelor of Science (BSc.) degree in Statistics. and currently pursuing a Master of Science (MSc.) degree in Computer Science and Quantitative Methods. Olalekan delivers innovative solutions that optimize processes, enhance efficiency, and facilitate strategic planning.


Toyyibat T. Yussuph holds a bachelor's degree in management and accounting (Nigeria) and a master's degree in management information systems (USA). Her extensive experience in product development, data strategy, and financial and data analysis has enabled her to transform and automate several critical insights into fraud trends and risk mitigation strategies as a Product Development Manager with American Express. She has a passion for innovation and leveraging big data to solve Credit and Fraud risks within the Financial Service industry.

Austine O. Unuriode has a bachelor's degree in mathematics (Nigeria). He is currently pursuing a master's degree in computer science and quantitative methods, with a concentration in database management and analysis (USA). Austine has over 5 years of working experience as a data and business analyst. He has a keen interest in data analytics and data engineering, particularly in cloud computing.

Osariemen T. Afolabi has a bachelor's degree in economics and Statistics from her home country, Nigeria. She is a grad student in the Computer Science department of Austin Peay State University, Clarksville, Tennessee, USA with a concentration in Data Management and Analysis. Osariemen is goal-oriented with over 5 years' of experience ranging from consulting to manufacturing industries. She is experienced in analyzing and interpreting data to drive business growth and decision-making.
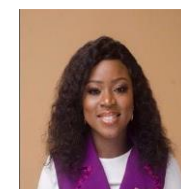
Mayowa Jesse Akinwande is a results-driven professional with a strong background in operations, IT, and data analysis. He holds a Bachelor of Science (BSc.) degree in Physics and Education, showcasing his commitment to both technical and educational pursuits. Currently, Mayowa is pursuing a Master of Science (MSc.) degree in Computer Science and Quantitative Methods, furthering his expertise in the ever-evolving field of technology and data analytics. Mayowa aims to leverage his data-driven skills and insights to drive positive change on a global scale. He is passionate about improving financial inclusion, operational excellence and using data-driven methodologies to deliver impactful projects worldwide.

Tobi Yusuf has a Bachelor's degree, Geography and Earth Sciences/Geosciences, He is pursuing a master's degree in computer science and quantitative methods, with a concentration predictive analytics, Tobi is a skilled Quantitative Analyst with expertise in Manufacturing, Six Sigma and Data science.