

Separate and Somewhat Equal: Racial Disparity in the Prescription of Peripheral
Nerve Block and Pharmacotherapy to Treat Postoperative Breast Cancer Pain

Nsenga Magnus Farrell

Submitted in partial fulfillment of the
requirements for the degree of Doctor of Education in
Teachers College, Columbia University

2022

© 2022
Nsenga Magnus Farrell
All Rights Reserved

Abstract

Separate and Somewhat Equal: Racial Disparity in the Prescription of Peripheral Nerve Block and Pharmacotherapy to Treat Postoperative Breast Cancer Pain

Nsenga Magnus Farrell

Existing research on health disparities in breast cancer is heavily focused on outcomes for poor or low-income women. Little is known about the experience of privately insured Black breast cancer patients that have moderate to high SES. As a result, the present study was conducted to learn more about their experiences. It examines differences in physician prescribing of two breast cancer pain treatments, peripheral nerve block (PNB) and opioids, for Black and White women with like levels of health insurance coverage and socioeconomic status (SES). Three specific questions are addressed: 1. What, if any, race-based disparities exist in usage of PNBs at time of total mastectomy? 2. What, if any, race based disparities exist in the prescription of opioids for postoperative pain following total mastectomy? 3. What, if any, changes have occurred in the frequency of orders placed for PNBs and prescription opioids over time, to treat postoperative pain resulting from mastectomy? A cross-sectional design was used relying on an existing national dataset, Optum Clinformatics Data Mart. The study period was January 1, 2012, through December 31, 2019. Study results revealed that while moderate to higher SES Black women have equitable access to PNB and opioids - a kind of shield from long established physician bias against Black women – this protection is quite porous. They still do not have open and ready access to PNB as a more advanced pain treatment. Nor do they have assurance that they are protected from the overprescribing of opioids, a class of drugs with serious and well-known safety risks. Therefore, on the surface, it appears that equity and racial inclusion are

hallmarks of physician prescribing of postoperative breast cancer pain treatment. However, further interrogation reveals that ‘separate and somewhat equal’ is a more accurate characterization of their prescribing practices, based both on race and SES.

Table of Contents

Preface.....	1
Chapter 1: INTRODUCTION.....	2
1.1 Study Background.....	2
1.2 Study Purpose	4
1.3 Aims, Research Questions, Hypotheses.....	4
1.4 Theoretical Framework.....	7
1.5 Significance of Study.....	10
1.6 Summary.....	11
Chapter 2: LITERATURE REVIEW.....	12
2.1 Introduction.....	12
2.2 A Growing Demographic of High SES Black Women	12
2.3 Health Insurance Coverage Among Black Women	13
2.4 Overlooked and Untreated: History of Black Pain in U.S. Helathcare System.....	16
2.5 Persistent Race Based Disparities in Breast Cancer Epidemiology	17
2.6 Acute and Chronic Pain are Serious Side Effects of Breast Cancer Treatment.....	24
2.7 Peripheral Nerve Block Usage is on the Rise.....	26
2.8 Black Breast Cancer Survivors Expereince Greater Untreated Pain	27
2.9 Prescription Opioids are Standard for Breast Cancer Pain Management	31
2.10 Black Breast Cancer Survivors are Least Likely to Receive Prescription Opioids	36
2.11 Summary.....	37

Chapter 3: RESEARCH METHODS.....	39
3.1 Research Design.....	39
3.2 Rationale for Utilizing Optum® Clinformatics™ Data Mart.....	42
3.3 Procedure	43
3.4 Data Management	43
3.5 Anticipated Limitations	45
3.6 Disclosure	46
3.7 Summary.....	46
Chapter 4: RESULTS	47
4.1 Sample Overview.....	47
4.2 Selected Social Determinants of Health	48
4.3 Racial Ethnic Disparity in Selected Social Determinants of Health	51
4.4 Sample Overview: Matched Data by Black and White Race	54
4.5 Aim 1: Racial Disparity in Treatment – Peripheral Nerve Block.....	56
4.6 Aim 2: Racial Disparity in Treatment – Prescription Opioids.....	57
4.7 Aim 3: Yearly Trends– Peripheral Nerve Block (PNB) and Prescription Opioids	59
4.8 Summary.....	65
Chapter 5: SUMMARY, DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS ...	66
5.1 Summary of the Statement of the Problem, Purpose, and Objectives	66
5.2 Summary of Study Questions	69
5.3 Summary of Study Methods	69
5.4 Summary of Study Results.....	69
5.5 Theory of Planned Behavior and Physician Prescribing.....	79

5.6 Limitations of Study	80
5.7 Implications.....	81
5.8 Conclusion	84
References.....	86

List of Tables

Table 1. Sample Overview – Demographic Characteristics	48
Table 2. Selected Social Determinants of Health	50
Table 3. Racial Disparity in Selected Social Determinants of Health	53
Table 4. Sample Overview – Matched Data by Black and White Race	55
Table 5. Racial Disparity in Treatment - PNB Administration	56
Table 6. Racial Disparity in Treatment – Prescription Opioids.....	58
Table 7. Binomial Regression Analysis.....	59

List of Figures

Figure 1. Factors Related to Variation of Prescription Opioids Utilization	8
Figure 2. Interplay of Beliefs/Norms Constructs with Behavioral Intention, TPB	9
Figure 3. Sample Overview – PNB Administration	60
Figure 4. Racial Disparity in Treatment Year Over Year – PNB Administration	61
Figure 5. Sample Overview – Prescription Opioids	62
Figure 6. Racial Disparity in Treatment Year Over Year – Prescription Opioids	63
Figure 7. Racial Disparity in Treatment Year Over Year – Opioids - Preoperative.....	64
Figure 8. Racial Disparity in Treatment Year Over Year – Opioids - Postoperative	65

PREFACE

“Black people, we don’t even get our hands on opioids.”

“They don’t even give them to us.”

“I had a double mastectomy; you know what they sent my black ass home with?”

“Ibuprofen. Ibu–fucking–profen.”

“White people get opioids like they’re Tic Tacs.”

“This shit is not normal.”

Wanda Sykes, Stand-up Comedian, Actress,
Writer; Multimillionaire

"Wanda Sykes, Not Normal", Netflix Comedy Special,
2019

Chapter 1

INTRODUCTION

1.1 STUDY BACKGROUND

Over the last two decades, peripheral nerve block usage (PNB) has gained increasing acceptance for treating postoperative pain, especially for women who undergo total mastectomy to treat breast cancer (Lam et. al, 2021). PNB is accomplished by injecting a local anesthetic near the nerve controlling sensation or movement to the area of the body requiring surgery. Benefits of PNB include improved post-operative pain management and reduced risk of fatigue and vomiting. Also, patients require less pain medication during recovery when PNB is used during surgery.

Although PNB is increasingly used during total mastectomy, little is known about racial disparities in its utilization nationwide. A recent retrospective cohort study addressed this need gap with National Surgical Quality Improvement Program (NSQIP) data for multiple racially minoritized groups (Mazzeffi et. al., 2022). While this study advanced the canon of knowledge on racial disparities in PNB usage, there is still great opportunity for additional scholarship including studies on PNB use among Black women that have undergone total mastectomy.

Regarding pharmacotherapy or the use of medication, the World Health Organization (WHO) suggests a “by the ladder” framework for managing pain where analgesics are used in mounting order (Anekar et. al., 2022). These recommendations are especially timely considering the ongoing national opioid epidemic, characterized by widespread overuse of prescription pain medications such as oxycodone. In Stage 1 of the WHO scheme, non-opioids like paracetamol, ibuprofen, or acetylsalicylic acid (aspirin) are introduced for mild to moderate pain. If symptoms are not controlled, Stage 2 follows with less potent opioids like codeine and tramadol, which are

for moderate to severe pain. Continuing to Stage 3, when severe to very severe pain is present, stronger opioids like morphine or oxycodone are prioritized if pain control is not realized with weaker opioids. (Anekar et. al., 2022)

Surprisingly, most opioids used in the treatment of cancer today were developed more than 100 years ago and less toxic options are not yet available (Arthur & Bruera, 2019). Even with broadly distributed guideline-conformant pharmacological pain management, only 40 to 60% of patients will reach 30% pain reduction. For these reasons, there is strong need for research into safer and more effective pharmacotherapy approaches overall.

Unfortunately, Black women frequently report negative experiences and dissatisfaction with their physicians related to pain management which may correlate to their receiving less prescriptions for opioids (Samuel et al. 2015). For example, their perceptions of clinician disregard when “symptoms were not treated or were attributed to non-treatment causes” or ignored outright (p.1433). Also, Black women symptom concerns “were not validated (e.g., lack of concern/empathy) by their care team” (p.1434) and “clinicians fail[ed] to diagnose specific symptoms (especially pain)” due to lack of knowledge (p.1434). Additionally, having to “advocate for themselves to get clinicians to explain, diagnose, and manage” their pain symptoms (p.1435). For Black women, challenging physician/patient relationships contributed to “inequities in the delivery of symptom management services” in the postoperative setting and adversely affected outcomes (Samuel et al. 2015, p. 1436). There is strong need for more rigorous research to understand and improve Black women’s physician/patient relationships.

1.2 STUDY PURPOSE

Racial and ethnic disparities in healthcare is a topic that is very much in vogue, attracting local, state, and federal attention, and increasing interest from the public. Specific disparities in

pain care are not widely known or discussed. Nor is Black pain deeply or continuously excavated as a singular topic. Even less examined are disparities in pain diagnosis and treatment among Black women breast cancer survivors that have commercial insurance coverage. As a result, the purpose of this study is twofold. First, it will uncover the extent to which commercially insured Black women experience clinical care that is equitable - at and beyond the time of mastectomy for breast cancer treatment. Mastectomy is defined as a surgical operation to remove a breast, which can be done unilaterally or only for one breast. Or, bilaterally for both breasts, otherwise known as total mastectomy. Secondly, the study will reveal how trends pertaining to their clinical care have shifted over time, recognizing that poor pain symptom management is correlated to quality of life.

1.3 AIMS, RESEARCH QUESTIONS, HYPOTHESES

To address the knowledge gaps detailed in the previous section, a retrospective cohort study is planned with the following aims:

Aim 1. To examine racial-ethnic disparity in the use of PNBs.

Research Question 1. What, if any, race-based disparities exist in usage of PNBs at time of total mastectomy?

Null hypothesis: No significant difference exists in usage of PNBs between Black women and White women.

Alternative Hypothesis: Black women will be less likely to receive PNBs for postoperative pain, compared to White patients.

Aim 2. To evaluate racial-ethnic disparity in the rate of opioid prescriptions written.

Research Question 2. What, if any, race based disparities exist in the prescription of opioids for postoperative pain following total mastectomy?

Null hypothesis: No significant difference exists in prescription of opioids between Black and White women.

Alternative Hypothesis: Black women will receive opioid prescriptions less frequently for postoperative pain, compared to White women.

Aim 3. To understand changes over time in the frequency of orders placed for PNBs and prescription opioids.

Research Question 3. What, if any, changes have occurred in the frequency of orders placed for PNBs and prescription opioids over time, to treat postoperative pain resulting from mastectomy?

No prior hypothesis.

As breast cancer survivorship is frequently characterized by pain that can affect daily quality of life, there is urgent need to advance approaches that eradicate this burden effectively and safely. Pharmacotherapy, specifically, prescription opioids, is standard of care but risky given the propensity of overuse, as highlighted by the ongoing opioid epidemic. Strong need exists to adapt more advanced approaches to address persistent pain experienced by Black women, who continue to bear the greatest burden and worse breast cancer outcomes.

Data will be obtained from the Optum® Clinformatics™ Data Mart database, a large private payer administrative claims database. It consists of inpatient, outpatient, laboratory, and pharmacy claims. Demographic and socioeconomic data are also captured, including median household income, which is accessed through zip code–linked enrollment data from the US Census Bureau.

Notably, in years leading up to 2014, the odds of a patient receiving PNB at time of mastectomy was not significantly different from year to year. However, “after 2014, the odds of PNB increased by 2.24-fold each year” (Lam et. al., 2021, pg. 1000). As a result, the time frame

selected for the study is January 1, 2012 through December 30, 2019, just prior to the start of the COVID-19 pandemic. The cohort will be comprised of adult women diagnosed with breast cancer that also underwent mastectomy. Procedures will be identified in the existing database using relevant ICD-9 and ICD-10 CM diagnoses and procedure codes.

ICD Codes

The International Classification of Diseases (ICD) is a tool that assigns codes—a kind of medical shorthand—for diseases, signs and symptoms, abnormal findings, circumstances, and external causes of diseases or injury. Insurance companies utilize these codes widely and expect them to be consistent between a condition and the treatment rendered. This study included ICD-9-CM and ICD-10-CM diagnosis and procedure codes.

Case Definition

Hospital discharge and ambulatory surgery visit records with mastectomy procedures were defined based on all listed procedure codes as identified using the ICD-9-CM and ICD-10-CM procedure codes.

Diagnoses

The principal diagnosis is that condition established to be chiefly responsible for the patient's admission to the hospital. Secondary diagnoses are concomitant conditions that coexist at the time of admission or develop during the stay. All listed diagnoses include principal diagnosis plus any additional secondary conditions.

Procedures (Treatment Variables)

All listed procedures include procedures performed during the hospital stay, whether for definitive treatment or for diagnostic or exploratory purposes. The first-listed procedure, the one which the study will focus on, is the procedure that is listed first on the discharge record.

Inpatient data define this as the “principal procedure”—the procedure that is performed for definitive treatment rather than for diagnostic or exploratory purposes (i.e., the procedure that was necessary to take care of a complication). Procedures on inpatient hospitalization records were coded using the ICD-9-CM (procedures performed prior to 2015) and ICD-9-CM (procedures performed after 2015); procedures on ambulatory surgery and services records were coded using ICD-9-CM and ICD-10-C. ICD-9-CM and ICD-10-C assigns numeric codes to diagnoses and procedures. There are approximately 14,000 ICD-9-CM diagnosis codes and 4,000 ICD-9-CM procedure codes.

1.4 THEORETICAL FRAMEWORK

This research study is anchored in a theoretical framework that recognizes the interplay between social determinants of health, a patient’s experience of pain, and physician prescribing behavior (Chen et. al., 2019). For example, the framework explains study findings that unemployment and under employment is linked to higher rates of opioid use as is female gender. Further association between higher opioid use and certain patient characteristics - current smokers, obesity, depression – were also found. Figure 1.

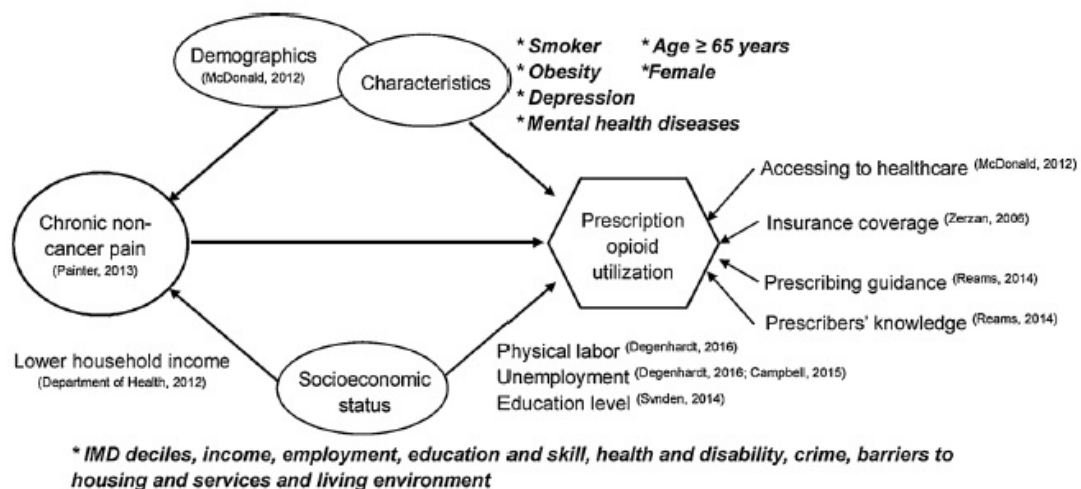


Figure 1. Factors Related to Variation of Prescription Opioids Utilization

This framework also infuses tenets from the Theory of Planned Behavior (Ajzen, 2006), which is a widely used model in public health research. It contends that individual behavior is anchored in two considerations. First, one's motivation or intention, and second, one's sense of agency, or ability to control. TPB is frequently used in research that attempts to understand relationships between intention and behavior which is core to the purpose of the present study. It consists of six constructs. Figure 2.

1. Attitudes – positive or negative estimation of the behavior of interest; involves some consideration of behavior outcome.
2. Behavioral intention – one's motivation to perform the behavior of interest; the stronger the motivation, more likely the behavior will be performed.
3. Subjective norms – applies to perceptions of how the behavior of interest will be perceived by peers and people of importance, whether they will approve or disapprove and how this impacts the decision to perform.
4. Social norms – refers to standard accepted codes of behavior within a group or broader culture.
5. Perceived power – consideration of factors that might start or stop performance of the behavior of interest; addresses a person's perceived behavioral control over barriers and drivers.
6. Perceived behavioral control – applies to the ease or difficulty of performing the behavior of interest which shifts across varying situations. The result is one's perception of behavioral control is highly circumstantial.

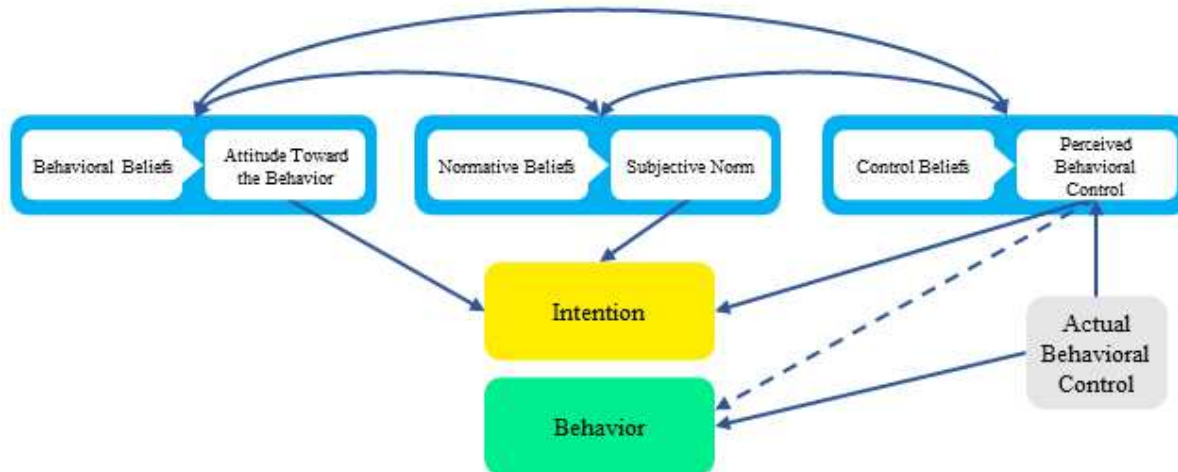


Figure 2. Interplay of Beliefs and Norms Constructs with Behavioral Intention, Theory of Planned Behavior (Ajzen, 2006)

Within this theoretical framework, special emphasis is placed on patient experience within the social context. For example, social norms and perceptions vary based on personal and professional beliefs within an oncology specialty. Sociocultural beliefs and attitudes about Black people and Black women (ideas about pain tolerance, predisposition to disease and worse outcomes, lack of value in society etc.) may also impact a physician’s choice to proactively treat breast cancer related pain. Alternately, where other racial ethnic groups are concerned, social influence including “patient demands for drugs, patient expectations, pharmacist expert power and pharmacist-physician collaboration may influence physician decision-making” (Murshid et al., 2017, p. 12).

1.5 SIGNIFICANCE OF STUDY

Disparities in health have been a central focus of Healthy People goals over the last two decades. (Healthy People, 2010). In Healthy People 2010, the mission was to eliminate, not just reduce, health disparities. In Healthy People 2020, that goal was significantly expanded with health disparity characterized as “a particular type of health difference that is closely linked with

social, economic, and/or environmental disadvantage. Health disparities adversely affect groups of people who have systematically experienced greater obstacles to health based on their racial or ethnic group; religion; socioeconomic status; gender; age; mental health; cognitive, sensory, or physical disability; sexual orientation or gender identity; geographic location; or other characteristics historically linked to discrimination or exclusion.” (U.S. Department of Health and Human Services. The Secretary’s Advisory Committee on National Health Promotion and Disease Prevention Objectives for 2020)

Over the years, efforts to eliminate disparities and achieve health equity have focused primarily on diseases or illnesses and on health care services. However, the absence of disease does not automatically equate to good health, and this singular insight is instructive for the study. For example, the significance of breast cancer survivors experiencing preventable acute and chronic pain, which does not represent good health, even after the removal of malignant breast tissue and structures.

Black women may survive breast cancer and experience greater quantity of life, yet they endure lower quality of life if they experience acute or chronic pain because of surgery. Therefore, effective symptom management is about improving quality of life. This study endeavors to shed light on the importance of all breast cancer survivors having an equitable opportunity for symptom free survivorship.

Complex multi-layered relationships continue to exist between socioeconomic status, the built environment, discrimination, systemic racism, literacy, and legislative actions. These factors, which influence an individual’s or population’s health, are known as the social determinants of health. Additional influences on health include access to culturally sensitive health care providers and quality health insurance which are central considerations in the study.

Race-based differences in breast cancer treatment and survival is a long-established problem. Research that further clarifies and documents these patterns is critical for meaningfully understanding and shifting this deleterious practice. In addition, very few studies have examined whether there is racial disparity in the use of PNBs for patients having total mastectomy. None have focused on higher SES women that match in their access to commercial insurance. This study will meaningfully grow the knowledge base on this subject.

1.6. SUMMARY

This initial chapter provided an introduction and rationale for the study including an overview of purpose, aims, research inquiries and hypotheses, theoretical underpinning, and significance.

Chapter 2

LITERATURE REVIEW

2.1 INTRODUCTION

This chapter provides an in-depth review and critique of the literature. It includes a current demographic profile of Black women in the U.S., their health insurance coverage, and growing socioeconomic status; existing research on racial disparities in breast cancer diagnosis, treatment, and outcomes, and clinical recognition and treatment of pain including opioid usage. It concludes with a section on peripheral nerve block as an advanced method for addressing postoperative pain stemming from breast cancer surgery.

2.2 A GROWING NUMBER OF HIGH SES BLACK WOMEN

In 1619 a group of enslaved West African women exited the hold of the White Lion slave ship (Jones, 2021) and entered the hold of U.S. history as foremothers to the vast majority of 21.7 million Black women living in the U.S. today (U.S. Census Bureau, 2020). A rising number of these women were born in African and Caribbean countries and comprise approximately half of the 4.6 million foreign born Black people that reside in the U.S., a striking 90% increase from 2000. In 2020, the Black or African American alone population (41.1 million) accounted for 12.4% of all people living in the United States, compared with 38.9 million and 12.6% in 2010.

It is estimated that Black women will grow from 12.9 to 15.2 percent of all women (U.S. Census Bureau, 2020). In addition to closing the racial high school completion gap, Black women earned 11.4% of all bachelor's degrees received by U.S. citizen women and permanent residents in 2020 (National Center of Education Statistics, 2020). In the prior decade they enrolled in college at a higher percentage than any other racial group, and secured degrees at a high rate, specifically, 68% of associate degrees, 66% percent of bachelor's degrees, 71% of

master's degrees, and 65% of doctorate degrees awarded to all Black students. Of all degrees in business earned by women, the percentage of those earned by Black women in 2020 is 11.5% (National Center of Education Statistics, 2020). Overall, the number of Black women in the labor force is expected to grow by 10.2% from 2020 to 2030. Historically, they are well-represented with fully 60% participating a decade ago and 14.2% participating in higher income fields currently (U.S. Bureau of Labor Statistics, 2021). These fields are management, business, and financial operations. Notably, Black women hold 4.4% of management roles, the largest share across all other ethnic minority women (McKinsey and Company, 2021).

These figures indicate that a growing number of Black women already have or are well poised to attain moderate to high SES, characterized as “encompassing not just income but also educational attainment, financial security, and subjective perceptions of social status and social class. Socioeconomic status can also encompass quality of life attributes as well as the opportunities and privileges afforded to people within society.” Furthermore, SES predicts various outcomes across the life span, including physical and psychological health (American Psychological Association, 2007).

2.3. HEALTH INSURANCE COVERAGE AMONG BLACK WOMEN

Universal access to health care, without discrimination, is a human right according to the Universal Declaration of Human Rights, however, there is no single nationwide system of health insurance in the United States (De Lew et al., 1992). Rather, employers are relied upon to provide health insurance coverage. Federal, state, and local programs prioritize the elderly, the disabled, and some poor members of society. These programs vary in benefits covered, financing, and payment schemes to medical care providers. There is little coordination between

private and public programs as public and private insurance may be used at the same time for some individuals, while others have no coverage at all (De Lew et al., 1992).

Black people are less likely to have health insurance compared to Caucasians and the higher uninsured rate largely reflects more limited rates of private coverage (KFF, 2021). Government programs may narrow the gap in private coverage for people of color, but “do not fully offset the difference, leaving them more likely to be uninsured”. Gaps in health coverage were larger among nonelderly adults compared to children, reflecting broader opportunities to opt in through Medicaid and CHIP for children compared to adults, even among states that have implemented the ACA Medicaid expansion. In addition, recent economic decline associated with the COVID-19 pandemic has adversely impacted people of color and their ability to obtain and secure health insurance. Specifically, Blacks have experienced greater job and income loss during the pandemic and subsequently grapple with disruptions in their health coverage since most people get their insurance through an employer (KFF, 2021).

The latest available data for Black women aged 18-64 is less bleak with the vast majority (86%) having health insurance coverage, even as Caucasian women were insured at a rate of over 90% for the same period (National Partnership for Women and Families, 2019). Not surprisingly, the highest coverage rates (90%) were found in the oldest and youngest Black women who are more frequently supported by government programs. Meanwhile “Black women of reproductive age (15-44) have slightly lower coverage at a rate of 86%” (pg.2). Black women also enroll in health insurance in varying ways, with just over half of them securing coverage through their employers and 12% purchasing on the individual market primarily through the Affordable Care Act. Predictably, Black women that earn the lowest incomes are less likely to have insurance compared to Caucasian women with low incomes. Notably, 21 percent of Black

women earning below \$25,000 annually “do not have the financial security of knowing she will be covered” for an illness, compared to 16% of Caucasian women” (National Partnership for Women and Families, 2019, pg. 2).

Low or no health insurance coverage is a major driver of racial disparities in breast cancer diagnosis and mortality (Ko et al., 2020). Black women are diagnosed with breast cancer at more advanced stages and have higher morbidity and mortality from the disease as a result. Earlier access to quality health care with “adequate insurance may be associated with earlier diagnosis, expedited treatment, and improved prognosis” (pg.2). The study explored correlations to insurance access with judicious breast cancer diagnosis and differences among a large national sample. This study’s findings showed a clear link between health insurance coverage and racial disparities in later stage breast cancer diagnosis. Specifically, 89% of White women were insured at the time of diagnosis compared with 74% of black women, and nearly half of those diagnosed with late-stage breast cancer were uninsured or on Medicaid (Ko et al., 2020).

While these findings meaningfully advance knowledge on health disparities in insurance coverage and breast cancer diagnosis - specifically outcomes for poor or low-income women - less is known about outcomes for commercially insured Black breast cancer survivors, who typically have moderate to higher SES. Much of the existing literature focuses on problems related to poverty, primarily, lack of access to care. Less is known about qualitative differences in breast cancer treatment and outcomes between racial and ethnic groups that have equal or comparable access to health insurance. Even less is known about disparities among women with similar or identical private insurance coverage, the possibly discordant care received depending on what kind of plan individuals are subscribed to. Overall, the literature focuses on equality,

rather than equity of care. For Black and other minoritized populations, equity is primarily a function of baseline access to treatment, just one dimension of health care.

2.4 OVERLOOKED AND UNTREATED: A HISTORY OF BLACK PAIN IN THE U.S. HEALTHCARE SYSTEM

Almost two centuries after the first group of captive African women disembarked the White Lion slave ship in Point Comfort, Virginia, their enslaved daughters, and granddaughters endured grotesque mutilation and intense pain when numerous experimental gynecological surgeries were performed without their consent and without anesthesia (Wall, 2020). Sims developed the first surgical intervention to consistently cure vesico-vaginal fistula, a widespread 19th century complication that leads to much longer and difficult childbirth labor due to obstruction of the vaginal canal. He improved his technique by operating on enslaved women with fistulas between 1846 and 1849. Ethical issues such as lack of informed consent and failure to use anesthesia are significant, as well as “the appalling nature of the injuries these women had received, the suffering their condition caused them, the lack of any effective standard-of-care” treatment for fistulas at that time. Dr. Sims perfected his technique on black women without pain medication and then offered it to White women with anesthesia (Wall, 2020).

The practice of under-prescribing pain medication to Blacks starts as early as residency and is ideologically considered during medical school (Hoffman et al., 2016). The authors found that a significant number of Caucasian medical students and residents hold false beliefs about biological differences among Black people, and these beliefs drive faulty perceptions of pain tolerance. Deeply concerning is the secondary finding that residents and medical students demonstrate racial bias in the accuracy of their pain treatment recommendations. Specifically, participants who endorsed more racist beliefs reported that a Black patient would feel less pain

than a Caucasian one, and as a result, they were less accurate in their treatment recommendations (Hoffman et al., 2016).

Healthcare providers that primarily serve Black cancer patients in clinic settings also dispense inadequate treatment of cancer-related pain (Cleeland et al., 1997). For example, among patients with metastatic or recurrent cancer, the study found that only 35% of racial/ethnic minority patients received suitable prescriptions compared to 50% of Caucasians. There are multiple causes for disparities in pain treatment, including “over-prescription of medications for Caucasian patients, under-prescription of medications for Black patients or both.” Under-prescription of pain medications is a tangible and unique problem for Black cancer patients, including women, that stem from two possibilities: physicians are aware of Black patients’ pain but do not to treat it or physicians do not recognize Black patients’ pain at all, and subsequently, cannot treat it (Cleeland et al., 1997).

2.5 PERSISTENT RACE-BASED DISPARITIES IN BREAST CANCER EPIDEMIOLOGY

It is encouraging that breast cancer death rates are steadily decreasing in women over 50, and not increasing among younger women, largely due to increased awareness, early screening and detection, and access to better treatments (Alkabban et al., 2020). However, breast cancer continues to be the most common cancer diagnosed in women, and the “second most common cause of death from cancer” among women in the world (p.1). Also, “breast cancer always evolves silently” with most patients encountering disease during regular screenings, or unexpectedly finding a breast lump, a change of breast shape or size, or fluid discharge (p.1). Tumors can spread “lymphatically or hematologically, leading to distant metastasis and poor prognosis” (Alkabban et al., 2020, p.1).

Among all U.S. racial ethnic groups, “Black women have the highest breast cancer incidence rate” under 40 years of age, making them the second highest group and most likely to die from the disease at any age (DeSantis et al., 2019, p. 442). Reviewing population-based incidence and prevalence. Findings reveal racial disparities with the largest gap found in young women, which decrease with age. Specifically, death rates for Black women are “1.9-2.6 times higher than for Whites” who are age 50 or younger (p.442). However, there is less variation in HER2-positive subtypes. The greater difference in young women may reflect the greater prevalence of high-grade tumors diagnosed in Black women. Specifically, “incidence rates for triple-negative breast cancers are about twice as high” in Blacks (p.442). Black women are more likely to die from breast cancer despite having a similar incidence rate to White women (DeSantis et al., 2019).

Factors that lead to higher breast cancer mortality rates among Black women include presenting with severe disease at diagnosis and having unequal access to advanced treatments (Carey et al. 2006). To identify “population-based distributions and clinical associations for breast cancer subtypes”, a control study of 496 women was undertaken in North Carolina (p.2492). Findings revealed that African American women were more likely to be pre-menopausal and have basal-like and other tumors with “high nuclear grade, high histologic grade, and high mitotic index”, which point to the least favorable histology including metaplastic, anaplastic, and undifferentiated (p.2496).

Their tumors were also more likely to be “greater than 2 cm in diameter” and “estrogen-receptor and progesterone-receptor negative” suggesting the need for more difficult or complicated treatment (p.2497). Over a follow-up period of 11 years, more than 70% of patients survived, and among those that died, more than half were breast cancer specific. “African-

American cases had worse breast cancer-specific survival” (74%) compared with non-African American cases (84%) (p. 2499). Recommendations include additional research to confirm the over-representation of the basal-like subtype in broader samples of young African American patients. Also, more data on breast cancer risk factors including “other inherited genetic variants that predispose to developing specific subtypes” (p.2501). Notably, the absence of BRCA1 carriers among African American breast cancer survivors in the sample indicate that genes other than BRCA1 could predispose women to basal-like breast cancers. Given the more aggressive nature of breast cancer among Black women, the importance of adequate, effective, and advanced treatment cannot be overstated for this population (Carey et al. 2006).

Social determinants of health are a significant consideration in the development of breast cancer in Black women (William et al., 2016). In a review of the epidemiological research and social conditions that contribute to “racial inequities across the continuum of breast cancer”, findings revealed that racism, segregation, and psychosocial stress all converge to compromise overall health (p.2). SES, including living in poverty, was also shown to increase risk of advanced or aggressive cancers among young Black women. For example, “Black households earned 59 cents for every dollar” earned by White ones, which remained the same from 1978 (p.6). Blacks and Hispanic individuals earned less wages at the same education levels, had significantly less wealth at comparable income levels, and less buying power because of higher costs of goods and services where they live.

Being Black in and of itself is not a risk factor for breast cancer. Rather, various cultural, social, economic, and biological events intersected within the Black population more frequently, which gives rise to disproportionate risk and mortality. Further, Black women were more likely to die from breast cancer than any other racial/ethnic group because of “racial differences in the

severity, course and treatment” of the disease (p.3). They did not receive timely diagnosis and advanced or quality treatment for breast cancer, including the aggressive subtypes, which all contribute to elevated mortality risk.

Considering all findings together, it is evident that “disparities in the quality and intensity of care exist” across a range of breast cancer services (p.4). Growing evidence that “equal treatment is associated with equal outcomes” drove recommendations for additional research on how risk factors combine over the life span with social and psychological resources or exposures (p. 4). Disentangling links to environmental factors was specifically recommended to “effectively reduce breast cancer disparities among Black women” (p.5). For example, minimizing biological weathering or the phenomenon of Blacks “experiencing greater physiological wear and tear” due to poverty and other systemic inequities, as well as premature and accelerated aging (p.4) (William et al., 2016).

Black women are also twice as likely to be uninsured and to depend on public insurance as White women (Thomasson, 2006). Limited education and lack of access to disease information, including the importance of early screening, correlated to low income and limited resources. In addition, poverty was associated with poorer breast cancer outcomes for all Americans, regardless of race; a larger proportion of Blacks than Whites live in poverty. This affects a woman’s ability to access physicians and other healthcare providers regularly, decreasing the likelihood of mammography screenings and conversely, increasing the probability of late-stage diagnosis (Thomasson, 2006).

Deep seated fear of breast cancer and cultural misconceptions about individual susceptibility can influence whether Black women participate in breast cancer screening and treatment (Lannin et al., 2002). Although breast cancer mortality has consistently decreased in

Caucasian women, the same trend has not been observed in African American women and the subsequent “mortality gap is a serious national problem” with reasons that are varied and complex (p.104). This study comprised an extensive literature review with inputs from large population-based surveys. Findings revealed that the mortality gap is the result of African American women being “diagnosed with more advanced stage breast cancer” (p. 105).

This occurs because presentation of palpable lumps or growths are typically delayed and when they do appear African American women do not seek care. This behavior is correlated to “cultural factors that tend to discourage women from seeking care” early (p.107). For example, Black women are “more likely than White women to rely on divine intervention” rather than seeking medical attention (p. 107). They are also more inclined to perceive any slight or “painless abnormality in the breast as benign” or believe that mostly women with large breasts develop cancer (p. 107). Black women are “more likely to avoid mammography screening” even when testing is accessible to them due to “fear of radiation, pain, and discomfort” (p. 109). Regarding recommendations, additional research is needed to better understand those social or cultural beliefs that “influence patient behavior, which will greatly aid physicians” in improving care of African American breast cancer survivors and close the racial gap on mortality (Lannin et al., 2002, p. 109).

Culture is a significant driving force in Black women’s attitudes and behaviors toward breast cancer treatment options which cannot be overemphasized (Schubart et al. 2015). In an interpretive-descriptive study of African American women, findings reveal that misconceptions about surgical treatment is prevalent in Black women. As a result, they are less likely to seek surgery compared to Caucasian women. Concern about the potential for surgery to activate breast cancer and prompt spread was expressed in previous research. In the current study, most

participants shared concern about the way information is shared, indicating a preference for “visual information for understanding the diagnosis and surgical treatment” (p. 497). Also, the vital importance of family and friends providing support “rather than the formal health-care system” (p. 502).

Because breast cancer is mostly diagnosed in women over 50, being female and aging are the two most significant risk factors, and Black women endure the greatest disease burden for breast cancer (Yedjou et al., 2019). The authors reviewed multiple years of population level data to identify trends in onset of disease. Across all age groups, “breast cancer is rarely diagnosed in women younger than 25” (p.6). Rather, the median age a woman is diagnosed is 61 years old. However, the median age of “diagnosis for black women is lower, 58 years” compared to 62 years for White women (p.6). Also, the median age of breast cancer death is 68 years for all races, but here again, the median age for “death among Black women is lower, 62 years” old compared to 69 years for Caucasian women (p.6). Young Black women (under the age of 45) also demonstrate higher breast cancer incidence rates than their Caucasian peers, especially, presenting with high grade tumors more frequently. (Yedjou et al., 2019)

Existing research establishes that “cardiovascular disease is the most common cause of mortality” for breast cancer, the benefits of low to moderate exercise for cancer survivors are well-documented, and physical activity is strongly recommended but not necessarily adhered to by African Americans (Beebe-Dimmer et al., 2020, p. 1987). The study surveyed 1500 participants. Although the American Cancer Society recommends moderate to vigorous exercise for at least 150 minutes per week and strength training, findings revealed that only “58% reported participating in regular physical activity” and 22% reported very little activity (p.1994). Not surprisingly, survivors that participated in “regular physical activity reported higher QOL”

(p.1994). Apparently, racial differences in engaging in unhealthy behaviors post-diagnosis like physical inactivity may be driving disparities in outcomes (Beebe-Dimmer et al., 2020).

Triple-negative breast cancer (TNBC) is an aggressive subtype that disproportionately affects young Black women, and it is strongly linked to overweight and obesity (Dietze et al. 2015). TNBC is frequently marked by “metastasis to the lung, liver and brain”, resulting in a higher risk of death (p.248). However, mortality differences for those diagnosed with TNBC are unclear once adjustments are made for “disparities in access to health-care treatment, co-morbid disease, and income” (p.249). Findings of this study also reveal a relationship between TNBC and obesity in African American women. “The association between body shape and risk of TNBC is complex” (p.290). Moreover, increased BMI was associated with a decreased incidence of all subtypes (including TNBC) of postmenopausal cancer.

Yet in premenopausal women, having a high recent weight correlated to an “increased risk of premenopausal ER⁺ tumors and all breast cancer subtypes” in postmenopausal women (p.290). Further, African American women have a high incidence of obesity, insulin resistance, and premenopausal TNBC, and there is “increasing evidence to support a mechanistic link” (p.290). The study concluded that, in African American women, there were likely different mechanisms for the associations between “adiposity and TNBC and ER⁺ breast cancers” (Dietze et al. 2015, p.290).

Given these findings, this study can help shed light, at least tangentially, on why Black women have worse outcomes, including being 40% more likely to die of breast cancer than White women and twice as likely to die if they are over 50. And, why a third of Black women report experiencing racial discrimination at a health provider visit.

2.6 ACUTE AND CHRONIC PAIN ARE SERIOUS SIDE EFFECTS OF BREAST CANCER TREATMENT

Two basic principles exist for breast cancer treatment. (Albakkan, 2021). First, “reduce the chance of local recurrence, and risk of metastatic spread” (p.5). Surgery, which may or may not be accompanied by radiation treatment, can cure cancer. But “systemic therapy is indicated” (p.7) when there is a risk for metastatic relapse. “Systemic therapy may include hormonal therapy, chemotherapy, or targeted therapy” (p.8). Surgery is the first line of treatment in most cases, especially, breast conserving strategy or modified radical mastectomy (Albakkan, 2021). Following initial treatment in and around the operated area, chronic pain can develop which lasts for years (Hamood et. al. 2018). This “translates to a growing population of survivors in pain” (p. 158).

The reported prevalence of chronic pain among breast cancer survivors ranges from “13% to more than 70%” and “all studies agree that chronic pain is a significant clinical problem” (p. 158). To understand prevalence and risk factors associated with chronic pain among breast cancer survivors, the authors undertook a random cross-sectional study that revealed “97% experience pain at least 1-3 days per week” and more than half endure multiple pain symptoms (p. 158). These include allodynia and parasthesia which are varying conditions of numbness, tingling, and aching at the surgery site, as well as phantom sensation or the feeling that the removed breast is still intact after mastectomy. Women that self-reported symptoms of chronic pain were “younger, less physically active...had more recent and regionally advanced disease” and frequently relied on healthcare services. Ultimately, chronic pain was “significantly correlated with poorer quality of life” (Hamood et. al. 2018, p. 157).

The prevalence of acute pain following breast cancer surgery is estimated to occur in 10% to 80% of women and occurs because of “tissue damage and inflammatory processes as

well as other mediators” (Schreiber et al., 2019, p.294). Acute pain is researched far less, compared to chronic pain, and it not always clearly defined from a temporal perspective. However, onset of pain symptoms within two weeks of surgery is a common benchmark (Schreiber et al., 2019).

In one study that focused on acute pain experienced by breast cancer survivors receiving reconstructive surgery, consistent correlations were found between “younger age, bilateral reconstruction, and anxiety and depressive symptoms” (Kulkarni et al. 2017, p.7). Not surprisingly, younger women were more likely to opt for breast reconstruction post mastectomy, and then report higher levels of postoperative pain. Particularly, pain in the chest and upper torso and more limited mobility. The relationship between age and postsurgical acute pain is an increasingly consistent finding, with a growing body of research “demonstrating a predictive effect of younger age on increased postoperative pain” (Kulkarni et al. 2017, p.7).

Persistent pain after breast cancer surgery and reconstruction is associated with “radiotherapy, axillary lymph node dissection, and greater acute postoperative pain” (Wang et al. 2016, p. 352). Younger age was also linked. Axillary lymph node dissection was noted as the most effective treatment for limiting risk of persistent pain (Wang et al., 2016). Although persistent pain is common with at least “20-60% of patients developing it”, patients may not readily anticipate it (Hovind et al. 2013, p. 51). In an exploratory qualitative study among breast cancer survivors that underwent surgery, most report that they “expected pain in the acute postoperative period” but were not explicitly informed of the possibility it would last (p. 1044). They received “no explanations for and little help with chronic pain” (p. 1048). This resulted in recommendations from researchers for more “adequate information and follow-up after discharge” (Hovind et al. 2013, p. 1052).

Pain science education, typically taught by physical therapists with a focus on self-empowerment, was offered to surgery patients in two randomized controlled trials (Van der Gucht et al. 2021). Interaction effects were noted among breast cancer survivors that received pain education including “significant increase in postoperative pain” compared to those that did not receive pain science education (p. 78). Also, pain catastrophizing or expressions of fear decreased after exposure, at least among orthopedic patients. Not surprisingly, pain education did not minimize the experience of pain among breast cancer survivors or others in the study sample (Van der Gucht et al. 2021).

2.7. PERIPHERAL NERVE BLOCK USAGE IS ON THE RISE WITH LESS ADVERSE EFFECTS THAN OPIOIDS

Thoracic paravertebral block (TPVB), also known as peripheral nerve block, is a regional anesthetic technique (Cali et al., 2017). The TPVB consists of an “injection of local anesthetic posterior to the parietal pleura, in the same tissue plane as the neurological structures and results in ipsilateral somatic and sympathetic nerve block” (p. 1342). Some studies have shown that TPVB is effective in reducing postoperative complications and hospital stays compared to general anesthesia alone.

In a randomized prospective study to compare the effects of TPVB with general anesthesia, postoperative complications were improved in women undergoing unilateral or bilateral breast augmentation or reconstruction (Klein et. al, 2000). Findings showed that TPVB provided improved pain control when compared to general anesthesia alone, and this superior pain control was maintained during the first 24 hours but could last up to 72 hours after the initial block. Also, a trend of decreased vomiting and nausea was detected in the TPVB group compared to the general anesthesia group. After surgery, patients treated with TPVB required 3 times fewer analgesics than patients receiving general anesthesia alone. One important advantage

of TPVB is that it seems to provide the most benefits in patients undergoing unilateral or bilateral mastectomy followed by immediate reconstruction. These patients usually suffer from higher pain levels and require longer hospital stays because of the length and the complications of the surgical procedure and the longer time under general anesthesia.

As extant research demonstrates, PNB has the potential to offer long-lasting postoperative pain relief and fewer side effects when used for breast surgery. However, few studies have investigated whether racial-ethnic disparity exists in their usage for women having total mastectomy.

2.8 BLACK BREAST CANCER SURVIVORS EXPERIENCE GREATER UNTREATED PAIN

Existing research also reveals that Black women are particularly at risk for inadequate pain management, with survivors frequently reporting negative experiences and dissatisfaction related to symptom management (Samuel et al., 2015). Key themes are apparent in one study on their collective experience. First, clinician disregard where their “symptoms were not treated or were attributed to non-treatment causes” or ignored outright (p.1433). Second, their symptom concerns “were not validated (e.g., lack of concern/empathy) by their care team” (p.1434). Third, abundant recall of instances of “clinicians failing to diagnose specific symptoms (especially pain)” due to lack of knowledge (p.1434). Finally, having to “advocate for themselves to get clinicians to explain, diagnose, and manage” their pain symptoms (p.1435). These gaps for Black women have contributed to “inequities in the delivery of symptom management services” and adversely affected patient care outcomes (Samuel et al. 2015, p. 1436). Further exploring physician-patient dialogue on pain symptoms is a keen need gap.

In contrast to most studies that evaluate health disparities at the national level, another study focused on breast cancer survivors at the local level in Memphis, Tennessee. It reinforced that for Black women survivors, “provider responses to patients’ needs complicated the treatment” process (White-Means et al., 2016, p. 10). Study participants were not convinced that adequate pain relief was made available to them, and their doctors were transparent about the lasting treatment effects. They believed that “too little information was shared between providers and survivors” about what patients should expect during and after treatment (p.13). Nonetheless, prayer and family support were essential for this cohort of women, like African American survivors in other parts of the country. A more patient-centered approach of unmasking breast cancer in patient-provider communication would improve how Black women cope with breast cancer and respond as recipients of information about its diagnosis (White-Means et al. 2016).

Additional evidence that physician bias exists toward Black women is found in a study of Black cis-gender sexual minority women (SMW) and their experiences with breast cancer screening and treatment (Greene et al., 2020). While interacting with healthcare providers, study participants documented the enormous adversity they faced from their multiple marginalized social position. For example, “negative interactions at times when providers failed to listen” or to “explain treatment options or other information” (p.4). Many noted that their “race, gender, or sexuality played a significant role” in their limited access and knowledge of breast cancer screening and treatment (p.5). Participants also experienced feelings of alienation when “autonomy, competence, and relatedness” was not afforded to them (p.5). In some cases, participants described treatment experiences that did not provide the same access to supportive services as other patients and their families (p.6). Many study participants also described negative experiences of providers “failing to create supportive and welcoming environments”

(p.6). Together, these findings suggest that “healthcare environments and healthcare providers may be less likely to support SMW” generally and Black women specifically (p.12).

Mistrust of healthcare providers is a known barrier that affects Black women and “keeps many SMW from obtaining breast cancer screening”, and other services across the continuum of care (p.10). In contrast, study participants relayed preference for “healthcare providers that share race, gender, sexuality” or at least one of these characteristics (p.12). And, when “congruence existed between the participant and her provider”, they favorably described providers as “treating them like human beings, understanding and being aware” (p.12). Generally, feelings of relatedness with healthcare providers empowered Black SMW to “ask for what they needed” and feel in control of their experience (Greene et al., 2020, p.12).

As previously stated, Black women suffer more from pain because “pain management is less adequate among African-American and Hispanic cancer patients”, compared to other groups (Raza et al. 2021, p.2). Breast cancer survivors within these groups tend to present with more advanced disease and do experience increased pain. However, hurdles to pain management “have not been associated with race/ethnicity” (p.2). Rather, “lower self-efficacy or confidence in [one’s] ability to cope” is linked to barriers to pain management (p.2). Self-efficacy was discussed as a more significant barrier and Black and Latina women were reported to have lower self-efficacy, specifically, for “seeking and understanding medical information (Raza et al. 2021, p.5).

The relationship between self-efficacy for coping with cancer and barriers to pain management was further explored including correlations to ethnicity, language, and education (Mosher et al. 2010). Findings revealed that “Spanish language preference and greater distress” correlated to greater barriers to pain management (p. 227). Also, “average pain severity was

higher among Spanish speaking individuals” (p. 227). Lower rates of self-efficacy among Latina women reinforce the correlation between race/ethnicity and self-efficacy in evaluating barriers to pain management (Mosher et al. 2010).

Black women with breast cancer demonstrate emotional distress as they face a range of treatments and painful side effects and employ multiple coping strategies, which often differ from those used by Caucasian women (Yoo et al., 2014). For example, Black women’s coping is relational, based on the extent to which “a woman’s illness impacts those closest to her” (p. 9). Many want to invest their time caring for their families and insulate them from guilt, stress and being worried about their well-being. Less positive coping strategies include “emotional suppression, wishful thinking, and behavioral disengagement” were also more common among Black women and associated with worse outcomes (Yoo et al., 2014, p.8).

The importance of understanding how self-care influences symptom-management self-efficacy and quality of life (QOL) was also explored (Chin et al., 2021). Higher self-efficacy was found to be “associated significantly with better self-care and higher QOL” (p. 5). Moreover, the connection between increased self-efficacy and greater quality of life is incrementally explained by improved self-care (Chin et al., 2021).

Survivorship can also be challenging as breast cancer survivors may encounter decreased social, physical, and emotional functioning, and pain, compared to the general population (Coughlin et al. 2021). While “24% to 84% of breast cancer survivors report persistent pain” following cancer treatment, in the current study, “71% of participants report aches and pains” while 67% report muscle or joint stiffness (p. 101). These various symptoms are associated with poorer QOL, and are also linked to “younger age, more invasive surgery, adjuvant therapy” as well as psychological and social factors (Coughlin et al. 2021, p. 109).

Women with metastatic breast cancer, also known as advanced or stage IV breast cancer are uniquely burdened with “a wide range of psychosocial and spiritual concerns” (Drageset et al. 2021, p.2). While more sophisticated breast cancer treatments are available to extend life, they also increase symptom burden and affect QOL. Particularly, the experience of pain because of physical ailments spurred from treatment. Pain management “significantly alleviated pain and improved health related QOL” (p.11). It reinforces that “medical pain relief in addition to supportive care are essential” (Drageset et al. 2021, p.15).

2.9 PRESCRIPTION OPIOIDS ARE STANDARD FOR BREAST CANCER PAIN MANAGEMENT

Self-efficacy, agency, and other mental health considerations withstanding, pharmacotherapy is the hallmark of breast cancer pain management which includes opioid and non-opioid analgesics. Furthermore, “adjuvant medications such as tricyclic antidepressants (TCA) (amitriptyline, desipramine), anticonvulsants (gabapentin), local anesthetics (mexilitine), corticosteroids (prednisolone, dexamethasone), and bisphosphonates (clodronate, pamidronate, zoledronic acid, and ibandronate) can also be added”.

Most of the NSAIDs used for cancer pain management are not as potentially toxic as opioids; however, side effects can occur. In addition, morphine is the most used opioid in managing severe pain before and after surgery because there is no ceiling effect, and hence no maximum safe dose. There is no optimal dose for any of the opioids, but the dose that provides enough analgesia without intolerable side effects is preferred. Moreover, “morphine is used in doses that range between 5 mg and 1,000 mg” but using doses higher than 200 mg for management of pain should prompt alternative considerations. Another opioid might be introduced when adequate pain management is not achieved with a particular opioid minding the balance between toxicity and pain control.

Because pain is a common and very unsettling symptom of breast cancer treatment, opioids are frequently used given their speed of effect on moderate to severe pain, and limited harm to other organs (Dalal et al. 2019). Nevertheless, a growing body of research suggest that cancer patients receiving opioids are “at higher risk for non-medical opioid use (NMOU)” (p. 24). While increased risk for addiction is noted, it is “difficult to predict which patients taking opioids are at higher risk” for addiction (p. 24). Despite the application of ‘one size fits all’ precautions to prevent over-use, opioid-associated deaths continue to increase, at least between 2006 and 2016.

Cancer associated pain is diverse in presentation and encompasses a group of syndromes that are frequently treated with opioids, alone or in concert with other therapies, from short to long term duration. The risk for regular opioid use was observed in “patients the year after curative-intent surgery” (p. 25). Notably higher among patients that have undergone chemotherapy and radiation treatments. Because the experience of pain is subjective, health care providers rely on patient reports to inform treatment. Further, “the patient’s ability to cope, level of distress” and other psychological factors inform a patient’s willingness or ability to express their pain experience (p.25). Risk factors associated with NMOU and substance use disorder (SUD) are “younger age...personal or family history of mental health” as well as tobacco use (p.25). Notably, “alcohol abuse is the most common risk factor for NMOU” (p. 25). Individually or collectively these factors are not predictive of NOMU risk, so other assessment tools are required to evaluate risk. (Dalal et al., 2019)

Opioid overuse is well documented in patients that have undergone oncologic surgery, including mastectomy and reconstruction for breast cancer treatment. (Hite et al., 2020) In one study, 90% of patients filled opioid prescriptions and 10% continued to fill them 3 months after

their procedure. In addition to previously discussed risk factors for drug dependence, “bilateral oncologic surgery, axillary lymph node dissection, and surgical drains” were also found to contribute to higher opioid use (p.601). Moreover, those who received prescriptions for “more narcotics at discharge used more narcotics” (p.601).

Surprisingly, 93% of patients believed a non-narcotic would be more effective and 83% of patients retained multiple unused pills that they did not ingest. These findings frame “opioid abuse as a result of physician prescribing practices” (p. 598). The “overprescribing of narcotics is further supported” in a series of studies (p. 601). One focused on patients who underwent thoracic surgery, and less than a quarter of these patients took all prescribed opioids. Even less patients finished their prescriptions in another study on cesarean section patients. Meanwhile, in a third study of shoulder surgery patients, most had unused pills. Efforts are underway to reduce physician prescribing practices as “overprescribing of opioids may increase the risk of prolonged use” (Hite et al., 2020, p.598).

Opioids treat moderate to severe cancer pain by binding to receptors to reduce impulses and perceptions of pain (Arthur and Bruera, 2019). NSAIDS and other non-opioids are typically used as first-line treatment prior to opioids like morphine. Opioid agent, dose, formulation, route of administration, timing of opioid intake, and use of certain chemical compounds, are all features that impact risk of NMOU and overdose. Among cancer patients in an outpatient setting, requests for opioid medication refills occurred more rapidly, signaling abusive behavior. Moreover “deviation from opioid adherence to NMOU might be subtle” and easily overlooked by a clinician (p. 218). Urine drug tests are also used to monitor NMOU though controversy exists on best practices for the timing and frequency of their use, as well as the reliability of their

accuracy. Irrespective of detection method, once NMOU is detected, the healthcare provider “should have a candid conversation with the patient” (p. 219).

Key points covered should include reiterating necessary steps for habitual medication noncompliance, “decreasing time interval between follow-ups for refills”, minimizing opioid quantity and refills, and referring to palliative care specialists for additional support (p. 219). Unfortunately, most opioids used for cancer treatment today were developed more than 100 years ago and less toxic options are not yet available (Arthur & Bruera, 2019).

Patients who have undergone surgery have a high incidence of unsafe opioid related behaviors”, with many having left-over medication that they do not discard (Reddy, 2019, p. 1411). In the post-operative period, “higher quantity of opioid prescribed is associated with higher patient-reported consumption” (p.1411). In addition to retaining too many opioid pills, cancer patients may also “use opioids unsafely, store them in insecure locations” or share them with others (Reddy, 2019, p. 1410).

Opioids work on both acute and ongoing pain and are often prescribed with benzodiazepines, contrary to standard guidance on not mixing the two drugs (Sakamoto et al. 2021). However, providers use benzodiazepines to prevent breast cancer recurrence. While there isn’t abundant research on “short and long-term opioid use in patients with breast cancer”, or dispensing opioids with benzodiazepines both drugs are common during treatment (p. 29). For those that present with “higher number of comorbidities” and other signals, long term use of opioids are more prevalent (p. 34).

Although most benzodiazepines naïve breast cancer survivors are not prescribed benzodiazepines, a significant number of those that start the drug continue use for 3 or more months. Predictive factors of new opioid use included drug type, and tamoxifen and tramadol

were associated with longer term use while aromatase inhibitors were linked to shorter term use. In one of the largest studies of opioid and benzodiazepines use, it was found that 67% of opioid naïve breast cancer survivors receive opioids during the curative period of treatment, and only a small number of patients use opioids persistently at the three-month mark. Almost “two-thirds of opioid-naïve patients filled at least one prescription” (p.34). Also, during the curative treatment phase, patients with more advanced disease were more likely to receive a new opioid prescription but only “stage 3 patients continued at 3 and 6 months” post treatment (p.32). Patients in this study were also less likely to receive a prescription for an opioid plus benzodiazepines, and findings suggest patients were more inclined to share their experience when “discussing anxiety and nausea than pain symptoms” indicating fear of reporting pain and unwillingness by providers to initiate inquiries about their pain (p.36).

All patients diagnosed with cancer are survivors from time of diagnosis and are uniformly considered in many ways, but when it comes to pain, their experiences are individual and quite varied (Goodlev et al., 2019). For example, “recurrent or worsening pain may have differing clinical significance” from one person to another, and pain can be an indication of disease recurrence (p.1309). As such, screening for pain symptoms at every clinical encounter have become standard practice. The broad definition of survivorship makes interpreting new or changing symptoms challenging for health care professionals including deciding when and how to taper patients of opioids. Tapering is warranted when there is evidence of high-risk behaviors such as “early refills, missed appointments, or patient aggression” (p.1310). Opioid tapering and screening is “a crucial component of survivorship care” and a more holistic approach requires cognitive and behavioral considerations. Ultimately, the ideal treatment of pain in cancer survivors requires a comprehensive approach (p.1312). One that centers and “engages patients in

active and adaptive symptom management” starting at initial diagnosis (p.1312). Managing the twin issues of pain and opioid use disorder requires “blurring the line between acute and chronic pain” as well as other types including malignant and nonmalignant pain, spiritual and psychological pain, and treatment side effects versus disease recurrence (p.1315). Indeed, pain management in cancer survivorship is “complex and requires multidisciplinary care that balances analgesia” (Goodlev et al. 2019, p.1308).

Psychological distress occurs more frequently among cancer patients than the general population and this is a key factor for SUD (Khanna, 2021). Moreover, in-depth “assessment of pain, function, and risk factors for SUDs” in addition to physical examination” can help identify pain type and treatment plan (p.148). Also, “multimodal pain therapies can help reduce reliance on opioids” (Khanna, 2021, p.148).

One such approach to pain therapy includes following physical activity guidelines, but adherence to these is low among Black women (Smith et al., 2018). One reason is Black women are more likely to be overweight or obese. Despite this, “higher levels of pain intensity are associated with following physical activity guidelines” in this group (p.194). Also, physical functioning and level of pain intensity were the only domains of quality of life that correlated significantly with meeting these goals. Surprisingly, “pain interference did not contribute significantly to determining adherence” (pg 206). These findings suggest the potential of physical exercise as a strategy to manage pain, with or without the use of opioids, and risk of SUD (Smith et al., 2018).

2.10 BLACK BREAST CANCER SURVIVORS ARE LEAST LIKELY TO RECEIVE PRESCRIPTION OPIOIDS

Ethnic minority women were found to use opioids during the treatment phase but are “significantly less likely to receive opioids” months after treatment ended (Sakamoto et. al. 2021,

p.36). They were also less likely to receive a prescription for an opioid and benzodiazepines. Findings suggest they were more inclined to share when “discussing anxiety and nausea than pain symptoms” indicating fear of reporting pain and unwillingness by providers to initiate inquiries about their pain (p.36).

As previously discussed, difficult physician-patient dialogue, fear of disease and treatment, and medical mistrust are among the many stressors Black women deal with in breast cancer care and treatment (Coughlin et al., 2015). Also, unique among Black women is a “reluctance to share their illness with others” as Black women are more likely to report low or no social support, and fear of stigma (p.401). Even when they disclose their breast cancer diagnosis, “their close female relatives’ express discomfort” and friends and partners withdraw support after learning of their diagnosis (p.403). As many Black women are independent heads of household, many breast cancer survivors do not “take on a sick role” and “conceal their illness, which may hinder their own treatment process” (p.408). The most successful interventions for coping with stressors and managing pain will foster a “cultural environment in which Black women feel welcome” (Coughlin et al., 2015, p.413).

2.11 SUMMARY

This chapter highlighted the problem of breast cancer pain being diagnosed and treated at lower rates among Black women. It establishes that considerable research exists that advances the knowledge base on health disparities in insurance coverage and breast cancer diagnosis, namely, outcomes for poor or low-income women. However far less is known about outcomes for commercially insured Black breast cancer survivors who typically have moderate to higher SES. The problem with much of the existing literature is that it either focuses heavily on poverty or glosses over socioeconomic considerations altogether. Strong needs exist for scholarship

about differences in breast cancer treatment and outcomes between racial/ethnic groups that have equal or comparable health insurance coverage, and similar SES.

This chapter revealed that little is known about the extent to which Black women are prescribed prescription opioids for postoperative breast cancer pain, even as general overuse is documented in other groups. It also reveals that PNB is a viable option that offers superior postoperative pain relief compared to general anesthesia alone. However, little research exists on the usage of PNBs across racially diverse groups of women diagnosed with breast cancer. This study aims to address both knowledge gaps and the next chapter details the plan for data collection and analysis.

Chapter 3

RESEARCH METHODS

This chapter overviews the study methodology and is divided in the following sections: (1) Research Design, (2) Rationale for Utilizing Optum® Clinformatics™ Data Mart, an Existing Data Source, (3) Procedure, (4) Data Management, (5) Discussion, (6) Anticipated Limitations, (7) Disclosure and (8) Summary. The research protocol will be presented to the Institutional Review Board at Teachers College, Columbia University for approval, however as previously established, exempt status is anticipated.

3.1 RESEARCH DESIGN

A cross-sectional study was performed using data from Optum Clinformatics Data Mart, collected nationally from January 1, 2012, through December 31, 2019. The DataMart comprises detailed enrollment information, medical records, prescription drug use, and inpatient hospitalization data. The study team will have full access to the data, which cannot be made publicly available which would violate the data use agreement.

About OptumInsight Clinformatics Data

The Optum® Clinformatics™ Data Mart is an administrative health claims database from United healthcare, a large national insurer, made available by The University of Pennsylvania. The statistically de-identified data includes medical and pharmacy claims as well as laboratory results. Specifically, more than 8 million hospital claims, 1.2 billion lab results, 1.3 billion prescriptions, and 2.8 billion outpatient claims, as well as actual patients' out-of-pocket costs. Specific features of Optum® Clinformatics™ Data Mart, according to details found on company website:

- Administrative health claims data

- Updates typically delivered quarterly via secure file transfer protocol (SFTP)
- Integrated enrollment, medical and prescription claims data with select laboratory test results data Members with both medical and pharmacy benefits
- De-identified individual data and blinded provider data, yet supports individual-linked longitudinal analysis
- Paid claims includes: (1) Who, Member Quasi-identifiers; (2) What, Services; (3) Where, Place of Service; (4) When, Date of Service; (5) Why, Diagnosis; (6) How Much, Standard Cost

In addition to the standard data view which includes linked mortality information from The Social Security Administration Death Master File, the study will rely on the Socioeconomic Status data view in the Data Mart. It examines how health care utilization varies or is influenced by factors such as ethnicity, income, education, and marital status.

Patient Population

Optum® Clinformatics™ Data Mart is updated annually and comprises 63 million unique individuals, spanning all 50 states. It provides a geographically representative sample. However, it does not include recipients of Medicaid, so the resulting study population has a higher socioeconomic status than the total population. This skew is of particular interest to the study's focus on Black women representing moderate to higher socioeconomic groups.

Demographic and socioeconomic data, including median household income, are available through zip code-linked enrollment data from the US Census Bureau.

Defining Patient Characteristics

Race and ethnicity were determined through a combination of public records, self-report, and proprietary ethnicity code tables. According to the Optum website:

“Many aspects of health care, including treatment selection, therapy patterns, health care utilization and costs, are known to differ based on patient demographics. To allow for more powerful insight into health care outcomes, Optum has the unique ability to correlate these outcomes with the socioeconomic characteristics of patients — such as

educational attainment, occupation, household income and net worth, race/ethnicity, language preference and family structure — by linking claims data at the individual level to an external data source. Because records are linked at the individual level rather than just the prescription or regional level, these linked data provide opportunities to advance research in health economics and outcomes to increasing degrees of sophistication and understanding.”

The study will consider the experiences of female breast cancer survivors that represent multiple racial/ethnic groups including Blacks, Asians, Whites, and Hispanic individuals. For primary analysis, Black women will be compared to White women, with the latter group used as the control. Patients will be included if they underwent mastectomy either as an inpatient in a hospital setting or in an ambulatory setting, and unadjusted rates of peripheral nerve block (PNB) use will be compared between racial/ethnicity groups. Only patients with continuous insurance coverage for 12 months prior to surgery and 6 months after surgery will be included.

The average length of hospital stay for mastectomy is one to two nights. Therefore, patients with a hospital stay greater than 30 days will be excluded to eliminate confounding due to severe, unusual postoperative complications. Also, to increase the likelihood of an opioid-naïve cohort, analysis will be limited to patients who did not fill an opioid prescription in the 11 months prior to the perioperative period..

Health Insurance Provider/Payer

Payer is United Healthcare, the financier for the hospital stays..

Income

Median community-level income will be the median household income of the patient’s ZIP Code of residence. Income levels are separated into population-based quartiles with cut-offs determined using ZIP Code demographic data obtained from the Nielsen Company.

Education

Education level will be derived from Census data at the ZIP +4 level and categorized as less than high school diploma, high school diploma, less than bachelor's degree, bachelor degree or higher or unknown.

3.2 RATIONALE FOR UTILIZING OMPTUM CLIFORMATICS DATA MART, AN EXISTING DATA SOURCE

While a vast number of research questions can be well addressed with an existing data set or by developing a prospective research study, there is concern that using an existing data set is a less credible approach. But, as a general guideline, it is highly preferable to answer research questions using an existing data set if one is available to answer the research questions (Medical Research Archives, Vol. 5, Issue 9, September 2017) Optum® Clinformatics™ Data Mart is an appropriate choice for the study because it has the appropriate variables to evaluate the research aims, a sufficient sample size that is geographically representative, and a validated methodology for how variables are defined and measured.

The data source is preferable for other general reasons. For example, utilizing a data source is less time consuming in comparison to designing a new research protocol to recruit subjects and gather data. The advantage of obtaining results more quickly is especially applicable to longitudinal studies, where participants need to be recruited and followed over time. Using a data source is much cheaper because the data has already been collected. Finally, prospective research studies include some risk to subjects so leveraging an existing data source evades this threat as subjects have already been exposed. (Medical Research Archives, Vol. 5, Issue 9, September 2017)

Once approved by Teachers College Institutional Review Board, study team members will take steps to partner with UPenn's Health Services Research Data Center (HSRDC) to ensure that coding is accurate, and data is interpreted correctly. The group was established in 2005 to provide technical support to affiliated principal investigators who use highly sensitive patient information in their research. The HSRDC is comprised of secure high-performance servers within UPenn's Perelman School of Medicine that have the necessary security protections to permit storage and analysis of data containing Protected Health Information by affiliated investigators and research staff.

3.3 PROCEDURE

Upon Institutional Review Board approval from Teachers College, UPenn will grant access to the Optum® Clinformatics™ Data Mart database. UPenn has agreed to allow access to their licensed database for purposes of this study only.

3.4 DATA MANAGEMENT

Data will be collected and stored on HSRDC server folders. SAS will be used for data organization, cleaning, and analysis.

Treatment of the Data

The data analysis assessed the following questions with a serial cross-section of Optum® Clinformatics™ Data Mart. Data was extracted into R 4.2.1 for analysis. Descriptive and inferential statistics were used to examine the sample demographics; and other related items. Significant results are reported at a p-value of .05 or less. The statistical procedures used to analyze the study-related data are provided below.

Research Question 1. What, if any, race-based disparities exist in usage of PNBs at time of total mastectomy?

Research Question 2. What, if any, race based disparities exist in the prescription of opioids for postoperative pain following total mastectomy?

- i. Means and standard deviations were calculated for continuous items.
- ii. Percentages were calculated for categorical items.
- iii. Differences between PNB and opioid prescribing across demographic characteristics and Independent predictor variables were assessed via T-tests, and Analysis of Variance and Chi Square analysis.
- iv. Likelihood Ratio (LR) logistic regression analyses were conducted to identify significant predictors of PNB and opioid prescribing.

Research Question 3. What, if any, changes have occurred in the frequency of orders placed for PNBs and prescription opioids over time, to treat postoperative pain resulting from mastectomy?

- v. Hosmer and Lemeshow chi-square test of goodness-of-fit was used to examine provider prescribing practices for PNB and opioid.

Data Analysis – Matching

The study will include all Black patients to ensure that the Black study population will be constant and fully representative of Black patients in the database. The demographics analysis will match White to Black patients on socioeconomic status including insurance coverage, level of income and education; the presentation analysis will include matched pairs of Black and White patients on the demographic variables. Matches will balance the variables they are intended to balance. The standardized difference for each matching variable will be the mean difference between black and White as a fraction of the standard deviation (SD) before matching. The study will aim to achieve standardized differences below 0.1 SDs. Finally, Mahalanobis

propensity score matching may be used. With this method, Black and White patients will be matched with the closest propensity, allowing for meaningful comparisons to be made between groups while limiting confounding factors in the statistical assessment of outcomes.

Presentation of Results

Research findings will endeavor to document separate and unequal treatment of breast cancer patients by surgeons, anesthesiologists, and other physicians. Should any statistically significant occurrences be found, they will be distilled, reported, charted, and discussed. Specific aims and proposed research questions will also be addressed.

Existing literature documents the historical experiences of Black women diagnosed with breast cancer, and current and emerging treatment practices to date, including advances in surgical protocols. Few studies have specifically examined whether there is racial disparity in the use of PNBs for patients having unilateral or total mastectomy, and prescriptions of opioids for acute and chronic breast cancer pain post mastectomy. I hypothesize that Black women will be less likely to receive PNBs for postoperative analgesia, compared to White patients having mastectomy. Secondly, I hypothesize that Black patients will be less likely to receive prescription opioids for postoperative pain. Recommendations for future research include continued efforts to better understand causes of disparity, and to ensure equitable access to PNBs and prescription opioids.

Informed Consent

Data are already collected and deidentified so informed consent is thereby waived.

3.5 ANTICIPATED LIMITATIONS

The study aims to evaluate physician bias, not via a prospective study that can afford direct interviews about attitudes, values, and beliefs, but with an existing data source of hospital

and pharmacy records that primarily record physician behavior. As a result, the study will be limited to making inferences about physician psychographics. The current quantitative focus is on rate of prescribing only. This translates to limited clarity on the full breadth of physician motivations. Secondly, the study will not consider the direct role of patients in physician decision-making. Patients or the public will not be involved in the design, reporting, or dissemination of research. Notably, the Yale Medicine page for nerve blocks for surgery addresses patients this way (2023):

“If you are going to have surgery, talk to your surgeon or anesthesiologist beforehand to ask if you are eligible for a nerve block. You may not be eligible for one if you have an infection at the site where the injection would be made, if you have a bleeding disorder, if you are taking an anticoagulant (a drug such as warfarin that prevents blood clots) that you have not stopped ahead of time, or if you have had problems with the nerve in the area that would be targeted by the injection.

According to this content, patients are encouraged to inquire about their eligibility for a PNB which suggests their influence on whether they receive one. As previously stated, the data source is not set up to capture the patient voice nor their appeals or denials for any treatment. Finally, missing data is a widely accepted problem with large clinical datasets. To address this, categories for missing values will be created for each variable, and outcome rates will be compared and pooled.

3.6 DISCLOSURE

Nsenga is the Senior Manager of Communication and Community Engagement at UPenn’s Palliative and Advanced Illness Research Center.

3.7 SUMMARY

This chapter overviewed research methodology and rationale for the study. Specifically, the research design, impetus for utilizing Optum® Clinformatics™ Data Mart (an existing data source), procedure, data management, discussion, and anticipated limitations.

Chapter 4

RESULTS

This chapter details study results based on the data analysis plan and relevant summary tables. Findings will address study aims, posed research questions, and hypotheses. T-tests, ANOVAs and regression analyses were performed on matched and unmatched data to answer research questions one and two, while chi-squared tests were done on matched data to address research question three.

4.1 SAMPLE OVERVIEW

The study sample comprises 7,728 adult women diagnosed with breast cancer that underwent total mastectomy and no prior treatment for breast cancer (n = 7,728). The average age of women in the total sample was 56.6 ± 12.40 . Women that received PNB were slightly younger, 55.7 ± 11.91 years old. Self-reported race, in order of population size, was 77.2% White (n=5967), 8.2% Black (n=636), 7.3 % Hispanic (n=567), and 2.9% Asian (n=225). These figures reflect women diagnosed at all stages and with all types of breast cancer. The average number of days from diagnosis to surgery was 90.88 ± 233.53 , and those that received peripheral nerve block (PNB) waited longer, by as much as 110 days. Surprisingly, less than 10% of the sample – only 682 individuals – received PNB at the time of surgery while 7,046 did not. Access to pharmacotherapy was far more widespread as 80.9% or 6,250 women received prescriptions for opioids. Most of them, 67.6%, were written in the postoperative period. Table 1, Table 2

Table 1.*Sample Overview - Demographic Characteristics (N= 7728)*

	All patients that underwent total mastectomy	Stratified by PNB		
		No	Yes	p
N	7728	7046	682	
Race (%)	333 (4.3)	305 (4.3)	28 (4.1)	0.19
Asian	225 (2.9)	201 (2.9)	24 (3.5)	
Black	636 (8.2)	588 (8.3)	48 (7.0)	
Hispanic	567 (7.3)	529 (7.5)	38 (5.6)	
White	5967 (77.2)	5423 (77.0)	544 (79.8)	
All Opioids Prescribed = 1 (%)	6250 (80.9)	5695 (80.8)	555 (81.4)	0.765
Opioids (Pre-op) = 1 (%)	1902 (24.6)	1699 (24.1)	203 (29.8)	0.001
Opioids (Post-op) = 1 (%)	5223 (67.6)	4779 (67.8)	444 (65.1)	0.159

4.2 SELECTED SOCIAL DETERMINANTS OF HEALTH

As previously established, Healthy People 2020 solidified the following social determinants of health: economic stability, education, health and health care, neighborhood and built environment, and social and community context. (Riegelman et. al., 2020) The present study prioritizes the first four as a proxy for socioeconomic status (SES) Namely: 1) household income 2) home ownership status, 3) level of education, and 4) duration and type of commercial health insurance coverage.

Based on these considerations, the total sample is confirmed as comprising of mostly moderate to high SES women. For example, virtually all members (92.8%), including those that received PNB (93.3%), were living at least 400% above the federal poverty level, which in 2019 were as follows: 2 family household \$16, 910; 3 family household \$21,330; 4 family household \$25,750. (U.S. Federal Poverty Guidelines, Department of Health and Human Services, 2019) The largest group in the sample earned household income of 100K or more (38.4%), the second

largest group earned below \$40K (19.2%), and the third largest earned \$75-99K (14.4%).

Among those that received PNB, household income is slightly higher. For this group, the top two tiers were 100K or more (41.0%) and \$75-99K (17.3%). The number of those earning below \$40K (15.4%) were just slightly lower in this group. Only a small number of patients reported net worth of \$250K or more (15.4%), with those receiving PNB having just slightly higher net worth (17.7%).

Individuals with the least amount of net worth, less than \$25K, totaled 17.5% of the sample. This figure was even less among those that received PNB (15.0%). Most of the sample reported owning their own homes (78.2%), while PNB recipients owned their homes at a rate of 80.8%.

All individuals in the study were enrolled in a commercial insurance plan, namely, United Healthcare, at the time of surgery. Most of the sample (82.4%), including those that received PNB (84.6%), maintained their health insurance six months' post-op or after total mastectomy. A slightly smaller percentage (70.4%) was enrolled six months' pre-op or prior total mastectomy. Point of Service (POS) was the most frequently used plan among those that underwent PNB (50.4%), followed by Health Management Organization (HMO) (11.1%). Among the most common types of health insurance plans, these are the most moderate and least expensively priced, respectively, in terms of monthly out of pocket costs for individuals.

Most women in the sample did not graduate from a four-year college (53.6%). Only a quarter of them earned a bachelor's degree or higher (25.4%). Most employment information was either missing or unknown (70.2%). Table 2.

Table 2.*Selected Social Determinants of Health*

Social Determinant	All patients underwent Bilateral Mastectomy	PNB Administration	
		No	Yes
N	7728	7046	682
Household Income Range			
Unknown	384 (5.0)	354 (5.0)	30 (4.4)
<\$40K	1484 (19.2)	1379 (19.6)	105 (15.4)
\$40K-\$49K	463 (6.0)	432 (6.1)	31 (4.5)
\$50K-\$59K	474 (6.1)	428 (6.1)	46 (6.7)
\$60K-\$74K	680 (8.8)	622 (8.8)	58 (8.5)
\$75K-\$99K	1116 (14.4)	998 (14.2)	118 (17.3)
\$100K+	2965 (38.4)	2685 (38.1)	280 (41.1)
Home Ownership			
Unknown	1034 (13.4)	955 (13.6)	79 (11.6)
Homeowner	6042 (78.2)	5491 (77.9)	551 (80.8)
Renter	490 (6.3)	452 (6.4)	38 (5.6)
Education Level			
Less than 12th Grade	9 (0.1)	9 (0.1)	0 (0.0)
High School Diploma	1438 (18.6)	1320 (18.7)	118 (17.3)
Less than Bachelor	4144 (53.6)	3778 (53.6)	366 (53.7)
Bachelor Plus	1961 (25.4)	1779 (25.2)	182 (26.7)
Unknown	14 (0.2)	12 (0.2)	2 (0.3)
Health insurance coverage			
Dx to procedure	4927 (63.8)	4482 (63.6)	445 (65.2)
One year >surgery	5620 (72.7)	5110 (72.5)	510 (74.8)
6 months > surgery	6366 (82.4)	5788 (82.1)	578 (84.8)
6 months < surgery	5441 (70.4)	4951 (70.3)	490 (71.8)
Net Worth Range			
Unknown	378 (4.9)	349 (5.0)	29 (4.3)
<\$25K	1353 (17.5)	1251 (17.8)	102 (15.0)
\$25K-\$149K	1283 (16.6)	1184 (16.8)	99 (14.5)
\$150K-\$249K	671 (8.7)	607 (8.6)	64 (9.4)
\$250K-\$499K	1190 (15.4)	1069 (15.2)	121 (17.7)
\$500K+	2691 (34.8)	2438 (34.6)	253 (37.1)
Occupation Type			
Manager/Owner/Professional	547 (7.1)	494 (7.0)	53 (7.8)
White Collar/Health/Civil			
Service/Military	718 (9.3)	661 (9.4)	57 (8.4)
Blue Collar	225 (2.9)	205 (2.9)	20 (2.9)
Homemaker/Retired	654 (8.5)	615 (8.7)	39 (5.7)
Missing/Unknown	5422 (70.2)	4923 (69.9)	499 (73.2)
Federal Poverty Status			
Above 400% FPL	7173 (92.8)	6537 (92.8)	636 (93.3)
Below 400% FPL	9 (0.1)	7 (0.1)	2 (0.3)
Unknown/Missing	384 (5.0)	354 (5.0)	30 (4.4)
Children at home	0.24 (0.64)	0.23 (0.64)	0.28 (0.67)
Adults at home	1.92 (1.25)	1.90 (1.25)	2.03 (1.33)
Insurance plans			
EPO – Exclusive Provider Org	545 (7.1)	490 (7.0)	55 (8.1)
HMO – Health Maintenance Org	1041 (13.5)	965 (13.7)	76 (11.1)
IND - Indemnity	28 (0.4)	27 (0.4)	1 (0.1)
OTHER	1768 (22.9)	1625 (23.1)	143 (21.0)
POS- Point of Service	3917 (50.7)	3545 (50.3)	372 (54.5)
PPO-Preferred Provider Org.	429 (5.6)	394 (5.6)	35 (5.1)

4.3 RACIAL DISPARITY IN SELECTED SOCIAL DETERMINANTS OF HEALTH

Disparities were found across multiple social determinants of health. For example, Black women mostly earned high school diplomas (51.6%) compared to Asian (9.8%) and Whites (16.8%). In addition, more Black women earned in the lowest household income tier of \$40K or less (41.4%) compared to their White (17.6%) and Asian counterparts (8.4%). They also had lowest net worth in the \$25K or under range (43.6%) compared to White (15.4%) and Asian (10.2%) study participants.

On average, Black women were also older (Age 57.86) than Asian women (Age 53.2) at the time of surgical treatment. Although not statistically significant, Black women waited approximately 102.74 days for surgery after being diagnosed, while Asian women waited 78.7 days – a difference of almost one month. The starkest differences in duration and type of health insurance coverage were found between Black and White women. White women had coverage at one year (73.8%) post-surgery, as well as the six months (71.8%) prior to surgery. They tied Asian women in coverage at the six-month mark after surgery, with both groups totaling 83.1%. More Black women were enrolled in HMO plans (15.9%) compared to all groups. HMO plans tend to be the least expensive (in terms of monthly out of pocket costs). They also afford minimum choice and freedom for enrollees (Baker et.al., 2020). Inversely, Black women represent the smallest group of enrollees (37.9%) in POS plans which are typically the most expensive type (Baker et.al., 2020). White (51.7%) and Asian women (61.3%) populate them by a much wider margin.

Black (38.7%) and Latino (26.1%) women report having up to a high school level of education, while Asian (47.1%) women indicate earning a bachelor's degree or higher. They have the most advanced education in the sample, and Black women have the least. Black women

also reported earning an annual salary of \$40-49K (41.4%) Asian (48.4%) and White women (41.9%) dominate the highest tier of \$100K or more. Only 16.2 percent of Black women were found in this latter category. Net worth, as an additional measure of SES, was highest among Asians (50.8%) who had \$500,000 or more in assets, followed by Whites (38.1%). Blacks were disproportionately represented (43.6%) in the group that reported net worth of \$25K or less. Lower education and SES status overall was most common among Black women. Table 3.

Table 3.*Racial-Ethnic Disparity in Selected Social Determinants of Health*

	Overall	Asian	Black	Hispanic	White	p-value
N	7728	225	636	567	5967	
Age (mean (±SD))	56.61 (±12.40)	53.24 (±11.94)	57.86(±12.84)	53.78 (±12.42)	56.87 (±12.29)	<0.001
days < diagnosis and surgery	90.88 (±233.53)	78.77 (±233.57)	102.74 (±256.29)	81.02 (±197.94)	92.29 (±238.09)	0.155
Insurance diagnosis to procedure	4927 (±63.8)	138 (±61.3)	402 (±63.2)	347 (±61.2)	3781 (±63.4)	<0.001
Insurance 1 year after surgery	5620 (±72.7)	163 (±72.4)	440 (±69.2)	408 (±72.0)	4403 (±73.8)	<0.001
Insurance 6 months after surgery	6366 (±82.4)	187 (±83.1)	497 (±78.1)	460 (±81.1)	4956 (±83.1)	0.018
Insurance 6 months < surgery	5441 (±70.4)	158 (±70.2)	425 (±66.8)	378 (±66.7)	4286 (±71.8)	<0.001
Insurance plan types						<0.001
EPO	545 (7.1)	18 (8.0)	61 (9.6)	65 (±11.5)	385 (6.5)	
HMO	1041 (13.5)	28 (12.4)	101 (15.9)	80 (14.1)	781 (13.1)	
IND	28 (0.4)	0 (0.0)	3 (0.5)	1 (0.2)	24 (0.4)	
OTH	1768 (22.9)	34 (15.1)	189 (29.7)	109 (19.2)	1366 (22.9)	
POS	3917 (50.7)	138 (61.3)	241 (37.9)	283 (49.9)	3087 (51.7)	
PPO	429 (5.6)	7 (3.1)	41 (6.4)	29 (5.1)	324 (5.4)	
Education level						<0.001
	162 (2.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Less than 12th Grade	9 (0.1)	0 (0.0)	1 (0.2)	6 (1.1)	2 (0.0)	
High School Diploma	1438 (18.6)	22 (9.8)	246 (38.7)	148 (26.1)	1004 (16.8)	
Less than Bachelor Degree	4144 (53.6)	96 (42.7)	328 (51.6)	293 (51.7)	3334 (55.9)	
Bachelor Degree or higher	1961 (25.4)	106 (47.1)	61 (9.6)	120 (21.2)	1614 (27.0)	
Federal poverty level						<0.001
	162 (2.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Above 400%	7173 (92.8)	207 (92.0)	603 (94.8)	518 (91.4)	5688 (95.3)	
Below 400%	9 (0.1)	0 (0.0)	1 (0.2)	0 (0.0)	8 (0.1)	
Home Ownership						<0.001
	162 (2.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Homeowner	6042 (78.2)	179 (79.6)	453 (71.2)	408 (72.0)	4871 (81.6)	
Renter	490 (6.3)	15 (6.7)	80 (12.6)	49 (8.6)	338 (5.7)	
Household Income Range						<0.001
	162 (2.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
<\$40K	1484 (19.2)	19 (8.4)	263 (41.4)	125 (22.0)	1050 (17.6)	
\$40K-\$49K	463 (6.0)	18 (8.0)	64 (10.1)	35 (6.2)	338 (5.7)	
\$50K-\$59K	474 (6.1)	10 (4.4)	52 (8.2)	45 (7.9)	358 (6.0)	
\$60K-\$74K	680 (8.8)	25 (11.1)	61 (9.6)	58 (10.2)	524 (8.8)	
\$75K-\$99K	1116 (14.4)	26 (11.6)	61 (9.6)	78 (13.8)	923 (15.5)	
\$100K+	2965 (38.4)	109 (48.4)	103 (16.2)	177 (31.2)	2503 (41.9)	
Net Worth Range						<0.001
	162 (2.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
< \$25K	1353 (17.5)	23 (10.2)	277 (43.6)	118 (20.8)	917 (15.4)	
\$25 – 149	1283 (16.6)	21 (9.3)	133 (20.9)	101 (17.8)	1004 (16.8)	
\$150 – 249	671 (8.7)	15 (6.7)	61 (9.6)	39 (6.9)	546 (9.2)	
\$250-499	1190 (15.4)	35 (15.6)	68 (10.7)	101 (17.8)	958 (16.1)	
\$500K+	2691 (34.8)	113 (50.2)	65 (10.2)	159 (28.0)	2276 (38.1)	
Occupation Type (%)						<0.001
	162 (2.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	
Manager/Owner/Professional	547 (7.1)	17 (7.6)	25 (3.9)	42 (7.4)	442 (7.4)	
White Collar/Health/Civil						
Service/Military	718 (9.3)	15 (6.7)	49 (7.7)	32 (5.6)	611 (10.2)	
Blue Collar	225 (2.9)	5 (2.2)	21 (3.3)	12 (2.1)	183 (3.1)	
Homemaker/Retired	654 (8.5)	9 (4.0)	56 (8.8)	17 (3.0)	562 (9.4)	
Missing/Unknown	5422 (70.2)	179 (79.6)	485 (76.3)	464 (81.8)	4169 (69.9)	
Number of children @home	0.24 (0.64)	0.41 (0.72)	0.15 (0.51)	0.30 (0.70)	0.23 (0.64)	
Number of adults @home	1.92 (1.25)	2.11 (1.17)	1.59 (1.07)	1.94 (1.24)	1.94 (1.27)	

4.4 SAMPLE OVERVIEW: MATCHED DATA BY BLACK AND WHITE RACE

The matched study sample comprises 1,907 adult women diagnosed with breast cancer that underwent total mastectomy and no prior treatment for breast cancer (n = 1907). The average age of women in the total sample was 58.77 ± 12.92 . Statistically significant difference (p.029) was found with Black women being younger, on average 57.86 (12.84%) years old, and White women were 59.22 (12.94%) years old. Self-reported race was White (n=1271) and Black (n=636). These figures reflect women diagnosed at all stages and with all types of breast cancer. The average number of days from diagnosis to surgery was 94 ± 250.19 . White women waited 90.06 days on average while Black women waited 102.74 days, about 12 days longer. Less than 10% of the sample – only 160 individuals – received PNB. Specifically, 48 or 7.5% of Black women received it and 112 or 8.8% of White women underwent the procedure. Access to pharmacotherapy was far more widespread as 79.3% or 1,512 women received prescriptions, with a slightly higher percentage of Black women (80.8%) receiving opioid prescriptions than White women (78.5%). Most of them, 67.8%, were written in the postoperative period. Also notable, White women were significantly more likely to have insurance coverage six months (82.4%, p.031) and one year after surgery (74 %, p.0.32) after surgery. Table 4.

Table 4.*Sample Overview: Matched Data by Black and White Race*

	Overall	B	W	p
N	1907	636	1271	
Opioid = 1 (%%)	1512 (79.3)	514 (80.8)	998 (78.5)	0.268
Preop_opioid = 1 (%)	398 (20.9)	126 (19.8)	272 (21.4)	0.456
Postop_opioid = 1 (%)	1293 (67.8)	443 (69.7)	850 (66.9)	0.241
Opioid_diag_proc = 1 (%)	1038 (54.4)	361 (56.8)	677 (53.3)	0.163
Age (mean (±SD))	58.77 (±12.92)	57.86 (±12.84)	59.22 (±12.94)	0.029
Peripheral_nerve_block = 1 (%)	160 (8.4)	48 (7.5)	112 (8.8)	0.394
Dx to procedure	94.29 (250.19)	102.74 (256.29)	90.06 (247.07)	0.297
Continued enrollment	1226 (64.3)	402 (63.2)	824 (64.8)	0.518
One year >surgery	1380 (72.4)	440 (69.2)	940 (74.0)	0.032
6 months > surgery	1544 (81.0)	497 (78.1)	1047 (82.4)	0.031
6 months < surgery	1266 (66.4)	425 (66.8)	841 (66.2)	0.815
Insurance plans				0.002
EPO – Exclusive Provider Org	121 (6.3)	61 (9.6)	60 (4.7)	
HMO – Health Maintenance Org	302 (15.8)	101 (15.9)	201 (15.8)	
IND – Indemnity	6 (0.3)	3 (0.5)	3 (0.2)	
OTHER	588 (30.8)	189 (29.7)	399 (31.4)	
POS- Point of Service	751 (39.4)	241 (37.9)	510 (40.1)	
PPO-Preferred Provider Org.	139 (7.3)	41 (6.4)	98 (7.7)	
Education Level				0.969
Less than 12th Grade	2 (0.1)	1 (0.2)	1 (0.1)	
High School Diploma	738 (38.7)	246 (38.7)	492 (38.7)	
Less than Bachelor	984 (51.6)	328 (51.6)	656 (51.6)	
Bachelor Plus	183 (9.6)	61 (9.6)	122 (9.6)	
Federal Poverty Status				1
Above 400% FPL	1808 (94.8)	603 (94.8)	1205 (94.8)	
Below 400% FPL	3 (0.2)	1 (0.2)	2 (0.2)	
Unknown/Missing	96 (5.0)	32 (5.0)	64 (5.0)	
Home Ownership				0.958
Unknown	309 (16.2)	103 (16.2)	206 (16.2)	
Homeowner	1364 (71.5)	453 (71.2)	911 (71.7)	
Renter	234 (12.3)	80 (12.6)	154 (12.1)	
Household Income Range				1
Unknown	96 (5.0)	32 (5.0)	64 (5.0)	
<\$40K	788 (41.3)	263 (41.4)	525 (41.3)	
\$40K-\$49K	192 (10.1)	64 (10.1)	128 (10.1)	
\$50K-\$59K	156 (8.2)	52 (8.2)	104 (8.2)	
\$60K-\$74K	183 (9.6)	61 (9.6)	122 (9.6)	
\$75K-\$99K	183 (9.6)	61 (9.6)	122 (9.6)	
\$100K+	309 (16.2)	103 (16.2)	206 (16.2)	
Net Worth Range				<0.001
\$500K+	287 (15.0)	65 (10.2)	222 (17.5)	
\$250K-\$499K	222 (11.6)	68 (10.7)	154 (12.1)	
\$150K-\$249K	189 (9.9)	61 (9.6)	128 (10.1)	
\$25K-\$149K	427 (22.4)	133 (20.9)	294 (23.1)	
<\$25K	686 (36.0)	277 (43.6)	409 (32.2)	
Unknown	96 (5.0)	32 (5.0)	64 (5.0)	
Occupation Type				0.003
Manager/Owner/Professional	103 (5.4)	25 (3.9)	78 (6.1)	
White Collar/Health/Civil Service/Military	147 (7.7)	49 (7.7)	98 (7.7)	
Blue Collar	71 (3.7)	21 (3.3)	50 (3.9)	
Homemaker/Retired	230 (12.1)	56 (8.8)	174 (13.7)	
Missing/Unknown	1356 (71.1)	485 (76.3)	871 (68.5)	
Children at home	0.15 (0.53)	0.15 (0.51)	0.15 (0.54)	0.996
Adults at home	1.61 (1.10)	1.59 (1.07)	1.62 (1.12)	0.581

4.5 AIM 1: RACIAL DISPARITY IN TREATMENT – PNB

As previously outlined, the first aim of the study is to examine racial-ethnic disparity in the use of PNB during total mastectomy, with a focus on differences between Black and White women. Specific research question on PNB and results are detailed below.

1: What, if any, race-based disparities exist in usage of PNBs at time of total mastectomy?

While it was hypothesized that Black women would be less likely to receive PNB compared to White women, this hypothesis was not proven. Rather, the null hypothesis was confirmed when results showed no significant differences in PNB treatment overall. When Black and White women were exact matched on two major social determinants of health - level of education and household income – and propensity score matched on federal poverty level and homeownership status, lack of significance on PNB distribution remained insignificant. Table 5.

Table 5.

Racial Disparity in PNB Administration

	Overall	Black	White	P value
	PNB Administration			
N	6603	636	5967	
PNB Administered	592 (9.0)	48 (7.5)	544 (9.1)	0.213
	PNB – Matched Groups			
N	1907	636	1271	
PNB Administered = 1 (%)	160 (8.4)	48 (7.5)	112 (8.8)	0.394

4.6 AIM 2: RACIAL DISPARITY IN TREATMENT – PRESCRIPTION OPIOIDS

The second aim was to evaluate racial-ethnic disparity in the rate of opioid prescriptions written with a focus on differences between Black and White women. Specific research question on prescription opioid(s) and results are detailed below.

2. What, if any, race based disparities exist in the prescription of opioids for postoperative pain following total mastectomy?

Like PNB distribution, it was hypothesized that prescription opioids would not be given to Black women as frequently as White women. This assumption was only partly confirmed. The null hypothesis was confirmed when results showed insignificance in prescriptions written for both groups during the post-operative period. However, rather astoundingly, White women were significantly more likely to receive prescriptions for opioids prior to total mastectomy, up to 14 days earlier. However, when Black and White women were exact matched on level of education and household income, and propensity score matched on federal poverty level and homeownership status, significance was no longer evident. White women did not receive prescription opioids at a significantly higher rate than Black women prior to surgery. Therefore, the null hypothesis is confirmed for disparity in prescription of opioids when Black women and White women are matched. Table 6.

Table 6.*Racial Disparity in Treatment – Prescription Opioid(s)*

	Overall	Black	White	P values
		Prescription Opioid(±s)		
N	6603	636	5967	
All Opioids Prescribed	5338 (80.8)	514 (80.8)	4824 (80.8)	1
Opioids Prescribed (Preoperative)	1636 (24.8)	126 (19.8)	1510 (25.3)	0.003
Opioids Prescribed (Postoperative)	4466 (67.6)	443 (69.7)	4023 (67.4)	0.271
		Matched Groups		
N	1907	636	1271	
All Opioids Prescribed = 1 (%)	01512 (79.3)	514 (80.8)	998 (78.5)	0.268
Opioids Prescribed (Preoperative) = 1 (%)	398 (20.9)	126 (19.8)	272 (21.4)	0.456
Opioids Prescribed (Postoperative) = 1 (%)	1293 (67.8)	443 (69.7)	850 (66.9)	0.241

Likelihood Ratio (LR) logistic regression analysis was conducted to identify the significant predictors of opioid and PNB prescribing. Study participants were significantly more likely to receive PNB if they had net worth that was not between \$25K and \$149K (OR -0.78; 95% CI -1.29, -0.26). Also, if they were not enrolled in an HMO (OR -0.77 95% CI -1.66, 0.12), or an Indemnity plan (OR -12.33; 95%CI -13.42, -11.24).

Similarly, study participants were significantly more likely to receive prescriptions for opioids if they were younger (OR -0.05; 95% CI -0.06, -0.03). And, not enrolled in an HMO (OR -0.72; 95% CI -1.34, -0.10).

During the preoperative period, study participants were more likely to receive opioids if they were younger (OR -0.03; 95% CI -0.04, -0.02). Also, if they had net worth that was unknown or 0 (OR -0.58; 95% CI -1.11, -0.05), or under 25K, the lowest bracket or 1, (OR -0.51; 95% CI -0.86, -0.1). They were also significantly more likely to receive opioids during the preoperative period if they were not enrolled in an HMO (OR -0.48; 95% CI -0.98, 0.03), an indemnity health plan (OR -13.11; 95% CI -14.03, -12.18) or continuously enrolled in any

insurance plan (OR -0.22; 95% CI -0.47). Also, more likely to receive if they did not have children at home (OR -0.21; 95% CI -0.44, 0.02).

During the post-operative period, study participants were significantly more likely to receive prescriptions for opioids if they were younger (OR -0.03; 95% CI -0.04, -0.02). Also, if they had low net worth below \$25K (OR 0.47; 95% CI 0.16, 0.78). And, if they were enrolled in a POS plan (OR 0.41; 95% CI -0.002, 0.83). Table 7.

Table 7.

Binomial Regression Analysis N=1907

Reference Level		Dependent variables			
		Opioid	Pre-Op Opioid	Post-Op Opioid	PNB
Constant		4.48*** (3.26, 5.71)	0.95** (0.12, 1.79)	2.08*** (1.17, 3.00)	-2.05*** (-3.27, -0.83)
PNB		-0.04 (-0.47, 0.38)	0.16 (-0.23, 0.55)	0.04 (-0.32, 0.41)	
Black	Age	-0.05*** (-0.06, -0.03)	-0.03*** (-0.04, -0.02)	-0.03*** (-0.04, -0.02)	-0.002 (-0.02, 0.02)
	RACE_CODEW	-0.06 (-0.31, 0.19)	0.10 (-0.15, 0.34)	-0.06 (-0.27, 0.14)	0.15 (-0.21, 0.50)
5	NETWORTH_4	-0.29 (-0.71, 0.14)	-0.21 (-0.61, 0.20)	0.03 (-0.33, 0.40)	-0.24 (-0.81, 0.33)
	NETWORTH_3	-0.27 (-0.70, 0.16)	-0.13 (-0.56, 0.31)	-0.05 (-0.43, 0.33)	-0.06 (-0.65, 0.52)
	NETWORTH_2	0.04 (-0.35, 0.43)	-0.21 (-0.56, 0.14)	0.20 (-0.14, 0.54)	-0.78*** (-1.29, -0.26)
	NETWORTH_1	0.21 (-0.15, 0.57)	-0.51*** (-0.86, -0.15)	0.47*** (0.16, 0.78)	-0.37 (-0.82, 0.07)
	NETWORTH_0	-0.11 (-0.67, 0.46)	-0.58** (-1.11, -0.05)	0.24 (-0.25, 0.72)	-0.50 (-1.28, 0.28)
EPO	HMO	-0.72** (-1.34, -0.10)	-0.48* (-0.98, 0.03)	-0.07 (-0.53, 0.39)	-0.77* (-1.66, 0.12)
	IND	-1.23 (-2.88, 0.42)	-13.11*** (-14.03, -12.18)	-0.32 (-1.94, 1.29)	-12.33*** (-13.42, -11.24)
	OTH	-0.27 (-0.90, 0.36)	-0.16 (-0.68, 0.36)	0.18 (-0.29, 0.65)	-0.32 (-1.12, 0.48)
	POS	0.08 (-0.53, 0.69)	-0.34 (-0.78, 0.10)	0.41* (-0.002, 0.83)	-0.10 (-0.74, 0.53)
	PPO	0.08 (-0.67, 0.84)	0.03 (-0.57, 0.62)	0.27 (-0.30, 0.84)	-0.10 (-1.06, 0.85)
	NUM_CHILD	-0.12 (-0.43, 0.19)	-0.21* (-0.44, 0.02)	-0.14 (-0.37, 0.08)	0.10 (-0.19, 0.38)
	NUM_ADULTS	0.05 (-0.13, 0.23)	0.04 (-0.06, 0.13)	0.01 (-0.10, 0.12)	0.03 (-0.12, 0.18)
Cont. Enroll: Insur		-0.09 (-0.35, 0.16)	-0.22* (-0.47, 0.02)	0.02 (-0.18, 0.22)	0.28 (-0.09, 0.65)

*P=0 ****, p=0.001 ***, p=0.01 **, **

4.7 AIM 3: YEAR OVER YEAR TRENDS – PNB AND PRESCRIPTION OPIOIDS

Aim three is an amalgam of aims one and two. It focuses on observed changes in utilization of PNB and access to prescription opioids over time. Specific research question and results are detailed below.

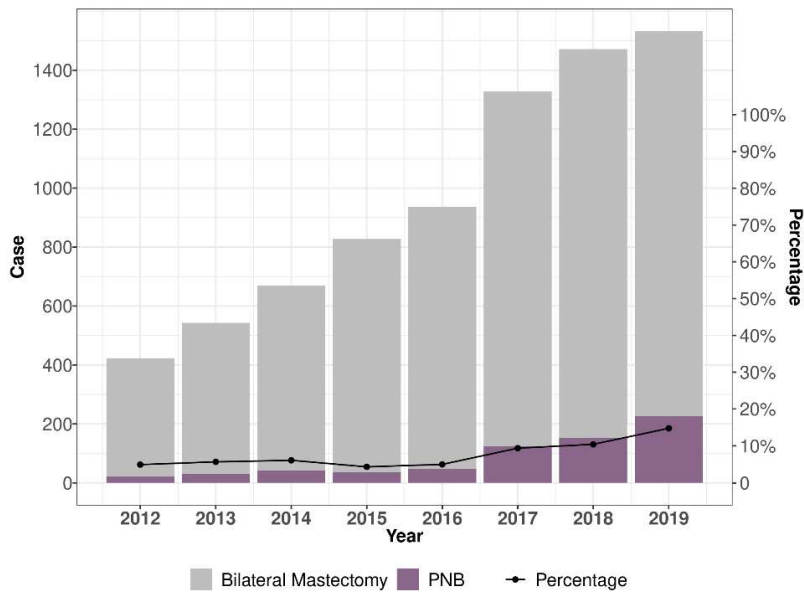
3. What, if any, changes have occurred in the frequency of orders placed for PNBs and prescription opioids over time, to treat postoperative pain resulting from mastectomy? The present study is also concerned with physician prescribing prior to the start of the COVID-19 pandemic. Specifically, the period between January 1, 2012 and December 31, 2019. First, PNB utilization trends for the entire sample are discussed followed by data for all racially minoritized groups with an emphasis on Black and White women.

PNB

Among the total sample of women that underwent double mastectomy, PNB was seldom administered – growing from a single digit percentage in 2012 to just over 15% of all cases in 2019. Figure 3.

Figure 3.

Sample Overview – PNB Administration



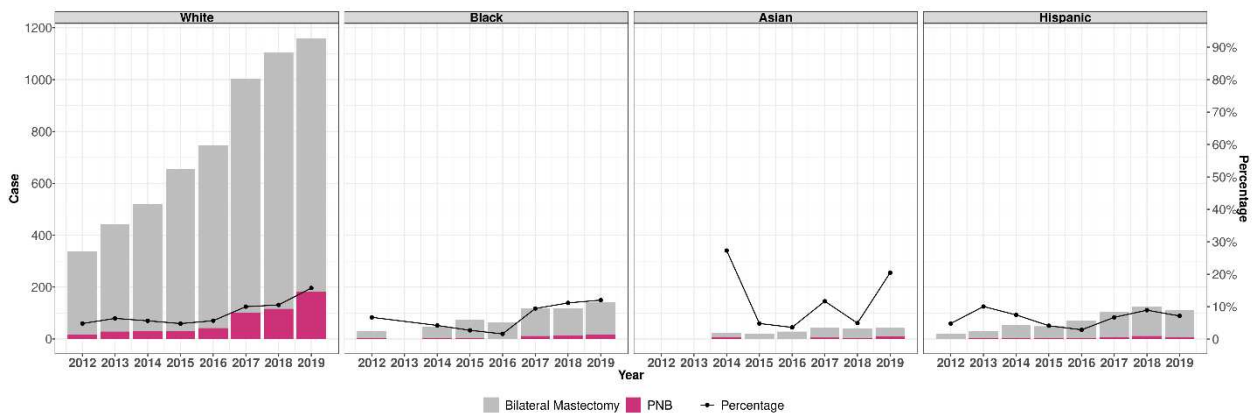
White women received PNB considerably more consistently over the years. In 2017, just about 10% of them underwent the procedure and this figure increased to 15% by 2019. PNB

administration trends for Black and Latino women followed a similar pattern, hovering just around 10% for Black and Hispanic women by 2019.

The most dramatic pattern of PNB administration is found in the Asian population, starting with 30% of women in 2012, dropping precipitously to under 5% by 2016, spiking to 10% in 2017, declining again to single digits in 2018, and up to about 20% in 2019. Statistical significance was not seen on comparisons between groups, therefore, disparity in treatment was not proven. Figure 4.

Figure 4.

Racial Disparity in Treatment Year Over Year – PNB Administration

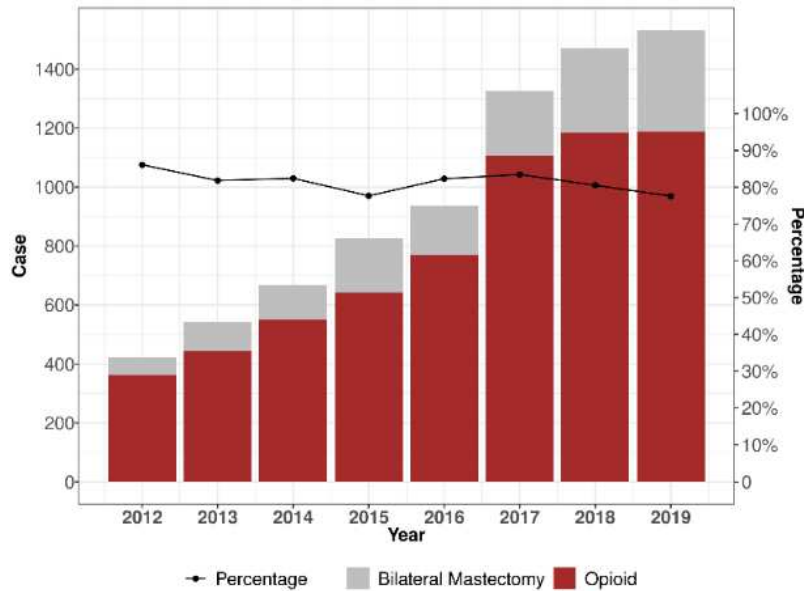


Prescription Opioid(s)

The number of opioid prescriptions written for women that underwent double mastectomy remained consistent through the years as reflected in the mostly horizontal line captured in Figure 1. Notably, very slight dips are observed between 2012 and 2013, 2014 and 2015, and 2017 and 2019. Figure 5.

Figure 5.

Sample Overview – Prescription Opioid(s)



When evaluating the percentage of opioid prescriptions written overall, there is clear variance in trends between whites and racially minoritized groups. Perhaps the most comprehensive finding is that White women were dispensed opioids rather consistently throughout study years, even as they were tapered down beginning in 2017. But racially minoritized groups received opioid prescriptions much more irregularly. Slightly more prescriptions were written for Black and Latino women in 2019. In each group, 80% of them were prescribed opioids compared to 75% of white women and 65% of Asians.

Particularly dramatic highs and lows are observed among Asian women with as much as 90% of them receiving opioids in 2012 to 65% in 2019. While a stealth decrease was observed among Asian women, the inverse was observed among Latino women. For example, in 2012, approximately 60% of this group received opioid prescriptions with a rather dramatic uptick to 90% just one year later in 2013. After some decline, the figure reached over 90% again in 2016

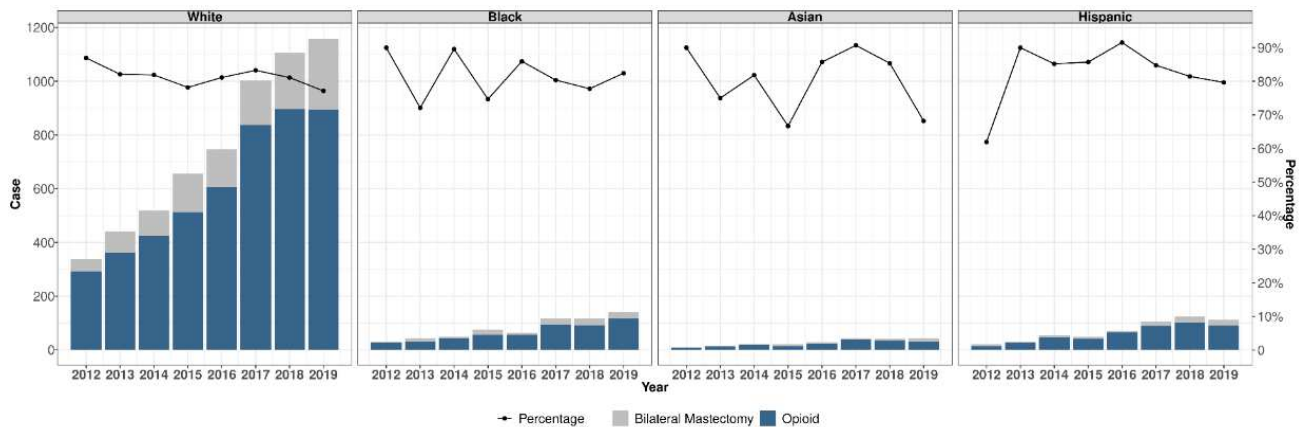
and then steadily declined in years following. By 2019, Latino and Black women were on par with 80% of both groups receiving opioid prescriptions.

When Black and White women are compared explicitly, consistent decline is observed for white women beginning in 2016 resulting in only 75% of them receiving prescriptions in 2019. However, this is not the case for Black women. This group received slightly more prescriptions during those same years culminating in 80% of them receiving prescription opioids in 2019.

Despite observed differences in cadence, statistical significance was not achieved in prescriptions for opioids overall. Therefore, inter-group disparity was not proven. Figure 6.

Figure 6.

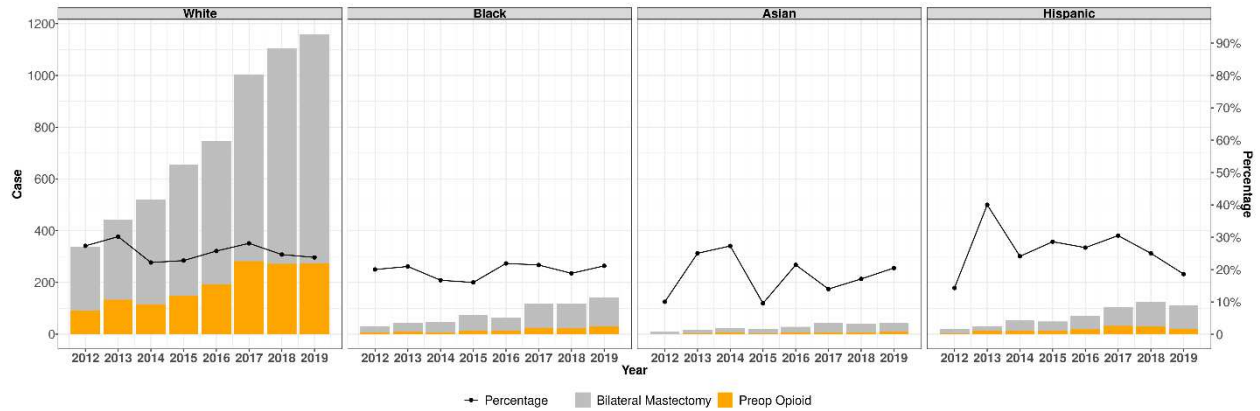
Racial Disparity in Treatment Year Over Year – Prescription Opioid(s)



As previously discussed, statistical significance was initially observed in the number of prescriptions written for White women (up to 14 days prior to surgery) compared to other groups, when adjustments were not made for SES. However, when exact and propensity matching was done, little difference is observed between Black and White women which is reflected in the virtually horizontal line across both groups from 2012 through 2019. Figure 7.

Figure 7.

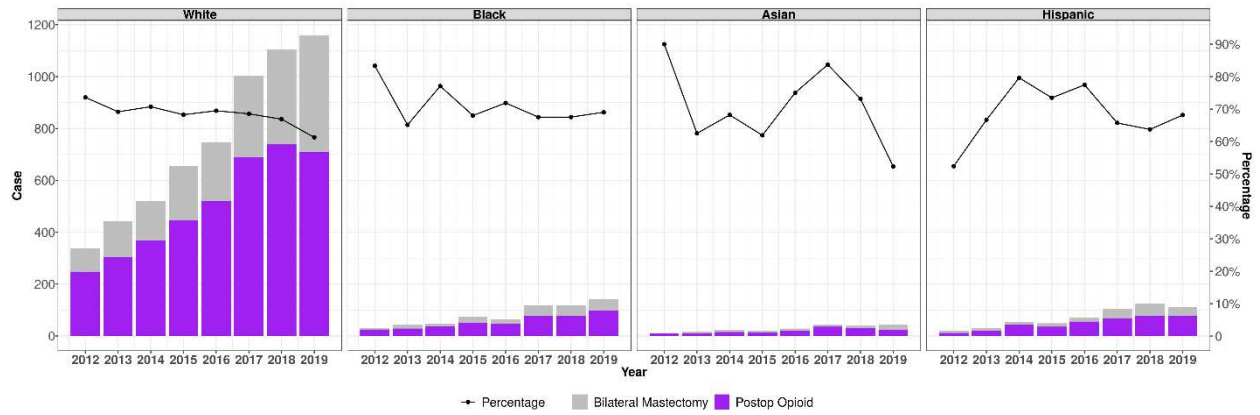
Racial Disparity in Treatment Year Over Year – Prescription Opioid(s) – Preoperative



More substantial differences in cadence are observed between Black and White women's access to opioids postoperatively. For example, more Black women (85%) received prescriptions than White women (70%) in 2012; they were second only to Asian women (90%). This was also the case in 2014 and 2019. Notably, more Latino women (80%) received opioid prescriptions than Black women (75%) from 2014 to 2016. Asian women received the least of all groups in 2018, plummeting from 90% in 2012 to 50% in 2019. Figure 8.

Figure 8.

Racial Disparity in Treatment Year Over Year – Prescription Opioid(s) – Postoperative



4.8 SUMMARY

This chapter provided a detailed demographic profile and overview of select quantitative findings, as well as various categorical correlations. The next chapter provides an extended discussion on study results.

Chapter 5

SUMMARY, DISCUSSION, IMPLICATIONS, AND RECOMMENDATIONS

This chapter presents a discussion of the study across the following sub-chapters: (1) Summary of the Statement of the Problem, Purpose, and Objectives, (2) Summary of Study Questions, (3) Summary of Study Methods, (4) Summary of Results, (5) Limitations of Study, (6) Implications, and (6) Conclusion.

5.1 SUMMARY OF THE STATEMENT OF THE PROBLEM, PURPOSE, AND OBJECTIVES

Race based disparities exist in almost every aspect of breast cancer treatment (Wheeler et. al., 2013). Black and Latino women, for example, do not receive chemotherapy and radiation as frequently as Whites. Black women are also five times more likely to experience treatment delays that last more than two months and are least likely to receive surgery (with or without radiation therapy) for curable breast cancers, notwithstanding adjustments for age and tumor characteristics. Breast surgeries range from oncologic mastectomy, breast reconstruction, and enhancement, and all have one characteristic in common: postoperative pain that substantially impacts quality of life (Urits et. al., 2020). Acute and chronic postoperative pain is a frequent occurrence in patients undergoing mastectomy and breast reconstruction, and more than half of these patients experience pain up to one year following surgery, which can lead to impairment of functional abilities.

The existing knowledge base on health disparities in breast cancer is heavily focused on outcomes for poor or low-income women. Little is known about the experience of privately insured Black breast cancer survivors that have higher SES. The existing literature is primarily deficiency focused - more concerned with financial lack, or it overlooks socioeconomic considerations outright. As a result, there is a growing need for research about differences in breast cancer treatment and outcomes between racial groups with like levels of health insurance

coverage and SES. The importance of matching as a study method cannot be overstated because it allows for control and isolation of all variables, which will lead to more tailored and effective interventions.

For Black people living in the United States, it is well established that racism, segregation, and psychosocial stress can combine to deteriorate health, as well as induce and exacerbate illness (William et al., 2016). And socioeconomic status – one’s proximity to poverty - can spur advanced or aggressive cancers among young Black women. Unfortunately, except for research from Williams and a small yet growing number of health equity researchers, there is limited scholarship that directly ties racial health disparities to the systemic social and cultural practices that produce them, including but not limited to poverty. An even lesser number of studies have removed poverty from the calculus entirely to examine social and cultural injustice more singularly in healthcare settings.

While there are clear gaps in the current health equity knowledge base, unproven theories related to human nature and racial inferiority abound. Consider the disproportionate impact of the COVID-19 pandemic, which renewed discourse on racism in healthcare in both the scientific community and public sphere. Most of it focused on differences between racial and ethnic groups based on phenotype or skin color. Attributing greater genetic susceptibility to COVID-19 to Black patients, for example (Giudicessi, 2020). Similar beliefs about race-based biological differences have been propagated by U.S. medical students, with some alleging that Black patients feel less pain than White ones based on skin color alone (Hoffman et al., 2016).

Frequently, research studies focused on health equity “do not explicitly connect observed disparities to mechanisms of systemic racism that drive adverse health outcomes among racialized and other marginalized groups. Without this connection, investigators inadvertently

support harmful narratives of biologic essentialism or cultural inferiority that pathologize racial identities and inhibit health equity” (Lett et. al, 2022, pg.158).

The Theory on the Biopsychosocial Effects of Perceived Racism (Clark et. al., 1999) evaluates the “effects of intergroup racism and intragroup racism” on health outcomes (p. 805) and is characterized by three principles. The first holds that if someone is exposed to racism and if the experience is “stressful, it may have a negative biopsychosocial sequela” and may also “help explain intergroup differences in health outcomes” (p. 806). The theory also suggests that “differential exposure to and coping responses following perceptions of racism may help account for the wide within-group variability in health outcomes” (p. 806). Most relevant to the study is the principle that “exposure to racism is among the factors related to negative health outcomes” and “specific intervention and prevention strategies could be developed and implemented to lessen its deleterious impact” (p. 806). Quite importantly, the Theory on the Biopsychosocial Effects overshadows this study on the importance of distinguishing between equality and equity in clinical care. It is concerned with understanding the equitable distribution of advanced pain treatment across individuals of different race/ethnicity. More specifically, documenting race-based physician bias and correlation to worse outcomes for Black patients.

The present study is intentional about challenging the objectionable yet common practice of presuming biologic essentialism, the presumption of cultural inferiority. By decoupling poverty and instead pairing economic solvency and prosperity with race, it aims to investigate whether physician treatment decisions concerning Blacks vary more with class than race, phenotypically considered. More specifically, whether having moderate to higher SES is linked to physicians affording Black breast cancer patients more equitable access to pain treatments.

5.2 SUMMARY OF STUDY QUESTIONS

- Research Question 1. What, if any, race-based disparities exist in usage of PNBs at time of total mastectomy?
- Research Question 2. What, if any, race based disparities exist in the prescription of opioids for postoperative pain following total mastectomy?
- Research Question 3. What, if any, changes have occurred in the frequency of orders placed for PNBs and prescription opioids over time, to treat postoperative pain resulting from mastectomy?

This section will unpack results on higher SES Black breast cancer survivors specifically, and contrasts between racial groups generally. Priority is given to White women as the control group.

5.3 SUMMARY OF STUDY METHODS

The present study used a cross-sectional design. Data was cleaned and coded into categorical and continuous variables. Descriptions of these variables were placed into a codebook for future use. Outcome variables were dichotomized to PNB Yes/No and prescription opioid Yes/No.

5.4 SUMMARY OF STUDY RESULTS

Participants and Procedures

Snapshot of the Sample: Young with Disproportionately High Black Representation

The total study sample consisted of more than 7,000 breast cancer survivors that underwent total mastectomy with no prior treatment for breast cancer. Secondary data was captured from routine medical care and combined with primary data collected from patients and health care providers. Inclusive of these data are electronic health records retrieved from medical visits that occurred pre and post breast cancer diagnosis and treatment.

Interestingly, women in the total sample were younger than those usually diagnosed with breast cancer, with an average age of 56.6. As previously introduced in the literature review, the

median age of breast cancer diagnosis for all racial/ethnic groups is 61 years old. This figure is slightly lower for Black women who are diagnosed at 58 years of age on average, and frequently present with higher grade tumors. (Yedjou et al., 2019) Women that received PNB in the present study were significantly younger, on average 55.7 years old.

Study results on younger age are consistent with existing literature which establishes a relationship between younger age and post-surgical pain. Specifically, that younger age is predictive of the experience of postoperative pain. Also, that younger women are more likely to elect breast reconstruction following lateral or bilateral mastectomy, and then report higher levels of postoperative pain (Kulkarni et al. 2017).

In the realm of race and ethnicity, it is not surprising that most of the sample (77%) self-identified as White, generally reflecting the most populous racial group in the nation. At the time of the study in 2019, Hispanics were the second largest racial group. However, Blacks (8.2%) were the second largest group in the sample which reflects a known fact from existing literature – Black women are more likely to develop more aggressive, more advanced-stage breast cancer that is diagnosed at a young age (Moormeier, 1996). Hispanic individuals (7.3%) were the third largest group in the sample followed by Asians (2.9%).

Black Women Lag Behind on Virtually All Social Determinants of Health

From the small group of enslaved African women that first disembarked at Fort Comfort, VA to the sizable number of African American women that now occupy middle and upper economic classes, Black women have collectively and consistently pushed for upward social mobility, a plight that is eloquently captured in the below excerpt from “The Three Mothers: How the Mothers of Martin Luther King, Jr., Malcolm X, and James Baldwin Shaped a Nation by Anna Malika Tubbs”.

“I am an American citizen and by God, we all have inalienable rights and whenever and wherever those rights are tampered with, there is nothing left to do but fight...and I fight.”

- Fredi Washington

“As a rule, the Negro woman as wife or mother was the mistress of her cabin...Neither economic necessity nor tradition had instilled in her the spirit of subordination to masculine authority. Emancipation only tended to confirm in many cases the spirit of self-sufficiency which slavery had taught.”

- Edward Franklin Frazier

The fruits of their labor are evident as all Black women in the present study are privately insured. Mostly, because of employer sponsored plans which signals access to consistent employment and income. Many Black women in the study also owned homes.

However, it is rather astounding that despite having private insurance, Black women ranked lowest on virtually all other measures of SES. They were outpaced by Asian and White women in educational attainment, household income, and net worth. They also had the lowest rate of home ownership even though more than half of them own homes.

Black women were also more likely to have unstable health insurance coverage. While nearly all were covered at the time of total mastectomy, they were significantly less likely to be continuously enrolled in their plan six months prior to, and after surgery. And, up to one year post surgery. Together, these findings signal that Black women’s socioeconomic status may be rather precarious in contrast to other groups, which mirrors extant research on the fragility of the Black middle class overall.

“African Americans who successfully enter the ranks of the middle class face several challenges to maintaining this status. Newly middle-class African Americans are particularly vulnerable to slipping back to their low-income origins, in part, because they lag behind Whites on many of the major indicators of middle classness (i.e., income, wealth, homeownership, and educational attainment). Middle class African Americans are mostly lower-middle class and are heavily concentrated in government employment and in jobs that provide services to low-income African Americans. More wage earners contribute to the total household incomes of African Americans, and strikingly, middle class African American families work almost twelve weeks more per year to earn the same income as similar White families.”

Escaping Poverty and Securing Middle Class Status: How Race and Socioeconomic Status Shape Mobility Prospects for African Americans During the Transition to Adulthood, 2009

Demographic Characteristics of the Sample

Virtually No PNBs Administered Across Races, Broad Access to Opioids Observed

Race and ethnicity notwithstanding, most of the sample did not receive PNBs at the time of total mastectomy. As previously discussed, less than 10% of the sample – only 682 women – received PNB while 7,046 did not. This suggests that PNBs were not standard of care for United Healthcare enrollees during the study period and may not have been common in breast cancer treatment overall. Not surprisingly, among those that received PNB, their wait from initial diagnosis to total mastectomy was significantly longer (110.1 days) compared to those that did not have the procedure (89.2 days). It is reasonable to consider that additional testing and administrative processing may have been required for these patients since PNB was seldom done during this time. (Do Peripheral Nerve Blocks Make Your Surgeons Skittish? Outpatient Surgery Magazine, October 10, 2007)

As previously discussed, prescribing opioids were standard practice as 80.9% or 6,250 women received prescriptions. Most of them, 67.6%, were written in the postoperative period. Not surprisingly, those that received PNB were significantly more likely to receive prescriptions for opioids prior to surgery (29.8%) compared to those that did not (24.1%). In a recent study on

prescription opioid misuse, White individuals were more likely to access and misuse opioids, more than Black, Hispanic, and Asian individuals from 1999 - 2018. Notably, the relative difference in misuse between White and Black individuals significantly decreased over time. (Schuler et. al., 2021)

Higher SES Black Breast Cancer Survivors Are Afforded Some Protection from Physician Bias

Williams et. al. asserts that being Black in and of itself is not a risk factor for breast cancer. (Williams et. al., 2016) Rather, various cultural, social, economic, and biological events intersect within the Black population more frequently, which gives rise to disproportionate breast cancer risk and mortality. Poverty, a distinct economic condition with numerous effects, may be an especially substantial consideration.

The results of the present study reveal that moderate to high SES is linked to more equitable medical treatment. For Black women battling breast cancer, having moderate to high SES offered a kind of shield from long established physician prejudice and racism. Yet, there are distinct limits to this protection. The highly porous nature of it is also disturbingly evident in study results.

Research Question #1

Black Breast Cancer Survivors Had Equitable Access to PNBs

Aim: To examine racial-ethnic disparity in the use of PNBs.

Research Question #1: What, if any, race-based disparities exist in usage of PNBs at time of total mastectomy?

Regarding PNB administration, statistically significant race-based disparity was not found. Among 6,603 Black and White women, PNB was administered to vastly more White women (544) or 9.1% than Black women (48) or 7.5. However, this chasm was not statistically significant ($p.213$) based on the total population of Black and White women receiving PNB. To

avoid confounding, specifically, ruling out the possibility that observed disparity is based on variables other than race, both groups were exact matched on core social determinants of health. They were also propensity score matched on federal poverty level and homeownership status. Once exact and propensity matching was completed, the sample size was reduced to only 1907 women. In this group 112 White women or 8.8% and 48 Black women or 7.5% received PNB. Notably, the number of Black women remained constant in both unmatched and matched groups. Statistical significance was not attained once both groups were matched ($p=0.394$). Because substantial difference in PNB administration was not observed between unmatched and matched Black and White women, race-based disparity was not proven. More nuanced findings were revealed in the regression analysis. For example, the greater likelihood of receiving PNB if a participant had net worth outside of \$25K-\$149K. Also, not being enrolled in an HMO plan. This finding is particularly interesting as it points to socioeconomic factors as drivers. HMO plans tend to be the least expensive in terms of out-of-pocket costs. They also provide the least flexible coverage because enrollees receive care from in-network physicians only (Baker et.al., 2020)

The findings in the present study are a sharp departure from a pioneering 2021 study that investigated racial/ethnic disparities in PNB administration for postoperative anesthesia (Lam et. al, 2021). This retrospective cohort study used National Surgical Quality Improvement Program (NSQIP) data. Participants were included if they underwent total mastectomy under general anesthesia, and unadjusted rates of PNB utilization were evaluated between racial/ethnic groups. Among 64,103 patients that underwent total mastectomy, 4,704 (7.3%) received a PNB. This study had a similar study period between 2015 and 2019, and its results on very low overall PNB utilization are consistent with the present study. Also, the skew on younger age. Multivariable logistic regression was performed to understand relationships between race-ethnicity and PNB

receipt, and results indicated that Black patients were less likely to receive PNB compared to White patients. Moreover, “significant disparity was found in the use of PNBs for postoperative analgesia in patients of different race-ethnicity who undergo total mastectomy in the United States.” (pg. 170) Notably, NSQIP data is culled from the patient’s medical chart rather than insurance claims. As such, the database does not capture health insurance plan types or individual socioeconomic data, a perceivable limitation for detecting any correlation to poverty and systemic racial injustice.

Research Question 2.

Black Breast Cancer Survivors Had Relatively Equitable Access to Opioids Overall

Aim: To evaluate racial-ethnic disparity in the rate of opioid prescriptions written.

Research Question 2: What, if any, race based disparities exist in the prescription of opioids for postoperative pain following total mastectomy?

For opioid prescriptions, statistically significant race-based disparity was found in the pre-operative period but not the post-operative one. Among 1,636 opioid prescriptions written for Black and White women, only 126 Black women received prescriptions in the pre-operative period compared to 1,510 White women, with statistical significance met ($p.003$). Without matching, White women were much more likely to receive opioid prescriptions earlier than Black women – by up to 14 days. This singular finding faintly echoes conclusions from existing literature. As introduced earlier, ethnic minority women were found to use opioids during the treatment phase but are “significantly less likely to receive opioids” months after treatment ended (Sakamoto et. al. 2021, p.36). When Black and White women were exact matched on level of education and household income, and propensity score matched on federal poverty level and homeownership status, significance was no longer evident however ($p.456$).

In the pre-operative period, White women did not receive prescription opioids at a much higher rate than Black women with virtually identical SES. The same was found in the post

operative period. Among 4,466 or 67.6% of opioid prescriptions written, 443 or 69.7% of them went to Black women in contrast to 4,023 or 67.4 % that went to White women. Surprisingly, this finding was not statistically significant ($p=.271$), and insignificance remained constant when both groups were matched ($p=.241$). These findings are supported in the existing literature. For example, in a recent study on opioid prescriptions written for metastatic breast cancer survivors, results indicate that almost 50% of 24,752 study participants received opioid prescriptions prior to their diagnosis. However, this figure dwindled significantly from 49.8% in 2006 to 42.5% in 2015, which points to enhanced vigilance of opioid prescribing (Shen et. al., 2020). In contrast, prescribing rates increased significantly in the Black population as “drug overdose deaths between 2015-2016 was 40 percent compared to the overall population increase at 21 percent” (Substance Abuse and Mental Health Services Administration: The Opioid Crisis and the Black/African American Population: An Urgent Issue., SAMHSA, 2020, pg. 3)

Regression analysis revealed more nuanced findings. Specifically, study participants were significantly more likely to receive opioids, pre and post-surgery, if they had net worth under 25K. Because Black women were over-represented on the lower rungs of socioeconomic categories including net worth and household income, as well as not having continuous health insurance, they were more likely to receive prescriptions for opioids. Arguably, their lower socioeconomic status is at least as, if not more predictive, of opioid access than their race. Again, these findings are reinforced in the existing literature. One study hypothesized that low-income ethnic minoritized patients are especially at risk for insufficient pain treatment (Anderson et al. 2015).

Research Question 3

*Black Breast Cancer Survivors Had Equitable Access to PNB Year Over Year,
But Were Pummeled with Opioids During National Epidemic*

Aim: To understand changes over time in the frequency of orders placed for PNBs and prescription opioids.

Research Question 3. What, if any, changes have occurred in the frequency of orders placed for PNBs and prescription opioids over time, to treat postoperative pain resulting from mastectomy?

Examining trends from January 1, 2012 through December 31, 2019, study findings reveal that despite the rate of PNB administration being extremely low overall, White women received PNB more frequently over the years but not at a statistically significant level. By 2019, 15% of them underwent the procedure compared to only 10% of Black and Hispanic women. This suggests that PNB administration did not increase significantly over time and reinforces results about lack of significance. Essentially, PNB administration was low for everyone.

Findings on year-over-year prevalence of PNB are reinforced in the existing literature. As previously introduced, “the proportion of mastectomy cases with PNB was 0.5% in 2010 and 13% in 2018” and prior to 2014, the odds of PNB among the mastectomy cases was not significantly different” (Lam et. al, 2021, pg.33). However, after 2014 PNB administration increased slightly but absolute prevalence remained very low.

Regarding year-over-year trends for opioid prescribing, greater volume and sharper differences in access are noted. For example, White women received opioid prescriptions consistently from 2012, but were tapered down beginning in 2016 and reached a low of 75% by 2019. In comparison, Black women received opioids more frequently starting in 2016, and reached a high of 80% by 2019.

This observed difference of 5% by 2019 appears small. However, it is quite significant when considered against the backdrop of the national opioid epidemic, with HHS declaring the national epidemic in 2018. In study years, 2017 and 2018, 47,600 and 46, 802 opioid-induced overdose deaths occurred respectively (Centers of Disease Control and Prevention, National

Center for Health Statistics, Multiple Cause of Death 1999-2020. Released 12/2021). The death rate continued to rise sharply through 2019 and 2020 when 68,630 overdose deaths were recorded. From 2017 through 2019 when physicians were reducing exposure to opioids among White women, they were simultaneously increasing exposure among Black women. Ultimately, exacerbating their risk for opioid addiction and overdose-induced death. This increased risk for Black women is documented in existing literature. One heavily cited study found that “although rates of opioid use at the national scale are higher for whites than they are for Blacks, rates of increase in opioid deaths have been rising more steeply among Blacks (43%) than whites (22%) over the last five years” (James et.al., 2018, pg. 404).

Despite Seemingly Equitable Access to PNB at Time of Surgery and Opioids Post Surgery, Black Breast Cancer Patients were Forced to Wait Longer

Extant literature establishes that Black women are more likely to wait longer than White woman for breast cancer surgery whether they receive PNB or opioids for post operative pain management, and this finding is reinforced in the present study. Compared to other racial/ethnic groups, Black women were found to wait the longest from time of diagnosis to time of procedure – 102.7 days. This is in comparison to 92 days for White, 78 days for Asian, and 81 days for Hispanic women. Even when Black women are matched with White women on core socioeconomic variables, they wait longer for surgery. On average, matched Black women waited 12 more days for surgery than their White counterparts. These findings suggest that waiting is a feature of the Black treatment experience, not predicted by SES alone but race. In important research conducted on 2,841 patients with stage I-III disease in the Carolina Breast Cancer Study, findings revealed that Black women wait longer for breast cancer surgery after being diagnosed than white women. Notably, “treatment delay was high at all levels of SES in Black women (eg, 11.7% in high SES Black women compared with 10.6% and 6.7% among low

and high SES White women, respectively). Neither SES nor access to care classes were significantly associated with delayed initiation among Black women, but both low SES and more barriers were associated with treatment duration across both groups” (Emerson et. al., 2020, pg. 4957)

5.5 DISCUSSION

Moderate to higher income Black women breast cancer survivors are in pain after treatment. This is a common occurrence, yet healthcare providers do not treat it (surgically) with heightened urgency. As a result, Black women experience greater pain and poorer quality of life. Prescribed opioids, which are far more accessible to Black women, may offer relief but these toxic and highly addictive agents may be more hazardous than beneficial. More patients and physicians should consider the trade-offs.

Across racial groups, breast cancer survivors with acute and chronic pain after surgery report worse scores on wellness assessments including mental health and daily social functioning compared to pain-free survivors. Epidemiological data confirms that the prevalence of post-breast cancer pain and poor symptom management is a burden on daily life and fulfilment of one’s full potential. For this reason, it is imperative to produce research that further excavates facets of postoperative breast cancer pain, and the physician’s role in potentially exacerbating it. Especially, on behalf of racial/ethnic groups that are historically marginalized and mistreated and that may have limited opportunity to advocate for better clinical care in more elite academic research circles. Deepening the line of insight on racial disparities in the provision of PNBs and prescription opioids can also help physicians increase their knowledge and multicultural competency, and dialogue with Black women patients.

This study can add to the growing body of research on breast cancer treatment disparities reported on by Shavers and Brown (2002). These include limited biomarker testing as well as follow-up after diagnosis and initial treatment, and surveillance mammography. In addition, Black women “disproportionately endure inadequate pain management and serious side effects of treatment, the result of patient- or tumor-related, provider-related, and health system-related differences (pg.602). However, these considerations are rarely addressed in empirical studies as complicit or connected actors.

The study can also address one of the overarching goals of Healthy People 2030, specifically, to “eliminate health disparities, achieve health equity, and attain health literacy to improve the health and well-being of all” (Healthy People 2030, 2022). With its focus on disparities in prescriptions of peripheral nerve block and opioids, it can address health equity and its links to social determinants of health. Moreover, it can help inform Healthy People 2030’s goal of providing “tools for action to help individuals, organizations, and communities committed to improving health and well-being advance health equity.” (Healthy People 2030, 2022)

5.6 LIMITATIONS OF STUDY

As previously established in Chapter 1, the present study is limited to making certain assumptions about physician attitudes and beliefs. Because the quantitative focus is on rate of prescribing, it cannot fully interrogate physicians’ motivations. Another limitation of the study is it did not consider Black physician prescribing practices and how they differed from choices made by White physicians. Also, the study hypothesized but did not consider the direct role of patients because they were not a part of the design, reporting, or dissemination of research. Missing data is also a well-known limitation when working with large data sets.

5.7 IMPLICATIONS

Lack of a Health Disparity is Not an Indication of the Existence of Health Equity

Health equity and health disparities are intertwined ideas (Braveman, 2014). Health equity refers to social justice in health (i.e., no one is denied the possibility to be healthy for belonging to a group that has historically been economically/socially disadvantaged). Health disparities are the metric used to measure progress toward achieving health equity. A reduction in health disparities (in absolute and relative terms) is believed to be evidence of movement toward greater health equity.

The results of the present study tell a different, and more complex story. PNB was administered to more White women than Black women - 9.1% versus 7.5% (unmatched), and 8.8% versus 7.5% (matched) – however statistically significant disparity was not found. Those who received PNB were more likely to not be enrolled with an HMO, the least expensive and least flexible type of insurance plan. This finding suggests that certain socioeconomic considerations are at play in the prescribing of PNB. Individuals with POS and PPO plans, which are generally more expensive offerings, have greater access to the procedure. SES seems to be as, if not more, predictive than race in physician prescribing. Race-based disparity for PNB administration may not have been found in the present study, at least not in absolute terms. Disparities based on level of insurance coverage, an indicator of SES, were revealed. This tension signals an extremely important challenge and opportunity for the field. Namely, to move beyond the accepted practice of presuming that lack of health disparity equates to achievement of health equity. As study findings reveal, PNB is rendered to Black women based on beliefs about both race and class or SES. Black women that fall on the lower rungs of insurance coverage plans are less likely to receive it. This pattern signals the existence of a different, arguably more

insidious, kind of disparity. In this scenario Black women are more likely to be denied because of their membership in relatively lower strata of moderate to higher SES groups. Plainly stated, despite their membership in a more privileged set, Black women are still treated as second class citizens by their physicians. They may have more access to treatment than their counterparts living in poverty, but the nature of this protection is porous because they still do not have open or readily available access to the most advanced treatments like PNB for postoperative pain.

Like Aim 1, statistically significant disparity in access to opioids was not observed in Aim 2. For example, 4,466 opioid prescriptions were written in the postoperative period with 443 or 69.7% of them going to Black women in contrast to 4,023 or 67.4 % to White women. Black women received just slightly more opioids, but the difference was not statistically significant. During the pre-operative stage, White women were significantly more likely to receive opioids although this difference evaporated when both groups were matched.

A rather stunning pattern emerges in results from Aim 3 which examined year over year trends in opioid prescribing. When a national public health crisis was raging due to misuse and rising death rates in 2016, opioid prescriptions started decreasing for White women while they increased markedly for Black women. By 2019, the tables had turned, so to speak, and Black women were receiving more opioids for pain than their white counterparts, 80% vs 75%. Like Aim 1, statistically significant race-based disparity was not proven or the existence of health equity. Physician over-prescribing or pummeling of opioids on Black women placed them at greater risk for misuse and opioid-induced death. Therefore, in this scenario, providing greater access to pain treatment is not curing a health disparity but creating multiple ones for Black women. It is the opposite of social justice in health, so equity is not achieved. However, this is

not clear when we only evaluate health disparity in absolute terms. A final consideration is the absolute disparity in wait times for life-saving breast cancer surgery. Black women are forced to wait longer in circumstances where they receive PNB and opioids and in circumstances when they do not. They wait the most. And they wait the longest. Even when Black women are matched socioeconomically with their White counterparts, this disparity does not disappear.

The results of the present study signal a strong need for future research to evaluate race-based disparity in both absolute and relative terms, and to educate those in and outside the academy that the absence of a health disparity does not signal the presence of health equity. Black women are denied the possibility of good health despite having seemingly equitable access to PNB and prescription opioids.

Heightened Focus on the Lives of Higher SES Black Breast Cancer Survivors

Previous health equity research has examined intersections of race and class but primarily focused on the poor and working class. Working- and middle-class Black women are generally in a more advantaged economic position than their poorer counterparts, but this group still faces its own unique challenges as captured in the results of the present study. Much remains to be learned about the complexities of how discrimination affects their health. The present study reveals strong need to further explore variance within the Black community, specifically, the distinct qualitative experiences of higher SES Black women.

Intersectionality Matters

In the present study, findings address both race and SES and demonstrate that both impact the health care experiences of Black women. This research takes the point of view that

they are very much intertwined or intersecting. Intersectionality, as a social science concept, contends that Black women have multiple oppressed identities that coexist and can exacerbate each other.

As a framework, it provides insight into how racism and economic disadvantage can affect Black women across classes and afford greater appreciation of intra group variance (Crenshaw, 1994). For this reason, it is vital to consider the role of intersectionality in the healthcare experiences of higher SES Black women in future research.

5.8 CONCLUSION

Rather than shed light on the important yet largely overlooked topic of SES and race-based disparity in breast cancer pain treatment, existing literature is hardly robust on the topic. Previous studies reveal that PNB is a viable option that offers superior postoperative pain relief compared to general anesthesia alone. Yet, few studies cover the usage of PNB with racially diverse women diagnosed with breast cancer. Little was also known about the extent to which Black women are prescribed prescription opioids for breast cancer pain, even as general overuse is well documented in other racial ethnic groups for other conditions. Black women frequently report negative experiences and dissatisfaction with their physicians related to pain management which may correlate to their receiving less prescriptions for opioids (Samuel et al. 2015). For example, their perceptions of clinician disregard when “symptoms were not treated or were attributed to non-treatment causes” or ignored outright (p.1433).

The present study revealed that while moderate to higher SES Black women have equitable access to PNB and pharmacotherapy - a kind of shield from long established physician bias against Black women – this protection is quite porous. They still do not have relatively open and ready access to PNB as a more advanced pain treatment. Nor do they have assurance that

they are protected from the overprescribing of opioids, which has serious and well-known safety risks. Therefore, on the surface, it appears that equity and racial inclusion are hallmarks of physician prescribing of postoperative breast cancer pain treatment. However, further interrogation reveals that ‘separate and somewhat equal’ is a more accurate characterization of their prescribing practices, based both on race and SES.

Black women should advocate for themselves more frequently to reduce this insidious practice. If they are able, they should do their own research on treatments (rather than rely solely on what they are told by doctors) and ask direct questions about pain symptoms and treatments to various healthcare providers, not just oncologists. They should vocalize their needs and desires directly and do so repeatedly if necessary. Finally, insured Black women should be aware of what health insurance companies will and won’t cover, and if they have means and ability, take steps to advocate for the latest, most advanced treatments. Black women can further think and behave healthy by continuously monitoring physician dialogue with vigilance.

REFERENCES

- Ajzen, I. (2006). *Behavioral interventions based on the Theory of Planned Behavior*. https://people.umass.edu/aizen/pdf/tpb_intervention.pdf
- Alkabban, F. M., & Ferguson T. (2021). Breast cancer. *StatPearls*. StatPearls Publishing.
- American Psychological Association, Task Force on Socioeconomic Status. (2007). *Report of the APA Task Force on Socioeconomic Status*. American Psychological Association. [https://www.apa.org/pi/ses/resources/publications/education#:~:text=Socioeconomic%20status%20\(SESES\)%20encompasses%20not,afforded%20to%20people%20within%20society.](https://www.apa.org/pi/ses/resources/publications/education#:~:text=Socioeconomic%20status%20(SESES)%20encompasses%20not,afforded%20to%20people%20within%20society.)
- Anderson, K. O., Palos, G. R., Mendoza, T. R., Cleeland, C.S., Liao, K. P., Fisch, M. J., Garcia-Gonzalez, A., Rieber, A. G., Nazario, L. A., Valero, V., Hahn, K. M., Person, C. L., & Payne, R. (2015). Automated pain intervention for underserved minority women with breast cancer. *Cancer*, *121*(11), 1882-1890. doi: 10.1002/cncr.29204.
- Anekar, A. A., & Cascella, M. (2022). WHO Analgesic Ladder. *StatPearls*. StatPearls Publishing. <https://www.ncbi.nlm.nih.gov/books/NBK554435/>
- Arthur, J., & Bruera, E. (2019). Balancing opioid analgesia with the risk of nonmedical opioid use in patients with cancer. *Nature Reviews Clinical Oncology*, *16*(4), 213-226. doi: 10.1038/s41571-018-0143-7.
- Artiga, S., Hill, L., Orgera, K., & Damico, A. (2021, July 16). Racial equity and health policy issue brief. *KFF*. <https://www.kff.org/racial-equity-and-health-policy/issue-brief/health-coverage-by-race-and-ethnicity/>
- Baker, L.C., Bundorf, M. K., & Kessler, D. P. (2010). HMO coverage reduces variations in the use of health care among patients under age sixty-five. *Health Affairs*, *29*(11), 2068-2074. doi: 10.1377/hlthaff.2009.0810. PMID: 21041750; PMCID: PMC3195432.
- Beebe-Dimmer, J. L., Ruterbusch, J. J., Harper, F., Baird, T. M., Finlay, D. G., Rundle, A. G., Pandolfi, S. S., Hastert, T. A., Schwartz, K. L., Bepler, G., Simon, M. S., Mantey, J., Abrams, J., Albrecht, T. L., & Schwartz, A. G. (2020). Physical activity and quality of life in African American cancer survivors: The Detroit Research on Cancer Survivors study. *Cancer*, *126*(9), 1987–1994. <https://doi.org/10.1002/cncr.32725>
- Braveman P. (2014). What are health disparities and health equity? We need to be clear. *Public Health Reports*, *129*(Suppl 2): 5–8. <https://doi.org/10.1177/00333549141291S203>
- Cali Cassi, L., Biffoli, F., Francesconi, D., Petrella, G., & Buonomo, O. (2017). Anesthesia and analgesia in breast surgery: The benefits of peripheral nerve block. *European Review for Medical and Pharmacological Science*, *21*(6), 1341-1345.

- Carey, L. A., Perou, C. M., Livasy, C. A., Dressler, L. G., Cowan, D., Conway, K., Karaca, G., Troester, M. A., Tse, C. K., Edmiston, S., Deming, S. L., Geradts, J., Cheang, M. C., Nielsen, T. O., Moorman, P. G., Earp, H. S., & Millikan, R.C. (2006). Race, breast cancer subtypes, and survival in the Carolina Breast Cancer Study. *JAMA*, *295*(21), 2492-2502.
- Centers of Disease Control and Prevention, National Center for Health Statistics. (2021, December). *Multiple cause of death 1999-2020*. CDC.
- Chen, T. C., Chen, L. C., Kerry, M., & Knaggs, R. D. (2019). Prescription opioids: Regional variation and socioeconomic status - evidence from primary care in England. *International Journal of Drug Policy*, *64*, 87-94. doi: 10.1016/j.drugpo.2018.10.013.
- Chin, C. H., Tseng, L. M., Chao, T. C., Wang, T. J., Wu, S. F., & Liang, S. Y. (2021). Self-care as a mediator between symptom-management self-efficacy and quality of life in women with breast cancer. *PloS One*, *16*(2), e0246430.
- Clark, R., Anderson, N. B., Clark, V. R., & Williams, D. R. (1999). Racism as a stressor for African Americans: A biopsychosocial model. *American Psychologist*, *54*(10), 805–816. <https://doi.org/10.1037/0003-066X.54.10.805>
- Cleeland, C. S., Gonin, R., Baez, L., Loehrer, P., & Pandya, K. J. (1997). Pain and treatment of pain in minority patients with cancer: The Eastern Cooperative Oncology Group Minority Outpatient Pain Study. *Annals of Internal Medicine*, *127*(9):813-816. doi: 10.7326/0003-4819-127-9-199711010-00006. PMID: 9382402.
- Coughlin S. S. (2021). Social determinants of health and cancer survivorship. *Journal of Environment and Health Sciences*, *7*(1), 11–15.
- Coughlin, S. S., Yoo, W., Whitehead, M. S., & Smith, S. A. (2015). Advancing breast cancer survivorship among African-American women. *Breast Cancer Research and Treatment*, *153*(2), 253–261. <https://doi.org/10.1007/s10549-015-3548-3>
- Crenshaw. K. W. (1994). Mapping the margins: Intersectionality, identity politics, and violence against women of color. In M. A. Fineman & R. Mykitiuk (Eds.), *The public nature of private violence* (pp. 93-118). Routledge.
- Dalal, S., & Bruera, E. (2019). Pain management for patients with advanced cancer in the opioid epidemic era. *American Society of Clinical Oncology Educational Book*, *39*, 24-35.
- De Lew, N., Greenberg, G., & Kinchen, K. (1992). A layman's guide to the U.S. health care system. *Health Care Financing Review*, *14*(1), 151–169.
- DeSantis, C. E., Ma, J., Gaudet, M. M., Newman, L. A., Miller, K. D., Goding Sauer, A., Jemal, A., & Siegel, R. L. (2019). Breast cancer statistics, 2019. *CA: A Cancer Journal for Clinicians*, *69*(6),438-451.

- Dietze, E. C., Sistrunk, C., Miranda-Carboni, G., O'Regan, R., & Seewaldt, V. L. (2015). Triple-negative breast cancer in African-American women: Disparities versus biology. *Nature Reviews. Cancer*, *15*(4), 248–254.
- Do peripheral nerve blocks make your surgeons skittish? Outpatient surgery.* (2007, October 10). Herrin Pub. Partners.
- Drageset, S., Austrheim, G., & Ellingsen, S. (2021). Quality of life of women living with metastatic breast cancer and receiving palliative care: A systematic review. *Health Care for Women International*, 1-22.
- Emerson, M. A., Golightly, Y. M., Aiello, A. E., Reeder-Hayes, K. E., Tan, X., Maduekwe, U., Johnson-Thompson, M., Olshan, A. F., & Troester, M. A. (2020). Breast cancer treatment delays by socioeconomic and health care access latent classes in Black and White women. *Cancer*, *126*(22), 4957-4966. doi: 10.1002/cncr.33121.
- Escaping poverty and securing middle class status: How race and socioeconomic status shape mobility prospects for African Americans during the transition to adulthood.* (2009).
- Giudicessi, J. R., Roden, D. M., Wilde, A., & Ackerman, M. J. (2020). Genetic susceptibility for COVID-19-associated sudden cardiac death in African Americans. *Heart Rhythm*, *17*(9), 1487–1492. <https://doi.org/10.1016/j.hrthm.2020.04.045>
- Goodlev, E. R., Discala, S., Darnall, B. D., Hanson, M., Petok, A., & Silverman, M. (2019). Managing cancer pain, monitoring for cancer recurrence, and mitigating risk of opioid use disorders: A team-based, interdisciplinary approach to cancer survivorship. *Journal of Palliative Medicine*, *22*(11), 1308-1317.
- Greene, N., Malone, J., Adams, M. A., Dean, L. T., & Poteat, T. (2020). "This is some mess right here": Exploring interactions between Black sexual minority women and health care providers for breast cancer screening and care. *Cancer*, *127*(1), 74–81. <https://doi.org/10.1002/cncr.33219>
- Hamood, R., Hamood, H., Merhasin, I., & Keinan-Boker, L. (2018). Chronic pain and other symptoms among breast cancer survivors: Prevalence, predictors, and effects on quality of life. *Breast Cancer Research and Treatment*, *167*(1), 157-169. doi: 10.1007/s10549-017-4485-0.
- Hite, M., Dippre, A., Heldreth, A., Cole, D., Lockett, M., Klauber-DeMore, N., & Abbott, A. M. (2021). A multifaceted approach to opioid education, prescribing, and disposal for patients with breast cancer undergoing surgery. *Journal of Surgical Research*, *257*, 597-604.

- Hoffman, K. M., Trawalter, S., Axt, J. R., & Oliver, M. N. (2016). Racial bias in pain assessment and treatment recommendations, and false beliefs about biological differences between Blacks and Whites. *Proceedings of the National Academy of Sciences of the United States of America*, *113*(16), 4296–4301. <https://doi.org/10.1073/pnas.1516047113>
- Hovind, I. L., Bredal, I. S., & Dihle, A. (2013). Women's experience of acute and chronic pain following breast cancer surgery. *Journal of Clinical Nursing*, *22*(7-8), 1044-1052.
- James, K., & Jordan A. (2018). The opioid crisis in Black communities. *Journal of Law, Medicine, and Ethics*, *46*(2), 404-421. doi: 10.1177/1073110518782949.
- Jones, N., Roper, C., Silverman, E., & Silverstein, J. (2021, November 16), The 1619 Project: A new origin story. *New York Times Magazine*.
- Khanna, A. (2021). Role of interventional pain management in breast cancer. In *Breast cancer and gynecologic cancer rehabilitation* (pp. 141-148). Elsevier.
- Klein, S. M., Nielsen, K. C., Ahmed, N., Buckenmaier, C. C., & Steele, S. M. (2004). In situ images of the thoracic paravertebral space. *Regional Anesthesia and Pain Medicine*, *29*(6), 596-599. doi: 10.1016/j.rapm.2004.08.016.
- Ko, N. Y., Hong, S., Winn, R. A., & Calip, G. S. (2020). Association of insurance status and racial disparities with the detection of early-stage breast cancer. *JAMA Oncol.*, *6*(3), 385-392. doi:10.1001/jamaoncol.2019.5672
- Kulkarni, A. R., Pusic, A. L., Hamill, J. B., Kim, H. M., Qi, J., Wilkins, E. G., & Roth, R. S. (2017). Factors associated with acute postoperative pain following breast reconstruction. *JPRAS Open*, *11*, 1-13. doi: 10.1016/j.jptra.2016.08.005.
- Lam, E., Wong, G., Zhang, L., Drost, L., Karam, I., Yee, C., ... & Chow, E. (2021). Self-reported pain in breast cancer survivors receiving adjuvant radiotherapy. *Supportive Care in Cancer*, *29*(1), 155-167.
- Lam, S., Qu, H., Hannum, M., Tan, K. S., Afonso, A., Tokita, H. K., & McCormick, P. J. (2021). Trends in peripheral nerve block usage in mastectomy and lumpectomy: Analysis of a national database from 2010 to 2018. *Anesthesia and Analgesia*, *133*(1), 32-40. doi: 10.1213/ANE.0000000000005368.
- Lannin, D. R., Mathews, H. F., Mitchell, J., & Swanson, M. S. (2002). Impacting cultural attitudes in African-American women to decrease breast cancer mortality. *American Journal of Surgery*, *184*(5), 418-423.
- Mazzeffi, M. A., Keneally, R., Teal, C., Douglas, R., Starks, V., Chow, J., & Porter, S. B. (2022, April 25). Racial disparities in the use of peripheral nerve blocks for postoperative analgesia after total mastectomy: A retrospective cohort study. *Anesthesia and Analgesia*. doi: 10.1213/ANE.0000000000006058.

- McMorrow, S., & Polsky, D. (2016, December). *Insurance coverage and access to care under the Affordable Care Act*. <https://ldi.upenn.edu/brief/insurance-coverage-and-access-care-under-affordable-care-act>
- Moormeier, J. (1996). Breast cancer in Black women. *Annals of Internal Medicine*, *124*(10), 897-905. doi: 10.7326/0003-4819-124-10-199605150-00007.
- Mosher, C. E., DuHamel, K. N., Egert, J., & Smith, M. Y. (2010). Self-efficacy for coping with cancer in a multiethnic sample of breast cancer survivors: Associations with barriers to pain management and distress. *The Clinical Journal of Pain*, *26*(3), 227.
- Murshid, M. A., & Mohaidin, Z. (2017). Models and theories of prescribing decisions: A review and suggested a new model. *Pharmacy Practice (Granada)*, *15*(2), 990. doi: 10.18549/PharmPract.2017.02.990.
- National Center for Education Statistics. (1996). NCES/
- Partnership for Women and Families. (2019, April). *Fact sheet: Black women experience pervasive disparities in access to health insurance*.
- Raza, M. M., Zaslansky, R., Gordon, D. B., Wildisen, J. M., Komann, M., Stamer, U. M., & Langford, D. J. (2021). Chronic breast pain prior to breast cancer surgery is associated with worse acute postoperative pain outcomes. *Journal of Clinical Medicine*, *10*(9), 1887.
- Reddy, A., & de la Cruz, M. (2019). Safe opioid use, storage, and disposal strategies in cancer pain management. *The Oncologist*, *24*(11), 1410.
- Reddy, S., Orenstein, L. A., Strunk, A., & Garg, A. (2019). Incidence of long-term opioid use among opioid-naïve patients with hidradenitis suppurativa in the United States. *JAMA Dermatology*, *155*(11), 1284–1290. doi:10.1001/jamadermatol.2019.2610
- Riegelman, R. K., & Garr, D. R. (2011). Healthy People 2020 and education for health: What are the objectives? *American Journal of Preventive Medicine*, *40*(2), 203-206. doi: 10.1016/j.amepre.2010.10.017. PMID: 21238870.
- Sakamoto, M. R., Eguchi, M., Azelby, C. M., Diamond, J. R., Fisher, C. M., Borges, V. F., ... & Kabos, P. (2021). New persistent opioid and benzodiazepine use after curative-intent treatment in patients with breast cancer. *Journal of the National Comprehensive Cancer Network*, *19*(1), 29-38.
- Samuel, C. A., Pinheiro, L. C., Reeder-Hayes, K. E., Walker, J. S., Corbie-Smith, G., Fashaw, S. A., Woods-Giscombe, C., & Wheeler, S. B. (2016). To be young, Black, and living with breast cancer: A systematic review of health-related quality of life in young Black breast cancer survivors. *Breast Cancer Research and Treatment*, *160*(1), 1–15. <https://doi.org/10.1007/s10549-016-3963-0>

- Schreiber, K. L., Zinboonyahgoon, N., Xu, X., Spivey, T., King, T., Dominici, L., Partridge, A., Golshan, M., Strichartz, G., & Edwards, R. R. (2019). Preoperative psychosocial and psychophysical phenotypes as predictors of acute pain outcomes after breast surgery. *The Journal of Pain*, 20(5), 540-556. doi: 10.1016/j.jpain.2018.11.004.
- Schubart, J. R., Farnan, M. A., & Kass, R. B. (2015). Breast cancer surgery decision-making and African-American women. *Journal of Cancer Education*, 30(3):497-502.
- Schuler, M. S., Schell, T. L., & Wong, E. C. (2021). Racial/ethnic differences in prescription opioid misuse and heroin use among a national sample, 1999-2018. *Drug and Alcohol Dependence*, 221, 108588. <https://doi.org/10.1016/j.drugalcdep.2021.108588>
- Shavers, V. L., & Brown, M. L. (2002). Racial and ethnic disparities in the receipt of cancer treatment. *Journal of the National Cancer Institute*, 94(5), 334-357. doi: 10.1093/jnci/94.5.334. PMID: 11880473.
- Shen, C., Thornton, J. D., Newport, K. et al. (2020). Trends and patterns in the use of opioids among metastatic breast cancer patients. *Scientific Reports*, 10, 21698. <https://doi.org/10.1038/s41598-020-78569-8>
- Smith, S. A., Ansa, B. E., Yoo, W., Whitehead, M. S., & Coughlin, S. S. (2018). Determinants of adherence to physical activity guidelines among overweight and obese African American breast cancer survivors: Implications for an intervention approach. *Ethnicity and Health*, 23(2), 194–206. <https://doi.org/10.1080/13557858.2016.1256376>
- Substance Abuse and Mental Health Services Administration. (2020). *The opioid crisis and the Black/African American population: An urgent issue* (Publication No. PEP20-05-02-001). Office of Behavioral Health Equity, Substance Abuse and Mental Health Services Administration.
- Thomasson, M. A. (2006). Racial differences in health insurance coverage and medical expenditures in the United States: A historical perspective. *Social Science History*, 30(4), 529–550. <http://www.jstor.org/stable/40267921>
- United States Bureau of Labor Statistics. (2021). *Table 10: Employed persons by occupation, race, Hispanic or Latino ethnicity, and sex* [Data set]. Labor Force Statistics from the Current Population Survey.
- United States Census Bureau. (2018). Table 4: Projected race and Hispanic origin [Data set]. *2017 National Population Projections Tables*.
- United States Census Bureau. (2020). *Annual estimates of the resident population by sex, race, and Hispanic origin* [Data set],

- United States Centers for Disease Control and Prevention. (2017, September). *Pregnancy and prenatal care. Medical Research Archives, 5(9)*. <https://www.cdc.gov/healthcommunication/toolstemplates/entertainmented/tips/PregnancyPrenatalCare.html>
- United States Department of Health and Human Services. *The Secretary's Advisory Committee on National Health Promotion and Disease Prevention Objectives for 2020*.
- United States Department of Health and Human Services, (2019). *U.S. federal poverty guidelines*,
- United States Department of Health and Human Services, Centers for Disease Control and Prevention, National Center for Health Statistics. *Healthy People 2010: Final review. Healthy People 2010: Understanding and Improving Health*.
- United States Department of Health and Human Services, Office of Disease Prevention and Health Promotion. *Healthy People 2020* [Internet].
- United States Department of Health and Human Services, Office of Disease Prevention and Health Promotion. *Healthy People 2030* [Internet].
- Urits, I., Lavin, C., Patel, M., Maganty, N., Jacobson, X., Ngo, A. L., Urman, R. D., Kaye, A. D., & Viswanath, O. (2020). Chronic pain following cosmetic breast surgery: A comprehensive review. *Pain and Therapy, 9(1)*, 71–82. <https://doi.org/10.1007/s40122-020-00150-y>
- Van der Gucht, E., Dams, L., Haenen, V., Godderis, L., Morlion, B., Bernar, K., & Meeus, M. (2021). Effectiveness of perioperative pain science education on pain, psychological factors and physical functioning: A systematic review. *Clinical Rehabilitation, 02692155211006865*.
- Wall, L. L. (2020). The controversial Dr. J. Marion Sims (1813-1883). *International Urogynecology Journal, 31(7)*, 1299-1303. doi: 10.1007/s00192-020-04301-9.
- Wang, L., Guyatt, G. H., Kennedy, S. A., Romerosa, B., Kwon, H. Y., Kaushal, A., Chang Y., Craigie, S., de Almeida, C. P. B., Couban, R. J., Parascandolo, S. R., Izhar, Z., Reid, S., Khan, J. S., McGillion, M., & Busse, J. W. Predictors of persistent pain after breast cancer surgery: A systematic review and meta-analysis of observational studies. *CMAJ, 188(14)*, E352-E361. doi: 10.1503/cmaj.151276.
- Wheeler, S. B., Reeder-Hayes, K. E., & Carey, L. A. (2013). Disparities in breast cancer treatment and outcomes: biological, social, and health system determinants and opportunities for research. *The Oncologist, 18(9)*, 986–993. <https://doi.org/10.1634/theoncologist.2013-0243>

- White-Means, S., Rice, M., Dapremont, J., Davis, B., & Martin, J. (2015). African American women: Surviving breast cancer mortality against the highest odds. *International Journal of Environmental Research and Public Health*, 13(1), ijerph13010006. <https://doi.org/10.3390/ijerph13010006>
- Williams, D. R., Mohammed, S. A., & Shields, A. E. (2016). Understanding and effectively addressing breast cancer in African American women: Unpacking the social context. *Cancer*, 122(14), 2138-2149.
- Women in the workplace 2021, A special report.* McKinsey and Company.
- Yale Medicine Nerve Blocks for Surgery. <https://www.yalemedicine.org/conditions/nerve-blocks-for-surgery>.
- Yedjou, C. G., Sims, J. N., Miele, L., Noubissi, F., Lowe, L., Fonseca, D. D., Alo, R. A., Payton, M., & Tchounwou, P. B. (2019). Health and racial disparity in breast cancer. *Advances in Experimental Medicine and Biology*, 1152, 31-49.
- Yoo, G. J., Levine, E. G., & Pasick, R. (2014). Breast cancer and coping among women of color: A systematic review of the literature. *Supportive Care in Cancer: Official Journal of the Multinational Association of Supportive Care in Cancer*, 22(3), 811–824. <https://doi.org/10.1007/s00520-013-2057-3>