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Racial Disparities in Cancer Treatment: Breaking Down Barriers to Equality

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Abstract

Over the recent decades, there have been significant and diverse developments in cancer research, encompassing both the realms of cancer detection and its treatment. The increased accessibility of healthcare resources and heightened public awareness have led to a decrease in the consumption of cancer-causing substances like tobacco. Furthermore, the widespread adoption of preventive measures, regular cancer screenings, and the advancement of targeted therapies have substantially lowered cancer-related deaths worldwide. Nonetheless, the significant decline in cancer mortality demonstrates discrimination and reflects disparities among different ethnic groups and economic strata. Various factors play a role in this systemic inequality, affecting the processes of diagnosis, treatment options, cancer prognosis and even the availability of healthcare facilities. These disparities are influenced by social determinants like social status, economic disadvantage, educational access, diagnostic methods involving biomarkers and molecular testing, treatment options, and access to palliative care. Cancer treatment is a dynamic field that continually advances, with the emergence of novel targeted therapies such as personalized treatment, immunotherapy, and combination therapies. However, these innovations also reveal disparities in their adoption across different segments of the society. Substantial advancements in cancer management and their global implementation require a thorough assessment to uncover and address biases related to racial discrimination within healthcare facilities. The review provides a comprehensive analysis of this worldwide issue of racial discrimination in cancer treatment and care and can aid in the development of more effective strategies for cancer management, ultimately leading to reduced mortality rates.

Keywords: Cancer, racial disparities, treatment outcome, cancer control

Introduction

Despite consistent efforts that have resulted in a substantial decrease in cancer-related deaths, it continues to rank as the second leading cause of mortality, trailing behind cardiovascular diseases. The peak in the cancer mortality rate occurred in 1991, with 215 cancer-related deaths

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per 100,000 individuals (R. L. Siegel, Miller, et Jemal 2018). As of beginning of current year, the American Cancer Society projected a total of 1,918,030 new cancer cases and 609,360 deaths in the year 2022 (R. L. Siegel, Miller, et Jemal 2018) . Additionally, there were in year 2020, approximately 10 million cancer deaths worldwide, with expected 19.3 million new cancer cases. Cancer incidence and cancer-related deaths are on a positive decline worldwide, thanks to effective healthcare facilities, improved surveillance, early detection, and enhanced cancer care. Nevertheless, specific populations still face a higher risk of both cancer occurrence and mortality for certain types of malignancies. While cancer affects people across the globe, there are specific geographic regions where particular types of cancer are more prevalent. Number of factors associated with this imbalance, encompassing genetic factors, socioeconomic variables, and environmental influences (Buteau et al. 2023). The National Cancer Institute (NCI) defines disparities in cancer health as differences in the disease metrics, including incidence rates, survival rates, mortality rates, complications, financial burdens, and quality of life [Source: Cancer Disparities—NCI]. Significant disparities are evident in cancer screening, early detection, and the preferred treatment modalities within various population subclasses. These disparities are noticeable in sense that despite overall progress in terms of increased awareness, enhanced screening resources, and considerably improved cancer management, specific subgroups are not experiencing the same advancements as others. Such observations underscore the need for a deeper understanding of the factors contributing to these varying mortality rates and for the development of strategies to ensure more equitable implementation of improved cancer care (Itzkowitz et al. 2016). These disparities result from intricate and interconnected factors, making it difficult to isolate and assess the independent impact of each factor. Significant disparities in cancer healthcare and related mortality rates have been observed across various segments of the population, with key factors being geographical location, socioeconomic status, and genetics. This variation is particularly evident in regional differences in the incidence, types, and prognosis of cancer patients. The occurrence of lung carcinoma, as indicated by primary data sourced from the GLOBOCAN year 2020, is linked to increased exposed to pollutants and is a regrettable consequence of the industrialization (Deo, Sharma, et Kumar 2022). Consequently, Latin America and African exhibit comparatively low rates of lung cancer incidence. Colorectal cancer approximately accounts 10% of all cancer cases. In Oceania and North America, higher incidence rates of colorectal cancer are attributed to the prevalence of unhealthy diets with an abundance of processed foods and sedentary lifestyles. Additionally, contributing risk factors include heavy alcohol consumption, tobacco use, and the consumption of red or processed meat. Prostate cancer, the most commonly diagnosed cancers in men, exhibits varying incidence rates on a global scale. North America, Latin America, Oceania and Europe report higher incidence rates, primarily attributed to regular monitoring and marker-based screening practices. The prostate cancer incidence rate is highly present among black males of Caribbean and the United States (Deo, Sharma, et Kumar 2022) (Deo, Sharma, et Kumar 2022; Rebbeck et al. 2013). The incidence and subsequent mortality rates are strongly influenced by level of industrialization and pollutants exposure. Death rates related to colorectal malignancies tend to be fairly consistent across regions, possibly due to urbanization, a reliance on fast foods, desk-bound lifestyles, and a lack of physical activity. Prostate cancer treatable if screened early, the higher mortality rates in the African population, in comparison to North America where the mortality rates are low instead of high incidence, can be attributed to the lack of effective screening facilities. Factors such as limited knowledge, financial distress, and access to health insurance seem to play an equally crucial role as biological factors in determining access to early diagnosis and appropriate treatment. Moreover, societal inequalities, such as the persisting consequences

of racial discrimination, continue to affect the doctor-patient relationship. Additionally, cultural characteristics may shape individuals' behaviors regarding their healthcare management, including regular health checkups, preventive care, and their trust in conventional medicine versus alternative treatments (Freeman 2003).

The goal of reducing cancer fatalities and improving survival rates among disadvantaged populations is aimed at eliminating inequalities. (Bhatia 2011). However, our current understanding of the factors and variables that contribute to reducing this disparity is limited due to a lack of data in the context of cancer prevention and medical and palliative care. To address this gap, extensive cohort studies are required, and a more comprehensive investigation of disparities in mortality among various ethnic groups through meta-analysis is essential. Nonetheless, conducting broad-scale analyses is severely restricted by cost constraints and a lack of sensitivity in available methods. Our review strives to present a comprehensive examination of numerous factors that play a pivotal role in shaping differences in cancer mortality rates among diverse racial populations. The ultimate goal is to propose improved strategies for cancer management that can be applied across various segments of society.

Disparities Due to Social Determinants

The mortality rates, incidence and cancer predisposing factors differ not only based on race and heritage but also across various socioeconomic strata (Newman et Martin 2007). Poverty, culture, and social injustices are the socioeconomic determinants contributing to the disparities in cancer-related deaths. (Freeman et Chu 2005) Poverty is the main social factor driving health disparities. Moreover, there are some other cancer risk factors associated with socioeconomic disparities, such as tobacco use, poor diet, physical inactivity, and obesity (Freeman 2004). Tobacco companies often target low-income and minority populations as their customer base. These groups often have limited access to nutritious foods and fresh produce, as well as fewer opportunities for regular physical activity (Bernstein, Teal, Joslyn, et Wilson 2003)

Studies reveal that the variations in breast cancer incidence among racial groups are relatively minor, but there is noteworthy disparity in mortality figures across different ethnicities. Social and economic factors exert such a substantial influence on treatment choices and cancer care that they result in significant disparities in cancer outcomes among ethnic populations. (Yedjou et al. 2019) Poverty is related with poorer outcomes in breast cancer regardless of ethnicity; however, due to the higher poverty rates among Black Americans comparable to white Americans, they are more likely to experience higher mortality rates. (Gerend et Pai 2008). Financial distress and lack of access to insurance coverage discourage the female from undergoing regular screenings of breast cancer, which in turn increases the likelihood of detecting the disease at a later stage, thereby elevating the mortality risk. Similarly, Asian and Africans women tend to have infrequent healthcare visits, lower rates of mammography screenings, and a reduced likelihood of early-stage detection. Moreover, the high costs associated with healthcare often result in suboptimal and inappropriate treatment, further increasing the death risk in these patients (O'Malley, Forrest, et Mandelblatt 2002).

Innovations in monoclonal antibody-based therapies, tailored to the marker profiles of breast cancer patients, proven significant improvements in cancer regression for individuals who do not respond to traditional treatments. However, these therapies are costly and often necessitate access to advanced medical facilities, which are not widely available to many women worldwide. A significant portion of the global population lacks or has inadequate health insurance coverage and depends on government interventions for healthcare (Vagia, Mahalingam, et Cristofanilli

2020).

Women residing in different countries often find themselves in areas with inadequate infrastructure, making it challenging to access essential healthcare facilities and medical professionals for treatment, diagnosis or even regular check-ups. Genetic profiling to assess the risk of specific cancer types and prophylactic cancer vaccinations are adopted by less than 1% of the global population and exhibit disparities among various ethnic groups. This is frequently attributed to limited awareness and social barriers (Lacey et al. 1993).

Cardiovascular disease, hypertension, diabetes, respiratory conditions and obesity are prevalent comorbidities in females with lower incomes, which can limit their treatment options (Tammemagi et al. 2005) Black women, compared to white women, tend to have diets higher in fat, lacking in fruits and vegetables, and less regular physical exercise, making them more susceptible to being overweight (Ogden et al. 2006). As a result, disparities in breast cancer rates among women are influenced by lifestyle and nutritional factors that are indirectly associated with socioeconomic constraints.

Additional factors such as lack of disease awareness, lower educational status, and religious and cultural taboos often contribute to late-stage diagnoses and inadequate treatments, resulting in fatalities (Johnson, Elbert-Avila, et Tulsky 2005). Black women are more inclined to rely on spiritual and supernatural remedies despite of seeking proper medical treatment, which can be detrimental to their survival (Lannin, Mathews, Mitchell, et Swanson 2002) Overall, societal injustices, poverty, and various other factors both directly and indirectly contribute to the disparities in breast cancer rates among women.

Comparable socioeconomic disparities are also evident in several developing nations, including India (Negi et Nambiar 2021). Intriguingly, in India, there has been a significant increase in the occurrence of breast cancer among urban women, primarily attributable to factors such as stress, lifestyle choices, late menopause and delayed pregnancies. Conversely, breast cancer incidence is lower among rural women in comparison to urban counterparts, though there is increase prevalence of cervical carcinoma among them (Moss, Liu, et Feuer 2017).

The primary reason for racial disparities in lung carcinoma survival is the lack of access to higher quality healthcare and clinical trials. It's important to recognize that societal determinants of health can contribute to differences in lung carcinoma treatment (Jessica J Lin et al. 2016). These determinants encompass; Social and economic factors, (Farrow et al. 2020) literacy level, lack of awareness, Patients frequently make suboptimal treatment decisions due to a lack of trust in the medical profession, stemming from previous experiences within the healthcare system. Negative perceptions of surgical procedures, fatalistic attitudes, and skepticism are potential explanations for why some patients struggle to adhere to prescribed therapies (Jenny J Lin et al. 2014). This mistrust often arises from a lack of awareness about the evolving ethical standards in healthcare and the subpar care provided in unregulated healthcare facilities. Disparities in access to treatment may stem from geographic or neighborhood factors that result in inadequate practical availability and utilization of healthcare facilities. Whether residing in remote rural areas or urban metropolitan areas, or living within communities with varying socioeconomic statuses, these factors can all contribute to insufficiency of diagnostic and therapeutic resources.

Colorectal cancer (CRC) ranks as third most prevalent cancer in United States, regardless of gender. Incidence of CRC is higher in men compared to females (4.3% vs. 4%). Several factors, including hereditary and age, have been identified as influencing the risk of developing CRC.

Given its association with aging, the likelihood of developing CRC rises with increasing age, and guidelines recommend that individuals with an average risk should commence screening tests at the age of 50 (Rex et al. 2017).

Nevertheless, intricate associations exist among ethnicity/race, socioeconomic status (SES), and CRC. Poor dietary habits and a sedentary lifestyle are two modifiable factors associated with CRC risk, which are also intertwined with socioeconomic status. Lifestyle choices can influence gut microbiota and biological behavior of colon cells, as well as the local colonic environment (Rex et al. 2017) Maintaining a well-balanced diet, hormone replacement therapy, and the use of NSAIDs or aspirin can potentially reduce the risk of colorectal cancer. However, these factors also connected to socioeconomic status (SES) and the availability of healthcare. SES-related factors such as income, educational attainment, and access to health insurance play a role in determining who has access to healthcare resources and services (Carethers 2015).

It is widely acknowledged that social and economic factors have an impact on the occurrence of prostate cancer. There is often an inverse relationship between prostate cancer risk and social and economic status (SES). Individuals with lower SES are associated with a decreased likelihood of survival and a lower quality of life. Prostate cancer survival rates vary significantly depends on socioeconomic factors, including education level, race, and employment status. Several reasons may explain adverse association between social support and the detection of advanced stages of prostate cancer (Bergelt et al. 2009). Male might encourage to undergo prostate cancer screenings with their partners, family members and friends within their social network. Research suggests that married men tend to have improved prostate cancer management, including early screening and more effective therapy, compared to unmarried men (Coughlin 2020).

Disparities in Diagnosis

Breast cancer tends to affect Asian women in their 40s to 50s, whereas Non-Hispanic White women are more commonly diagnosed between their 60s and 70s. Approximately 5% to 10% of breast carcinoma cases are attributed to genetic factors. Most cases of autosomal dominant hereditary breast cancer are linked to mutations in BRCA genes (BRCA1 on chromosome 17 and BRCA2 on chromosome 13).

The BRCA1 and BRCA2 genes function as tumor suppressors, playing a crucial role in DNA repair and safeguarding the integrity of genetic information. When these genes undergo alterations, they lead to DNA damage and mutations, increasing the susceptibility of cells to genetic modifications that can potentially lead to the development of cancer.

The frequency of these mutations can vary depending on an individual's racial and ethnic background. For example, Ashkenazi Jewish women had the highest occurrence of BRCA1 mutations at 8.3%. Following this group are Hispanic women at 3.5%, non-Hispanic white women at 2.2%, Black women at 1.3%, and Asian women at 0.5%. (John et al. 2007). Asian women often do not adhere to the recommended regular breast cancer screening guidelines set forth by the WHO. This may explain the Asian women have decrease incidence of breast cancer as compared to Western countries. It's worth noting that 55% to 65% of women with BRCA1 mutations and 45% of women with BRCA2 mutations have a breast cancer after reaching the age of 70. (Chen et Parmigiani 2007). Furthermore, ovarian cancer may occur in 39% of women with harmful BRCA1 mutations and in 11% to 17% of women with harmful BRCA2 mutations before they reach the age of 70. It's important to note that while detrimental BRCA1 and BRCA2 mutations are recognized as causing breast cancer in over 50% of families

with recurring cases, mutations in other genes also linked to elevated risks of the disease (Campeau, Foulkes, et Tischkowitz 2008; Walsh et al. 2006).

Rare mutations are present in genes like ATM, CHEK2, BRIP1, CDH1, MLH2, MRE11A, MLH1, PTEN, NBN, RAD50, PALB2, SEC23B, RAD51C, TP53 and STK11. When females with a harmful PALB2 gene alteration reach the age of 70, 33% of them will develop breast cancer. Those females having positive family history of breast cancer and PALB2 alteration face an even higher risk, with a 58% chance (Antoniou et al. 2014). Multiple Asian ethnicities have a higher susceptibility to positive HER2 breast cancer (Gomez, Yao, Kushi, et Kurian 2019). In comparison to the more common hormone-receptor-positive breast cancer types, this specific subtype is more harmful and less favorable prognosis (Gomez, Yao, Kushi, et Kurian 2019). Consequently, genetic screening could provide valuable information about the predisposition to certain cancers and could potentially serve as a foundation for ongoing monitoring or even preventive surgical or vaccine-based interventions. Nevertheless, these interventions are seldom pursued because of limited awareness, as well as societal barriers and stigmas. Significant disparities in the 5-year survival rates were noted among various ethnic groups in a breast cancer study involving 777 Hispanic individuals, 1016 Black individuals, and 4885 White individuals. Patients with Hispanic heritage had survival rates of approximately 70% (±2%), Black patients had rates of around 65% (±2%), and White patients exhibited survival rates of about 75% (±1%). (Board 2023). These differences in survival rates are primarily influenced by the stage at which the diagnosis is made. The mortality rate for patients in the United States varies depending on the stage of breast cancer, highlighting the fact that early detection, regardless of any racial bias, can result in full recovery in the majority of instances.

Based on approximations, there were approximately 654,620 individuals in the United States who have had a lung cancer, and additional 236,740 new cases were identified in the year 2022. From a treatment perspective, lung cancer are of two types: small cell lung cancer (SCLC), accounting for about 14% of cases, and non-small cell lung cancer (NSCLC), representing roughly 82% of cases. There is a small proportion, approximately 3%, of cases where the histology of the cancer remains undetermined. The advent of targeted cancer drugs has fundamentally transformed the treatment landscape for non-small cell lung cancer (NSCLC), establishing personalized therapy using techniques like Next-Generation Sequencing (NGS) as the preferred approach. In specific subsets of NSCLC patients eligible for this form of treatment, the utilization of specialized kinase inhibitors has substantially improved survival rates (Jessica J Lin et al. 2016). The National Comprehensive Cancer Network (NCCN) suggests including EGFR mutation, ALK rearrangement and PDL-1 testing in the molecular assessment for metastatic non-small cell lung cancer (NSCLC) due to their importance in targeted therapy for lung cancer management. Additionally, a thorough molecular profile should encompass the screening of mutations in KRAS, BRAF, METex14, NTRK1/2/3, RET, skipping, and ROS1 as part of the comprehensive evaluation. It is essential to consider the potential influence of race on screening of biomarker and molecular analysis in lung carcinoma. These methods play an increasingly significant role in enhancing cancer outcomes, particularly for individuals having NSCLC. While targeted therapy previously recognized as advancements in NSCLC treatment, it has been pointed out that their utilization varies across different racial and socioeconomic groups (Palazzo, Sheehan, Tramontano, et Kong 2019). An initial study showed that individuals having limited incomes and those residing in severely poor areas had a reduced likelihood of undergoing EGFR screening. Additionally, African Americans had lower rates of both erlotinib use and EGFR screening when compared to

Whites in univariate analysis, even after accounting for socioeconomic, clinical, and demographic factors. Another study investigated the connection between the likelihood of requesting an EGFR test and characteristics of the treating hospital, such as its location and institution-specific factors, as well as variations in socioeconomic factors. The research indicated that hospitals were more likely to pursue EGFR screening for individuals with advanced NSCLC if the area had a more affluent or educated population. (J.A. Lynch et al. 2013) Lynch et al. highlighted persistent challenges in accessing anti-EGFR therapies and EGFR testing within rural hospitals, further worsen disparities in cancer care (J.A. Lynch et al. 2013) While happened no variations in alteration of EGFR and ALK rearrangements based on race, individuals from the most lowest economically regions had a reduced chance of ever undergoing any form of biomarker assessment. The prevalence of comprehensive genetic testing utilizing NGS was consistently lower across all global populations. In comparison to Caucasian patients, African American patients were less likely to have undergone NGS analysis (Bruno et al. 2021).

As of January 1, 2022, it was estimated that over 1.4 million individuals, both males and females, had been diagnosed with colorectal cancer, and an additional 151,030 patients were expected to receive this diagnosis within the current year. Mutation in KRAS gene is found in approximately 45% of cases with colorectal cancer. Around 12% of colorectal cancer cases exhibit a BRAF alteration (specifically V600E), and it is associated with a less favorable prognosis. Figure 3C illustrates the mortality rates for various stages of breast cancer among patients in the United States. It underscores the importance of biomarker screening and early detection, as late-stage diagnosis is associated with a significantly elevated likelihood of fatal outcomes.

Prostate cancer is one of the most hereditary forms of cancer, and it can be readily identified in its early stages through biomarker screening (Rebbeck 2018). It affects one in nine American men during their lifetimes, but this rate increases to one in seven for Black males, who experience a 1.7 times higher mortality rate than white male (Rebecca L Siegel, Miller, et Jemal 2020)

Notably, prostate cancer demonstrates a significantly lower mortality figure at the localized and regional stages compared to other cancer types. Early detection, especially at localized or regional stages, generally leads to successful treatment and a potential cure. Unfortunately, Black patients often seek treatment only when the disease has reached advanced stages, accompanied by elevated PSA levels.63,64,65. This is compounded by the fact that Black men undergo PSA screening less frequently compare to White men. (D.A. Siegel et al. 2020)

A similar situation is observed in African males, where the lower incidence of prostate cancer is primarily a consequence of inadequate screening. Unfortunately, this results in a high mortality rate due to late diagnoses. Thanks to advancements in screening technologies, that 50% prostate cancer incidence reduces since 1992, and overall survival rates have increased by over 2%.

Disparities in Treatment

Owing to population growth and advancements in early detection and treatment, there is a larger population of cancer survivors than ever before. As of January 1, 2022, it was estimated that over 4,000,000 women in the United States had a history of metastatic breast carcinoma, and additional 287,850 women were expected to get a new diagnosis. In one of the research study, approximately 3/4th of the roughly 150,000 breast cancer survivors who have metastatic

disease were initially detected and confirmed at cancer stages I, II, or III.67

Among breast cancer survivors, round about 2.7 million females, constituting about two-thirds of this group, are at 65 years aged or older, while only 6% are under the age of 50.

While 34% of women diagnosed with stage I and stage II cancer opt for mastectomy, often without the need for radiation and chemotherapy, the remaining 50% of these individuals opt for breast-conserving surgery (BCS) coupled with adjuvant radiotherapy. Conversely, 65% of women diagnosed with stage III malignancy choose mastectomy as their preferred treatment, often accompanied by chemotherapy. When it comes to stage I and stage II illness, there is a lower likelihood for Black women compared to White women to undergo BCS (60% vs. 64%, respectively). For stage III illness, Black women are more likely to receive only chemotherapy and/or radiation (9% vs. 6%), and they are less likely to undergo surgical excision (57% vs. 66%).

In cases 60% of female patients opt for either radiation therapy or chemotherapy alone in stage IV metastasis. Adjuvant hormonal treatment is prescribed in approximately 50% of women with invasive breast cancer who have tumors expressing hormone receptors and who do not undergo surgery, radiation therapy and chemotherapy. Some women eligible for BCS choose surgical excision due to concerns about receiving radiation therapy, fear of recurrence, or medical conditions that contraindicate radiation therapy (Albornoz et al. 2015).

Geographic accessibility and proximity to treatment facilities may pose structural barriers to receiving radiation therapy (Lautner et al. 2015).

In terms of breast cancer diagnosis, there is a disparity between Black and White women, with 53% of Black women diagnosed at stage I compared to 68% of White women. This difference in diagnosis stages contributes to lower survival rates among Black women at all stages of breast cancer, with the most significant gap observed in advanced malignancies. For stage III, survival rates are 65% for Black women compared to 77% for White women, while for stage IV, the rates stand at 19% for Black women and 30% for White women. Among patients with stage I or II NSCLC (Non-Small Cell Lung Cancer), over 55% undergo various types of surgery, including wedge resection, lobectomy, sleeve resection or pneumonectomy. Wedge resection involves the removal of a portion of a lung lobe, while sleeve resection entails the removal of the tumor along with a section of the damaged airway. In contrast, around one-fifth of patients diagnosed with stage III NSCLC are candidates for surgical intervention, while the majority (61%) undergo chemotherapy and/or radiation therapy. Black patients are notably less likely than White patients to opt for surgery, with rates at 16% versus 22% for stage III and 49% versus 55% for stages I and II. Additionally, the utilization of therapy is lower in Black patients (10%) compared to White patients (15%) for stages I and II cancer. There is conflicting evidence on whether Black patients who receive platinum-based chemotherapy experience poorer treatment outcomes or increased toxicity, potentially impacting survival rates and contributing to lower post-operative mortality. Figure 4C and 4D depict trends in lung cancer treatment, comparing the treatment preferences among different ethnic groups. While surgery remains a primary treatment choice, it is less favored by many African Americans.

The predominant age group among colorectal cancer survivors, encompassing both males and females, is aged 65 and older. Approximately 67% of individuals diagnosed with stage III colorectal cancer receive chemotherapy as an adjuvant treatment to minimize the risk of recurrence. In contrast, the majority of patients with stage I & II colorectal cancer (84%) undergo partial surgical removal of the colon and do not require chemotherapy.

For those with stage I rectal cancer, proctectomy and related procedures are the most commonly administered treatment (61%), with nearly half of them also receiving neoadjuvant radiation or chemotherapy. Stages II and III rectal tumors are often treated with a combination of surgery and neoadjuvant chemotherapy and radiation.

Patients diagnosed with stage IV colon cancer (49%) and stage IV rectal cancer (29%) typically undergo surgery in addition to radiation and/or chemotherapy as part of their treatment regimen.

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In the United States, there are over 3.5 million male individuals who have previously been diagnosed with prostate cancer, and it is anticipated that there will be approximately 268,490 new cases identified in 2022. Among male prostate cancer survivors, a significant majority, around 85%, are aged 65 and older, while only a small percentage, just 1% (12,630 individuals), are under the age of 50.

According to a publication from the National Comprehensive Cancer Network in 2010, there has been a notable increase in the active monitoring of low-risk cases, rising from 15% in 2010 to 42% in 2015 (Mahal et al. 2019) This shift suggests a move toward reducing unnecessary treatment, (Mohler et al. 2010) as evidenced by a decrease in radical prostatectomy rates from 47% to 31%. Several studies have also shown an uptrend in proactive monitoring, especially among elderly males aged 75 and above, leading to early detection and a 100% rate of cancer regression (Cooperberg et Carroll 2015).

While genetic predisposition does not contribute significantly to racial disparities, the key determinant of achieving a 100% cancer recovery versus a fatal outcome upon late diagnosis is regular screening.(Luigi Nocera, Wenzel, Ruvolo, et al. 2021; L. Nocera, Wenzel, Collà Ruvolo, et al. 2021). Therefore, addressing the racial disparities in prostate cancer mortality primarily hinges on raising awareness and implementing widespread screening outreach measures on a global scale (L. Nocera, Wenzel, Collà Ruvolo, et al. 2021).

Disparities in Access to Targeted Therapies and Immunotherapy

Despite advances in treatment strategies, disparities in cancer healthcare have continued to grow. The major contributing factors to this widening gap are cost and availability (Osarogiagbon et al. 2021) Immunotherapy has now become a standard component of primary treatment for metastatic tumors lacking targetable mutations. The increased utilization of immune checkpoint blockers has significantly reduced cancer-related mortality (Gandhi et al. 2018).

Disparities in access to immunotherapy are evident even at stage of recruiting participants for clinical trials. Instead, a higher prevalence of lung carcinoma among Black populations, only 4.5% Black individuals participated in the screening trials, and a mere 2% took part in durvalumab trial for stage III NSCLC (Team 2011; Antonia et al. 2017). A cohort study conducted using data from NCDB (National Cancer Database) from 2004 to 2012 also highlighted a significant difference in the study sample, with a participation rate in immunotherapy for melanoma among Blacks being 97.7% lower than that of Whites (Al-Qurayshi et al. 2018).

In recent study, disparities were observed in pembrolizumab trials for breast cancer participants, where 12 White females participated compared to only one Black female participant in immunotherapy trial (Grette et al. 2021).

When it comes to metastatic HCC (Hepatocellular Carcinoma), immunotherapy is typically favored over chemotherapy for overall survival. However, significant disparities in early access to immunotherapy are evident, particularly among Hispanic and Black populations compared to White individuals (Ahn et al. 2022)

In colorectal, lung and breast, cancers, there is no demonstrated variation in PDL1 expression and tumor genomic profiles among different ethnic groups. However, significant differences are observed in the immune cell composition within the tumor microenvironment (Mitchell et al. 2017).For instance, breast tumors in Black patients exhibit a pronounced prevalence of

immune cells and increased expression of inhibitory receptors like CTLA4, PD1and LAG3 when compared to non-Hispanic white females. (Yao et al. 2021).Similar trends are also observed in prostate tumors where in this population increased expression of proinflammatory genes.93 While the findings proved potential advantages for immunotherapy in Black female patients, the reality presents a contrasting picture. This is due to a combination of patient-level factors, including socioeconomic status, treatment-related behaviors, and ethnicity, as well as provider-level factors such as the cost of immunotherapy, healthcare provider knowledge, beliefs, and attitudes toward patients, and systemic factors like reimbursement policies and healthcare infrastructure quality.

Regulatory agencies have a role in governing specialized therapies, such as immunotherapy. Research has shown that the percentage of patients receiving immunotherapy both before and after FDA approval has risen to 12.4% in the case of NSCLC (Non-Small Cell Lung Cancer). Over the past decade, the use of immune checkpoint inhibitors has experienced significant growth, leading to a substantial reduction in cancer-related deaths (Mitchell et al. 2017).

However, when considering cancer registrations across various populations, it becomes apparent that targeted treatments offer advantages primarily to non-Hispanic White individuals in comparison to other minority subgroups. Interestingly, contrary to common perceptions, Asian lung cancer patients appear to have better survival rates compared to other ethnic populations.95

Well-designed clinical trials have significantly enhanced the diagnosis and treatment of cancer, and ongoing scientific advancements continue to introduce innovative approaches to cancer care. However, the implementation of these new treatment strategies necessitates the informed consent of patients who choose to participate in clinical trials. Statistics indicate that this participation rate is relatively low, with less than 5% of cancer patients opting to do so.

A meta-analysis has shown a slightly higher participation rate, around 8%, in the case of industry-sponsored projects. This might be attributed, in part, to incentives provided by the industry. However, it's worth noting that the recruitment of patients for industry-sponsored trials largely occurs through academic centers, whereas patients in investigator-initiated trials are often drawn from community centers.

Disparities in Clinical Trial Involvement

Well-designed clinical trials have significantly enhanced diagnosis and cancer therapy, and ongoing scientific advancements continue to introduce innovative approaches to cancer care. However, implementation of these new treatment methods necessitates informed consent of participants who choose to participate in clinical trials. Statistics indicate that this participation rate is relatively low, with less than five percent of cancer patients opting to do so.96,99 A meta-analysis has shown a slightly higher participation rate, around 8%, in case of industry-sponsored projects.100 This might be attributed, in part, to incentives provided by the industry. However, it's worth noting that recruitment of patients for industry-sponsored trials largely occurs through academic centers, whereas patients in investigations trials are often drawn from community centers (Osarogiagbon et al. 2021).

The availability of clinical study in a specific geographic area can have an impact on its participation rates. Research indicates that disparities in geographic access to healthcare services are connected with negative outcomes, reduced quality of life, and suboptimal adherence to treatment protocols 101. Syed et al. 102 have additionally illustrated that these

disparities disproportionately affect minorities and individuals with lower incomes, which, in turn, poses challenges to achieving equitable representation in therapeutic studies. According to a nationwide survey conducted in Pennsylvania, only 37% of individuals with cancer expressed their willingness to travel for the purpose of participating in a clinical trial (Meropol et al. 2007).

Lara et al. conducted a prospective analysis of cancer patients at the University of California Davis Cancer Center, and their findings mirrored those mentioned earlier, with the second most common reason (Meropol et al. 2007) for non-participation in a trial being the patient's distance from the study center (Lara Jr et al. 2001).

Current studies have highlighted that even within the United States, there are disparities in the accessibility of clinical trials. As per study conducted by Galsky et al., a significant proportion of patients with various cancers, including NSCLC, prostate, breast and colorectal cancers, must travel beyond an hour to reach a clinical trial site (Galsky et al. 2015). Between 1987 and 2016, there was a notable lack of representation of Black males in Phase three studies on prostate cancer conducted in the United States. Among the 72 clinical trials analyzed, a significant majority, 83.4%, consisted of White males, whereas only 6.7% were Black (Rencsok et al. 2020).

Disparities in access to cancer trials are even more pronounced in economically transition countries across the globe. In this context, there were only 1,951 trials available for lung, breast, and cervical cancers in lower and middle-income nations, in contrast to approximately 4,700 trials in high-income countries. (Ramaswami et al. 2018). According to findings by Carneiro et al., the prevalence of interventional trials in Europe varies from 0.14 to 10.7 trials per 100,000 individuals.110. In the realm of cancer clinical trial participation, African Americans make up approximately 5% of the enrolled subjects. The implementation and accessibility of preventive clinical trials are probably influenced by the presence of socioeconomic disparities and the country's multicultural nature.

Several noteworthy factors contribute to this discrepancy. These include inadequate safeguards for patient rights and compensation in cases of trial-related harm, insufficient adherence to informed consent procedures, deficiencies in scientific and ethical review processes, suboptimal regulatory protocols for new pharmaceuticals, and, of significant importance, the absence of access to expensive cancer therapy that have demonstrated effectiveness in post-trial populations in economically developing countries. Agarwal et al. (Agrawal et al. 2015)and Joseph et al. (Joseph et al. 2019) have identified numerous challenges when conducting such research, which include workforce mobility, socioeconomic obstacles like gender inequality, casteism, and the stigma associated with illness, as well as a lack of access to primary healthcare facilities, particularly in developing countries.

In studies focusing on the treatment of NSCLC, genomic analysis is often a prerequisite for participation. Consequently, disparities in the inclusive molecular profiling and NGS analysis can significantly contribute to variations in trial enrollment across different racial groups. Recent investigations have examined whether racial disparities exist in the utilization of biomarker analysis and if inclusion criteria in clinical trials is linked to extensive genetic testing. Significantly, participants were markedly more inclined to participate in clinical study if their tumors had undergone NGS screening, as such molecular profiling offered a greater prospect of favorable outcomes, as evidenced by the effectiveness of targeted therapies.

Disparities in Palliative Care

Palliative care is defined as "comprehensive care for patients whose conditions do not show improvement with treatment." (Gluyas 2015). The effectiveness of pain management and the utilization of palliative care are fundamental aspects influenced by socioeconomic factors and accessibility of healthcare facilities.

Approximately fifty eight percent of global population has access to palliative care facilities; however, these services are not uniformly distributed worldwide. Regions like the USA, Europe, Australia and Canada boast modern and well-equipped facilities, whereas African and South American regions lack similar services. Although there are certain commonalities in the palliative cancer care practices worldwide, notable disparities exist in terms of the prevalence, awareness, and availability of palliative care resources (T. Lynch, Connor, et Clark 2013).

Furthermore, there is a deficiency in the integration of specific cancer treatment into palliative care and cultural considerations that necessitate a tailored approach to treatment (Brant et Silbermann 2021).

A study discovered that the likelihood of receiving any form of palliative care was notably lower in hospitals serving impoverished communities. Despite improvements in the accessibility of hospice care, non-Hispanic Blacks continue to be underrepresented among hospice patients. An analysis of 204,175 hospitalizations involving late-stage cancer revealed a significant disparity: non-Hispanic Blacks were considerably less likely than their White counterparts to access hospice care for terminally ill patients, despite a 14% increase in hospice facility availability.(Rhodes et al. 2019).

When comparing palliative and hospice care utilization between 133 non-Hispanic Black and White patients at a cancer treatment center, it was observed that non-Hispanic Blacks had access to significantly fewer state-of-the-art facilities compared to Whites. Additionally, Odonkor and colleagues conducted a comprehensive study evaluating the effectiveness of cancer pain therapy studies carried out in North America, Europe, and Africa (Odonkor, Kim, et Erdek 2017).

Out of the 18 studies conducted, only three took place in Africa, specifically in Egypt, with investigators underscoring the uneven distribution of trials on a global scale. In a survey encompassing 15 Middle Eastern nations, just 41.4% of respondents reported that their organizations had established palliative care facilities (Silbermann et al. 2015).

Addressing disparities in the utilization of appropriate cancer treatment among patients begins with enhancing awareness and ensuring equitable access to hospice and palliative care services. The reluctance to engage more frequently with hospice care can typically be attributed to several factors, including prohibitive costs, differing cultural or personal values concerning modern hospice concepts, lack of knowledge about hospice care, distrust in medical care, and hesitance to bear the financial burden of palliative care, particularly in terminal conditions.

To eliminate these disparities, it is essential to comprehend both the gaps in critical disease treatment and the inequalities associated with palliative care. An analysis of 187 individuals who received palliative care during hospitalization unveiled a strong association between birthplace and racial background with patient disposition.

Research has also indicated that minority communities, including African Americans, Asian Americans, and Hispanics/Latinos, tend to utilize hospice care less frequently.(Escobedo, Cervantes, et Havranek 2023) There are notable cultural variations in how the disease is

perceived and how palliative care is approached among different segments of patients and their families, particularly when comparing Western societies to tightly-knit societal structures observed in regions like South Asia, Southeast Asia, and the Far East. In cultures where Buddhism is the predominant faith, the belief in "natural fate" often encourages individuals to confront pain as they await death. Given that Buddhism holds sway in countries like China and Southeast Asia, there is a reluctance to embrace palliative hospice care within these cultural contexts (Bharmjeet et Das 2023).

Conclusion

Discussing cancer or palliative care remains challenging in many countries due to deep-seated cultural taboos and fears associated with the disease. In some regions of Africa, certain ethnic groups still harbor the belief that cancer is contagious, which has posed significant obstacles to the effective administration of palliative treatment and has resulted in the social isolation of patients due to the stigma attached to the illness. It is imperative to recognize and consider this societal perspective on palliative care, while also juxtaposing it with scientific reasoning to promote compassionate patient management and raise awareness. To alleviate pain and suffering, advanced palliative care techniques should be more consistently accessible, irrespective of racial disparities on a global scale. To assess and address racial and ethnic disparities in hospice and palliative care, research strategies must be implemented, and effective management of the financial burden associated with these services is crucial.

Conflict of Interest

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Ethical Approval

Since the manuscript does not involve human and animal experimentation, ethical approval is not necessary.

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