

## **Title: Deconstructing, Addressing, and Eliminating Racial and Ethnic Inequities in Prostate Cancer Care**

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## **ABSTRACT**

**Context:** Men of African ancestry have demonstrated markedly higher rates of prostate cancer mortality compared with men of other races and ethnicities around the world. In fact, the highest rates of prostate cancer mortality worldwide are found in the Caribbean, Sub-Saharan West Africa, and among men of African descent in the US. Addressing this inequity in prostate cancer care and outcomes requires a focused research approach that creates durable solutions to address the structural, social, environmental, and health factors that create racial disparities in care and outcomes.

**Objective:** To introduce a conceptual model for evaluating racial inequities in prostate cancer care to facilitate the development of translational research studies and interventions.

**Evidence acquisition:** A collaborative review of literature relevant to racial inequities in prostate cancer care and outcomes was performed. Existing literature was used to highlight various components of the conceptual model to inform future research and interventions towards equitable care and outcomes.

**Evidence synthesis:** Racial inequities in prostate cancer outcomes are driven by a series of structural and social determinants of health that impact exposures, mediators, and outcomes. Social determinants of equity, such as laws/policies, economic systems, structural racism affect the inequitable access to environmental and neighborhood exposures, in addition to healthcare access. Although the incidence disparity remains problematic, various studies have demonstrated parity in outcomes when social and health factors, such as access to equitable care, are normalized. Few studies have tested interventions to reduce inequities in prostate cancer among Black men.

**Conclusions:** Worldwide, men of African ancestry demonstrate worse outcomes in prostate cancer, a phenomenon driven largely by social factors that inform biologic, environmental, and healthcare risks. A conceptual model was presented that organizes the many factors that influence prostate cancer incidence and mortality. Within that framework, we must understand the current state of inequities in clinical prostate cancer practice, the optimal state of what

equitable practice would be, and how achieving equity in prostate cancer care balances costs, benefits, and harms. More robust characterization of the sources of prostate cancer inequities should inform testing of ambitious and innovative interventions as we work towards equity in care and outcomes.

**Patient summary:** Men of African ancestry demonstrate the highest rates of prostate cancer mortality, which may be reduced through social interventions. We present a framework for formalizing the identification of drivers of prostate cancer inequities to facilitate the development of interventions and trials to eradicate them.

## INTRODUCTION

Prostate cancer is a heterogeneous disease characterized by wide variation in lifetime incident risk and mortality worldwide. Even within homogenous patient populations, prostate cancer outcomes vary widely by disease grade and stage at presentation. Routine prostate-specific antigen (PSA) testing became available in the late 1980s and increased the heterogeneity of prostate cancer phenotypes and outcomes at disease diagnosis. One persistent and notable trend in prostate cancer outcomes is the high burden in both incidence and cancer-specific mortality observed in Black men (see Table 1 for terms and definitions [1]). Prostate cancer is the leading cause of male cancer death in 46 countries—almost all in Africa, the Caribbean, and South America—many of which have high proportions of Black men (Figure 1) [2–5]. The highest prostate cancer mortality rate in the world is in Barbados [6]. Population-based registry data from the Surveillance, Epidemiology and End Result (SEER) national cancer registry has consistently demonstrated that Black men exhibit a 60-70% higher rate of prostate cancer incidence and 100-120% increased rate of cancer-specific mortality compared with White men in the US [7–9]. The difference in incidence and mortality have remained relatively stable despite a 50-60% decrease in the rates of both incidence and mortality for both Black and non-Black men since the introduction of PSA testing [10]. Black men are more likely to present with clinically detected disease [11], more advanced disease by stage [12–15], and at a younger age [15–17]. Data from the National Cancer Data Repository in the United Kingdom (2008-2010) show that Black men have up to a two-fold increased risk of both incidental and fatal prostate cancer [18].

An evaluation of global prostate cancer trends demonstrated higher incidence of prostate cancer in more economically developed countries [2–4,19,20], which may reflect the resource intensive infrastructure needed to perform wide-scale prostate cancer screening and to develop and maintain national cancer registries [21]. A prostate cancer screening study of 1,037 healthy men (age 45-74 years) in Ghana, West Africa, demonstrated a higher prevalence of screen-detected prostate cancer in Ghana compared with Black men in the United States [22]. A similarly high prevalence of prostate cancer has been described in Trinidad and Tobago [23]. However, contrasting findings have been demonstrated in autopsy studies, which suggest lower rates of clinically diagnosed and latent prostate cancer among Black men in West Africa [24]. It is

unclear how geographic factors, such as social and environmental exposure, may drive the incidence disparities and inform prostate cancer biology in the US, UK, and Caribbean.

Understanding and studying the drivers of racial inequities in prostate cancer in incidence and mortality is challenging, since the observed outcomes reflect a complex relationship among genetic, social, environmental, patient-related, and health system factors. Each of these components contains a significant amount of heterogeneity, with effects on prostate cancer outcomes that can vary by race and ethnicity. Race and ethnicity are social constructs used to classify and aggregate large, heterogeneous groups. These constructs are affected by significant events (i.e., the slave trade, wars, genocide, segregation) that can influence biologic/genetic, social/environmental, and patient/health-related factors. For example, some of the geographic regions associated with the highest burden of prostate cancer mortality in the United States [25] and among Black men [26,27] have a high proportion men with low socioeconomic status, limited access to healthcare, limited availability of social services, and a high proportion of Black men in their population. One study found that the highest disparity in prostate cancer mortality exists in US cities with the highest levels of segregation [28]. Similar heterogeneity can be found among Black populations around the world. Genetic ancestry and admixture vary significantly among men who otherwise self-identify as Black [29]. Consequently, the use of a category such as “Black” may represent too broad of a cohort definition for certain disparities studies, such as those focused on biologic risk and phenotype [30], and strong consideration must be given to the use of genetic ancestry in this setting.

A framework is needed that organizes the complex structural, social, environmental, biologic, and health factors that influence prostate cancer outcomes to help guide future studies and interventions to mitigate racial inequities in prostate cancer, with a focus on the high burden of prostate cancer among Black men. The purpose of this review is to introduce a conceptual model for evaluating and addressing racial inequities in prostate cancer. This model integrates the impact of structural determinants of equity (i.e., structural racism, economic policies, environmental racism), social determinants of health, and disparate allocation of health services to provide a broad landscape of racial inequities in prostate cancer care and outcomes. This model aims to facilitate the development of translational research and interventions, with a health

equity lens. Although this conceptual model is presented in the context of racial inequities in prostate cancer among Black men, it can be adapted to other marginalized populations and urologic cancers and diseases.

## **EVIDENCE ACQUISITION**

This is a collaborative review of literature relevant to racial inequities in prostate cancer among Black men that focused on English-language studies published from April 2011-April 2020 and identified using the MEDLINE electronic database. MEDLINE search terms are provided in the attached supplement. Additional relevant studies including clinical guidelines and level I clinical trial data were also included.

Articles were evaluated based on their level of evidence and subject matter. Articles were chosen for this review based on the relevance and appropriateness of its content as deemed by the expertise and knowledge of the authors. Given the breadth of the subject and the paucity of high-level data in some areas, a narrative synthesis was chosen over meta-analysis or systematic review to ensure adequate discussion of the topic. A conceptual model, which is introduced below, and was iteratively modified with all study authors, serves as the framework for organizing the data obtained from this review.

## **A CONCEPTUAL MODEL FOR PROSTATE CANCER DISPARITIES**

A conceptual model was proposed integrating structural, social, and health factors that impact racial inequities in prostate cancer from carcinogenesis to cancer-related death (Figure 2). At each clinical transition within the conceptual model, translational health disparities research would consider the following questions: *(1) Are current practices equitable? (2) What is an equitable practice? (3) What are the costs, harms, and benefits of achieving equitable practices?*

To develop this conceptual model, we first consider the continuum from carcinogenesis to death. Our conceptual model is divided into three broad clinical events: (1) diagnosis; (2) disease management/treatment; and (3) oncologic outcomes (e.g., cancer progression, death). We start by acknowledging that biology and environment drive disease risk and prognosis in men with

prostate cancer. Several studies demonstrate that West African genetic ancestry measured by SNP-based ancestry informative markers is associated with an increased risk of incident and clinically-significant prostate cancer in Black men [31–34]. A study of men from 64 global populations demonstrated that men of West and East African ancestry had the highest global estimates of prostate cancer risk and death [35]. This increased genetic risk among Black men was largely driven by a small number of genetic variants (i.e., 8q24, 2q37, and 22q13) that demonstrated a paradoxically high allele frequency in the study population, and it has been hypothesized that higher allele frequencies could be explained by a genetic bottleneck resulting from forced migration (i.e., slave trade) and immigration by the African diaspora [35]. Biology and environmental exposures likely continue to impact prostate cancer prognosis beyond diagnosis and management/treatment.

Inequities in health outcomes are driven by structural and social determinants of health and equity, which include economic stability, neighborhood/physical environment, education, food sources, community/social context, and healthcare systems available to patients [36,37]. These determinants of health are informed by structural and social determinants of equity, which are comprised of systemic factors, such as systemic and institutionalized racism, social norms, laws and policies, and economic systems [38]. These structural and social determinants of health and equity were integrated into the model overlying a patient’s prostate cancer trajectory. The impact of the healthcare system on disparities can be further specified using published frameworks like the Andersen behavioral model for studying healthcare utilization, which comprises the following factors: (1) predisposing (i.e., age, race/ethnicity, family history); (2) enabling (i.e., insurance status, education, income); (3) need (i.e., comorbidity, cancer stage); and (4) context (i.e., physician density, health networks) [39,40].

## **A REVIEW OF THE RACIAL/ETHNIC DISPARITIES IN PROSTATE CANCER OUTCOMES USING A CONCEPTUAL FRAMEWORK**

The scope of this review was restricted to a discussion of health services within the conceptual model focusing on the known structural and social determinants and health factors underlying racial and ethnic inequities in prostate cancer treatment and outcomes. A review of environmental and biologic factors is out of the scope of this review, but no less important. We

review and summarize the current literature to illustrate potential areas of need in which the conceptual model can be used to guide future studies.

Figure 3 displays a context-specific application of the conceptual model to understanding disparities in the early diagnosis of prostate cancer. The diagnosis of prostate cancer can occur in an early, localized state due to PSA screening, or present symptomatically (largely representing locally advanced or metastatic disease). The presumed benefit of early detection is in the availability for curative therapy in men diagnosed with clinically localized, unfavorable-risk disease. The European Randomized Study of Screening for Prostate Cancer (ERSPC) trial provides level 1 evidence that PSA screening reduces mortality by 20% at a median follow-up of 16-years [41]. However, Black men represented 0-3% of the ERSPC and the Prostate, Lung, Colon and Ovarian (PLCO) screening trial cohorts [41,42] and has been cited as a reason for limited recommendations for early detection among Black men [43]. In practice, access to health insurance [44], PSA screening [45], multiparametric prostate magnetic resonance imaging [46], urologists [47] and prostate biopsy [48] differs significantly by race/ethnicity and could impact disparities in incidence, stage at diagnosis, and mortality. Figure 3 demonstrates the interconnectedness of structural, social, and health factors and their impact on carcinogenesis and health service utilization around early detection. The model provides opportunity for critical evidence synthesis, research prioritization, and intervention design, study, and implementation to address inequities in the early detection of prostate cancer in Black men.

### ***Structural Factors***

Structural and contextual factors are considered fundamental causes that impact the social determinants of health. Structural factors that are biased against particular racial and ethnic groups impose sustained and widespread effects on inequities in prostate cancer outcomes. Structural racism against Black men and its consequent downstream effects on residential segregation, physician/patient bias, medical distrust, perceived discrimination, adverse childhood experiences, and life course stressors, is of critical importance and deserve greater focus in observational, clinical trial, implementation, and intervention research [49]. Laws, policies, and social norms can correspond with practices such as redlining, which can place marginalized



communities at higher risk of adverse environmental exposures. In the US, Black individuals are more likely to live in areas with high levels of environmental pollution, which correlates with increased risk of all-cause mortality [50]. A SEER-Medicare analysis demonstrated that pollution was associated with worse disease stage and outcomes for Black men with prostate cancer [51].

Lived and inherited experiences—which include historical exclusion, medical mistrust/distrust, John Henryism (i.e., the stress of high effort coping to succeed in the face of prolonged discrimination, inequality, and financial hardship resulting in physiologic cost), health literacy, cultural health beliefs (e.g., preferences for alternative/complementary medicine), transgenerational trauma, and financial burdens/stress—influence how patients navigate the complex social drivers of their medical decision-making. A qualitative analysis assessing interviews of rural Black men identified a lack of understanding, tradition, distrust of the system, fear, and perceived threat to manhood as common themes influencing their perception of prostate cancer and PSA testing [52]. Yet, informational resources, particularly those available online, have been shown to be not racially representative, and of those with Black racial representation, determined to be low quality and readability [53].

Medicine is marked with examples of poor and marginalized populations being subjected to medical experimentation for the sake of clinical training or medical research [54]. This history and trauma influences relationships between marginalized communities and the medical field, and impacts the utilization of health services and participation in clinical research. However, it must be noted that marginalized populations have also been historically excluded from clinical trials and higher quality care as a result of structural and systemic racism [55]. Even now the improvement of Black men in clinical trial enrollment is largely limited to phase I trials.

### ***Social Determinants of Prostate Cancer Disparities***

Social determinants of health affect how prostate cancer patients access and utilize care. Socioeconomic and insurance status, financial toxicities, and social support networks all correlate with both race/ethnicity and oncologic outcomes among prostate cancer patients. Socioeconomic status is a broad term that aims to characterize the social and economic well-

being of a person or population by using education status, income, and/or occupation to classify individuals. Worldwide, studies have demonstrated that prostate cancer patients of higher socioeconomic status have better outcomes compared with men of lower socioeconomic status [56–58]. Lower socioeconomic status in Black men has been associated with decreased prostate cancer incidence [57], which may be due to reduced access to healthcare services. This hypothesis is supported by the mitigation of racial/ethnic disparities in prostate cancer screening after adjusting for socioeconomic status in the Southern Community Cohort Study [59]. Higher socioeconomic status was associated with improved access to care, higher health literacy, and financial stability, which all improve access to and quality of the health services one may have the opportunity to receive. Conversely, lower socioeconomic status may be associated with lower health literacy and underinsurance rates, thus creating barriers to early detection and/or treatment. These social determinants result from, or are exacerbated by, structural racism and other social/economic barriers. This is observed globally by the relationship between the human developmental index and burden of prostate cancer as measured by the mortality-to-incidence ratio [60].

A multi-institutional radical prostatectomy cohort of patients treated within the Veterans Affairs Health System demonstrated that Black men had a 10-11% increased risk of biochemical failure when adjusted for socioeconomic status [61]. There was a significant interaction between race and socioeconomic status such that Black men of lower socioeconomic status had lower risks of metastases, castration-resistant prostate cancer, and cancer-specific mortality relative to White men of higher socioeconomic status, which highlights the complexity of the interactions and relationship between socioeconomic status and race/ethnicity [61]. A multi-institutional cohort study of 347 Black men from two academic centers in northeastern US (2010-2015) demonstrated that lower socioeconomic status was associated with higher PSA and risk of adverse pathology measured by Cancer of the Prostate Risk Assessment postsurgical score (CAPRA-S), TNM stage (i.e., higher rates of seminal vesicle invasion), and margin status [62]. Black race, divorced status, and lower socioeconomic status measured via income have been associated with longer time to treatment following prostate cancer diagnosis in a cohort of 2,053 patients treated between 1990-2010 [44]. An interaction between income status and ethnicity has also been shown, with lower odds of definitive therapy utilization observed with decreasing

income among Black men with localized high-risk prostate cancer [63]. These studies likely reflect the strong impact of socioeconomic status on access to healthcare and that the effects of socioeconomic status appear to be mitigated in settings with equal access to healthcare services [64–66]. A more recent study evaluated treatment outcomes of Black and White men with localized prostate cancer from a pooled cohort of clinical trial data, data from the SEER cancer registry, and the Veteran Affairs Health System and demonstrated that the association of Black race with prostate cancer mortality is rendered insignificant by treatment in “equal-access” settings after adjusting for clinical and socioeconomic factors [67]. Though Black men in equal-access settings are younger (VA & RCTs) than their White counterparts, and healthier (86% with ECOG 0) than the SEER population, access to care is impactful.

In the US, Europe, and many parts of the world, socioeconomic status is correlated with both race and geography. For instance, Southern US has a higher proportion of Black populations, higher rates of poverty, and lower levels of educational attainment and access to medical care [68]. However, these geographic patterns in socioeconomic status can demonstrate significant variation within smaller geographic units, such as postal codes. Investigators have also shown an increase in incident prostate cancer among veterans living in areas with high indices of social vulnerability [69]. Medicare claims data show Black men have a lower odds of seeing a urologist within 1-year of prostate cancer diagnosis (odds ratio 0.65, 95% CI 0.60-0.71) and that residence in counties with high poverty and crime is an independent predictor of not having a post-diagnosis treatment visit. [70]. Even with high-quality data, geographic patterns of prostate cancer disparities, such as higher mortality, are difficult to disentangle from the confounding effects of race, social barriers, education, economics, and health care access [26].

Education status, a proxy for health literacy and financial status, has an inverse association with poor prostate cancer outcomes. A higher education level among Black men was associated with increased odds of undergoing PSA screening [71], while men with lower education levels and high-risk prostate cancer are less likely to utilize definitive therapies, such as radiotherapy and/or surgery, an association that remained significant in adjusted modeling accounting for race/ethnicity [72]. Social support is a powerful factor that influences patient decision-making. Numerous studies have demonstrated that partnered men with prostate cancer have better quality

of life [73,74] and oncologic outcomes [75–78]. However, partner status (e.g. married, single, etc.) is just one measure of social support, with the quality and quantity of social support a better predictor of treatment choice among low-income men with localized prostate cancer [79]. Black men are less likely to be partnered in a large regional community cohort of PSA screening-eligible men [59].

Health literacy and medical knowledge of prostate cancer among Black men is multi-factorial and reflects socioeconomic, educational, and support network factors that are informed by structural and social inequities. These same factors also impact lower prostate cancer-related knowledge among Black women [80]. Higher prostate cancer health knowledge is associated with higher education and income, younger age, and physician discussion about PSA testing among Black men [81]. Improving access to high-quality information and fund of knowledge among Black men might enhance their willingness to participate in diagnostic and therapeutic interventions, since self-efficacy is associated with the desire to seek PSA testing among Black men [82]. Additional factors that influence decision-making include younger age, religion/spirituality, and stories of famous persons with prostate cancer [83].

These factors also influence treatment decisions and regret. A study of men with prostate cancer demonstrated that Black men were more likely to underestimate the severity of their prostate cancer diagnosis, and twice as likely to factor the duration of their treatment and recovery in their treatment decisions compared with White men [84]. Black men experience nearly two-fold higher likelihood of decision regret after robotic radical prostatectomy [85] or at the time of cancer recurrence [86] than White men. Community-based participatory and patient-centered research efforts and interventions rooted in advocacy and partnership are strategies that can be used to assess and support the informational and educational needs of Black men, and other marginalized communities, around prostate cancer care and research.

#### ***Healthcare System Drivers of Disparities***

Healthcare systems can drive disparities in care and outcomes by creating barriers to access or through variations in quality of care that are likely to disproportionately impact Black men with prostate cancer. The healthcare system imposes barriers to improving prostate cancer outcomes in disadvantaged populations by under-accruing these men in clinical trials and translational clinical and health services research studies. These limitations can exacerbate disparities along

the continuum of prostate cancer care (Figure 2). Black men have higher grade and stage disease at clinical presentation and are less likely to have a PSA test ordered by a clinician prior to diagnosis [11][87]. Black men are more likely to have treatment underutilization as measured by recommendations not executed by a prostate cancer provider [88]. The lack of targeted screening strategies, appropriate use of definitive therapies, access to appropriate post-treatment surveillance, and access to standard-of-care and novel systemic therapies in the metastatic setting may all impact the higher rate of prostate cancer-related mortality seen in Black men.

Microsimulation data calibrated to US cancer registry data suggested Black men have a 28-56% increased risk of preclinical prostate cancer and a 44-75% increased risk of progression to metastatic disease compared with the general population [11]. High-level data do not exist to inform the use of PSA screening in Black men. The ERSPC was almost exclusively conducted without Black men [41], and Black men only comprised 3% of the US PLCO screening trial [89]. Policy and guideline recommendations regarding diagnostic and therapeutic interventions are driven by the availability and quality of trial data, and the lack of available evidence hinders developing recommendation for the early detection of prostate cancer in Black men around the world, though NCCN has attempted to do so for sub-Saharan Africa [90].

PSA and PSA derivatives (i.e., PSA density) may vary by race/ethnicity [91,92]. Studies have demonstrated Black men undergoing prostate cancer screening have higher PSA levels [93] and more rapid increases in PSA [94] compared with men of other race/ethnicities, which could be due to biological, social or lifestyle factors, or access to care. Other groups have demonstrated PSA values of men without cancer are similar regardless of race [94,95]; however, Black men have demonstrated higher median PSAs among prostate cancer cases [95]. Better understanding this relationship is essential, as a midlife baseline PSA is a strong predictor of lifetime prostate cancer risk among Black men [95], as well as men of other races/ethnicities. A reconstruction of PSA screening over time between Black and White men using data from the National Health Interview Survey and Medicare data demonstrated that the rates of PSA testing among men 40-74 years of age are similar between Black and White men [11]. The absolute difference in screening rates has been reported to be 2.6% higher in White men compared with Black men surveyed between 2010 and 2014 [96]. The relationship between these small absolute

differences in screening and racial disparities in prostate cancer mortality remains unclear. A SEER-Medicare study based on data from 1994 to 2002 found that Black men had longer intervals between PSA screening and a higher likelihood of a clinical prostate cancer diagnosis [81]. Prostate cancer screening was associated with a decreased disparity in the diagnosis of locally advanced and metastatic prostate cancer between Black and White men [81], suggesting that early detection strategies for prostate cancer may mitigate racial prostate cancer disparities.

Several factors were associated with increased utilization of PSA screening among Black men that included family history [97], higher medical knowledge/health literacy [98], a regular medical home [99–101], decreased physician/medical trust [99,102], having a partner [100], higher educational attainment [100], increased burden of comorbidities [100], being insured [102], and higher income [102]. Adopting and implementing more intensive detection strategies that decreases the interval between PSA testing has the potential to reduce racial disparities in outcomes in Black men [103]. However, increased rates of screening, without access to higher specificity tools like PSA density, prostate health index and prostate MRI, are likely to increase the detection of indolent and clinically insignificant prostate cancers [104].

The model can then be adapted to other prostate cancer contexts. For localized disease, patients may be eligible for active surveillance, observation, or definitive therapy based on their disease risk, life expectancy, and comorbidities. The decision to pursue treatment may be influenced by access to care, financial concerns, caretaker support, medical distrust, patient and provider preferences, and the availability of resources. Clinical outcomes during disease management may vary based on the quality and timeliness of care patients receive. Outcomes may be modified by various competing risk factors, such as obesity [105], smoking status [106], and diet and physical activity [107]. Among patients who receive definitive therapy, appropriate monitoring is a critical component of providing timely and effective salvage therapies for patients with clinical recurrences. The availability of salvage therapies and clinical trials represents an important source of outcome disparities among men with localized prostate cancer. These factors are all impacted by structural, social, and health care access factors.

Similarly, survivorship is an important and complex consideration for men with a prostate cancer diagnosis given the long natural history of the disease. Considerations should be given to understanding the impact of race/ethnicity and other social factors on how men live with their prostate cancer and its treatments.

### **Translational Health Services**

A review of disparities research in prostate cancer revealed many studies that characterize the magnitude of the problem. Few studies demonstrated viable clinical and policy solutions that can create parity in outcomes for Black men. A few examples of these interventions include the Improving, Access, Counseling and Treatment for Californians with Prostate Cancer (IMPACT) program, the Cleveland Clinic Glickman Urological and Kidney Institute Minority Men's Health Center, and the Los Angeles County Department of Health Services interventions [108].

We found that few studies have defined equitable practice and the benefit/cost/harm of achieving these equitable practices. The routine consideration of defining equity beyond current practice patterns are fundamental to applying the conceptual model that we present and provide opportunity for translating health services research into equitable prostate cancer care and outcomes. The pathway to reducing prostate cancer inequities is essential and relies on a few important considerations: (1) development of large, high-quality comparative data in the form of prospective cohorts and clinical trials; (2) strong policy solutions to mitigate disparities in access to care; (3) culturally appropriate interventions to bridge the divide between healthcare institutions and at-risk, marginalized populations; (4) enrichment of biologic cohorts from underrepresented populations to facilitate the development of personalized risk- and therapy-stratifying molecular tools; (5) community-engaged and patient-centered efforts rooted in partnership, collaboration, and trust; (6) increasing the diversity of our clinical workforce applying existing roadmaps to increase underrepresented populations in medicine [109]. Underlying each of these considerations must be attention to structural and social determinants of equity and health.

Advocacy partnerships can facilitate the prioritization, development, and execution of research activities [110]. Patient advocacy networks also present opportunities to create supportive networks for marginalized communities and can provide important perspective on defining optimal practices and assessing the benefits/costs/harms of equitable practices. These efforts ultimately drive the quality of care that is provided to patients with prostate cancer by providing care that is safe, effective, patient-centered, timely, efficient, and equitable [111].

## **Conclusions**

A conceptual model was presented that organized the many structural, social, and health system factors that influence prostate cancer incidence and mortality. Within the proposed framework, we must understand the current state of inequities in clinical prostate cancer practice, the optimal state of what equitable practice would be, and how achieving equity in prostate cancer care balances benefits and harms. More robust characterization of the sources of prostate cancer inequities that inform testing of ambitious and innovative interventions may one day overcome these disparities in care and outcomes.



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## Figures Legend

**Figure 1 – Global Age-Adjusted Rates of Prostate Cancer Mortality** (permission to use required)

**Figure 2 - Conceptual Model for Translating Health Services Research and Interventions into Solutions to Address Inequities in Prostate Cancer Care and Outcomes.** This model provides a formalized framework to incorporate structural, social, and health factors in the study of inequities in prostate cancer along the continuum of care delivery and outcomes.

**Figure 3 – Application of Conceptual Model for Racial Inequities in the Early Detection of Prostate Cancer**

**Table 1 – Key Terms and Definitions**

<b>Term</b>	<b>Definition</b>
Race	“Historically referred to broad categories of people that are divided arbitrarily but based on ancestral origin and physical characteristics.” [1]
Ethnicity	“Historically referred to a person’s cultural identity (e.g., language, customs, religion).” [1]
Ancestry <sup>1,2</sup>	“Refers to a person’s country or region of origin or an individual’s lineage of descent.” [1]
Black	“A racial, ethnic or cultural sense, conveying an essential and shared sense of history, identity and community among people who identify as Black, including those in the African diaspora and within Africa.” [112]
Genetic admixture	“Refers to genetic exchange among people from different ancestries and may correlate with an individual’s risk for certain genetic diseases.” [1]

<sup>1</sup>African ancestry refers to an individual whose country or region of origin is in Africa, or has a lineage of descent from Africa; <sup>2</sup>African ancestry often refers specifically to men of predominant West African ancestry in prostate cancer studies