

**STRATEGIES TO ENHANCE THE APPROACH TO PROSTATE CANCER  
SCREENING OF AFRICAN MEN IN THE FREE STATE**

by

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Submitted in fulfilment of the requirements in respect of the degree

**DOCTOR OF PHILOSOPHY  
in FAMILY MEDICINE**

in the

DEPARTMENT OF FAMILY MEDICINE  
FACULTY OF HEALTH SCIENCES  
UNIVERSITY OF THE FREE STATE  
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**JUNE 2023**

## DECLARATION

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I declare that the thesis “Strategies to enhance the approach to prostate cancer screening among African men in the Free State”, submitted to the University of the Free State for the degree Doctor of Philosophy (PhD) in Family Medicine, in published article format, is my independent and original work. I declare that the work has not previously been submitted, in part or in full, for a qualification at another institution of higher education.

I have endeavoured to use the research sources cited in the text responsibly and given credit to the authors and compilers of the references for the information provided, as necessary. This thesis does not contain other authors’ writing unless expressly acknowledged, quoted, and referenced.

I also declare that all information study participants provide were treated with the necessary confidentiality.

I have also acknowledged those persons who have assisted me in this endeavour.

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## ABSTRACT

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**Background:** Prostate cancer is a significant public health concern in South Africa, with rising incidence and mortality rates, particularly among African men. Prostate-specific antigen (PSA) screening is a practical method for early detection and improved outcomes. However, it carries the risks of overdiagnosis and overtreatment. Recent studies have shown a more significant net benefit of PSA screening for Black men than the general population. However, there are knowledge, attitude and practice gaps among primary healthcare providers and users, especially Black men, regarding prostate cancer screening. Practical strategies to address these gaps are lacking. This study focuses on vulnerable African men in the Free State Province, South Africa.

**Methods:** This thesis presents the results of five complementary studies aiming to identify gaps in prostate cancer screening and determine strategies to enhance prostate cancer screening among African men in the Free State Province from the perspectives of primary healthcare providers and users.

The first study employed a cross-sectional descriptive design, using case record information and self-administered questionnaires to profile Black South African men with prostate cancer attending a tertiary hospital's oncology and urology clinics in the Free State Province. The second study used a cross-sectional analytical survey design, administering self-administered questionnaires to assess the knowledge, attitude and practice of primary healthcare providers in the study setting. The third study also employed a cross-sectional analytical survey design, utilising self-administered questionnaires to investigate African men's knowledge, cultural beliefs and screening intentions regarding prostate cancer screening. Factors associated with their intention to screen for prostate cancer were examined. Quantitative data were analysed using descriptive statistics, and associations were tested using chi-squared or Fisher's exact tests. The fourth and fifth studies comprised a scoping review and a modified Delphi survey to identify and propose strategies to enhance prostate cancer screening among African men in the study setting, addressing the identified gaps.

**Results:** The findings revealed that aggressive prostate cancer is prevalent among African men in the study setting. Poor knowledge and awareness of the disease and low screening uptake

were observed. Factors such as dietary habits, lifestyle and presentation time were associated with aggressive disease at diagnosis. Cultural beliefs influenced screening uptake among men. Factors associated with a higher intention to screen included reduced fear, perceived benefits, situational barriers, and perceived risk of developing prostate cancer.

Regarding primary healthcare providers, the majority demonstrated poor knowledge (64.8%), neutral attitudes (58.6%) and poor practice (40.0%) related to prostate cancer screening. Female providers, lower cadre nurses and community health workers had lower knowledge scores. Lack of prostate cancer-related continuing education was significantly associated with poor knowledge, negative attitudes and poor practice among healthcare providers.

The study proposed strategies to address the identified gaps among African men and primary healthcare providers. Community-oriented approaches involving the active participation of both providers and community members were emphasised. These strategies focused on relevant prostate cancer health education topics in public spaces, employing diverse, comprehensive, user-friendly and culturally sensitive methods.

**Conclusion:** This thesis highlights the gaps in prostate cancer screening among African men and primary healthcare providers in the Free State Province, South Africa. Targeted strategies are needed to enhance prostate cancer screening uptake and improve outcomes in this vulnerable population. Implementing the proposed strategies can improve awareness and knowledge of the disease and ultimately enhance screening practices among African men in the study setting.

**Keywords:** Prostate cancer screening; awareness; disease stage and grade; social determinants; Black men; African men; healthcare providers; knowledge, attitude and practice; KAP; screening intentions.

## ACKNOWLEDGEMENTS

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First, I am deeply thankful to GOD Almighty, the source of wisdom, knowledge, and understanding, for granting me success in this endeavour.

I extend my heartfelt gratitude to my research supervisor, Prof. Frederik Claassen. Your guidance, assistance, and unwavering support throughout the research process have been invaluable. I am also grateful to my co-supervisors, Prof. Hannes Steinberg and Prof. Nathaniel Mofolo, for their encouragement and support. Your profound research experience significantly contributed to the successful completion of this study. I am grateful to Prof. Klaus von Pressentin for his generous sharing of valuable ideas that greatly influenced the direction of my research. I am equally appreciative of Prof. Hanneke Brits for her unwavering support and invaluable guidance. Special thanks also go to Mr Johan Botes for his assistance with structuring, formatting, and technical aspects.

I would like to acknowledge and express my gratitude to the Three School of Medicine Research and Postgraduate Committee of the University of the Free State for their financial support, which made this research possible.

I sincerely appreciate the respondents, including primary healthcare workers, clinical experts, and African men. They willingly participated in this research study and generously shared their time and perspectives.

Special appreciation goes to my family members, friends, and colleagues for their constant support and encouragement. I would like to express my appreciation for the support I received from my parents, Prof. Niyi Benedict and Prof. (Mrs) Titilola Benedict (now of blessed memory), as well as Dr Ufok J Samson-Akpan (my mother-in-law). I am also grateful to my siblings – Appolinaire, Mayowa, Tolulope, Henrie, Yemi, Tosin, Mmedaara, and others.

To my loving wife, Ekaete, I want to express my deepest gratitude for your love, unwavering emotional support, and constant encouragement throughout this challenging journey.

Lastly, I thank our daughters, IbukunOLUWA, IfeOLUWA, and TiOLUWAlope, for their understanding, cooperation, and patience. Your presence and support have been an immense blessing.

Thank you all for your contributions, encouragement, and unwavering support.

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## LIST OF ABBREVIATIONS

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AJCC	American Joint Committee on Cancer
AMCOA	Association of Medical Councils of Africa
CHC	community health centre
CHW	community health worker
COPC	community-oriented primary care
CT	computerised tomography
CHPE	continuing healthcare provider education
CME	continuing medical education
CPD	continuous professional development
DRE	digital rectal examination
FDA	Food and Drug Administration
GP	general practitioner
HBM	health belief model
HPCSA	Health Professions Council of South Africa
HSREC	Health Sciences Research Ethics Committee
HCP	healthcare provider
IDM	informed decision-making
KAP	knowledge, attitude and practice
LMIC	low- and middle-income countries
LUTS	lower urinary tract symptoms
MRI	magnetic resonance imaging
MACUFE	Mangaung African Culture Festival
MMM	Mangaung Metropolitan Municipality
mpMRI	multiparametric MRI
NHI	National Health Insurance
OPD	outpatient department
OTL	outreach team leader
PhD	Philosophiae Doctor
PHC	primary healthcare
PCa	prostate cancer
PSA	prostate-specific antigen

PSMA	prostate-specific membrane antigen
STD	sexual transmitted disease
SDM	shared decision-making
SME	social-economical model
SAAFP	South African Association of Family Physicians
SANC	South African Nursing Council
SACPS	South African Prostate Cancer Study
SAPCDTG	South African Prostate Diagnostic and Treatment Guidelines
SD	standard deviation
SAS	Statistical Analysis System
SSA	sub-Saharan African
SEER	Surveillance Epidemiology and End Results
TPB	Theory of Planned Behaviour
TRA	Theory of Reasoned Action
TRUS	transrectal ultrasound
TNM	tumour node metastases
US	United States
USAID	United States Agency for International Development
USPSTF	United States Preventive Services Task Force
UFS	University of the Free State
WBOT	ward-based outreach team
WBPHCO	Ward-Based Primary Health Care Outreach Team
WHO	World Health Organization
WONCA	World Organization of Family Doctors

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# CHAPTER 1 – INTRODUCTION

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## 1.1 BACKGROUND TO THE STUDY

Cancer poses a significant societal burden in both economically developed and developing nations (Torre, Bray, Siegel, Ferlay, Lortet-Tieulent & Jemal 2015). Its incidence is rising due to population growth, ageing demographics, and a higher prevalence of established risk factors like smoking, obesity, sedentary lifestyles, and shifting reproductive patterns linked to urbanisation and economic progress (Torre et al. 2015).

Prostate cancer (PCa) is the second most common cancer and is the fifth most common cause of death among males globally (Bray, Ferlay, Soerjomataram, Siegel, Torre & Jemal 2018; Sung, Ferlay, Siegel, Laversanne, Soerjomataram, Jemal et al. 2021). In 2018, it was diagnosed in approximately 1.3 million individuals and resulted in 360,000 deaths. By 2020, these numbers rose to 1.4 million diagnoses and 375,000 deaths (Bray et al. 2018; Sung et al. 2021).

Africa and low- and middle-income countries (LMICs) experience a greater burden due to genetic, socio-economic, and sociocultural factors (Adeloye, David, Aderemi, Iseolorunkanmi, Oyedokun, Iweala et al. 2016; Bahnassy, Abdellateif & Zekri 2020). Both foreign (Jiang, Narayan & Warlick 2018; Siegel, O’Neil, Richards, Dowling & Weir 2020) and local (Dewar, Kaestner, Zikhali, Jehle, Sinha & Lazarus 2018; Tindall, Monare, Petersen, van Zyl, Hardie, Segone et al. 2014) studies have indicated inequities in the presentation of PCa, with individuals of African descent predominantly impacted by this disparity.

In South Africa, PCa is the most common cancer among men (Ramaliba, Sithole, Ncinitwa & Somdyala 2022). The incidence has witnessed a rise, with an increase from 29 cases per 100,000 men in 2007 (Le Roux, Urry, Sartorius & Aldous 2015) to 68 cases per 100,000 men in 2018 (Cassim, Ahmad, Wadee, Rebbeck, Glencross & George 2020).

Late presentation and advanced disease are commonly observed among Black men in South Africa, leading to higher rates of mortality and morbidity. Factors such as low socio-economic status, limited access to healthcare, insufficient education, and inadequate awareness of disease symptoms contribute to the delayed presentation (Mofolo, Betshu, Kenna, Koroma, Lebeko, Claassen et al. 2015). The majority of indigenous languages in South Africa lack translations for the term ‘prostate’.

Prostate cancer contributes to approximately 13% of male cancer-related fatalities in South Africa (Babb, Urban, Kielkowski & Kellett 2014). Black South African men have a higher likelihood of hereditary PCa compared to other racial groups, resulting in a disproportionate impact on their health (Hayes & Bornman 2018). This disparity in the manifestation of PCa is also evident in the study setting, with African men presenting with aggressive disease, with the majority often incurable (Myburgh & Claassen 2018). Therefore, as part of the National Development Plan 2030, the South African government has outlined a set of long-term health goals, including the objective of reducing the prevalence of non-communicable diseases (Free State Department of Health 2021).

Prostate-specific antigen (PSA) screening for PCa has been a subject of controversy due to the potential drawbacks associated with it, such as false-positive results, overdiagnosis, overtreatment and related complications (United States [US] Preventive Services Task Force, Grossman, Curry, Owens, Bibbins-Domingo, Caughey et al. 2018). Nevertheless, this screening test continues to be a practical approach for early detection, treatment, and prevention of metastatic disease and complications (Cuzick, Thorat, Andriole, Brawley, Brown, Culig et al. 2014), particularly in Africa, where mortality rates are higher, compared to other global regions (Mutua, Pertet & Otieno 2017).

The US Preventive Service Task Force has found evidence suggesting a potential decrease in PCa mortality among men aged 55–69 years who undergo PSA screening. However, there is presently no demonstrated advantage of screening men aged 70 years and above (Rawla 2019; US Preventive Services Task Force et al. 2018).

A recent study examining the harm-to-benefit ratio of PCa screening revealed that, despite the risks of overdiagnosis and overtreatment, the overall benefit of PSA screening is higher for Black men compared to the general population. These findings suggest that race-specific

screening guidelines may be necessary to optimise the effectiveness of PCa screening in different populations (Basourakos, Gulati, Vince, Spratt, Lewicki, Hill et al. 2022). Also, the South African Prostate Diagnostic and Treatment Guidelines (SAPCDTG) recommend PSA testing for men likely to benefit from the test (Segone, Haffejee, Wentzel, Heyns, Mutambirwa, Coetzee et al. 2013).

Yet, there is evidence that African men are less likely to participate in PCa screening, which may partly explain the disparity in PCa deaths (Kinyao & Kishoyian 2018). Limited compliance with PCa screening guidelines in Black men may suggest knowledge, cultural and belief gaps concerning PCa and related matters. (Kinyao & Kishoyian 2018).

The disparities in PCa outcomes among African men are multifactorial, involving a complex interplay of genetic, socio-economic, cultural and healthcare access factors (Baratedi, Tshiamo, Mogobe & McFarland 2020). Also, it has been shown that the strongest factor associated with screening amongst African men is the influence of physicians (Berglund, Nilsson & Nordin 2005; Weinrich 2006). Therefore, developing strategies to enhance the approach to PCa screening tailored explicitly for African men is crucial to reducing this population's disease burden.

## **1.2 PROBLEM STATEMENT**

Black South African men continue to experience significantly higher incidence and mortality rates from PCa than men of other ethnic backgrounds (Cassim et al. 2020; Hayes & Bornman 2018). Due to the associated risk of overdiagnosis and overtreatment, PSA screening of asymptomatic men is currently not the practice in the study setting, which may, in part, explain the late presentation to the primary healthcare (PHC) facilities, with the majority already having PCa-related symptoms. The associated controversy related to PSA screening notwithstanding, the SAPCDTG recommend informed patient-based PSA testing for men likely to benefit from the test (Segone et al. 2013).

Yet, the disparity in the incidence and mortality owing to the disease is on an upward trend (Cassim et al. 2020). No doubt, the existing approach to PCa screening fails to adequately address the unique challenges faced by African men, including genetic predisposition, socio-economic factors, cultural beliefs, and healthcare provider- and healthcare systems-related

factors (Baratedi et al. 2020). The racial differences in stage at presentation show the need for greater PCa awareness and education amongst patients and their PHC providers. Early detection of PCa through more widespread PSA screening may be of value amongst this identified vulnerable group of men (Heyns, Fisher, Lecuona & van der Merwe 2011).

Consequently, there is an urgent need to develop and implement effective strategies that enhance the approach to PCa screening specifically tailored to the needs of African men, to reduce the burden of this disease within this population and improve health outcomes.

### **1.3 STUDY MOTIVATION AND RATIONALE**

Underrepresentation of men's health issues within the South African healthcare systems and the media has been noted. Even though South Africa has national registries for breast and cervical cancers, none exists for PCa (Hayes & Bornman 2018). There appears to be insufficient prioritisation and limited emphasis on secondary prevention strategies specifically tailored to PCa disease. Moreover, despite the racial disparities in PCa morbidity and mortality, research on this disease often lacks adequate representation of Black men (Basourakos et al. 2022; Carthon, Sibold, Blee & Pentz 2021).

The Free State Province has the lowest life expectancy (male 55 years; female 61 years) compared to the average figures for South Africa (male 62 years; female 68 years) (Free State Department of Health 2021). The Black population is disproportionately affected by lower socio-economic status and poorer health outcomes. As a result, it is crucial to prioritise equitable access to essential PHC services, including screening, in the study setting.

According to recent research, the controversies surrounding the PSA test notwithstanding, its overall benefit is more significant for Black men than the general population. Hence, it is imperative for policymakers to carefully consider the necessity of implementing race-specific screening guidelines (Basourakos et al. 2022).

The SAPCDTG address the need for men to be ‘informed’ before PSA testing, a process more commonly referred to as ‘shared decision-making’ or SDM (Segone et al. 2013). This affirms the crucial roles of healthcare providers in the rational approach to PCa screening. Studies addressing PCa in the PHC setting to enhance disease awareness and approach to screening are scarce.

Overall, the study is motivated by the urgent need to address African men’s specific challenges regarding PCa screening in the Free State Province of South Africa. By focusing on the client- and healthcare-provider-related factors contributing to the disparities in PCa outcomes, this research aims to improve the approach to screening and ultimately reduce healthcare disparities and the burden of PCa among African men, leading to better health outcomes and improved quality of life.

#### **1.4 CONTRIBUTION AND SIGNIFICANCE OF THE STUDY**

This study’s outcomes can inform policy, healthcare practices and interventions relating to PCa, which would improve screening rates, early detection and better results for African men in the study setting. The study aligns with health equity and social justice principles and would thus promote equal access to high-quality healthcare services.

The insights gained from identifying effective strategies can guide the development or revision of existing guidelines and protocols that address the unique needs of this population. This, in turn, can influence healthcare delivery, resource allocation and decision-making processes at individual and population levels.

The study contributes to the existing knowledge on PCa screening, emphasising African men. Exploring and evaluating complementing strategies expands our understanding of the best practices for improving screening outcomes within the study setting. The findings can serve as a baseline and thus facilitate future research on PCa screening approaches for African men.

For the purpose of this study, “African men” are defined as self-identified indigenous Black South African men.

## **1.5 RESEARCH QUESTIONS**

The following research questions were formulated to achieve the study goal:

1. What is the level of awareness of PCa among African men in the study setting?
2. What is the level of uptake of PCa screening among African men in the study setting?
3. What are the prevalence and pattern of PCa among African men in the study setting?
4. What are the determinants of PCa severity at diagnosis among African men in the study setting?
5. What is the knowledge, attitude and practices (KAP) of PHC providers in the Free State regarding PCa screening?
6. What factors influence African men's PCa screening intention in the Free State?
7. What strategies can be engaged to enhance the approach to PCa screening of African men in the Free State?

## **1.6 AIM AND OBJECTIVES**

### **1.6.1 Aim**

This study aimed to develop strategies to enhance the approach to PCa screening of African men in the Free State Province of South Africa.

### **1.6.2 Objectives**

To achieve the above aim, the following objectives were identified:

- To describe the profile of African men diagnosed with PCa in the Free State;
- To determine the KAP on screening and early diagnosis of PCa of PHC providers in the Free State;
- To determine African men's knowledge, cultural beliefs and intentions in the Free State about PCa screening;
- To explore and compile strategies shown to have improved African men's awareness and practice of PCa screening; and
- To develop strategies to enhance the approach to PCa screening of African men in the Free State.

## **1.7 CHAPTER LAYOUT OF THE THESIS**

The following layout for the thesis was devised:

Chapter 1 serves as an introductory section, providing an overview of the study and highlighting its scientific significance. The chapter begins by presenting a concise argument that emphasises the research's scientific value. It outlines the problem statement and establishes the rationale behind the study.

Chapter 2 of the thesis presents the study frameworks employed, and critically examines the scholarly significance of the research by exploring what is known about the challenges relating to PCa screening of Black men globally and locally. The chapter concludes with a highlight of the existing gaps in literature, which require attention.

Chapter 3 describes the research methodology. The various study designs adopted for the five published articles are described. The chapter concludes by briefly highlighting the study overview.

Chapter 4 contains the five articles addressing the aim of the study from five different angles. At the point of submission of this thesis, the five articles were already published in peer-reviewed journals. Each article outlines the methods employed, presents the results and discusses the findings.

Chapter 5 of the thesis provides a comprehensive analysis of the findings from the five articles, offering conclusive insights and recommendations. By triangulating the findings, the chapter aims to provide an overall understanding of the identified gaps in PCa screening and propose strategies for improvement, specifically in the Free State.

## **1.8 CHAPTER SUMMARY**

Chapter 1 gives a background to the study and states the problem. It briefly highlights the study gaps and argues for the scientific values of the study. The chapter concludes with a statement on the study's contribution and significance. The following chapter presents the literature review and study frameworks.

## CHAPTER 2 – FRAMEWORKS AND LITERATURE REVIEW

---

### 2.1 INTRODUCTION

Prostate cancer (PCa)-related incidence and mortality are rising, with Black South African men presenting disproportionately with aggressive disease (Tindall et al. 2014). The variation in PCa presentation can be attributed to socio-economic and health systems factors. These factors include the lack of affordable community-based screening and health promotion initiatives, delayed patient presentation at healthcare facilities, limited treatment options, inadequate follow-up, and the influence of social norms and beliefs (Adeloye et al. 2016). Several factors contribute to the delayed presentation of men, often with advanced disease. These include low health literacy, cultural perceptions and beliefs about the disease, the influence of masculinity and attitudes towards illness, reluctance to seek help, and a failure to acknowledge the role of being unwell (Machirori, Patch, Metcalfe & Kay 2018).

Prostate cancer screening attempts to diagnose PCa in asymptomatic men through digital rectal examination (DRE) and the measurement of serum prostate-specific antigen (PSA). While the benefits of using DRE and PSA as screening tests for PCa remain inconclusive, large population-based studies have demonstrated improved survival outcomes through early treatment compared to no active therapy, particularly in men with moderately and poorly differentiated disease (Nakandi, Kirabo, Semugabo, Kittengo, Kitayimbwa, Kalungi et al. 2013).

Overdiagnosis, overtreatment and the risk of side effects, such as sexual and urinary dysfunction, are the major challenges associated with PSA screening (Harvard Health Publishing 2009). A recent European study, however, shows a more significant net benefit of PSA screening of Black men compared with the general population (Basourakos et al. 2022).

The recommended guidelines for PCa screening notwithstanding, the uptake of PCa screening is low among African men, which raises a suspicion of patterns in knowledge and beliefs toward PCa screening among these men (Kinyao & Kishoyian 2018).

The researcher approached the problem statements with different methods and sought to develop strategies to enhance the approach to PCa screening of Black men in the study setting. As stated earlier, the study subject, PCa, is interdisciplinary. However, the study focussed on the screening aspect and was therefore conducted in family medicine.

This chapter gives a report on the literature review relating to the study's aim and objectives. The chapter begins by establishing the context and frameworks upon which the study is based. It concludes by expounding on the scientific and social values of the study. Searches were conducted in the following databases: Academic Search Ultimate, Africa-Wide Information, APA PsycArticles, APA PsycINFO, CINAHL with Full Text, Communication & Mass Media Complete, ERIC, Health Source - Consumer Edition, Health Source: Nursing/Academic Edition, Humanities Source Ultimate, MEDLINE, Sociology Source Ultimate, MasterFILE Premier, as well as Google Scholar.

## **2.2 STUDY FRAMEWORKS**

A conceptual framework is a researcher's chosen structure for understanding the natural progression of the phenomenon under study. It integrates relevant concepts, empirical research and essential theories to systemise and promote knowledge in the field (Adom, Hussein & Joe 2018). It serves as the researcher's exploration plan, offering an integrated perspective on the problem being studied. It provides a logical structure that visually represents the relationships between ideas, making it easier to define and understand key concepts within the research problem. Conceptual frameworks can take the form of graphical or narrative representations, highlighting the essential variables or constructs to be examined and their presumed connections (Adom et al. 2018).

A theoretical framework acts as a research guide, providing a blueprint based on existing theories in a particular field. It serves as a foundation that researchers adopt to shape their own inquiries. The theoretical framework incorporates relevant theories and principles, including constructs and concepts, that offer insights into the study of human phenomena (Adom et al. 2018).

### **2.2.1 Contextualising the study – community-oriented primary care principles**

“Community-oriented primary care (COPC) is a continuous process by which primary healthcare is provided to a defined community based on its assessed health needs, by the planned integration of primary care practice and public health” (Mash, Ray, Essuman & Burgueno 2019:1). It works with local knowledge about individuals, families and organisations to provide comprehensive healthcare by practising equity, applying science in practice and integrating services around users (Mash et al. 2019). The five principles of COPC are described below in the context of this study:

#### **PRINCIPLE 1 – LOCAL HEALTH AND INSTITUTIONAL ANALYSIS**

In this study, COPC begins with gathering information specific to Black men 40 years and above residing in the Free State community, as addressed by the first article. Black men in this community present late with PCa and therefore have worse morbidity and mortality than other races. There are gaps in knowledge, attitude and practice among Black men and their healthcare providers. There is, hence, the need to identify these gaps and address them. Statistics on the prevalence and incidence of PCa in the Free State community were obtained from the Departments of Urology and Oncology, Universitas Academic Hospital, Bloemfontein. Also, information about the healthcare facilities (local clinics, community health centres (CHCs), private general practices and district hospitals) and the primary healthcare (PHC) providers in the Free State community was obtained from the district health offices and the provincial human resource department. The general surgical and urology outpatient departments (OPDs) are referral centres for primary healthcare facilities and general practitioners (GPs) practices. The healthcare providers include the community lay counsellors, ward-based outreach teams (WBOTs), which comprise six community health workers (CHWs) and a professional nurse (the outreach team leaders [OTLs]), nurses, clinical associates, medical officers, Family Medicine registrars, family physicians, and Allied Health practitioners. The knowledge, attitude and practice gaps among healthcare providers and users were established in Articles 1, 2 and 3.

#### **PRINCIPLE 2 – COMPREHENSIVE CARE**

Comprehensive care addresses health and disease management along the health-disease continuum and involves five activities: health promotion, disease prevention (primary, secondary and tertiary), treatment, rehabilitation and palliation (Marcus & Hugo 2017). This

study pertains mainly to health promotion and disease prevention. Lifestyle modification (diet, exercising) is an example of primary prevention, while PCa screening is an example of secondary prevention. Adequate knowledge and continued training are required of the PHC providers to discharge this role effectively. For example, men over 70 years and those with life expectancy less than 10 years may not benefit from PSA screening, as there is a risk of overdiagnosis of this slow-growing tumour. Article 2 explored PHC providers' knowledge of the risk factors, symptoms of PCa, and the importance of shared decision-making (SDM).

On the other hand, Article 3 explored the healthcare users' level of knowledge of the risk factors and symptoms of PCa. Their preferred method of education to close these gaps was also sought. The scoping review and Delphi study also sought strategies to address these gaps among healthcare providers and users.

### **PRINCIPLE 3 – EQUITY**

Equity is about values, social justice and human right. The National Health Insurance (NHI) initiative, National Health Act, PHC re-engineering strategy, and PHC principles all uphold and promote accessibility and equity in the delivery of healthcare services (Marcus & Hugo 2017). For instance, instead of waiting for people to come into the facilities, the WBOTs can enhance accessibility to healthcare services by taking such services (e.g., PCa health education) to the homes of those having difficulty with access (Marcus & Hugo 2017).

Affordability and relevance are essential concepts in PCa screening. In South Africa, public health services are subsidised by the state, so population PSA screening for PCa is not advocated. Secondly, it is not beneficial to everyone. Primary healthcare providers should be trained to provide counselling and SDM and thus identify those likely to benefit from PSA screening.

These healthcare services should be delivered acceptably and appropriately to the community served. For example, the local lay counsellors and CHWs, mainly from the served community, might be best positioned to render certain culture-sensitive healthcare services.

#### **PRINCIPLE 4 – PRACTICE WITH SCIENCE**

There remain unanswered questions regarding PCa screening. Research is ongoing, and the applicable guidelines get updated as evidence becomes available. Therefore, it is necessary to be acquainted with such pieces of evidence and put them to practice. These discoveries and practices are then tested for their effectiveness.

Prostate cancer screening entails multi-professional practice, which belongs to primary care providers, such as allied health practitioners, CHWs, nurses, clinical associates and medical doctors (including the family physician). There is, therefore, the need for teamwork between these practitioners to provide a comprehensive service.

#### **PRINCIPLE 5 – SERVICE INTEGRATION AROUND USERS**

Community-oriented primary care advocates for healthcare services directed towards and organised around the needs of those who use them. These services “of the people, by the people, for the people” should be people-centred, allowing for their participation and collaboration with other government areas and between all health providers in the system (Marcus & Hugo 2017). People are social beings living in individual and social contexts that shape their experiences, relationships and responses to health and care. Healthcare users have the autonomy to think and act for themselves, be heard and respected, and make decisions for themselves (Marcus & Hugo 2017). Men’s ideas, concerns, and values should be considered regarding PCa screening. Shared decision-making is, therefore, vital (Marcus & Hugo 2017).

The COPC principles corroborate the principles of primary healthcare, which, according to the Alma Ata declaration, is the

“...essential health care based on practical, scientifically sound and socially acceptable methods and technology made universally accessible to individuals and families in the community through their full participation and at a cost that the community and country can afford to maintain at every stage of their development in the spirit of self-reliance and self-determination” (World Health Organization [WHO] 1978:1).

Primary healthcare is thus the first level of contact for members of the community within the national health system, bringing healthcare as close as possible to where people live and work (WHO 1978).

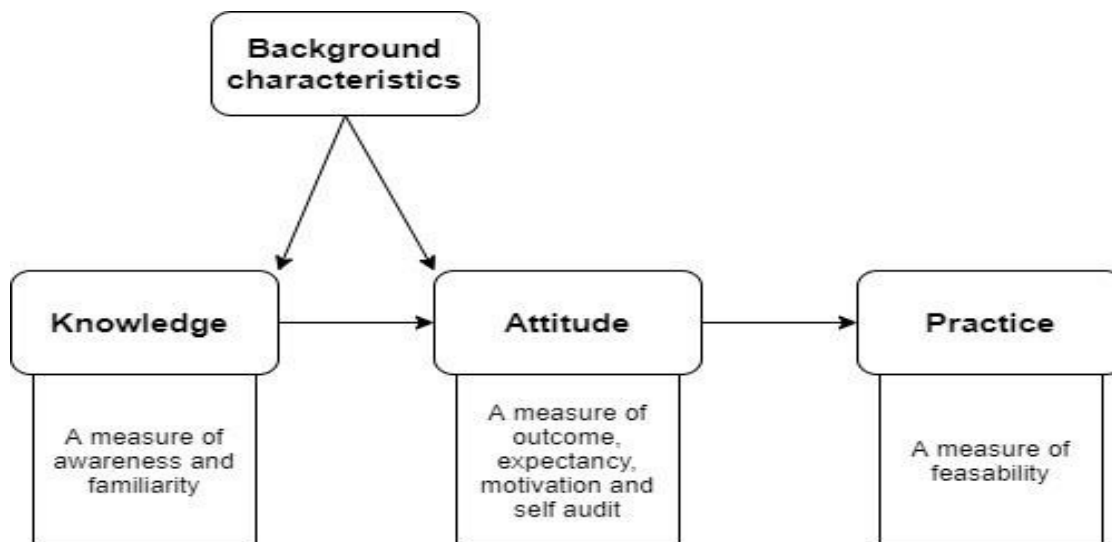
### **2.2.2 The knowledge, attitude and practice framework**

The KAP (Knowledge, Attitudes and Practice) conceptual framework assumes a linear relationship between knowledge, attitudes and practice. Lack of knowledge, measured through awareness or familiarity with health-related aspects, is believed to impact motivation for self-audit in public health matters. Consequently, attitudes are expected to reflect the absence of specific expectations, which can be changed through increased awareness of the public health issue. This intervention is anticipated to lead to desired actions and forms the basis of many public health interventions (Muleme, Kankya, Ssempebwa, Mazeri & Muwonge 2017; Roelens, Verstraelen, Van Egmond & Temmerman 2006).

A KAP survey gathers information on knowledge, beliefs and behaviours related to a specific topic within a representative population (WHO 2008). It adopts standardised questionnaires to gather both quantitative and qualitative information. It helps identify misconceptions, misunderstandings and potential barriers to behaviour change that may hinder the implementation of desired activities (United States Agency of International Development [USAID] 2011).

A KAP survey may be engaged to measure the extent of a known situation, confirm or disprove a hypothesis or provide new tangents of a situation's reality. It improves the understanding of specific health-related topics by assessing knowledge and behaviours. It establishes a baseline for future evaluations and measures the effectiveness of health education efforts in promoting behaviour change. Additionally, it informs intervention strategies tailored to local circumstances and cultural factors, facilitating population-specific activity planning (USAID 2011).

A KAP survey is conducted on a specific target population; participants are randomly selected from a complete sampling frame. The target group may share common characteristics, such as, in this case, PHC workers in the Free State (USAID 2011). Certain demographic and background characteristics of healthcare workers are likely to influence their KAP.



**Figure 1.** The Knowledge, Attitude and Practice framework.

*Source:* Adapted from Muleme, Kankya, Ssempebwa, Mazeri & Muwonge 2017.

### 2.2.3 The Theory of Planned Behaviour

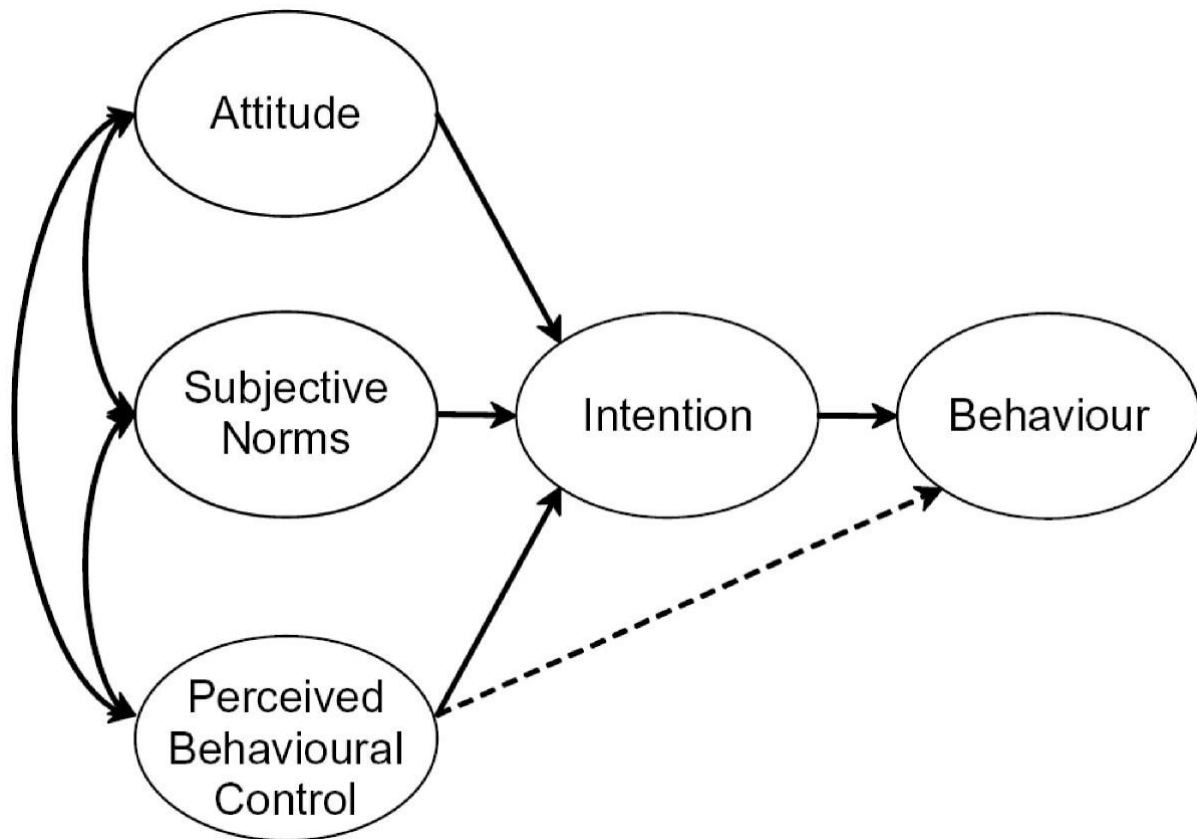
Behavioural theories and models such as the Theory of Planned Behaviour (TPB), Theory of Reasoned Action (TRA), Social-Ecological Model (SEM), and Health Belief Model (HBM) have been used to explore and explain patients' health-related behaviours and decision-making (Raingruber 2016).

The TPB suggests that people's intentions regarding a specific behaviour are the key predictors of their actual performance of that behaviour (Ajzen & Fishbein 1980). Intentions are influenced by three variables: attitudes, subjective norms and perceived behavioural control. Attitudes represent people's overall evaluation of the behaviour, subjective norms refer to perceptions of social pressure from others to perform the behaviour, and perceived behavioural control reflects individuals' belief in their ability to carry out the behaviour (Sheeran, Conner & Norman 2001).

When individuals hold more positive attitudes and subjective norms towards a behaviour and have a higher perceived behavioural control, their intentions to perform the behaviour become stronger. Likewise, when individuals have stronger intentions and higher perceived behavioural control, they are more likely to actually engage in the behaviour (Sheeran et al. 2001).

The TPB, as shown in Figure 2, assumes that intentions and perceived behavioural control mediate the effects of attitudes, subjective norms and external variables (e.g., age, gender, socio-economic status) on behaviour. The predictive validity of the TPB is well-established in health psychology research (Sheeran et al. 2001).

There is a lack of theoretical research focusing on PCa screening behaviours among African men in South Africa.



**Figure 2.** Theory of Planned Behaviour (TPB).

*Source:* Adapted from Ajzen 1991 (License CC BY 2.0).

This theory applies to Article 3 of this study. The questionnaire used in this study was a validated modified version of the Thomas Jefferson University Prostate Cancer Screening Survey Questionnaire. It was developed based on the constructs of the TPB (Kenerson 2010). Further description of the questionnaire and the constructs are contained in Article 3.

## **2.3 LITERATURE REVIEW**

### **2.3.1 Overview of prostate cancer**

#### **Definition**

“Cancer is the uncontrolled growth and spread of cells. It can affect almost any part of the body. The growths often invade surrounding tissue and can metastasize to distant sites” (WHO n.d.). Prostate cancer develops when prostate gland tissues start multiplying without regulation (American Cancer Society n.d.-a). The rates of cell division surpass those of cell death, leading to uncontrolled tumour growth (Tracy n.d.).

#### **Incidence and mortality – global and local report**

Prostate cancer poses a significant global health burden. It is the second most common cancer in men worldwide, with over 1.2 million new cases and approximately 359,000 deaths in 2018. African American men have the highest incidence rates and are more likely to develop the disease earlier in life compared to other racial and ethnic groups. This suggests a genetic predisposition to PCa among this population. Incidence rates vary globally, with Oceania and North America having the highest rates, while Africa and Asia have lower rates. The use of PSA testing has led to overdiagnosis in certain regions. Mortality rates also vary across regions, with Central America and Western Europe having the highest rates. Projections indicate a doubling of PCa mortality by 2040, with Africa and Asia expected to be the most affected due to limited resources for screening and detecting the disease (Rawla 2019).

African men suffer disproportionately from PCa compared to many parts of the world, with the mortality rates from PCa being generally higher in predominantly Black African populations than other races. These variations were also observed in the patterns and presentations of PCa between northern and sub-Saharan African (SSA) regions (Adeloye et al. 2016). Reports show lower PCa incidence and mortality rates in North Africa at 10.6 and 7.0 per 100,000, compared to the average rates in SSA at 34.3 and 22.1 per 100,000, respectively. Some of these variations have been attributed to the relatively higher poverty levels, dietary differences, genetic differences and infectious diseases in SSA (Adeloye et al. 2016). Moreover, some challenges involved in the management of PCa have also been partly responsible. These include the absence of low-cost, community-based screening and health promotion programmes, late

presentation of patients to health facilities (usually at advanced stages of the malignancy), fewer options of treatment, high cost and unavailability of appropriate medications, lack of adequate follow-up, and inherent social norms and beliefs (Adeloye et al. 2016).

Prostate cancer is the most commonly diagnosed cancer in men in South Africa and ranks second in terms of mortality, following lung cancer (Dewar et al. 2018; Ramaliba et al. 2022). The incidence rate of PCa has risen from 29 per 100,000 men in 2007 to 68 per 100,000 men in 2018 (Cassim et al. 2020; Le Roux et al. 2015). About 13% of male deaths from cancer in South Africa are attributable to PCa (Babb et al. 2014).

In the Western Cape Province of South Africa, Black men demonstrated higher disease stages, grades and PSA levels compared to White and Coloured men. Similarly, the South African Prostate Cancer Study (SACPS) investigated Black populations in Limpopo and Gauteng Provinces and revealed that Black men had more aggressive disease and higher PSA levels than African American men. This disparity was particularly pronounced among men from rural communities (Le Roux et al. 2015).

A study conducted in South Africa found that 66% of patients were diagnosed with incurable disease at the time of presentation. Only a small minority of patients had the possibility of receiving treatment with curative intent. In the Western Cape, 53% of Black patients were diagnosed with metastatic disease at presentation. In Limpopo and Gauteng, 50% of Black patients had a PSA level greater than 98 ng/mL at diagnosis (Le Roux et al. 2015).

Delayed diagnosis has been identified as a likely cause for presentation with advanced disease. In three South African studies conducted in Kwazulu-Natal, the Western Cape, and the SACPS populations, the mean age at presentation for Black patients was 71.6, 68.9, and 71 years, respectively. These values are higher than the mean age of 64.7 years in Black patients from the United States (US) based on the Surveillance Epidemiology and End Results (SEER) database, indicating later presentation and potential delayed diagnosis (Le Roux et al. 2015).

In a study conducted at the Department of Oncology, Universitas Annex in Bloemfontein, the profile and risk stratification of PCa patients were examined. The study included predominantly Black patients (72.8%), with a significant portion (43.7%) having high-grade PCa (Gleason score 8–10). A majority of patients (67.9%) had PSA levels above 20 ng/mL, and 62.3% had

T stage  $\geq$  T3. About half of the patients (48.7%) were diagnosed with stage IV disease, and 38.4% received palliative hormonal therapy as their initial treatment. Most patients (82.5%) fell into the high-risk group (Sherriff, Da Costa, Engelbrecht, Li, Prince & Joubert 2015).

According to an unpublished work from the Urology Department of Universitas Academic Hospital, Free State, South Africa, African men, compared to their European counterparts, had PCa of worse prognosis (i.e., Gleason score  $\geq$  8), higher mean PSA levels and more advanced local staging (Myburgh & Claassen 2018). These results are corroborated by previous studies on disparities in PCa presentation (Dewar et al. 2018; Jiang et al. 2018; Lewis & Cropp 2020; Siegel et al. 2020; Tindall et al. 2014; Xin 2017;). Also, an unpublished audit of PCa cases from January 2019 to July 2019 in the same department revealed that curative treatment was possible in only about 10% (38 out of 366) of the cases.

### **Aetiology and risk factors**

Prostate cancer is frequently diagnosed among older males, particularly due to increased life expectancy and the use of PSA screening. The risk of PCa tends to rise after the age of 50 in White men without a family history of the disease, and after the age of 40 in Black men or those with a family history of PCa (Pernar, Ebot, Wilson & Mucci 2018; Rawla 2019).

Although the aetiology of PCa remains largely unknown compared to other common cancers (Pernar et al. 2018; Rawla 2019), its associated risk factors are either non-modifiable (e.g., increasing age, ethnicity, genetic factors and family history of PCa and breast cancer) or modifiable, e.g., diet (increased intake of saturated animal fat and red meat, coffee consumption, lower intake of fruits, vegetables and vitamins), smoking, obesity, physical inactivity, vitamin D deficiency, infections and environmental exposure to chemicals or ionising radiation. Modifiable risk factors are primarily behavioural and lifestyle factors (Hayes & Bornman 2018; Rawla 2019).

Several studies proposed that genetic predisposition might play a role. African American men have the more common chromosome 8q24 variants associated with increased PCa risk. Several research studies have indicated that African Americans exhibit a higher prevalence of gene variations that can suppress tumours (such as EphB2) or regulate cell apoptosis (such as BCL2). Additionally, African American men often experience a more aggressive form of PCa, which

has been linked to genetic and biological disparities. However, it is important to note that inadequate screening and delayed presentation also contribute to these findings (Rawla 2019).

Approximately 20% of PCa patients have a family history of the disease, which can arise from shared genetic factors as well as similar exposure to environmental carcinogens and lifestyle behaviours. Various studies have highlighted the association between inherited genetic factors and an elevated risk of PCa, accounting for approximately 5% of the overall disease risk. (Rawla 2019).

A review article examining determinants of PCa risk, stage at diagnosis and survival among African American men identified several factors associated with unfavourable outcomes. These factors include poor socio-economic status, lack of social support and network, and limited access to healthcare services (Coughlin 2020). In a US study, it was concluded that separate PCa screening guidelines might be beneficial to the African American population (Shenoy, Packianathan, Chen & Vijayakumar 2016). More empirical and evidence-based studies may be necessary among African men, who are more susceptible to developing PCa (Centre for Disease Control and Prevention n.d.; De Bruin 2018; Odedina, Akinremi, Chinegwundoh, Roberts, Yu, Reams et al. 2009). Unlike the non-modifiable risk factors, some modifiable risk factors for PCa are community specific. Environmental exposure to chemicals such as pesticides, herbicides, chromium and cadmium is an important risk factor among African men in the Free State, as many are employed in the agricultural and mining industries (Municipalities of South Africa n.d.).

Age at diagnosis of PCa is one factor contributing to poor health-related quality of life outcomes for survivors (Kurian, Leader, Thong, Keith & Zeigler-Johnson 2018). According to the American Cancer Society, 60% of cases are diagnosed in men 65 years or older and are rare in men under the age of 40 years (American Cancer Society n.d.-b). A recent retrospective study revealed that South African and Nigerian men had an average age of 66 years at the time of PCa diagnosis (Ahmed, Sewram, Oyeseun, Ayele, Van Wyk & Fernandez 2022). Due to the lack of symptoms in the early stages, many men with PCa may only seek medical attention when they experience symptoms, particularly in settings without widespread PCa screening. Late presentation and decreased awareness of the disease have been associated with a poorer prognosis (Rawla 2019).

### **Anatomy, structure and physiology of the prostate gland**

The prostate gland is a fibromuscular, walnut-sized gland located below the bladder and in front of the rectum in males. It surrounds the neck of the bladder and the urethra, which in men is responsible for urination and ejaculation. Structure-wise, the prostate gland consists of three main zones, histologically: the peripheral zone, central zone and transitional zone. The peripheral zone is the largest and surrounds the other two zones. Approximately 70% of PCa originate in this zone. The central zone is located near the ejaculatory ducts and makes up about 15–20% of the gland. The transitional zone is the smallest zone and surrounds the urethra. It accounts for 10–15% of PCa. The lobe classification, on the other hand, divides the prostate into four different anatomical regions: the anterior lobe (roughly the same as the transitional zone); posterior lobe (comparable to the peripheral zone); lateral lobes (spans all zones); and the median or middle lobe (Cooper & Williams 2006; Khan 2011; Singh & Bolla 2022).

The prostate gland produces an alkaline seminal fluid, which is a vital component of semen. It contains substances such as PSA, citrate, zinc, spermine and cholesterol. This fluid helps to nourish and protect the sperm, aiding in motility and viability, especially during its course in the vaginal tract, which is acidic. During ejaculation, the smooth muscles in the prostate help expel semen through the urethra (Cooper & Williams 2006; Khan 2011; Singh & Bolla 2022).

### **Pathogenesis**

About 90% of prostatic tumours are adenocarcinomas arising from the glandular epithelium. The majority of prostate tumours (70%) occur in the peripheral zone, while 15–20% are found in the central zone and 10–15% occur in the transitional zone. As the tumour grows, it can spread within the prostate gland and extend into surrounding tissues, such as the seminal vesicles. However, invasion of the rectum is rare due to the protective barrier provided by the Denonvilliers fascia. The mechanism for distant metastasis is poorly understood. The cancer spreads to bone early, often without significant lymphadenopathy (Cuschieri, Grace, Darzi, Borley & Rowley 2003; Tracy n.d.).

## **Clinical features**

Prostate cancer may be asymptomatic at the early onset. The patient may present with various symptoms as the growth progresses. Most patients experience symptoms of bladder outflow obstruction, including a weak urine stream, hesitancy in urination, nocturia and a feeling of incomplete bladder emptying. In some cases, the tumour may cause acute urinary retention. Advanced PCa can manifest with symptoms related to ureteric obstruction or bony metastasis. Bone metastasis can cause night-time pain that improves with walking. Physical examination may reveal a normal-feeling prostate, a hard nodule within a lobe, or an area of hardness that has spread into the opposite lobe. Locally invasive PCa may be associated with a hard, irregular, fixed prostate gland and may involve the seminal vesicles or the pelvic sidewall (Cuschieri et al. 2003).

## **Investigation – Blood tests and imaging studies**

The investigation of PCa includes various tests and procedures. Initial tests may include a full blood count, renal profile, liver function tests, PSA blood test and chest X-ray. Additional imaging investigations may involve transrectal ultrasound (TRUS) with guided needle biopsy, bone scan to detect bony metastases, and magnetic resonance imaging (MRI) to evaluate local invasion and lymphadenopathy.

Patients with advanced metastatic disease may show signs of anaemia and uraemia. Serum alkaline phosphatase levels may be elevated in those with bone metastases. PSA levels are commonly elevated in PCa, with values above 4 ng/mL considered abnormal. Specific PSA modifications such as age-specific PSA, PSA density, per cent-free PSA and complexed PSA can enhance specificity.

Transrectal ultrasound is useful for assessing tumour volume and guiding biopsies. However, TRUS alone is not recommended for PCa screening. Other imaging methods such as intravenous urogram, computerised tomography (CT) scan, chest X-ray and abdominal X-ray may reveal urinary or bone abnormalities but have varying accuracy for staging. MRI and specialised scans such as ProstaScint® (Cytogen Corporation, Princeton, NJ) and J-591 can provide further staging information, although their accuracy and usefulness may vary. Fine-needle aspiration and cytologic studies of abnormal lymph nodes can offer valuable staging data. Overall, a comprehensive investigation of PCa involves a combination of blood tests,

imaging studies and biopsies to evaluate the extent and characteristics of the disease (Cooper & Williams 2006).

### **Definitive diagnosis - biopsy**

Prostate cancer diagnosis is typically established through transrectal biopsies guided by TRUS. In cases where patients have elevated PSA levels without abnormal TRUS findings, biopsies are performed in the base, middle and apex of the prostate, with focus on the peripheral zone. Six biopsies are performed per side to ensure an accurate diagnosis (Cooper & Williams 2006).

The tumour differentiation is assessed using the Gleason scale, which grades both the primary and secondary forms of the tumour on a scale of 1 to 5, indicating a low to high grade. The grades are combined to give a Gleason sum ranging from 2 to 10, with higher numbers indicating poorly differentiated cancer. A Gleason sum of 7 or more is associated with aggressive cancer and an increased likelihood of metastasis (Cooper & Williams 2006).

### **Tumour node metastasis (TNM) staging**

The tumour node metastases (TNM) staging system of the American Joint Committee on Cancer (AJCC) is used to stage PCa. The current revision of the AJCC system, which took effect in January 2018, also uses both the Gleason score and the grade group for staging (Chodak n.d.).

***T (Primary tumour):*** The clinical stages (cT) of the primary tumour are classified as follows: TX (primary tumour cannot be assessed); T0 (no evidence of a primary tumour); T1 (clinically inapparent tumour not palpable or visible on imaging); T2 (tumour confined within the prostate); T3 (tumour extending through the prostatic capsule); and T4 (tumour fixed to or invading adjacent structures other than the seminal vesicles) (Chodak n.d.).

***N (Nodes):*** The clinical (cN) nodal stages categorise the involvement of lymph nodes as follows: NX indicates that regional lymph nodes were not assessed; N0 indicates the absence of regional lymph node metastasis; and N1 signifies the presence of metastasis in regional lymph node or nodes (Chodak n.d.).

***M (Metastases):*** Metastatic stages are classified as follows: M0 indicates the absence of distant metastasis, while M1 represents the presence of distant metastasis. M1a signifies the

involvement of non-regional lymph nodes, M1b indicates metastasis in the bone(s), and M1c denotes metastasis in other site(s) with or without concurrent bone disease. In cases where the extent of metastasis cannot be measured accurately, it is classified as MX. These stages are used to categorise the presence and location of metastatic spread, aiding in the staging and treatment decisions (Chodak n.d.).

### **Tumour grading – Gleason score**

The Gleason grading system is used to assess the prognosis of PCa based on the histologic examination of biopsy samples (Chodak n.d.). The grading of PCa is determined by the degree of deviation from normal glandular structure. Grades range from less malignant (grade 1) to more malignant (grade 5), with grade 5 indicating the absence of glandular pattern. It is important to note that grading can vary to some extent depending on the pathologist's expertise and experience (Chodak n.d.).

The Gleason score in PCa is determined by assigning grades 1 to 5 to the predominant and second most common patterns observed in the tumour. Adding these grades together gives the Gleason score. This scoring method considers the heterogeneity within PCa cases and provides better prediction of disease outcomes compared to using individual grades alone (Chodak n.d.).

Gleason score evaluations have changed considerably in recent years. Scores of 2–5 are rarely seen, while Gleason 7 is being reported more often. Chodak (n.d) summarised the Gleason score as follows: “a score of 2–6 indicates a low-grade or well-differentiated tumor, a score of 7 indicates a moderate-grade or moderately differentiated tumor, and a score of 8–10 indicates a high-grade or poorly differentiated tumor”.

### **Differential diagnosis**

Distinguishing between cancerous nodules and benign prostatic hyperplasia can be challenging. Benign nodules are typically rubbery in consistency, while cancerous nodules are much harder. Fibrosis resulting from previous prostatectomy, chronic prostatitis or biopsies can cause nodules that resemble cancerous lesions and may require a biopsy for accurate diagnosis. Phleboliths or prostatic calculi on the prostate surface can sometimes cause confusion, but TRUS can aid in differentiation and guide biopsy procedures (Cooper & Williams 2006).

## **Treatment modalities**

The American Urological Association's guidelines for localised PCa strongly recommend considering the following factors in the selection of a management strategy: cancer severity (risk category), patient preferences, life expectancy, pre-treatment symptoms, expected post-treatment functional status, and the potential for salvage treatment. Standard treatment options for clinically localised PCa include active surveillance, watchful waiting, radical prostatectomy, radiation therapy and hormone therapy (Chodak n.d.).

## **Prevention**

Prevention is difficult to determine because the aetiology of PCa is not known. However, there is evidence that a low-fat diet, vitamin E, selenium, and lycopene (found in tomatoes) decrease PCa cell growth in vitro and in vivo in animals. Further large-scale epidemiologic studies confirm reduced PCa in humans who consumed vitamin E and selenium. However, these studies were not explicitly planned for this purpose and thus are questionable. The largest chemoprevention trial, with over 18,000 men, compared finasteride to placebo and found a 25% reduction in PCa with finasteride, but also showed an increased risk of high-grade cancer in the finasteride-treated patients. These latter results have generated limited enthusiasm for routinely recommending prevention therapy with finasteride (Cooper & Williams 2006).

### **2.3.2 Prostate cancer screening**

The identification of the PSA protein in semen dates back to 1966, marking a significant milestone. Soon after, it gained popularity as a valuable tool for law enforcement agencies, serving as an indicator for the presence of semen in cases involving suspected sexual assault. Another pivotal moment in the history of PSA occurred in 1979 when doctors discovered the presence of PSA in blood. Subsequently, in 1987, blood PSA levels were initially utilised for PCa screening, followed by US Food and Drug Administration (FDA) approval as a screening test seven years later (Harvard Health Publishing 2009).

The primary objective of any screening test is to identify disease at an early stage before it manifests clinically. Demonstrating their effectiveness, routine measurements of blood pressure and cholesterol serve as examples of such screening tests. Likewise, in the context of cancer screening, Pap tests for cervical cancer, mammograms for breast cancer, and a range of tests for colon cancer have gained broad recognition and acceptance. A screening test is

successful if it meets several goals: (i) high sensitivity and specificity, (ii) reliable and reproducible, (iii) safe and convenient, and (iv) affordable (Harvard Health Publishing 2009).

Most importantly, the test should result in a treatment that enhances the patient's quality of life, prolongs their lifespan or achieves both outcomes. In essence, the test should provide greater benefit than harm. The advancements in laboratory testing methods have ensured the reliability and consistency of PSA testing. This test only necessitates a single blood sample, making it safe, convenient and cost-effective (Harvard Health Publishing 2009).

Prostate-specific antigen screening for PCa, although controversial because of the associated false-positive results, overdiagnosis, overtreatment and related complications (US Preventive Services Task Force et al. 2018) remains a practical method of early detection, early treatment and prevention of metastatic disease and complication (Cuzick et al. 2014), especially in Africa where there is higher mortality compared with other regions of the world (Mutua et al. 2017).

Given the current controversies regarding PCa screening, multiparametric MRI (mpMRI) is gradually gaining recognition as it has been shown to detect clinically significant diseases and reduce the overdiagnosis of insignificant PCa (Würnschimmel, Chandrasekar, Hahn, Esen, Shariat & Tilki 2022).

One drawback of using mpMRI for PCa screening is its higher cost compared to PSA tests on a population level. However, the individual costs of prostate MRI are comparable to those of colonoscopy, which is the recommended screening test for colorectal cancer (Giganti & Moore 2019; Wallis, Haider & Nam 2017).

In 2011–2012, the US Preventive Task Force initially advised against PCa screening, but in 2018, acknowledged the potential decrease in mortality from PCa in men aged 55–69 years through PSA screening. However, the choice to undergo regular PSA-based screening for PCa should be a personal decision. Both patients and clinicians should carefully evaluate the trade-off between the benefits and risks, taking into account factors such as family history, race, ethnicity, existing medical conditions, patient values regarding the advantages and disadvantages of screening and treatment outcomes, as well as other health priorities. There is

currently no benefit in screening men above 70 years of age (Rawla 2019; US Preventive Services Task Force et al. 2018).

The trend seems to favour PCa screening as more evidence becomes available through intense research. The South African Prostate Diagnostic and Treatment Guidelines (SAPCDTG) recommend informed patient-based PSA testing for men with a life expectancy of more than ten years and with any of the following criteria: (i) Black Africans  $\geq 40$  years and those with a family history of prostate or breast cancer in a first-degree relative; (ii) men of other races  $\geq 45$  years; and (iii) men with a history of lower urinary tract symptoms (LUTS) and clinical suspicion of PCa, regardless of age group (Segone et al. 2013). More so, a recent European study suggests that PSA screening may have a greater net benefit for Black men compared to the overall population. (Basourakos et al. 2022).

Below are the summaries of PCa screening guidelines of some other international associations:

#### **American Cancer Society Screening Guidelines – 2021**

- Routine PCa screening is not recommended for any age group.
- Asymptomatic men with a life expectancy of at least 10 years should have a discussion with their healthcare provider to make an informed decision about screening.
- If a man is unable to decide, the healthcare provider can make the screening decision, considering the man's health preferences and values.
- Information about screening should be provided at different ages:
  - Age 50 for those at average risk;
  - Age 45 for high-risk individuals, including African Americans and men with a first-degree relative diagnosed before age 65; and
  - Age 40 for those at higher risk with multiple first-degree relatives diagnosed at an early age.
- Men who choose to be screened should undergo a PSA test, and a DRE may also be performed.
- The frequency of subsequent screenings depends on the PSA test results:
  - PSA  $< 2.5$  ng/mL: Follow-up testing may be conducted biennially
  - PSA  $\geq 2.5$  ng/mL: Follow-up testing should be conducted annually (American Cancer Society n.d.-c).

Ongoing dialogue regarding the advantages and disadvantages of testing should be revisited as fresh information emerges regarding the benefits and risks involved. Additionally, it is important to engage in further discussions to account for any changes in a man's health status, values and personal preferences (American Cancer Society n.d.-c).

### **American Urological Association screening guidelines – 2018**

- Routine screening is not advised in the following groups: men with a life expectancy of less than 10–15 years, men under 40 years of age, men between the ages of 40-54 years at average risk, and men over the age of 70.
- In the 55–69 age range, the decision to undergo PSA screening requires thoughtful consideration of the potential benefits and risks. Shared decision-making is recommended for men in this age group, where the decision is based on individual values and preferences.
- In cases where SDM has taken place and screening has been chosen, a routine interval of 2 years or longer is recommended. (Carter, Albertsen, Barry, Etzioni, Freedland, Greene et al. 2018).

### **European Society for Medical Oncology screening guidelines – 2020**

- Recommend against population-based PSA screening for PCa due to the risk of overdiagnosis and overtreatment.
- Testing for PCa in asymptomatic men with a life expectancy < 10 years is also not recommended.
- Early PSA testing (baseline PSA measurement followed by risk-adapted follow-up) can be offered to the following:
  - Men > 50 years;
  - Men > 45 years with a family history of PCa;
  - African American men aged > 45 years; and
  - *BRCA1/2* carriers > 40 years (Parker, Castro, Fizazi, Heidenreich, Ost, Procopio et al. 2020).

It is clear from the guidelines above that additional provisions are being made for Black men to address their higher risk (Carthon et al. 2021). Another common factor observed in current guidelines is the prerequisite of SDM before the screening. It is, therefore, essential to engage

a rational approach to this controversial subject of PCa screening to strike a balance; screening and subsequent treatment should be selective and appropriate.

Before the availability of PSA testing in 1986, DRE was the only method known for PCa screening (Ylitalo n.d.). A DRE entails the insertion of the clinician's gloved and lubricated finger into the patient's rectum to feel for the presence of bumps or hard areas on the prostate, which might suggest cancer (American Cancer Society n.d.-c).

Other abnormal findings on DRE are prostate enlargement, lobar asymmetry, obliteration of the median groove, induration of a lobe or the whole prostate, and palpable seminal vesicles. Findings such as fixity to the rectum and obliteration of the lateral sulci are considered features of advanced disease (Irekpita, Achor, & Alili 2020).

The DRE is less effective than the PSA blood test in PCa screening. It can, however, sometimes detect cancers in men with normal PSA levels. It is, therefore, often a valuable adjunct to PCa screening (American Cancer Society n.d.-c). Some authors recommend a prostate biopsy if DRE findings are abnormal (Irekpita et al. 2020).

### **2.3.3 Primary healthcare providers in the Free State Province**

As community-based services play a central role in health promotion and prevention of illness, the cadres of PHC practitioners in the Free State are briefly described here. South Africa's National Department of Health has prioritised re-engineering the PHC system since 2011. Community health workers, supported by other health professionals, form a bridge between communities and healthcare service provision within health facilities and act as the cornerstone of the national Ward-Based Primary Healthcare Outreach Teams (WBPHCOT) programme. From a policy perspective, the model has long embraced the generalist approach, described as 'integrated services' (Murphy, Moolla, Kgowedi, Mongwenyana, Mngadi, Ngcobo et al. 2021).

Community health workers have a broad scope of work that supports various health programmes, including health promotion and illness prevention; registering health needs at the household level; providing psychosocial support; management of minor health issues;

coordination with other health providers; and providing adherence support and counselling for chronic conditions, among others (Murphy et al. 2021).

Outreach team leaders, usually professional or enrolled nurses, are critical to implementing WBPHCOT. Supervision and guidance from OTLs were common and viewed as hands-on and supportive. Telephone advice and general support were also noted as a key part of OTL management strategies. In some settings, enrolled nurses are considered unsuitable for CHW supervision (Murphy et al. 2021).

Nursing is the largest profession, and nurses form the largest segment of the healthcare system in South Africa. Nurses' roles include the clinical management of patients in different settings such as PHC clinics, hospitals, old age homes, etc.) (Armstrong & Rispel 2015; Free State Department of Health 2021).

In South Africa, three categories of nurses graduate from nursing colleges: professional (registered) nurses with four years of training, enrolled (staff) nurses with 2 years of training, and nursing assistants or auxiliaries with one year of training (Armstrong & Rispel 2015). Irrespective of whether nursing training takes place at a college or a university, an integrated approach is followed. All nursing students must meet the minimum work-integrated learning requirements of the South African Nursing Council (SANC), including theoretical classroom instruction, bedside teaching at the workplace and simulation laboratories (Arafteh, Hansen & Nichols 2010).

The undergraduate nursing programme of the University of the Free State School (UFS) is embedded in community-based education. The students are placed in community settings and the public and private healthcare sectors; they are therefore prepared to meet the comprehensive health needs of South African citizens within their various contexts and not just within a hospital setting. Additionally, all students spend at least 1 week of inter-professional training at the Faculty of Health Sciences Collaborative Engagement Platform in Trompsburg, Free State (Hugo, Botma & Raubenheimer 2018).

The clinical associate is a competent, professional member of the healthcare team with the necessary knowledge, skills and attitude to function effectively in the healthcare system in South Africa. Clinical associate training takes 3 years, and a Bachelor of Clinical Medical

Practice degree qualification is awarded thereafter. The qualified clinical associates are to be registered with the Health Professions Council of South Africa (HPCSA) with a defined scope of practice. They work under the supervision of a doctor and form part of the healthcare team in hospitals, community health centres, clinics and private practice in rural and urban areas (University of Witwatersrand n.d.).

Regarding the PHC medical doctors, interns are newly-qualified doctors (post 5–6 years MBChB undergraduate programme), busy with the compulsory medical internship. South Africa runs a 2-year medical internship programme. After completing the internship programme, they are registered for the mandatory 12-month community service for health professionals. Following the 1-year community service, a South African medical doctor gets registered on the HPCSA register as an independent medical practitioner (general practice). Following registration in this category, these medical practitioners are graded and ranked based on their number of years of experience; medical officer grade 1 (0–5 years working experience post-community service), medical officer grade 2 ( $\geq$  5–10 years post-community service), medical officer grade 3 ( $>$  10 years post-community service).

Family Medicine registrars are medical doctors who, after community service, register for a 4-year full-time formal postgraduate training in the family medicine specialty. Registrars are expected to qualify and register as specialist family physicians at the end of their training. Table 1 below shows various categories of health personnel employed by the Free State Department of Health.

**Table 1.** Health personnel in the Free State, 2015/2016.

<b>Categories</b>	<b>Number employed</b>
Medical officers	634
Medical specialists	159
Dentists	55
Dental specialists	5
Professional nurses	3 824
Enrolled nurses	2 117
Enrolled nursing auxiliaries	858
Pharmacists	107
Physiotherapists	66
Occupational therapists	49
Radiographers	201
Emergency medical staff	1 590
Nutritionist	1
Dieticians	55
Community health workers	2 361
Clinical associates	10
Other personnel	7 900

*Source:* Free State Department of Health 2018.

#### **2.3.4 Pre-graduate training of primary healthcare providers on prostate cancer**

At the UFS, medical undergraduate learning and teachings on PCa are provided by the Departments of Urology and Oncology. The various methods of instruction include PowerPoint lectures, group work, case studies, simulations and feedback sessions.

The PCa component in the medical undergraduate curriculum encompasses various aspects, including the epidemiology of PCa, zonal distribution, tumour staging using TNM classification, tumour grading based on histological findings using Gleason scores, patterns of progression, clinical presentation of PCa, interpretation of PSA levels (and its role in diagnosis and treatment), relevant investigations necessary to stage PCa, treatment modalities, and the algorithm used for the early detection of PCa by screening (UFS 2019).

Similar topics are also relevant to nursing and clinical medical practice undergraduates. The instruction methods are aligned to their expected scope of practice; for instance, the enrolled nurses' and the enrolled nursing assistants' training span over 2 years and 1 year, respectively. As such, they are unlikely to have the same level of instruction as the professional nurses.

The aspects of PCa covered in the CHWs' training manual, under the 'Health of Man' section, are (i) what is PCa (definition), (ii) who can get PCa (risk factors), (iii) what are the symptoms of PCa, (iv) how will they test for PCa, (screening tests), and (v) what is the treatment for PCa. The methods of instruction of CHWs include group work, group discussion, individual exercises and work, reflection and case studies. The roles of CHWs concerning PCa, as stated in the training manual, include the following:

- Encourage male household members > 50 years old to go for annual check-ups at the clinic.
- Discuss the importance of yearly prostate examination with men > 50 years.
- Talk to these men about the symptoms of PCa.
- Refer men with symptoms of PCa to the clinic for a check-up and follow-up with the patients to ensure they went to the clinic (Department of Health n.d.).

### **2.3.5 Determinants of prostate cancer screening uptake**

The decision on the utilisation of healthcare services is multifactorial. In a review article by Baratedi et al. (2020), the barriers to PCa screening among men in SSA were client-related, healthcare provider-related, and health system-related. The researcher selected a cue from this classification and elaborated on the determinants of PCa screening uptake among African men.

#### **CLIENT-RELATED FACTORS**

##### **Sociodemographic and background factors**

**Age:** Age plays a crucial role as older men are more susceptible to developing PCa. Therefore, individuals in higher age brackets are more likely to consider and undergo screening compared to younger men. Studies have shown an increase in the likelihood of PCa screening with increasing age; men under the age of 45 are less likely to screen for PCa, while the screening rates for men over the age of 50 are higher (Baratedi et al. 2020; Moses, Zhao, Bi, Acquaye, Holmes, Blot et al. 2017).

**Level of education:** The level of education has a significant impact on PCa screening uptake. Higher education levels are associated with greater health literacy, awareness and understanding of preventive healthcare measures, including PCa screening. Individuals with higher education are more likely to be knowledgeable about the risks and benefits of screening and have better access to health information. Additionally, education is often linked to higher socio-economic status, which can provide financial means and access to healthcare resources necessary for screening. Studies have shown that the likelihood of testing for PCa is proportional to men's level of education, i.e., the higher the level of education, the higher the possibility for PCa screening uptake (Baratedi et al. 2020; Mureithi, K'Odhiambo, Mureithi & Murigi 2022).

**Income:** Men with higher incomes may have better access to healthcare resources, including PCa screening facilities. As routine screening is not the norm in the study setting, the level of income is a determinant of the affordability of the costs associated with screening, such as medical consultations and laboratory tests, in private healthcare facilities. Studies have shown that men with lower income are unlikely to be able to afford the screening test. For the same reason, they are less likely to have medical insurance coverage (Baratedi et al. 2020; Moses et al. 2017).

**Occupation:** In a study that investigated the relationship between occupation and uptake of PCa screening, it was found that men in primary industry, construction and machining were less likely to screen than those in management (Peters, Villeneuve & Parent 2020). Certain occupations increase environmental exposure to carcinogenic agents, such as pesticides, herbicides, chromium, cadmium, cutting fluids and ionising radiation (Krstev & Knutsson 2019; Rawla 2019). Hence, relevant routine screening is offered to the employees. On the other hand, some men may view employment as the reason for 'not having time' to go for screening.

**Marital status:** Married or partnered men often have better social support systems, with spouses or partners encouraging and reminding them to prioritise their health. This support can positively influence their decision to undergo screening. In a Kenyan study, men who were single, widowed, separated or divorced were less likely to screen for PCa (Mureithi et al. 2022).

**Family history of PCa:** According to an Ethiopian study, men with a family history of PCa had a higher probability of screening uptake (Shanko, Abute & Tamirat 2022). On the contrary, a Kenyan study showed no significant association between a family history of PCa and screening uptake (Mureithi et al. 2022).

Other sociodemographic factors that could determine the uptake of PHC services include the geographic location of the healthcare facilities. Transport affordability often poses a challenge to healthcare users, particularly those residing in remote rural areas.

**Choice of a healthcare provider:** Owing to certain strong traditional beliefs, some patients, especially from poor rural communities, prefer to visit traditional healers for issues about their health rather than attending a clinic or hospital (Le Roux et al. 2015).

### **Knowledge and awareness of prostate cancer and its screening tests**

Relevant international and local associations have recognised some benefits of PCa screening among specific categories of men and have therefore published guidelines for screening (Segone et al. 2013; Tracy, Brooks & Said n.d.). Yet, there is evidence that African men are less likely to participate in PCa screening to make an early diagnosis, which may partly explain the disparity in PCa deaths (Kinyao & Kishoyian 2018). Poor adherence to screening guidelines among a subculture could indicate gaps in knowledge regarding PCa and its related aspects (Kinyao & Kishoyian 2018).

Studies have identified a lack of knowledge of PCa amongst African men (Bugoye, Leyna, Moen & Mmbaga 2019; Mofolo et al. 2015). Most South African indigenous languages do not have translations for the term 'prostate'. The low turn-up for PCa screening is, therefore, not surprising. The conception of the idea of screening for a disease they do not know about will not make any sense to them. Hence, the question '*What is a prostate or prostate cancer?*' will need to be dealt with before proceeding to '*How do I screen for prostate cancer?*' and '*Why are you not getting screened for prostate cancer?*'.

The lack of knowledge and awareness of PCa and the related aspects has been reported as an important barrier to screening uptake among men (Baratedi et al. 2020; Mbugua, Karanja & Oluchina 2021; Mureithi et al. 2022; Shanko et al. 2022). The awareness and knowledge of the disease symptoms may also promote the consideration of the likelihood of having the disease

and therefore opting to test. A Kenyan study showed that the experience of symptoms was shown to promote testing (Mbugua et al. 2021).

### **Attitudes and cultural beliefs**

Surprisingly, among men with some degree of knowledge of PCa, there is still low uptake of PCa screening. Despite massive education campaigns on PCa awareness in Kenya, the screening rate was still low. Certain cultural beliefs and misconceptions were implicated in the low turn-up for PCa screening (Mutua et al. 2017).

Behavioural theories and models such as the TPB, TRA, SEM and HBM have engaged in understanding patients' behaviours and decisions regarding health practices (Rainingruber 2016). Article 3 of this study adopts the TPB to understand cultural and belief factors associated with men's intention to screen for PCa. Some of the factors are highlighted below:

***Fatalism:*** Fatalistic views of PCa, where individuals believe that nothing can prevent the disease if they are destined to have it, act as a significant barrier to screening. This fatalistic perspective reflects a sense of powerlessness towards health outcomes, considering preventive measures such as testing to be of little value or influence. Men who hold this view may find screening futile, perceiving PCa as inevitable and screening as ineffective. Consequently, this fatalistic mindset hinders motivation and engagement in proactive health behaviours, including regular screening (Mbugua et al. 2021).

***Perception of self-vulnerability:*** Many individuals may believe they are not at risk for certain diseases, including PCa, if they do not experience symptoms or have a family history of the disease. In a Kenyan study, men's perception of being at low risk and the absence of symptoms have been identified as significant barriers to screening uptake. This low-risk perception can lead to a lack of motivation or urgency to undergo screening, as individuals may underestimate their susceptibility to the condition (Mbugua et al. 2021).

***Myths and misconceptions regarding PCa:*** Some men believe that PCa can be acquired through sexual intercourse; hence not having sexual intercourse gives some form of immunity against the disease (Mureithi et al. 2022). On the other hand, some men believe being denied their conjugal right to sex is a cause of PCa (Mbugua et al. 2021).

**Male dominance:** The association of ill health with feminism and threat to masculinity by low sexual performance has been shown as barriers to PCa screening among certain African men (Kannan, Kirkman, Ruseckaite & Evans 2019; Mbugua et al. 2021).

**Religion:** Certain religious doctrines impose restrictions or prohibitions on individuals' participation in screening activities. These religious beliefs may discourage or forbid adherents from engaging in screening tests for various health conditions, including PCa. These men might subscribe to theological interpretations prioritising divine will over preventive healthcare interventions. As a result, individuals who adhere to these religious doctrines may face unique challenges when accessing and participating in screening programmes (Mureithi et al. 2022).

**Fear/apprehension:** This represents fear of physical discomfort or pain associated with the screening test. Anxiety or fear of a possible positive result is also a known factor among men. There is a higher probability of PCa screening uptake among men who are not afraid of being tested (Mureithi et al. 2022).

**Perceived benefits of PCa screening:** Generally, men who are health-conscious and prioritise their well-being are more likely to view PCa screening as a way of early cancer detection. Hence, they are more likely to opt for screening if they believe it could benefit their health, such as early treatment initiation, and overall prolonged survival (Kinyao & Kishoyian 2018; Kenerson 2010).

**Subjective norms:** Subjective norms play a significant role in men's decisions regarding PCa screening. They may experience social pressure from family members, friends or other influential individuals with expectations or beliefs about screening. These norms can either positively encourage men to prioritise their health or negatively perpetuate misconceptions and fears, leading to screening avoidance. Research has demonstrated that the involvement of relatives positively influences adherence to screening among African men (Kinyao & Kishoyian 2018; Kenerson 2010).

**Situational barriers:** PCa screening entails a PSA blood test and DRE, which are not without cost, especially without health insurance coverage. More often than not, the patient requires more than a single visit; there is often the need for a follow-up on the result, with an associated cost implication owing to transportation. These out-of-pocket expenses may be perceived as

barriers to screening uptake by many men, especially those with other poor socio-economic factors. The discomfort associated with PCa screening, especially DRE, could be perceived as significant enough for some men, and hence they hesitate. The process may be viewed as an invasion of privacy and could be painful enough to some. Others perceive a sense of embarrassment and loss of dignity from the procedure and the discussion of such a sensitive topic (Kinyao & Kishoyian 2018; Kenerson 2010).

The probability or likelihood of men's uptake of PCa screening has been described above concerning their knowledge, awareness, attitude and cultural beliefs. This inference is, however, not set in stone, as there is often an interplay of the highlighted factors, and the final decision on the uptake of screening may be unpredictable. For example, a Central American study revealed that though most men had good knowledge of PCa, they had a poor perception of screening for the disease. Barriers to screening among these men were fear of the procedure and a positive PCa result (Husaini, Harris-Thurton, Brown, Enriquez, Novelo, Pot et al. 2021).

On the contrary, as mentioned earlier, disease awareness and knowledge are poor in SSA. However, these men also have an interplay of cultural beliefs and misconceptions about the disease. For instance, in a Kenyan study, men had strong beliefs about the benefits of PCa screening, but they did not perceive men over 40 years to be at risk of getting PCa. Furthermore, they had relatively high fatalistic beliefs, a high degree of fear, and a high level of influence of family members towards PCa screening (Mutua et al. 2017). In another Kenyan study, the intention to screen was high, yet only 5% ever screened; the main barrier to PCa screening, in this case, was their belief that they were well (Mbugua et al. 2021). The barriers to PCa screening shown in other African nationalities include ignorance of the disease, fear of a positive result and financial constraints (Ugochukwu, Odukoya, Ajogwu & Ojewola 2019)

## **HEALTHCARE PROVIDER-RELATED FACTORS**

### **Demographic factors**

Limited research exists on the influence of healthcare providers' demographic characteristics on the utilisation of PCa screening. However, anecdotal evidence from the study setting suggests the following observations:

Gender plays a role in the discussion of PCa screening, as female healthcare providers are less likely to engage in conversations about it with men due to gender differences. Similarly, men may feel hesitant or uncomfortable discussing their sexual health concerns with female healthcare providers (Vapiwala, Miller, Laventure, Woodhouse, Kelly, Avelis et al. 2021). This dynamic can present a significant challenge to PCa screening uptake, particularly in the South African context, where PHC clinics are predominantly staffed by nurses.

Furthermore, the healthcare profession itself contributes to the issue, with nursing professionals comprising the majority of healthcare providers in South Africa (Kordom, Daniels & Chipps 2023; Matlala, Malema, Bopape & Mphekgwana 2021). As mentioned, female healthcare providers comprise a significant portion of the nursing workforce and may experience discomfort when addressing men's health matters. This discomfort can potentially hinder the promotion and facilitation of PCa screening initiatives, ultimately impacting its uptake.

These factors highlight the importance of addressing gender-related challenges and providing appropriate training and support for healthcare providers to effectively engage men in discussions about PCa screening.

### **Knowledge relating to prostate cancer**

Men often blame healthcare providers for not informing them about the disease and the available screening tests. Studies have also shown the lack of knowledge of these healthcare providers on PCa and other relevant aspects of the disease. Better education of primary care physicians was also recommended with regards to the following: SDM, restricting screening and biopsy to high-risk groups of healthy men, less frequent PSA screening if the patient is at low risk or has a low PSA, and considering incorporating newer tests that correlate with cancer aggressiveness to lessen the chance of overdiagnosis and overtreatment (Berberabe 2015).

In a European study, unlike the urologists, GPs perceived the PSA test not to be useful. In addition, the GPs showed a less proactive approach to informing men about PSA and were less familiar with guidelines and recommendations on PSA testing (Kappen, Jürgens, Freitag & Winter 2019). A US study showed poor practice of physicians on SDM for PCa screening (Leyva, Persoskie, Ottenbacher, Hamilton, Allen, Kobrin et al. 2016). In a Malaysian study, more than half of the GPs overestimated the positive predictive values of PCa screening tools (Tun Firzara & Ng 2016). At the 8<sup>th</sup> International Prostate Cancer Congress, better education

of primary care physicians on SDM was recommended to achieve an improved approach to PCa screening (Berberabe 2015).

In a study that assessed the knowledge and attitude of primary care physicians regarding PCa screening, the mean knowledge score was 66%. More than 70% of the responders believed that screening was effective, and the attitude scores were associated with practice setting and the proportion of patients having medical aid (Johnson, Chang, Sun, Miyake & Rosser 2013).

The performance of DRE is regarded as a fundamental nursing competency (Embleton & Henderson 2020). Apart from being a component of PCa screening, DRE is indicated for many other reasons in patient care, such as suspected haemorrhoids, faecal incontinence, constipation and suppositories, to mention a few. However, this practice is gradually being avoided by nurses in the study setting. In a study, some reasons nurses gave for avoiding performing DRE include lack of competence, not being trained, not being aware it was necessary, and the perception of the procedure as invasive (Embleton & Henderson 2020).

An experimental study conducted in Kenya showed that health education delivered by CHWs during household visits increased awareness and knowledge, perception and uptake of PCa screening (Mbugua, Karanja & Oluchina 2022). In a study comparing CHW-led PCa screening decision-making among Black men with that led by a physician, the CHW-led group showed significantly greater knowledge after the intervention (Martinez-Lopez, Makarov, Thomas, Ciprut, Hickman, Cole et al. 2023). A similar study also showed a positive impact of nurses in PCa health education in the community (Torres, Silva, Melo, Santos, Mendonça & Mota 2018).

The expected impact of the healthcare providers regarding health promotion is a function of their level of knowledge. This is particularly important among the non-medical PHC cadres; the first-line PHC providers in South African local communities and clinics. Studies exploring this subject are, however, scarce in our study setting.

### **Attitude toward prostate cancer screening**

Healthcare providers are not 'less human' and may, therefore, like any other person, have their culture and belief relating to PCa screening, especially in the study setting where only a few healthcare providers are aware of the guidelines for screening. For example, a study showed that healthcare providers who would consider having a PSA test performed on themselves were

more likely to screen asymptomatic men than those who would not have the test (Tun Firzara & Ng 2016). Primary healthcare providers' knowledge and attitude towards PCa screening may therefore affect their approach to the screening of men.

#### **HEALTH SYSTEMS-RELATED FACTORS**

Health systems barriers to PCa screening uptake in SSA include the unavailability of policies or programmes that promote PCa screening. Men are not provided with information on where screening tests could be done. Also, there is a lack of culturally appropriate communication between healthcare providers and men, leading to fear and lack distrust, and thus non-participation in screening (Baratedi et al. 2020). This was corroborated by a qualitative study in Kenya, where accessibility of screening services and community advocacy on PCa screening were established facilitators to screening uptake. These men believed that PCa screening services should be free, made available at the peripheral facilities, and included in the NHI (Mbugua et al. 2021).

Health promotion plans and educational intervention programmes provided by healthcare practitioners would increase awareness and correct false impressions about PCa, ultimately stimulating screening among men. Education programmes should be designed to identify and correct public misrepresentations for individuals to recognise health concerns and gain more knowledge (Saleh, Fooladi, Petro-Nustas, Dweik & Abuadas 2015).

Therefore, the realisation of an improved approach to PCa screening will require combining strategies channelled towards PHC providers and users (Black men). Adequate knowledge and awareness of men on risk factors and symptoms of the disease will promote their early presentation. Likewise, healthcare providers are more likely to promptly identify at-risk men and appropriately intervene if they know certain essential aspects of the disease, e.g., risk factors, symptoms, screening tests, diagnosis and treatment options. Such knowledge is a prerequisite for adequately conducting SDM.

### **2.3.6 Shared decision-making for prostate cancer screening**

Shared decision-making entails a concerted effort of clinicians and patients to make healthcare choices. The clinician informs the patient about the potential benefits and harms of the service and considers the patient's values and preferences (Allen, Porteny, Kaplan, Ladin, Monahan & Berry 2022; Eales & Smith 2021). It is the current standard in most cancer-screening guidelines and a standard of person-centred care (Echeverri, Felder, Anderson, Apantaku, Leung, Hoff et al. 2022).

There are certain variations regarding PCa screening across different associations. Currently, population screening may not be recommended, but it has been established that men may be offered screening only after SDM (Basin, Crane, Basnet, Chandrasekar, Shapiro, Jacob et al. 2023). This should be emphasised among African men, who, apart from being more vulnerable to the disease, are more at risk of aggressive disease.

The concept of SDM, particularly concerning PCa screening, is presently not entirely understood or known to some clinicians and patients and is perhaps not practised right. Reports from surveys have revealed that only a few men were informed of the advantages and disadvantages of the screening test by their physicians before it was conducted (Allen et al. 2022). Therefore, PCa screening is likely not to be practised as prescribed.

Shared decision-making is critical with the controversies relating to PCa screening. Studies have shown that patients from disadvantaged populations prefer SDM and are more likely to adhere to healthcare decisions made with their involvement (Allen et al. 2022; Eales & Smith 2021). Ng and Lee (2021) suggested six steps in the practice of SDM in the primary care setting: i) identify the decision, ii) list the available options, iii) discuss the pros and cons of each option, iv) elicit patient values, v) provide support, and vi) make a decision.

More specifically, for PCa screening, the American Cancer Society recommends including the following information for men to make screening decisions: risks, potential benefits, and uncertainties regarding PCa screening (American Cancer Society 2019).

There are various PCa screening decision aids meant to facilitate SDM. These aids have improved men's knowledge of PCa and reduced decisional conflict. Such aids include videotape, a combination of videotape and discussion session, written materials (leaflets, pamphlets or booklets) with illustrations, written materials combined with an education session, telephone decision education session, and internet-based materials. These decision aids are often delivered to men visiting the clinics and non-patients in the community (Riikonen, Guyatt, Kilpeläinen, Craigie, Agarwal, Agoritsas et al. 2019). Owing to the diversified culture, language and level of literacy, decision aids should be available in formats that are culturally appropriate, easy to understand and unbiased (Allen, Filson & Berry 2020).

### **2.3.7 Continuing education on prostate cancer screening for primary healthcare providers**

Medical education follows a continuum comprising three phases: undergraduate, postgraduate, and continuous professional development (CPD) (Von Pressentin 2017). Von Pressentin (2017 p. 26) stated that:

“...[e]ducation may also be viewed from the perspective of the four educational settings over the lifetime of a medical career: formal education at undergraduate and postgraduate levels; maintenance of competence through CPD; development of new or extended roles, such as academic research or professional leadership; and finally, the skills needed for teaching, mentoring and supervising others”.

The effectiveness of CHWs' work depends on their work and the system that supports them. Community health workers require practical and high-quality training to work successfully and positively impact the health of individuals and their communities. Unfortunately, apart from the non-standard and varied training received by the CHWs, there is a lack of research on how CHW trainees prefer to learn the material or which teaching methods are most effective in improving their knowledge base and confidence (Lightfoot & Palazuelos 2016). The following have been shown as effective methods of instruction among CHWs: role play, case studies, teach-back, group presentation, interactive didactic, demonstration, group assessment, group discussion, hands-on practice and individual assessment (Lightfoot & Palazuelos 2016).

Inadequate healthcare practitioner knowledge and practice, combined with limited resources and healthcare infrastructure, can have a disproportionate impact on low- and middle-income countries (LMICs) and lead to poor outcomes. There is a significant need for training and education in LMICs to address gaps in managing diseases and interventions. Insufficiently trained nurses, particularly in LMICs with severe health workforce shortages, can have implications for patient outcomes. While the importance of ongoing nursing education is recognised, specific training interventions tailored to address healthcare delivery challenges should be prioritised.

Narrative synthesis identified common practices for continuing nursing education. These include the train-the-trainer model, short and repeated education, comprehensive education with multiple modalities, training aids, nurse empowerment, cultural context considerations, and assessment/feedback (Azad, Min, Syed & Anderson 2020). The train-the-trainer model allows for scalable knowledge dissemination by training individuals who can deliver education to large numbers of trainees. Short, repeated education involves targeted, spaced-out learning activities with ongoing reviews to reinforce the material. Comprehensive education uses interactive techniques, simulated practice and tailored feedback. Training aids accommodate diverse learning styles with paper-based supplements, audio-visual modalities and simulation models. Nurse empowerment fosters high-level performance and leadership roles. Cultural context understanding is crucial for effective communication. Assessment and feedback enable evaluation and tailored training for long-term knowledge retention and behaviour change (Azad et al. 2020).

Continuing medical education (CME) encompasses activities that help physicians maintain, develop and enhance their skills, professional practice and relationships in order to provide optimal patient care. It is considered a crucial mechanism for driving change in healthcare. Multiple studies have demonstrated that CME leads to improvements in physician practice and, in certain cases, healthcare outcomes. Primary care physicians expressed a greater inclination towards specific educational formats for learning about cancer screening, according to a survey. These preferred formats included conferences, self-directed learning, small group workshops, hospital rounds and online CME or continuous professional development (CPD) (Lynn, Hatry, Burnett, Kan, Olatunbosun & Bluman 2018).

Learning styles refer to the characteristic cognitive and affective behaviours that individuals exhibit in learning environments. Identifying nurses' preferred learning styles can enhance their professional development. Kolb's learning model, along with the associated Learning Styles Inventory, have been commonly used in nursing and healthcare to assess learning style preferences. According to this model, there are four main learning styles: *accommodators*, who prefer hands-on experiences and emotions; *assimilators*, who prefer observing and thinking; *divergers*, who prefer observing and feeling; and *convergers*, who prefer thinking and applying knowledge practically (Mangold, Kunze, Quinonez, Taylor & Tenison 2018).

Knowledge of the preferred learning styles of the organisation's nursing staff can inform the planning delivery, resource utilisation and evaluation of learning activities (Mangold, Kunze, Quinonez, Taylor & Tenison 2018). In general practice, continual learning and a commitment to professional development are essential. Understanding one's preferred learning style can enhance the effectiveness of learning. Different learning activities are suited to individuals based on their learning preferences (Kotesha 2019).

Peter Honey and Alan Mumford expanded on the work of Kolb and identified four distinct learning styles or preferences: Activist, Theorist, Pragmatist and Reflector. These learning styles reflect individuals' tendencies and preferences in how they approach and engage in learning activities. The *Activist* style emphasises hands-on experiences and experimentation; the *Theorist* style focuses on analysing and understanding underlying concepts; the *Pragmatist* style emphasises practical application and problem-solving; and the *Reflector* style emphasises observation and reflection (University of Leicester n.d.). Some other learning style models described include Kolb's learning cycle, multiple intelligences, and the VARK (visual, aural, read and write, kinesthetic) model (Kotesha 2019).

### **2.3.8 Gaps in the literature**

Currently, there is limited research that offers a theoretical framework to understand the knowledge and screening behaviours related to PCa among African men in South Africa. The TPB, as discussed in Chapter 3, provides a framework for examining sociocultural factors thought to be associated with the patterns of health behaviour seen in African American men and has been well supported by empirical evidence (Kenerson 2010). However, its constructs

have not been extensively applied to examining PCa screening behaviours of African men in South Africa.

On the other hand, the study explores PCa screening KAP of PHC providers in the Free State, which is also scarce. Recommendations to address the identified gaps reported in the few existing studies have been generic, failing to specify the needful strategies, particularly among the Black men who are more vulnerable. Thus, this study sought to identify gaps relating to the PCa screening approach in the province by simultaneously exploring two perspectives (healthcare providers and healthcare users) and suggesting strategies to address the identified gaps.

### **2.3.9 Chapter summary**

Chapter 2 discussed the frameworks upon which the study is based. The literature review is also presented, arguing further for scientific and social values based on the study's aims and objectives. The next chapter presents the study research methodology.

## CHAPTER 3 – RESEARCH METHODOLOGY

---

### 3.1 STUDY PHASES

The study was executed in three phases, as described below:

*Phase 1* established the research problems by determining the profile of African men in the study setting regarding prostate cancer (PCa) awareness, uptake of PCa screening, prevalence and pattern of PCa, and the determinants of PCa severity at diagnosis.

*Phase 2* further established the research problem by determining (i) the knowledge, attitude and practices (KAP) of primary healthcare (PHC) providers on PCa screening and (ii) the knowledge, cultural beliefs and intention of African men on PCa screening.

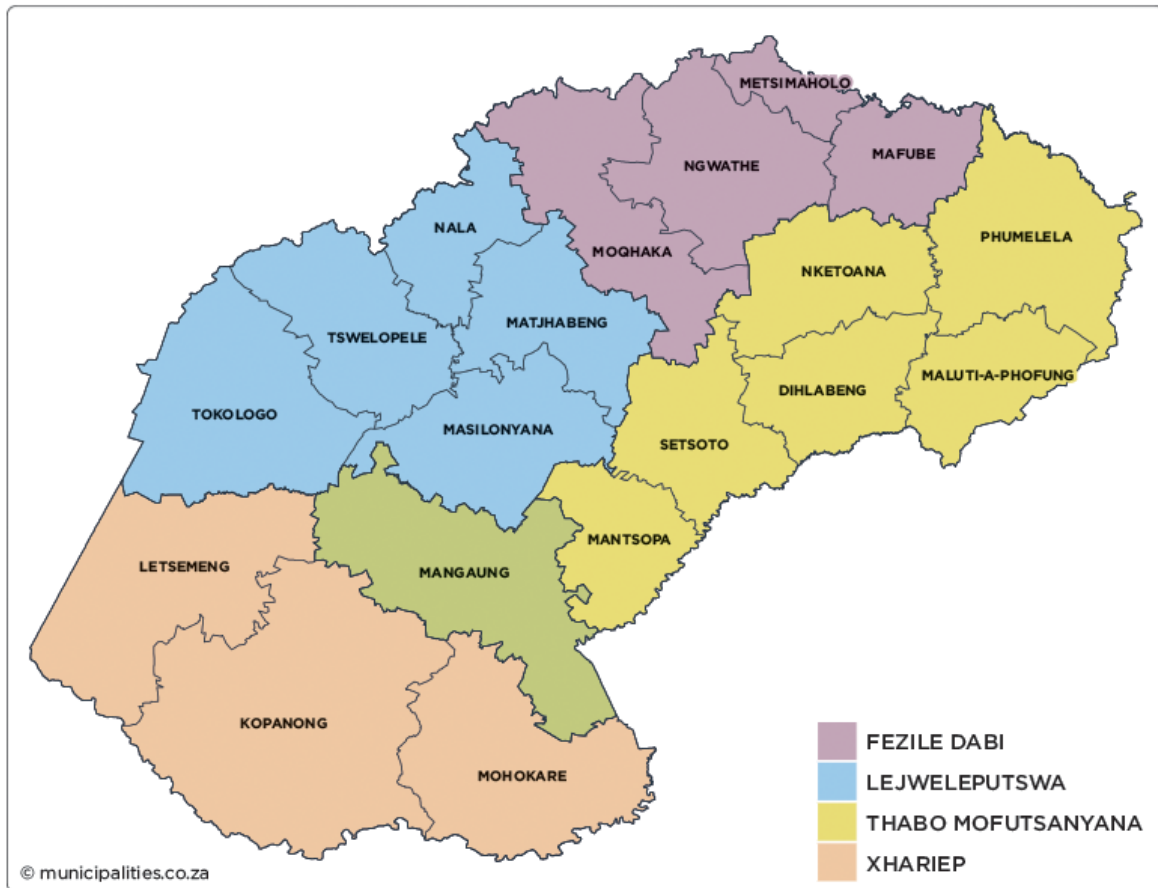
*Phase 3* sought strategies to address the identified problems in Phases 1 and 2.

### 3.2 STUDY SETTING

The Free State is geographically the third-largest province in South Africa and constitutes 5.1% of the national population. Its capital is Bloemfontein, which is also South Africa's judicial capital (Department of Health 2011). As of 2016, the Free State Province's population was 2.8 million, making it the second smallest province in South Africa in population size after the Northern Cape. About 58% of this population are male. The number of households increased from 823,316 in 2011 to 906,000 in 2016 with about 80% of the people residing in informal dwellings (Stats SA 2016).

The province comprises Mangaung Metropolitan Municipality and four district Municipalities: Xhariep, Lejweleputswa, Thabo Mofutsanyana and Fezile Dabi. The district municipalities are divided into 19 local municipalities, as shown in Figure 3 below (Department of Health 2011). Mangaung Metropolitan Municipality is one of the top-populated Black townships in South Africa (Stats SA 2011).

The majority of the Free State Province’s population resides in Mangaung and Thabo Mofutsanyana, where the economy is primarily driven by agriculture, mining, and manufacturing. The province’s socio-economic status is a crucial social determinant of health. The province’s socio-economic status includes housing, clean running water, education, employment and poverty. The country is generally facing a challenging period because of political and economic instability (Department of Health 2011).



**Figure 3.** Distribution of Free State Province districts and municipalities.

*Source:* Municipalities of South Africa n.d.

The Free State’s PHC facilities include local health clinics, community health centres and district hospitals. The Free State Province has 24 district hospitals and 231 fixed clinics, including local clinics and community health centres. These healthcare facilities serve as the primary access points for the majority of the population seeking public health services (Department of Health 2011). Table 2 summarises the distribution of PHC facilities in the Free State.

**Table 2.** Free State Province healthcare facilities.

S/N	Health district	Facility type	Number	Population
1	Fezile Dabi	Non-fixed clinics	11	527,522
		Fixed clinics	41	
		CHCs	5	
		Fixed clinics + CHCs	46	
		District hospitals	3	
2	Lejweleputswa	Non-fixed clinics	11	589,010
		Fixed clinics	44	
		CHCs	1	
		Fixed clinics + CHCs	45	
		District hospitals	5	
3	Mangaung	Non-fixed clinics	8	807,156
		Fixed clinics	44	
		CHCs	2	
		Fixed clinics + CHCs	46	
		District hospitals	3	
4	Thabo Mofutsanyane	Non-fixed clinics	21	709,906
		Fixed clinics	72	
		CHCs	1	
		Fixed clinics + CHCs	73	
		District hospitals	9	
5	Xhariep	Non-fixed clinics	6	135,035
		Fixed clinics	20	
		CHCs	1	
		Fixed clinics + CHCs	21	
		District hospitals	4	
Total district health services in the Free State Province		Non-fixed clinics	57	2,768,629
		Fixed clinics	221	
		CHCs	10	
		Fixed clinics + CHCs	231	
		District hospitals	24	

Source: Free State Department of Health 2018.

CHCs, community health centres; S/N, serial number

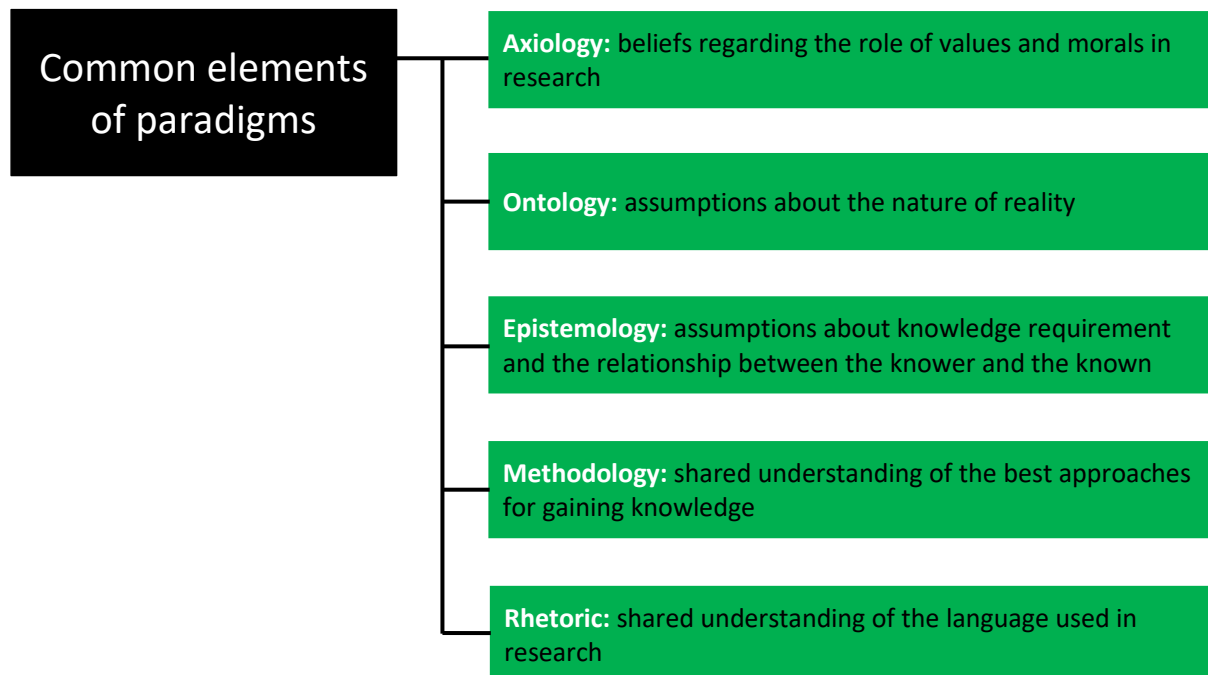
Ward-Based Primary Health Care Outreach Teams (WBPHCOTs) undertake outreach household visits to provide essential PHC services, including counselling and health promotion

(Department of Health 2011). The WBPHCOTs, connected to PHC facilities, comprise CHWs supervised by nurses. These CHWs assess individuals' health in households, deliver health education and promote services. They identify and refer individuals requiring preventive, curative or rehabilitative care to appropriate PHC facilities (Department of Health 2011).

### 3.3 RESEARCH PARADIGM

According to Khaldi (2017), "The routes leading to the discovery of new knowledge through research vary according to the philosophical tenets the researcher adheres to".

A paradigm represents the underlying philosophical assumptions or core beliefs that shape a researcher's worldview and guide their actions. They serve as conceptual tools for effectively addressing specific research problems. Different paradigms, such as post-positivism, constructivism, participatory action frameworks and pragmatism, encompass common elements, as illustrated in Figure 4 below:



**Figure 4.** Common elements found in different paradigms.

*Source:* Kaushik & Walsh 2019.

As described in the next section, this study mainly adopted a quantitative design with some qualitative elements (i.e., the scoping review and Delphi survey). The study can therefore be referred to as a ‘quantitative study with some qualitative components’ (Kaushik & Walsh 2019).

The researcher adopted a pragmatic approach to the research questions, which in practical terms, are best addressed through diverse methods. Diverse groups of participants, i.e., PHC providers, users and subject experts, were engaged in this study. Also, different methods and triangulation of data findings were employed, culminating in determining strategies to enhance the approach to PCa screening of African men in the study setting (Kaushik & Walsh 2019).

The pragmatic paradigm emphasises a practical and flexible approach to research, allowing researchers to use a combination of methods that best suit the research problem. It is commonly linked with the use of mixed or multiple research methods, placing greater importance on the outcomes and research questions rather than the specific methods employed (Kaushik & Walsh 2019).

The pragmatic paradigm incorporates several key elements. It embraces a relational epistemology, where the researcher determines appropriate relationships for a specific study. It acknowledges a non-singular reality ontology, recognising that individuals have unique interpretations of reality. It utilises a mixed or multiple research methods, combining quantitative and qualitative research approaches. Lastly, it adopts value-laden axiology, emphasising research that benefits people (Kuyini 2017). An added advantage of the mixed or multiple research methods is the possibility of offering research for data triangulation (Khaldi 2017).

### 3.4 RESEARCH DESIGN

Table 3 summarises the study design per article.

**Table 3.** The research designs employed in the study.

Article	Title of article	Study design and questionnaire
Article 1	<i>The profile of Black South African men diagnosed with prostate cancer in the Free State, South Africa</i>	A cross-sectional analytical study describing the profile of African men diagnosed with PCa in the Free State Questionnaire 1 (Appendix E)
Article 2	<i>Knowledge, attitude, and practice on screening and early diagnosis of prostate cancer of primary healthcare providers in Free State</i>	A cross-sectional survey to determine the KAP on screening and early diagnosis of PCa of PHC providers in the Free State Questionnaire 2 (Appendix F)
Article 3	<i>Knowledge, beliefs, and intentions of African men in the Free State about prostate cancer screening</i>	A cross-sectional survey to determine knowledge, cultural beliefs, and intentions of African men in the Free State about PCa screening Questionnaire 3 (Appendix G)
Article 4	<i>Enhancing public awareness and practice of prostate cancer screening among African men: A scoping review</i>	Scoping review to explore and compile the various strategies shown to improve African men's awareness and practice of PCa screening Questionnaire not applicable.
Article 5	<i>Strategies to enhance the approach to prostate cancer screening of South African Black men in the Free State: A Delphi study</i>	A Delphi study to establish expert consensus on the valuable strategies to enhance the PCa screening approach among PHC providers and African men. Questionnaire 4 (Appendix H)

PCa, prostate cancer; KAP, knowledge, attitude, and practice; PHC, primary healthcare

### **3.5 RELIABILITY AND VALIDITY OF STUDY QUESTIONNAIRES**

The study questionnaires were adapted from previous similar, peer-reviewed studies; some having used validated tools (cf. Chapter 4). The questionnaires used in the study were reviewed and approved by an evaluation committee from the Faculty of Health Sciences. The committee consisted of consultant family physicians, a urologist, medical educators, a professional nurse, and a biostatistician. The questionnaires that surveyed the African men were translated into Sesotho and isiZulu, the common local languages in the study setting.

To ensure balanced and accurately constructed questions, the questionnaires underwent pretesting with a pilot sample of participants, aiming to obtain crucial information. A librarian and a biostatistician from the Faculty of Health Sciences, University of the Free State (UFS), assessed the appropriateness and correctness of the literature review and statistical analysis processes.

Despite mitigating efforts, bias might have arisen from the selection, translation and participants' responses. These were addressed under the methods and limitation sections of the respective articles (cf. Chapter 4).

### **3.6 ETHICAL CONSIDERATIONS**

The research project obtained approval from the Health Sciences Research Ethics Committee of the Faculty of Health Sciences at UFS, South Africa (ethical clearance number UFS-HSD2020/1481/2411). Additionally, permission was obtained from the Head of the Free State Department of Health to conduct the study. Participants in the study provided signed informed consent after receiving a concise overview of the research purpose and requirements. Information leaflets in relevant languages were used to explain the study and its objectives.

To maintain participant confidentiality, number coding was employed for questionnaire responses. Personal identifiers and names were not included on any data sheets submitted for statistical analysis. Completed questionnaires were collected immediately and kept safe, accessible only to the researcher. Computers used for data analysis were password-protected. Strict professionalism and confidentiality were adhered to in managing all information.

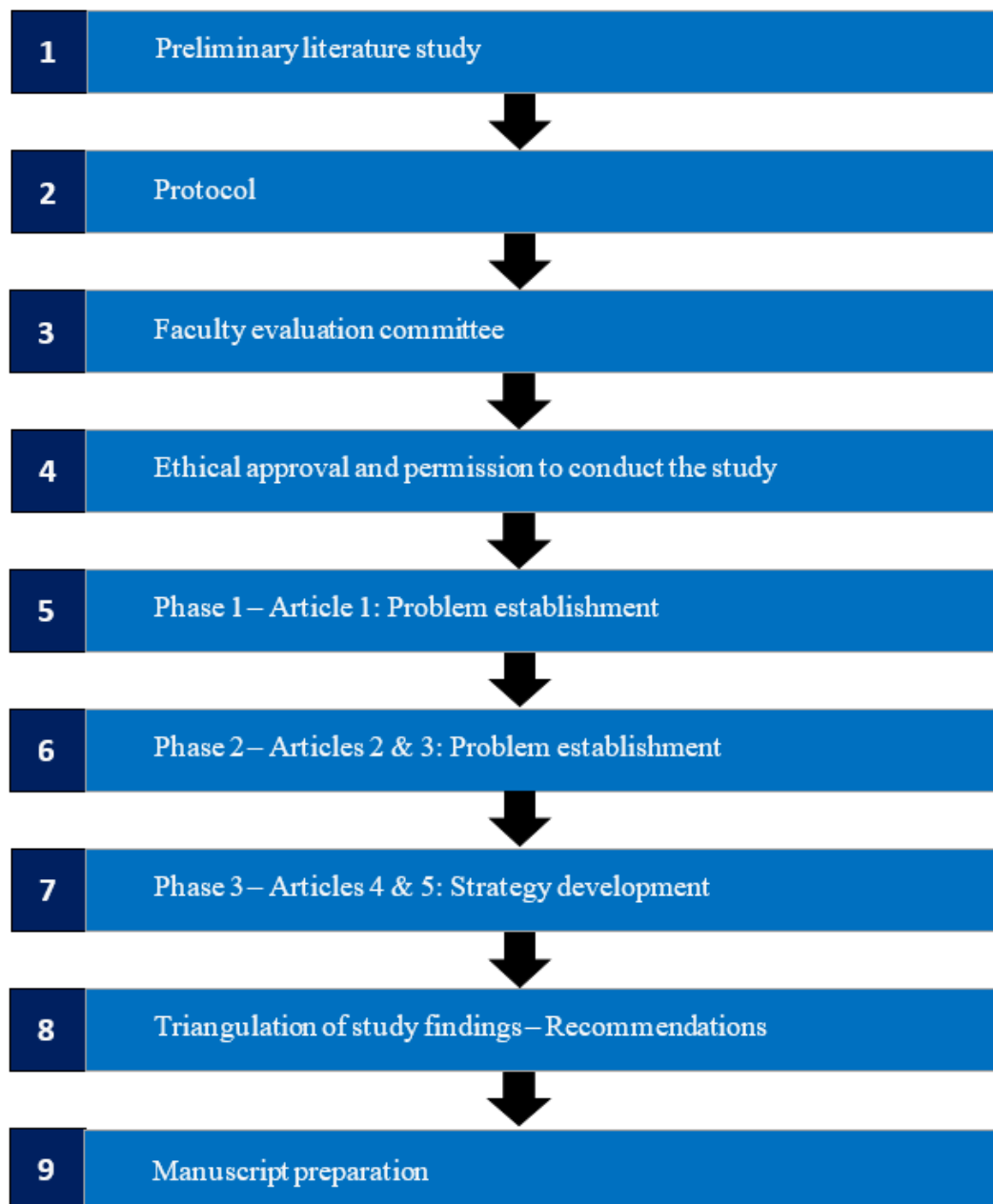
In addition to the above-mentioned ethical considerations, the following measures were also taken given the COVID-19 pandemic:

- Daily screening of participants by the researcher (or research assistants) or proof that participants have been screened at the healthcare facilities.
- Daily screening of researcher and research assistants.
- Strict adherence to the World Health Organization and National Department of Health COVID-19 measures, e.g., face mask use, regular hand sanitizing and social distancing.

### **3.7 DEMARCATION AND SCOPE OF THE STUDY**

The study was done in the domain of family medicine, as it mainly relates to screening. However, the subject of PCa is multi-disciplinary and hence cuts across other professions such as public health, urology, oncology, nursing and medical education.

### 3.8 SCHEMATIC OVERVIEW OF THE STUDY



**Figure 5.** Schematic overview of the study.

*Source:* Compiled by the researcher Benedict 2022.

### **3.9 MANUSCRIPT PREPARATION**

**PhD by publication** – the UFS stipulates in its policy on Master’s and doctoral studies:

*A Doctoral thesis is the sole research component of a doctorate. It must demonstrate that the candidate has made a specific contribution to enhancing knowledge in the chosen field while providing evidence of independent critical ability. The work must be of a quality to satisfy publication by reputable publishers. The degree may be earned through pure discipline-based or multidisciplinary research or applied research. A Doctoral thesis generally comprises between 70,000 and 100,000 words, or three publishable or published articles (UFS 2022).*

### **3.10 CHAPTER SUMMARY**

This chapter briefly presented the research methodology. In the next chapter, the different phases of the project that were conducted and completed are summarised in published article format. Each article describes the applicable methodology in more detail.

## CHAPTER 4 – THE PUBLISHED ARTICLES

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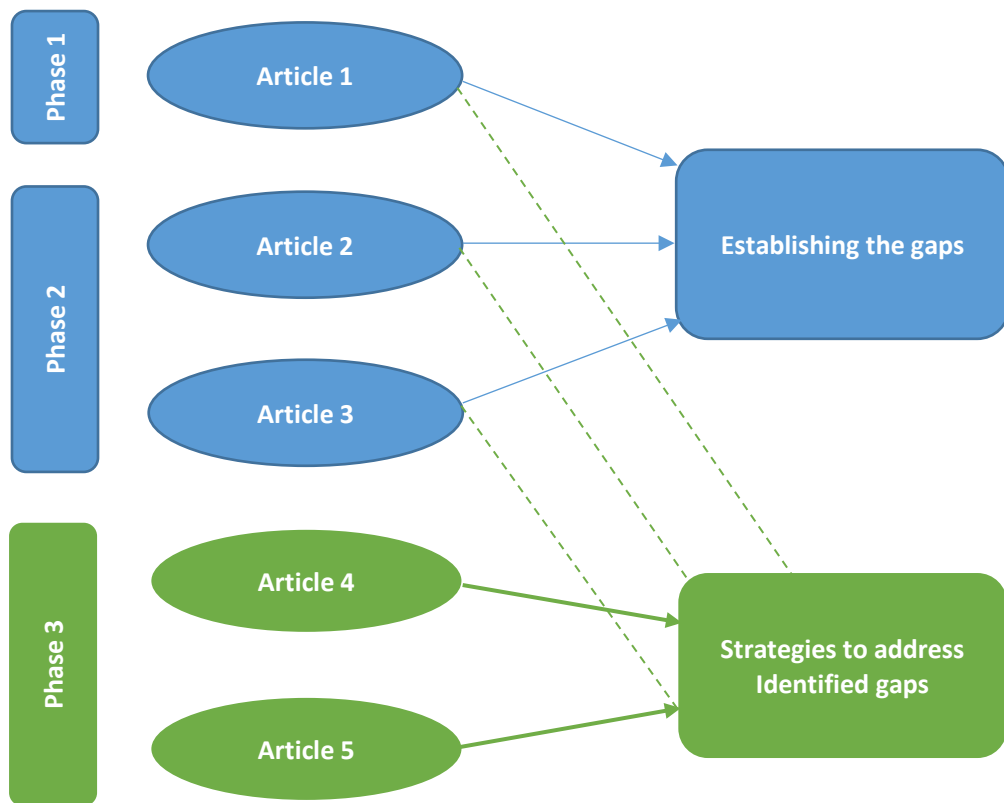
### 4.1 LIST OF PUBLISHED PAPERS

This thesis followed the route of PhD by publication and is based on the following five published articles:

**Table 4.** List of articles pertaining to this study.

Article 1	Benedict MOA, Steinberg WJ, Claassen FM, Mofolo N. <b>The profile of Black South African men diagnosed with prostate cancer in the Free State, South Africa.</b> South African Family Practice. 2023;65(1),a5553. <a href="https://doi.org/10.4102/safp.v65i1.5553">https://doi.org/10.4102/safp.v65i1.5553</a>
Article 2	Benedict MOA, Steinberg WJ, Claassen FM, Mofolo N, van Rooyen C. <b>Knowledge, attitude and practice on screening and early diagnosis of prostate cancer of primary healthcare providers in Free State.</b> African Journal of Primary Health Care and Family Medicine. 2023;15(1),a3688. <a href="https://doi.org/10.4102/phcfm.v15i1.3688">https://doi.org/10.4102/phcfm.v15i1.3688</a>
Article 3	Benedict MOA, Steinberg WJ, Claassen FM, Mofolo N, van Rooyen C. <b>Knowledge, beliefs and intentions of African men in the Free State about prostate cancer screening.</b> Health SA Gesondheid. 2022;27(0),a2081. <a href="https://doi.org/10.4102/hsag.v27i0.2081">https://doi.org/10.4102/hsag.v27i0.2081</a>
Article 4	Benedict MOA, Steinberg WJ, Claassen FM, Mofolo N. <b>Enhancing public awareness and practice of prostate cancer screening among African men: A scoping review.</b> South African Family Practice. 2023;65(1), a5621. <a href="https://doi.org/10.4102/safp.v65i1.5621">https://doi.org/10.4102/safp.v65i1.5621</a>
Article 5	Benedict MOA, Steinberg WJ, Claassen FM, Mofolo N. <b>Strategies to enhance the approach to prostate cancer screening of South African Black men in the Free State: A Delphi study.</b> Journal of Public Health in Africa. 2023;14(7). <a href="https://doi.org/10.4081/jphia.2023.2333">https://doi.org/10.4081/jphia.2023.2333</a>

*Source:* Compiled by the researcher Benedict 2022.



**Figure 6.** The interrelation and collective impact of the articles.

*Source:* Compiled by the researcher Benedict 2022.

## 4.2 ARTICLE 1

### The profile of Black South African men diagnosed with prostate cancer in the Free State, South Africa

This article was prepared according to the South African Family Practice submission guidelines.

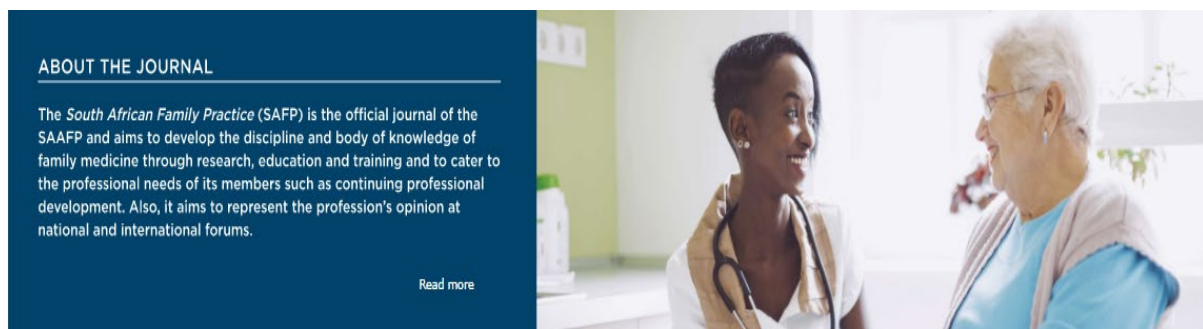
#### *Journal Information*

**Journal:** South African Family Practice

**Publisher:** AOSIS Publishing – African Online Scientific Information Systems

Country of publication: South Africa

**ISSN:** 2078-6204 (Online); 2078-6190 (Print)



#### *Published Article*

**DOI:** 10.4102/safp.v65i1.5553

**Citation:** Benedict MOA, Steinberg WJ, Claassen FM, Mofolo N. The profile of Black South African men diagnosed with prostate cancer in the Free State, South Africa. *South African Family Practice*. 2023;65(1), a5553.

<https://doi.org/10.4102/safp.v65i1.5553>

**Submitted:** 05 April 2022

**Accepted:** 24 June 2022

**Published:** 10 Jan 2023

# The profile of Black South African men diagnosed with prostate cancer in the Free State, South Africa



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## Dates:

Received: 05 Apr. 2022  
Accepted: 24 June 2022  
Published: 10 Jan. 2023

## How to cite this article:

Benedict MOA, Steinberg WJ, Claassen FM, Mofolo N. The profile of Black South African men diagnosed with prostate cancer in the Free State, South Africa. *S Afr Fam Pract.* 2023;65(1), a5553. <https://doi.org/10.4102/safp.v65i1.5553>

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**Background:** Prostate cancer (PCa) ranks high in terms of morbidity and mortality, especially in Africa. Prostate-specific antigen (PSA) screening remains a practical method of screening for and thereby detecting PCa early, especially among African men who are more negatively affected. Modifiable risk factors for PCa are mostly behavioural and lifestyle. Understanding community-specific determinants is important when developing health promotion interventions.

**Objective:** This study aimed to determine the profile of African men with PCa in the Free State, South Africa.

**Method:** A cross-sectional descriptive study was conducted using case record information and self-administered questionnaires among 341 African men with PCa attending the oncology and urology clinics of a tertiary hospital.

**Result:** Participants' median age at diagnosis was 66 years. Only 76 (22.3%) participants had ever heard of PCa prior to being diagnosed with the disease, 36 (47.4%) of whom had ever had screening performed. The majority ( $n = 298$ , 87.4%) were symptomatic; < 50% sought medical help within six months. At diagnosis, 133 (39.0%) men presented with stage T3 or T4 disease, 75 (22.0%) with metastatic disease and 84 (24.6%) with Gleason score  $\geq 8$ . Factors associated with advanced and high-grade disease included smoking, decreased sunlight exposure and physical activity, relatively increased ingestion of dairy products and red meat. Factors associated with early stage and low-grade disease included relatively increased ingestion of fruits, vegetables and fish.

**Conclusion:** Advanced and high-grade PCa disease is not uncommon among men  $\geq 60$  years in this study setting. Certain modifiable risk factors associated with advanced disease were established in this study. The majority had lower urinary tract symptoms (LUTS) prior to PCa diagnosis, but they were of poor health-seeking behaviour. Although there seems not to be a systematic delay in the definitive diagnosis and initiation of treatment for PCa, there is a need to improve on health education and awareness in the study setting.

**Keywords:** prostate cancer; Black men; African men; risk factors; social determinants; disease stage and grade.

## Introduction

Globally, cancer is a major health burden and is on an upward trend. Estimates from the Global Cancer Observatory of the International Agency for Research on Cancer showed an incidence and mortality of 18.1 million and 9.6 million, respectively, in 2018. These figures increased to 19.3 million and about 10 million, respectively, in 2020.<sup>1,2</sup> Prostate cancer (PCa) ranks the second most frequent cancer diagnosis and the fifth leading cause of death among men worldwide. Its global incidence and mortality for 2018 were 1.3 million and 360 000, respectively. These figures increased to 1.4 million and 375 000, respectively, in 2020.<sup>1,2</sup> The impact is greater in Africa and low- and middle-income countries (LMICs) because of genetic, socio-economic and sociocultural factors.<sup>3,4</sup> In South Africa, PCa is the most common cancer among men,<sup>5</sup> and there has been an increase in PCa incidence rate from 29 per 100 000 men in 2007<sup>6</sup> to 68 per 100 000 men in 2018.<sup>7</sup> Prostate cancer accounts for about 13% of male deaths from cancer in South Africa.<sup>8</sup> Prostate cancer in Black South African men is more likely to be hereditary than in other racial groups; hence, they are disproportionately affected.<sup>9</sup> The South African government, through the National Development Plan 2030, sets out nine long-term health goals, one of which is to 'significantly reduce prevalence of non-communicable diseases'.<sup>10</sup>

Prostate-specific antigen (PSA) screening for PCa, although controversial because of the associated false-positive results, overdiagnosis, overtreatment and the related complications,<sup>11</sup> remains a

practical method of early detection, early treatment and prevention of metastatic disease and complication,<sup>12</sup> especially in Africa where there is higher mortality compared with other regions of the world.<sup>13</sup>

According to the United States (US) Preventive Task Force, there is a likelihood for a decreased mortality from PCa in men aged 55–69 years with PSA screening; there is currently no benefit shown in screening men above 70 years of age.<sup>11,14</sup> In contrast, the South African PCa diagnostic and treatment guidelines (SAPCDTGs)<sup>15</sup> recommend PSA testing for men with a life expectancy of more than 10 years and with any of the following criteria: (1) Black Africans  $\geq 40$  years and those with family history of prostate or breast cancer in a first-degree relative, (2) men of other races  $\geq 45$  years and (3) men with history of lower urinary tract symptoms (LUTS) and clinical suspicion of PCa, regardless of age group.

According to an unpublished work by Myburg 2016 et al.<sup>16</sup> from the urology department of Universitas Academic Hospital, Bloemfontein, Free State, South Africa, African men, compared with their European counterparts, had PCa associated with worse prognosis (i.e. Gleason score  $\geq 8$ ), higher mean PSA levels and more locally advanced stage, at presentation. These results are corroborated by previous studies on racial disparities in PCa presentation.<sup>17,18,19,20,21,22</sup>

Another unpublished audit of PCa cases from January 2019 to July 2019 at the same department revealed that curative treatment was possible in only about 10% (38 out of 366) of the cases, whereas 77% of PCa cases are localised, according to the National Cancer Institute, United States.<sup>23</sup>

Risk factors that have been associated with PCa are either nonmodifiable (e.g. increasing age, ethnicity, genetic factors and family history) or modifiable, for example diet (increased intake of saturated animal fat and red meat, coffee consumption, lower intake of fruits, vegetables and vitamins), smoking, obesity, physical inactivity, infections and environmental exposure to chemicals or ionising radiation. Modifiable risk factors are mostly behavioural and lifestyle factors.<sup>9,14</sup>

In a review article to establish the determinants of PCa risk, stage at diagnosis and survival among African-American men, poor socio-economic status, lack of social support and network and poor access to healthcare services were associated with unfavourable outcome.<sup>24</sup> In a United States study, it was concluded that separate PCa screening guidelines might be beneficial to the African-American population.<sup>25</sup> More empirical and evidence-based studies may therefore be necessary among African men, who are more susceptible to developing PCa.<sup>26,27,28</sup>

Unlike the nonmodifiable risk factors, some of the modifiable risk factors for PCa are community specific. Environmental exposure to chemicals such as pesticides, herbicides,

chromium and cadmium is an important risk factor among African men in the Free State province, as many are employed in the agricultural and mining industries.<sup>29</sup> An understanding of community-specific determinants of this disease and the risk factors associated with the stage and grade at diagnosis is an important step towards the development of relevant health promotion interventions.<sup>30</sup> Although population screening for PCa is currently not supported, once a patient deemed to belong in the high-risk category attends a healthcare facility, he should be considered for screening through a shared decision process.<sup>31</sup>

### Aim and objectives

This study aimed to determine the profile of African men with PCa in the Free State province, South Africa. The primary objective was to identify their sociodemographic and background characteristics, common clinical features, risk factors for PCa, stage and grade of PCa disease. The secondary objective was to determine factors associated with the stage and grade of the disease at diagnosis.

## Materials and methods

### Study design

This was a cross-sectional descriptive study describing the characteristic features of African men diagnosed with PCa in the Free State province of South Africa.

### Target population and sampling

The target population was African men seen and diagnosed histologically with PCa at the urology and oncology units of Universitas Academic Hospital, a teaching hospital in the Free State province of South Africa. For the purpose of this study, 'African men' are defined as self-identified indigenous Black South African men.

Using convenience sampling, all African men diagnosed histologically with PCa attending the urology and oncology clinics for follow-up over a period of just over six months (21 January 2021 to 31 July 2021) were included in the study. All patients of non-black races (including mixed race patients) were excluded from the study. Also, five participants were excluded; three were nonconsenting while the other two were too weak to participate. In total, 341 participants were included in the study.

### Measurement, data collection and the questionnaire

Data were collected using a self-administered survey questionnaire. Parameters in the questionnaire were adapted from similar studies<sup>17,32,33</sup> that aimed to understand the profile of patients with PCa. Patients diagnosed with PCa and attending the urology and oncology clinics for follow-up visits were requested to complete the questionnaire. Adequate time was allowed for participants to read and understand the study information and consider their consent prior to

participation. Upon their consent, the researcher administered the questionnaires to them. Completed questionnaires were collected the same day and immediately kept secured.

The questionnaire consisted of two sections, A and B. Section A enquired about participants' sociodemographic and background details, that is, age, cultural group, level of education, occupation (including mine workers, exposure to pesticides and herbicides), relationship status and residential area.

The following data pertained to the participants' PCa, that is, events leading to PCa diagnosis, PCa symptoms reported, duration between onset of symptoms and presentation, previous PCa screening, year of diagnosis, duration between urology appointment and PCa diagnosis, duration between PCa diagnosis and treatment initiation, PCa history among first-degree relatives, medical comorbidities, prior history of sexually transmitted diseases (STDs), cancer stage at diagnosis, Gleason score, recalled history (from 20 years old) of physical activities, diet, body size, exposure to sunlight and smoking.

The questionnaire was translated into the languages spoken most commonly in the area, that is, Sesotho and IsiZulu.<sup>34</sup>

A trained research assistant fluent in these local languages helped with further clarification of questions to the participants who required such help.

Information unknown to the participants, such as cancer stage, Gleason score and other technical features, were obtained from Meditech (Universitas Adademic Hospital electronic clinical record system) and recorded on the questionnaire by the researcher.

### Steps taken to minimise measurement error

Case and data duplication was prevented by using a colour-coding system where the front cover of a participant's case record was marked by the researcher for easy identification of those who had already participated.

### Content validity of questionnaire

The questionnaire was adapted from previous similar peer-reviewed studies.<sup>17,22,33</sup> A Health Sciences Faculty evaluation committee consisting of consultant family physicians, a urologist, medical educators, a professional nurse and a biostatistician subjected the questionnaire to review and approval.

### Pilot study

The questionnaire (using the applicable language version) was pretested on the first 10 participants (in succession) to ensure that the questions were balanced and correctly constructed and that the crucial information would be obtained. The 10 piloted questionnaires were included in the study since no significant changes arose from the pilot study.

### Data analysis

The data were analysed by the first author, using SAS version 9.3 (Cary, NC: SAS Institute Inc.). Descriptive statistics were used for continuous variables, while frequencies and percentages were computed for categorical data. Association between variables were assessed using chi-squared or Fisher's exact tests. A *p*-value of < 0.05 was taken to be significant.

### Ethical considerations

The study was approved by the Health Sciences Research Ethics Committee (HSREC) of the University of the Free State (ref. no. UFS-HSD2020/1481/2411). Permission to conduct the study was granted by the Head of the Free State Department of Health.

Following a detailed description of the study, signed informed consent was obtained from each participant prior to their participation in the study. The voluntary nature of participation and the right to refuse to participate or to withdraw at any time were also explained to the participants. The self-administered questionnaire was anonymous, as no identifying information was recorded on any of the documents.

## Results

### Sociodemographic and background characteristics of participants

Table 1 summarises the demographic data of the 341 participants. The median age of the participants at diagnosis was 66 years (range 40–93 years). Most patients were in their 70s (*n* = 162; 47.5%) while 68 (20.0%) were in their 50s.

The majority of the participants (*n* = 298, 87.4%) had symptoms prior to the diagnosis of PCa. Of the 298 participants who had symptoms, 230 (77.2%) sought medical help themselves, and 67 (22.5%) were persuaded by family members, while one (0.3%) participant was advised on a PSA test by his doctor. The majority of the participants had multiple symptoms. The top 10 symptoms among the participants were dysuria (*n* = 216, 72.5%), poor stream (*n* = 203, 68.1%), urinary frequency (*n* = 129, 43.3%), nocturia (*n* = 98, 32.9%), urinary hesitancy (*n* = 78, 26.2%), frequent lower back pain (*n* = 75, 25.2%), impotence (*n* = 72, 24.2%), incomplete voiding (*n* = 47, 15.8%), dribbling of urine (*n* = 33, 11.1%) and urinary retention (*n* = 27, 9.1%).

Most patients presented to a healthcare facility within 1 year of symptoms (*n* = 238; 79.8%).

Only 76 (22.3%) participants had ever heard of PCa prior to diagnosis. Of these 76 participants, 36 (47.4%) had PCa screening in the past, by either PSA alone or in combination with digital rectal examination (DRE).

A total of 52 (15.2%) participants were aware of cancer history among first-degree family members.

**TABLE 1:** Sociodemographic and background characteristics of the participants ( $n = 341$ ).

Variable	<i>n</i>	%
<b>Age at diagnosis (years)</b>		
40–49	4	1.2
50–59	68	20.0
60–69	162	47.5
≥ 70	107	31.3
<b>Cultural group</b>		
Sesotho	255	74.8
Tswana	54	15.8
Xhosa	22	6.4
Venda	6	1.8
Zulu	4	1.2
<b>Level of education</b>		
Some primary level (Grade 1–7)	141	41.3
Some secondary level (Grade 8–12)	90	26.4
Primary level (Grade 7) completed	45	13.2
No formal education	37	10.9
Grade 12 (matric)	25	7.3
Tertiary	3	0.9
<b>Relationship status</b>		
Married	255	74.8
Living as married or civil union	42	12.3
Widowed	26	7.6
Separated or divorced	12	3.5
Single or never married	6	1.8
<b>Level of skilled employment</b>		
Semi-skilled	165	48.4
Unskilled	140	41.1
Skilled	36	10.5
<b>Occupational exposure to mines (<math>n = 103</math>)</b>		
< 5 years	44	42.7
5–10 years	32	31.1
> 10 years	27	26.2
<b>Occupational exposure to herbicides or pesticides (<math>n = 16</math>)</b>		
< 5 years	15	93.7
5–10 years	0	0.0
> 10 years	1	6.3
<b>District or country of residence</b>		
Mangaung	162	47.5
Lejueleputswa	65	19.0
Thabo Mofutsayana	45	13.2
Fezile Dabi	34	10.0
Lesotho	16	4.7
Xhariep	15	4.4
Other	4	1.2
<b>Residential area</b>		
Rural	261	76.5
Urban	80	23.5

A total of 226 (66.3%) participants had medical comorbidities, the most common being hypertension ( $n = 193$ , 85.4%), diabetes mellitus ( $n = 44$ , 19.5%), HIV infection ( $n = 22$ , 9.7%) and tuberculosis ( $n = 13$ , 5.8%).

A total of 89 (26.1%) participants had a past history of STDs; the majority ( $n = 55$ ; 61.8%) of whom had just one episode, 33 (37.1%) had 2–5 episodes and one (1.1%) had > 5 episodes.

### Assessment of participants for environmental risk factors for prostate cancer

Table 2, Table 3 and Table 4 summarise the assessment of participants on environmental risk factors for PCa.

At the time of the study, about a fifth ( $n = 76$ ; 22.3%) of the participants were ≥ 6 years post diagnosis while the others ( $n = 265$ ; 77.7%) were ≤ 5 years post diagnosis. The mean duration of PCa remission (at the time of the study) was 3.89 ± SD 3.21 years (range 1–17 years). Almost all ( $n = 319$ ; 93.5%) of the participants had prostate biopsy and diagnosis within 3 months of referral to the urology unit. Likewise, the majority ( $n = 242$ ; 71.0%) of the participants had commenced treatment within 3 months of diagnosis.

Table 5 summarises PCa staging and grading among the participants.

### Prostate cancer severity at diagnosis and associations with participants' background characteristics and risk factors

The married participants (compared with the other relationship statuses) had heard about PCa ( $p = 0.034$ ). Also, those with some secondary level education had heard about PCa ( $p < 0.001$ ) and had previously screened for the disease ( $p = 0.001$ ). Less than 10 years' exposure to the mine was associated with the absence of lymph node metastasis (N0) ( $p = 0.020$ ). Further associations between participants' background characteristics and risk factors and PCa severity are summarised in Table 6.

Symptomatic participants who sought medical attention within six months tended to have localised, non-metastatic and low-grade disease.

With regard to the history of PCa among first-degree family members, participants whose fathers did not have PCa tended to have absent nodal metastasis and low-grade disease. Also, those whose mothers did not have breast cancer had localised, non-metastatic (nodal) and low-grade disease.

Smoking ≥ 6 cigarettes per day was associated with metastatic disease.

A decreased (≤ 5 h per week) exposure to sunlight was associated with advanced and metastatic disease. Less than 2 h walk per week was associated with advanced disease.

The use of dairy products ≥ 2 times per day was associated with advanced and high-grade disease. The consumption of fruits and vegetables 2–4 times per week was associated with localised and low-grade disease. Daily consumption of red meat was associated with advanced, high-grade and metastatic disease. Eating fish 2–6 times per week was associated with localised, low-grade and non-metastatic disease.

## Discussion

### Background characteristics of participants

Age at diagnosis of PCa is one of the factors that contribute to poor health-related quality of life outcomes for survivors.<sup>35</sup> In this study, the median age at diagnosis

TABLE 2: Smoking, body size and exposure to sunlight.

Risk factor	Life stage (years)									
	20s (n = 341)		30s (n = 341)		40s (n = 341)		50s (n = 339)		≥ 60s (n = 302)	
	n	%	n	%	n	%	n	%	n	%
<b>Smoking (per day)</b>										
1 cigarette	1	0.3	1	0.3	3	0.9	1	0.3	0	0.0
2–5 cigarettes	31	9.1	28	8.2	31	9.1	31	9.1	26	8.6
6–10 cigarettes	82	24.0	86	25.2	81	23.8	64	18.9	31	10.3
11–20 cigarettes	47	13.8	48	14.1	43	12.6	30	8.8	16	5.3
> 20 cigarettes	2	0.6	2	0.6	1	0.3	0	0.0	0	0.0
Never smoked	178	52.2	173	50.7	172	50.4	170	50.1	150	49.7
Stopped smoking	0	0.0	3	0.9	10	2.9	43	12.7	79	26.1
<b>Body size estimate</b>										
Underweight	85	24.9	85	24.9	33	9.7	52	15.3	66	21.8
Normal weight	192	56.3	184	54.0	244	71.6	246	72.6	212	70.2
Overweight	60	17.6	68	19.9	61	17.9	37	10.9	20	6.6
Obese	4	1.2	4	1.2	3	0.9	4	1.2	4	1.3
<b>Exposure to sunlight</b>										
< 2 h	8	2.3	8	2.3	16	4.7	203	59.9	211	69.9
2 h – 5 h per week	181	53.1	182	53.4	212	62.2	115	33.9	75	24.8
6 h – 10 h per week	143	41.9	142	41.6	105	30.8	16	4.7	11	3.6
> 10 h per week	9	2.6	9	2.6	8	2.3	5	1.5	5	1.7

TABLE 3: Weekly physical activities and exercises.

Weekly physical activities and exercises	Life stage (years)									
	20s (n = 341)		30s (n = 341)		40s (n = 341)		50s (n = 339)		≥ 60s (n = 302)	
	n	%	n	%	n	%	n	%	n	%
<b>Walking</b>										
≤ 5 h	267	78.3	269	78.9	297	87.1	280	82.6	245	81.1
> 5 h	74	21.7	72	21.1	44	12.9	10	2.9	5	1.7
Never	0	0.0	0	0.0	0	0.0	49	14.5	52	17.2
<b>Home gardening</b>										
≤ 5 h	314	92.1	314	92.1	317	92.9	209	61.7	165	54.6
> 5 h	24	7.0	24	7.0	18	5.3	10	2.9	9	3.0
Never	3	0.9	3	0.9	6	1.8	120	35.4	128	42.4
<b>Gym</b>										
≤ 5 h	201	59.0	204	59.8	189	55.4	94	27.7	75	24.8
> 5 h	8	2.3	9	2.6	7	2.1	1	0.3	1	0.3
Never	132	38.7	128	37.5	145	42.5	244	72.0	226	74.8
<b>Housework</b>										
≤ 5 h	324	95.0	325	95.3	319	93.5	196	57.8	143	47.4
> 5 h	13	3.8	12	3.5	9	2.6	1	0.3	1	0.3
Never	4	1.2	4	1.2	13	3.8	142	41.9	158	52.3
<b>Social sport</b>										
≤ 5 h	270	79.2	268	78.6	226	66.3	68	20.0	53	17.5
> 5 h	8	2.3	8	2.3	4	1.2	0	0.0	0	0.0
Never	63	18.5	65	19.1	111	32.5	271	80.0	249	82.5

was 66 years. This is in keeping with statistics from the American Cancer Society, where 60% of cases are diagnosed in men who are 65 years or older and rare in men under 40 years.<sup>36</sup> A recent retrospective study also found the average age at diagnosis to be 66 years among South African and Nigerian men.<sup>37</sup> Early-stage PCa may be asymptomatic, and as such, most men will only present when symptomatic, especially if there is no PCa screening in the public sector. Hence, there is still the likelihood for delayed presentation in our setting.

Most men in this study are of the Sesotho cultural group. The ethnic differences shown in this study may be a

reflection of ethnic group distribution in the Free State province and not necessarily an indication of the prevalence of the disease across the various ethnic groups. Studies have suggested that ancestry may be associated with PCa burden.<sup>9,26,28</sup>

Occupational exposure to carcinogenic agents such as pesticides, herbicides, chromium, cadmium, cutting fluids and ionising radiation is not uncommon in the Free State province, where mining and agriculture are the predominant industries. There is an association between exposure to these agents and PCa.<sup>14,38</sup> Self-reported exposure to herbicides and pesticides in this study is relatively low

TABLE 4: Diet and eating habits.

Diet and eating habits	Life stage (years)									
	20s (n = 341)		30s (n = 341)		40s (n = 341)		50s (n = 339)		≥ 60s (n = 302)	
	n	%	n	%	n	%	n	%	n	%
<b>Carbohydrates</b>										
> 3 times per day	27	7.9	26	7.6	6	1.8	1	0.3	0	0.0
1–3 times per day	314	92.1	315	92.4	335	98.2	337	99.4	301	99.7
2–6 times per week	0	0.0	0	0.0	0	0.0	0	0.0	1	0.3
Once a week	0	0.0	0	0.0	0	0.0	1	0.3	0	0.0
< Once a week	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
<b>Dairy products</b>										
> 3 times per day	82	24.0	71	20.8	40	11.7	2	0.6	1	0.3
1–3 times per day	236	69.3	247	72.4	274	80.4	307	90.5	271	89.7
2–6 times per week	21	6.1	21	6.2	25	7.3	25	7.4	25	8.3
Once a week	1	0.3	1	0.3	1	0.3	4	1.2	4	1.3
< Once a week	1	0.3	1	0.3	1	0.3	1	0.3	1	0.3
<b>Fruits and vegetables</b>										
> 3 times per day	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1–3 times per day	38	11.1	38	11.1	43	12.6	87	25.7	83	27.5
2–6 times per week	206	60.4	212	62.2	212	62.2	203	59.9	177	58.6
Once a week	74	21.7	68	20.0	67	19.6	48	14.1	41	13.6
< Once a week	23	6.7	23	6.7	19	5.6	1	0.3	1	0.3
<b>Red meat</b>										
> 3 times per day	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1–3 times per day	132	38.7	132	38.7	134	39.3	123	36.3	105	34.7
2–6 times per week	198	56.1	198	56.1	197	57.8	201	59.3	182	60.3
Once a week	9	2.6	9	2.6	8	2.3	13	3.8	12	4.0
< Once a week	2	0.6	2	0.6	2	0.6	2	0.6	3	1.0
<b>Poultry</b>										
> 3 times per day	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1–3 times per day	21	6.1	21	6.1	22	6.4	27	8.0	25	8.3
2–6 times per week	311	91.2	311	91.2	312	91.5	306	90.2	271	89.7
Once a week	5	1.5	5	1.5	5	1.5	5	1.5	5	1.7
< Once a week	4	1.2	4	1.2	2	0.6	1	0.3	1	0.3
<b>Fish</b>										
> 3 times per day	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1–3 times per day	2	0.6	2	0.6	3	0.9	6	1.8	6	2.0
2–6 times per week	137	40.2	139	40.7	150	44.0	185	54.6	171	56.6
Once a week	149	43.7	148	43.4	145	42.5	128	37.7	112	37.1
< Once a week	50	14.6	49	14.4	39	11.4	17	5.0	11	3.6
Never	3	0.9	3	0.9	4	1.2	3	0.9	2	0.7
<b>Fast foods</b>										
> 3 times per day	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0
1–3 times per day	0	0.0	0	0.0	0	0.0	1	0.3	1	0.3
2–6 times per week	12	3.5	13	3.8	40	11.7	45	13.3	28	9.3
Once a week	69	20.2	89	26.1	210	61.6	216	63.7	126	41.7
< Once a week	259	76.0	238	69.8	90	26.4	75	22.1	145	48.0
Never	1	0.3	1	0.3	1	0.3	2	0.6	2	0.7

(4.7%) compared with mine exposure (30.2%). This may be because of a lack of awareness of their exposure to hazardous occupational agents.

The majority (91.2%) of the participants had less than Grade 12 as their highest level of education. This may also explain why the majority (89.5%) were working in either unskilled or semiskilled jobs such as farming and agricultural work, mining, casual labour and other informal jobs.

### Clinical features among the participants

The majority (87.4%) of men in this study had LUTS prior to the diagnosis of PCa. It may therefore be useful for family

physicians and GPs to consider symptomatic men for screening as recommended by SAPCDTG.<sup>15</sup> Literature has described similar symptoms among patients, with 47% being asymptomatic. Bone ache and weight loss have been described as symptoms suggestive of metastatic diseases.<sup>39</sup> Our study shows that about a quarter of the participants presented with lower back pain.

About 25% of the participants presented with impotence. This may however be because of androgen deficiency and certain cardiovascular diseases, which are not uncommon among the middle-aged and elderly. The top comorbid conditions among participants in this study were hypertension and diabetes mellitus.

**TABLE 5:** Disease stage and grade at diagnosis among participants (*n* = 341).

Variable	<i>n</i>	%
<b>TNM staging</b>		
<b>Tumour (T)</b>		
T1	70	20.5
T2	138	40.5
T3	75	22.0
T4	58	17.0
<b>Lymph node (N)</b>		
N0	191	56.0
N1, N2, N3	43	12.6
NX (regional LN not assessed)	107	31.4
<b>Metastasis (M)</b>		
M0	197	57.8
M1	75	22.0
MX (unknown or cannot be evaluated)	69	20.2
<b>Diagnosis grade</b>		
<b>Gleason score</b>		
≤ 6 (grade group 1)	101	29.6
7 (3+4) (grade group 2)	91	26.7
7 (4+3) (grade group 3)	65	19.1
8 (grade group 4)	57	16.7
9 or 10 (grade group 5)	27	7.9

TNM, tumour, node, metastasis; LN, lymph node.

Although the majority (77.2%) of the symptomatic men in this study sought medical attention out of self-conviction; the rest required some persuasion from family and healthcare providers. This may explain why more than 50% of the symptomatic men only sought medical attention after six months. According to Shaw et al.,<sup>40</sup> involvement of family members in shared decision-making for PCa screening and treatment is often beneficial. In another study, the other reasons for delayed presentation include financial barriers, lack of health insurance and poor health-seeking behaviour.<sup>9</sup>

Less than a quarter (22.3%) of the participants had ever heard of PCa prior to diagnosis. This is in keeping with local<sup>41</sup> and international<sup>42,43</sup> studies that have shown poor knowledge and awareness of PCa among Black men. Almost half (47.4%) of the 76 participants who had earlier heard of PCa had ever screened for the disease; there may be the lack of screening opportunities in the public sector. Also, in a Kenyan study,<sup>13</sup> despite massive education campaigns on PCa awareness, the screening rate was still low. Hence, apart from a knowledge gap, certain cultural factors were found to be responsible for the low turn-up for PCa screening.

### Risk factors for prostate cancer

Certain modifiable factors such as diet, lifestyle habits, infections and environmental exposure to chemicals or radiation, for PCa have been described.<sup>9,14</sup>

Positive associations between STDs have been described in studies.<sup>44,45</sup> In our study, over a quarter (26.1%) of the participants reported past history of STDs.

Regarding nonmodifiable risk factors, about 15% of the participants gave a positive history of cancer among first-degree family members. Literature has shown that a history

**TABLE 6:** Associations between PCa severity at diagnosis and participants' background characteristics and risk factors.

Variable	Outcome	<i>p</i>
Early presentation (≤ 6 months)	T1 or T2 tumour stage	< 0.001
	N0 (no nodal metastasis)	0.010
	M0 (no distant metastasis)	0.001
No PCa history in father	Grade 1 or 2 disease	0.016
	N0	0.016
No breast cancer history in mother	Grade 1 or 2 disease	0.028
	T1 tumour stage	0.002
	N0	0.018
Smoking ≥ 6 cigarettes per day	Grade 1 or 2 disease	0.006
	M1 (distant metastasis)	0.035
≤ 5 h per week sunlight exposure	T3 or T4 tumour stage	0.003
	M1	0.032
Less than 2 h walking per week	T3 or T4 tumour stage	0.019
Use of dairy products ≥ 2 times per day	T3 or T4 tumour stage	< 0.001
	Grade 4 or 5 disease	0.008
Consumption of fruits and vegetables 2–4 times per week	T1 tumour stage	< 0.001
	Grade 1 or 2 disease	0.009
Daily consumption of red meat	T3 or T4 tumour stage	< 0.001
	Grade 4 or 5 disease	0.007
	Nodal metastasis	0.005
	M1	0.033
2–6 times per week consumption of fish	T1	< 0.001
	Grade 1 or 2 disease	0.005
	N0	0.031
	M0	0.021

PCa, prostate cancer.

of PCa in a first-degree relative is associated with aggressive disease.<sup>46</sup> Likewise, a history of female breast cancer in first-degree relatives was associated with an increased risk of PCa, often of a high grade.<sup>47</sup>

### Stage and grade of prostate cancer among participants

In this study, 39.0% of the participants presented with T stage ≥ T3, 22.0% presented with metastatic disease, and 24.6% had Gleason score ≥ 8. In a similar local study,<sup>48</sup> 62.3% had T stage ≥ T3, and 43.7% had a Gleason score ≥ 8. This above-mentioned study included men of other races, and only participants on treatment were included; this may explain the differences in the stage and grade of the disease.

### Prostate cancer stage and grade at diagnosis and associations with participants' background characteristics and risk factors

Marital status has been shown to be an important factor associated with PCa stage and grade at diagnosis. In a study on marital status and PCa incidence,<sup>49</sup> widowers were shown to have worse cancer stage at diagnosis. Although there was no association of statistical significance between marital status and disease grade in this study, married participants were more likely to be aware of PCa (*p* = 0.034).

Level of education and health literacy are risk factors for a higher stage of PCa at diagnosis.<sup>50</sup> Although there was no association of statistical significance between education level and disease grade in this study, participants with at least a

secondary level education were more aware of the disease ( $p < 0.001$ ) and were more likely to have been previously screened for the disease ( $p = 0.001$ ).

The earlier the diagnosis, the better the prognosis. Worse prognosis has been shown where there is a decreased awareness of the disease and late presentation.<sup>14</sup> Our study showed that symptomatic men who presented earlier (within 6 months) were more likely to have T1 stage ( $p < 0.001$ ), low grade disease, that is, Gleason grade 1 ( $p = 0.016$ ), absence of lymph node metastasis ( $p = 0.010$ ) and absent distant metastasis ( $p = 0.001$ ).

A study conducted in the United States showed an association between exposure to cadmium and aggressiveness of PCa.<sup>51</sup> In our study, participants with less than 10 years mine exposure were more likely to present with PCa without lymph node metastasis ( $p = 0.020$ ).

Participants with a negative history of PCa among first-degree family members were more likely to present with low grade disease, that is, Gleason grade 1 ( $p = 0.028$ ) and absent lymph node metastasis ( $p = 0.016$ ). Those with negative history of breast cancer among first-degree family members were more likely to have T1 stage ( $p = 0.002$ ), low grade disease, that is, Gleason grade 1 ( $p = 0.006$ ) and absent lymph node metastasis ( $p = 0.018$ ).

Certain smoking patterns (onset, intensity and frequency) have been shown to be associated with higher poorly differentiated PCa.<sup>52,53,54</sup> Just over half of the participants in our study had never smoked cigarettes. Of the group that smoked, the majority smoked 6–10 cigarettes daily. Smoking  $\geq 6$  cigarettes per day was associated with metastatic PCa ( $p = 0.035$ ).

Vitamin D deficiency has been associated with certain cancers, including PCa.<sup>55</sup> Sunlight exposure is a vital process in producing vitamin D3 in the skin from 7-dehydrocholesterol, which is metabolised in the liver and kidney into the active form.<sup>56</sup> Sun exposure in early life has been shown to protect against PCa. Frequent sun exposure in adulthood has been shown to be associated with a significantly reduced risk of fatal PCa.<sup>57</sup> As shown in Table 2, the majority of the participants younger than 50 years report 2 h – 5 h of weekly exposure to sunlight. Participants in their 50s and older mainly reported less than 2 h sun exposure per week. A decreased exposure to sunlight was associated with T3 or T4 tumour stage ( $p = 0.003$ ) and metastatic disease ( $p = 0.032$ ).

Physical activity helps to decrease the deposition of central adipose tissue. It also lessens circulating levels of inflammation, insulin and unfavourable sex hormones, thereby preventing PCa progression.<sup>58</sup> As seen on Table 3, the majority of the participants engaged in weekly physical activities of  $\leq 5$  h across the life phases. Less than 2 h walk per week was associated with T3 or T4 tumour stage ( $p = 0.019$ ).

Certain diets or eating habits have been associated with an increased risk of developing PCa.<sup>14,54</sup> The staple foods in most

Southern African nations are corn, wheat-based and dairy products. Also, agriculture and farming are among the prevalent industries in the Free State province; these may therefore explain the reason for the majority of the participants consuming carbohydrates (96.4%) and dairy products (80.5%) 1–3 times daily. Certain cultures believe a meal is incomplete without meat. Also, as earlier stated, the province is notable for agriculture and farming; hence, there may be a relative increased access to these food products, including fruits and vegetables. As shown in Table 4, the majority of the participants consumed red meat (57.9%), poultry (90.8%), fish (47.2%), fruits and vegetables (60.7%) 2–6 times per week. The majority (72.9%) of participants in their 20s and 30s ate fast food less than once a week. This may be because of a lack of affordability. The frequency of consuming fast food, however, increased to once a week (55.7%) in those over 40 years of age.

Eating fruits and vegetables 2–4 times per week was associated with T1 tumour stage ( $p < 0.001$ ) and grade 1 or 2 disease ( $p = 0.009$ ). Also, eating fish 2–6 times per week was associated with T1 tumour stage ( $p < 0.001$ ), grade 1 or 2 disease ( $p = 0.005$ ), absent lymph node metastasis ( $p = 0.031$ ) and absent distant metastasis ( $p = 0.021$ ). On the contrary, daily consumption of red meat was associated with T3 or T4 tumour stage ( $p < 0.001$ ), grade 4 or 5 disease ( $p = 0.007$ ), lymph node metastasis ( $p = 0.005$ ) and distant metastasis ( $p = 0.033$ ). Also, the use of dairy products  $\geq 2$  times per day was associated with T3 or T4 tumour stage ( $p < 0.001$ ) and grade 4 or 5 disease ( $p = 0.008$ ).

While treatment delay of several months or even years may not affect outcomes of men with low-risk PCa, the same cannot be said when the PCa is not low-risk.<sup>59</sup> In a study among patients who underwent radical prostatectomy, a surgical delay time of up to six months after diagnosis was not associated with higher risks of having any adverse pathological outcomes or worse overall survival.<sup>60</sup> In another study<sup>61</sup> among patients who underwent low-dose-rate brachytherapy, treatment delay of more than six months appeared to adversely correlate with biochemical recurrence-free survival. Therefore, it was suggested that even low- and intermediate-risk PCa patients should have brachytherapy performed within six months of the diagnosis.<sup>61</sup>

Our study showed that most (93.5%) of the participants had histological confirmation of the disease within three months of referral from a primary health care facility. Also, the majority (98.8%) had commenced treatment within six months of diagnosis. Therefore, there seem to be no significant systems delays in the diagnostic and therapeutic process relating to PCa at the higher healthcare facilities of the Free State province.

### Strengths and limitations

As far as we know, this is the first study in the study setting focusing on the more vulnerable group, that is, men of African descent. However, several limitations of this study should be noted. Firstly, certain relevant information was

absent in the patients' case files, making it mandatory to interview live subjects; the use of case files (alone) would have increased the sample size, giving more credence to the study. However, all possible subjects were included in the study and data collection continued until data saturation was reached. Secondly, this was a cross-sectional descriptive study; therefore, a cause-effect relationship cannot be claimed. Lastly, with a median age of 66 years among the participants, recall bias was possible.

## Conclusion and recommendations

Late-stage (T3 or T4), poor grade (Gleason  $\geq 8$ ) and metastatic PCa disease are not uncommon among men  $\geq 60$  years in our study setting. The majority had LUTS prior to diagnosis but were of poor health-seeking behaviour. Certain modifiable risk factors associated with advanced disease such as smoking, decreased sunlight exposure, decreased physical activity and increased ingestion of red meat and dairy products were established in this study. Despite poor awareness of the participants prior to PCa diagnosis, once diagnosed, there was no delay in treatment. Because of the high prevalence of advanced and high-grade PCa disease and the possible associated modifiable risk factors along with poor awareness of the disease, a prompt community-specific health promotion strategy is needed. Also, targeted PSA screening should be considered among men with nonmodifiable risk factors and even more promptly in the presence of LUTS.

## Acknowledgements

The authors would like to thank the medical, nursing and administrative staffs of the urology and oncology clinics for their support during this study. Thanks also goes to the Departments of Family Medicine, Urology and Biostatistics for their support. They also wish to thank Mr C. van Rooyen, Department of Biostatistics, Faculty of Health Sciences, University of the Free State, for the valuable suggestions given at the onset of the study.

## Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

## Authors' contributions

M.O.A.B. conceptualised the study with inputs from W.J.S., F.M.C. and N.M. M.O.A.B. collected the data and conducted the data analysis. M.O.A.B. drafted the manuscript. All authors reviewed the manuscript, gave critical input and approved the final version.

## Funding information

The study was conducted with financial assistance from the Faculty of Health Sciences, University of the Free State, through the Three Schools of Medicine Research and

Postgraduate Committee. The contents of this document are the sole responsibility of the authors.

## Data availability

The data that support the findings of this study are available from the corresponding author, M.O.A.B., upon reasonable request.

## Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy of any affiliated agency of the authors.

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### 4.3 ARTICLE 2

#### **Knowledge, attitude and practice on screening and early diagnosis of prostate cancer of primary healthcare providers in Free State**

This article was prepared according to the African Journal of Primary Health Care and Family Medicine submission guidelines.

#### **Journal Information**

**Journal:** African Journal of Primary Healthcare and Family Medicine

**Publisher:** AOSIS Publishing – African Online Scientific Information Systems

Country of publication: South Africa

**ISSN:** 2071-2936 (Online); 2071-2928 (Print)



#### ***Published Article***

**DOI:** 10.4102/phcfm.v15i1.3688

**Citation:** Benedict MOA, Steinberg WJ, Claassen FM, Mofolo N, van Rooyen C. Knowledge, attitude and practice on screening and early diagnosis of prostate cancer of primary healthcare providers in Free State. *African Journal of Primary Health Care and Family Medicine*. 2023;15(1), a3688.

<https://doi.org/10.4102/phcfm.v15i1.3688>

**Submitted:** 02 June 2022

**Accepted:** 12 Nov 2022

**Published:** 28 Feb 2023

# Knowledge, attitude and practice on screening and early diagnosis of prostate cancer of primary health care providers in the Free State



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## Dates:

Received: 02 June 2022  
Accepted: 12 Nov. 2022  
Published: 28 Feb. 2023

## How to cite this article:

Benedict MOA, Steinberg WJ, Claassen FM, Mofolo N, Van Rooyen C. Knowledge, attitude and practice on screening and early diagnosis of prostate cancer of primary health care providers in the Free State. *Afr J Prim Health Care Fam Med.* 2023;15(1), a3688. <https://doi.org/10.4102/phcfm.v15i1.3688>

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**Background:** Prostate cancer is topmost in terms of incidence and mortality among men in sub-Saharan Africa, including South Africa. Prostate cancer screening is beneficial only to certain categories of men, making a rational screening approach necessary.

**Aim:** This study aimed to assess the knowledge, attitudes and practice (KAP) regarding prostate cancer screening among primary health care (PHC) providers in the Free State, South Africa.

**Setting:** Selected district hospitals, local clinics and general practice rooms.

**Methods:** This was a cross-sectional analytical survey. Participating nurses and community health workers (CHWs) were selected through stratified random sampling. All available medical doctors and clinical associates were approached to participate, totalling 548 participants. Relevant information was obtained from these PHC providers using self-administered questionnaires. Both descriptive and analytical statistics were computed using Statistical Analysis System (SAS) Version 9. A  $p$ -value  $< 0.05$  was considered significant.

**Results:** Most participants had poor knowledge (64.8%), neutral attitudes (58.6%) and poor practice (40.0%). Female PHC providers, lower cadre nurses and CHWs had lower mean knowledge scores. Not participating in prostate cancer-related continuing medical education was associated with poor knowledge ( $p < 0.001$ ), negative attitudes ( $p = 0.047$ ) and poor practice ( $p < 0.001$ ).

**Conclusion:** This study established appreciable KAP gaps relating to prostate cancer screening among PHC providers. Identified gaps should be addressed through the preferred teaching and learning strategies suggested by the participants.

**Contribution:** This study establishes the need to address KAP gaps regarding prostate cancer screening among PHC providers; therefore necessitating the capacity-building roles of district family physicians.

**Keywords:** Knowledge, attitude and practice; primary health care practitioners; primary health care providers; prostate cancer screening; early diagnosis.

## Introduction

Noncommunicable diseases (cancers inclusive) are responsible for about 70% of all deaths worldwide, with the majority of these deaths occurring in the low- and middle-income countries.<sup>1</sup> Hence, the Sustainable Developmental Goal 3.4 aims 'to reduce, by one third, premature mortality from non-communicable diseases through prevention and treatment and promote mental health and well-being by 2030'.<sup>2</sup>

In sub-Saharan Africa, prostate cancer (PCa) is topmost in terms of incidence and mortality among men.<sup>3</sup> Both foreign<sup>4,5</sup> and local<sup>6,7</sup> studies have shown racial disparities in PCa presentation, with men of African ancestry being mostly affected. In South Africa, black men often present late and with advanced disease, thus contributing to an increased mortality and morbidity. Poverty, poor socio-economic status, illiteracy and a lack of knowledge of the disease symptoms are some of the factors responsible for late presentation.<sup>8</sup> Most South African indigenous languages do not even have translations for the term 'prostate'.<sup>8</sup>

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The Free State has the lowest life expectancy (male 55 years; female 61 years) compared with the average figures for the other provinces in South Africa (male 62 years; female 68 years).<sup>9</sup> The black race is mostly associated with poor socio-economic status and concomitant poor health outcomes. There is therefore the need to prioritise access to basic primary health care (PHC) services, such as screening, in the study setting.

Relevant international<sup>10</sup> and local<sup>11</sup> associations have recognised some benefits of PCa screening among certain categories of men and have therefore published guidelines for screening. Screening for PCa has been controversial because of over-diagnosis, overtreatment and certain accompanying side effects such as sexual and urinary dysfunction.<sup>12</sup> However, a recent study on the harm-to-benefit of PCa screening showed that the potential for over-diagnosis and overtreatment notwithstanding, the net benefit of prostate-specific antigen (PSA) screening is greater for black men than the general population. This may indicate the need for race-specific screening guidelines.<sup>13</sup> The United States Preventive Task Force (USPSTF) has reported a potential benefit of decreasing deaths from PCa in men aged 55–69 years with PSA screening; this is doubtful for men above 70 years of age.<sup>14</sup>

South African guidelines<sup>11</sup> recommend that PCa screening (PSA and digital rectal examination [DRE]) be performed in all men from 45 years onwards in the absence of identifiable risk factors and from 40 years in black men, where there is a family history of PCa and other identifiable risk factors. Yet there is evidence that African men are less likely to participate in PCa screening with a view to making an early diagnosis, which may in part explain the disparity in PCa deaths.<sup>15</sup> Poor adherence to screening guidelines among black men could indicate gaps in their knowledge, culture and beliefs regarding PCa and related aspects.<sup>15</sup> In a review study, barriers related to PCa screening among men in sub-Saharan Africa were related to client, healthcare provider and healthcare systems factors.<sup>16</sup> The influence of healthcare providers is an important factor associated with PCa screening uptake among men.<sup>17,18</sup>

According to the health belief model, individual beliefs and certain sociopolitical factors are strong determinants of health behaviours.<sup>19</sup> Healthcare providers support users to make healthcare choices through shared decision-making (SDM).<sup>20</sup> Guidelines of the American Cancer Society highlighted the following as vital information needed for men to make screening decisions: risks, potential benefits and uncertainties regarding PCa screening.<sup>21</sup> Ng and Lee<sup>22</sup> highlighted six steps in the practice of SDM: (1) identify the decision, (2) list the available options, (3) discuss the pros and cons of each option, (4) elicit patient values, (5) provide support and (6) make a decision. More so, it has been shown that healthcare users from socio-economically disadvantaged areas prefer SDM.<sup>20</sup>

In a European study that compared general practitioners (GPs) and urologists in their handling of PSA testing and

guidelines on early detection of PCa, unlike the urologists, the GPs perceived the PSA test not to be useful. In addition, the GPs showed a less proactive approach to informing men about PSA and were less familiar with guidelines and recommendations on PSA testing.<sup>23</sup> This might imply a knowledge gap among these GPs. A United States (U.S.) study showed a poor practice of SDM among some physicians involved with PCa screening with PSA.<sup>24</sup> At the 8th International Prostate Cancer Congress, better education of primary care physicians on SDM was recommended to achieve an improved approach to PCa screening.<sup>25</sup> In a Malaysian study, more than half of the GPs overestimated the positive predictive values of PCa screening tools. The same study also showed that GPs who would consider having a PSA test performed on themselves were more likely to screen asymptomatic men than GPs who would not have the test.<sup>26</sup>

In a study that assessed the knowledge and attitude of primary care physicians in Florida, U.S., regarding PCa screening, the mean knowledge score was 66%. More than 70% of the responders believed that screening was effective, and the attitude scores were associated with practice setting and the proportion of patients having medical aid.<sup>27</sup> Primary health care providers' knowledge and attitudes towards PCa screening may affect their approach to the screening of men. Studies exploring this subject are, however, scarce in our study setting. Foreign studies<sup>28,29</sup> have shown the roles of nurses and community healthcare workers in health promotion and SDM relating to PCa screening. These roles should be encouraged among these nonmedical PHC cadres, who are first-line PHC providers in South African local communities and clinics.

As explained here, the controversy associated with PCa screening may inform the varied attitude and practice of PHC providers. Studies have identified gaps in knowledge, attitude and practice (KAP) regarding PCa screening among men; however, there is a scarcity of local studies on this subject among PHC providers in South Africa.

Therefore, the aim of the study was to assess the KAP regarding PCa screening and early diagnosis among PHC providers in the Free State, South Africa. The objectives were to determine: (1) demographic details, (2) KAP on PCa screening and early diagnosis, (3) participants' perceived need for enhanced knowledge on PCa screening and their preferred learning methods and (4) factors associated with participants' KAP.

## Research methods and design

### Study design

This was a cross-sectional analytical survey carried out among PHC providers in the Free State, South Africa, over six months (01 January 2021 – 30 June 2021).

### Study setting and rationale for this setting

The study setting chosen for this study was the Free State, which is geographically the third-largest province in South Africa, constituting 5.1% of the national population. The estimated population was 2 971 708 as of 2019. This province comprises Mangaung Metropolitan Municipality (MMM) and four district municipalities: Xhariep, Lejweleputswa, Thabo Mofutsanyana and Fezile Dabi. These district municipalities are subdivided into 19 local municipalities. The economy is dominated by agriculture, mining and manufacturing.<sup>30</sup>

The PHC facilities in the Free State include 231 PHC clinics, that is, local clinics and community health centres, and 24 district hospitals. Most of the population using public health services attend these healthcare facilities. Ward-Based Primary Health Care Outreach Teams (WBPHCOTs) are linked to the PHC facilities and consist of community health workers (CHWs) led by nurses. The WBPHCOTs undertake home visits, assess the health status of individuals in households and provide health education and promotion services; they identify and refer those in need of preventive, curative or rehabilitative services to relevant PHC facilities.

Mangaung Metropolitan Municipality of the Free State is one of the top populated black townships in South Africa.<sup>31</sup> According to an unpublished retrospective cross-sectional study conducted in Bloemfontein, Free State, African men were shown to be at higher risk of having PCa of worse prognosis, that is, Gleason score  $\geq 8$ , higher mean PSA levels and more advanced local staging, compared with their European counterparts.<sup>32</sup>

### Target population

The target population comprised PHC workers (doctors, nurses, clinical associates and CHWs) in the Free State. The PHC workers include all cadres of state-employed medical doctors (interns in Family Medicine rotation, community service medical officers, medical officers, Family Medicine registrars and specialist family physicians) and GPs in private practice, nurses (professional, enrolled and enrolled nursing assistants), clinical associates and CHWs working in the PHC clinics. The majority of these PHC providers (especially the nurses and CHWs) work in the community and are not hospital-based. The subject of PCa screening, like any other screening, falls within PHC services and does not require specialised capabilities. Healthcare providers working in more specialised settings were excluded from this study.

### Sample and sampling

Owing to the diversified cadres of the study population, multiple sampling methods were engaged to maximise the sample size per cadre of PHC provider while also minimising the risk of bias. The total number of PHC

medical doctors in the Free State at the time of the study was less than 200; hence, they were all targeted without sampling. The same went for clinical associates, who are less than 20 in the province. On the other hand, the PHC nursing staffs and CHWs in the Free State were much more numerous; hence, a stratified sampling was engaged for these cadres.

All state-employed medical doctors and clinical associates were easily accessed through the corresponding PHC facilities in the Free State (i.e. district hospitals and PHC clinics). Therefore, they were all approached to participate. There were approximately four nurses per 231 fixed PHC clinics (total of about 924 nurses) and around two full-time CHWs per 231 fixed PHC clinics (a total of about 462 CHWs). With the aid of the Raosoft sample size calculator (Raosoft, Inc., Seattle, Washington, United States),<sup>33</sup> setting the margin of error at 5%, confidence level at 95%, response distribution at 50% and with the population sizes of 924 and 462, the authors arrived at sample sizes of 272 and 210, respectively, for nurses and CHWs.

The list of the clinics was obtained from each district office. Through the stratified simple random sampling method, 105 clinics in total were selected from the five districts in the Free State, that is, 21 clinics per district. Three nurses and two CHWs were targeted from each of the 105 selected clinics.

### Measurement, data collection and questionnaire

For the purpose of this study, data were obtained from primary sources, that is, the eligible PHC providers in the Free State. A self-administered questionnaire was used. The questionnaire was adapted from previous similar surveys<sup>26,34,35</sup> aimed to understand the KAP of primary care physicians towards PCa and PCa screening. The researcher and his (research) assistant visited the selected PHC facilities and administered the questionnaires to consenting participants. An electronic version of the questionnaire was e-mailed to GPs in private practice.

The adapted questionnaire consisted of six sections. Section A dealt with the background information and demographics of the participants. Section B contained the knowledge items. This included 61-point knowledge-testing questions. Four of these questions were not applicable to the enrolled nurses, enrolled nursing assistants and CHWs; hence, these cadres responded to 57 knowledge-testing questions. The questions were mainly a combination of the following formats: single best answer; multiple choice; 'list' type; 'yes', 'no' or 'I don't know'; 'true', 'false' or 'I don't know'. The correct and incorrect responses were scored 1 and 0, respectively. The aspects of PCa knowledge tested included: function of the prostate, risk factors, symptoms, screening tests, screening test interpretation, diagnosis, staging, treatment and complications of treatment.

Bloom's cut-off points<sup>36</sup> was used to categorise knowledge levels as follows:

- good knowledge (80% – 100% correct responses)
- moderate knowledge (60% – 79% correct responses)
- poor knowledge (< 60% correct responses).

Section C was the attitude section. Participants were requested to respond to 14 statements, through which their attitude towards PCa was measured on a 7-point Likert scale (1 = *strongly disagree*; 7 = *strongly agree*). The individual points per statement were summed up, and the possible obtainable scores ranged from 0 to 98.

Using Bloom's cut-off points,<sup>36</sup> the scores were classified as follows:

- positive attitude (80% – 100% correct responses)
- neutral attitude (60% – 79% correct responses)
- negative attitude (< 60% correct responses).

In Section D, the participants' practices regarding PCa counselling and screening were measured on a 7-point Likert scale. An additional yes-or-no question asked the male participants if they would be willing to have a PCa screening.

The participants responded to nine practice statements. The enrolled nurses, enrolled nursing assistants and CHWs were exempted from three of these statements, which do not apply to them. The practice statements were graded on a 7-point Likert scale (1 = *very untrue of me*; 7 = *very true of me*). The individual points per statement were summed up, and the possible obtainable scores ranged from 0–63 (0–42 for enrolled nurses, enrolled nursing assistants and CHWs)

Using Bloom's cut-off points,<sup>36</sup> the scores were classified as follows:

- good practice (80% – 100% of the possible obtainable scores)
- fair practice (60% – 79% of the possible obtainable scores)
- poor practice (< 60% of the possible obtainable scores).

Section E assessed participants' perceived barriers to PCa counselling and screening. This was measured on a 3-point scale (*true, false, I don't know*).

Finally, Section F checked the participants' perceived need for additional knowledge on PCa as well as their preferred method of knowledge transfer.

### Content validity and reliability of the questionnaire

This original questionnaire was validated by experts specialising in urology, public health, health education and behavioural sciences in Saudi Arabia. Cronbach's reliability test was used to test the internal consistency of the different scales used (the scores were 0.75 for knowledge, 0.65 for attitude and 0.93 for self-efficacy and practice).<sup>34,35</sup>

Changes were made to the original questionnaire to adapt the questions to the study setting, for example, 'Saudi Arabian men' was changed to 'South African men'. The adapted questionnaire was reviewed and approved by a Health Sciences Faculty evaluation committee comprising consultant family physicians, a urologist, medical educators, a professional nurse and a biostatistician.

### Pilot study

The adapted questionnaire was pretested in December 2020 on 22 participants, including two clinical associates and four from each of the other cadres of PHC workers. Participants were chosen in succession. The pilot study was to ensure that the questions were balanced and correctly constructed and that the crucial information was obtained. The 22 piloted questionnaires were included in the study because no significant changes arose from the pilot study.

### Data analysis

The data were analysed by the Department of Biostatistics, Faculty of Health Sciences, University of the Free State (UFS), using Statistical Analysis System (SAS) version 9 (SAS Institute Inc., Cary, North Carolina, U.S.). Descriptive statistics (e.g. median and standard deviation [s.d.]) were used for continuous variables, while frequencies and percentages were calculated for categorical data. Association between variables were assessed using chi-square or Fisher's exact tests. A level of significance was set at  $p$ -value of < 0.05.

### Ethical considerations

The permission to conduct the study was granted by the head of the Free State Department of Health. Ethical approval for the study was obtained from the Health Sciences Research Ethics Committee of the University of the Free State (ethical clearance number UFS-HSD2020/1481/2411).

Before study participation, each participant gave informed consent after being provided with a detailed description of the study. The voluntary nature of participation and the right to refuse participation or withdraw during the study was explained. The self-administered questionnaire was anonymous. The names of participants were not recorded on any of the documents.

## Results

### Sociodemographic characteristics of participants

Five hundred and forty-eight ( $n = 548$ ) PHC providers participated out of the 763 eligible participants invited, giving a response rate of 71.8%. Table 1 summarises the participant characteristics.

The median age of the participants was 38 years (range 22–77 years). Of the 309 participants with a degree(s) (or equivalent), 110 (35.6%) had postgraduate qualifications, ranging from

**TABLE 1:** Sociodemographic characteristics of participants ( $n = 548$ ).

Variable	<i>n</i>	%
<b>Gender</b>		
Female	418	76.3
Male	130	23.7
<b>Age group (years)</b>		
22–30	157	28.6
31–40	159	29.0
41–50	121	22.1
51–60	100	18.2
> 60	11	2.0
<b>Profession or rank</b>		
Family physician	17	3.1
Medical officer or GP	88	16.1
Community service medical officer	36	6.6
Medical intern	26	4.7
Professional nurse	142	25.9
Enrolled nurse	27	4.9
Enrolled nursing assistant	55	10.0
Clinical associate	8	1.5
Community health worker	149	27.2
<b>Work sector</b>		
State	505	92.2
Private	26	4.7
Both	17	3.1
<b>Years of experience in current position</b>		
< 1 year	47	8.6
1–5 years	216	39.4
6–10 years	106	19.3
> 10 years	179	32.7
<b>Additional postgraduate qualification</b>		
Yes	110	20.1
No	438	79.9

GP, general practitioner.

postgraduate certificates to PhD degrees. Forty-three (7.8%) participants had some training outside South Africa, while 39 (7.1%) had practised outside South Africa. Forty-one (7.5%) participants had held posts or worked in a urology unit, the duration of which was less than a year ( $n = 33$ , 80.5%). Most ( $n = 511$ , 93.2%) participants had never attended continuing medical education (CME) focusing on PCa. Only 28 (5.1%) worked in a facility that runs a men's health clinic. Sixty-nine (12.6%) participants were involved in the training of medical students.

### Other prostate cancer-related background information

About a fifth ( $n = 117$ , 21.4%) of the participants had guidelines on PCa screening, and 192 (35.0%) were aware of the South African Prostate Diagnostic and Treatment Guidelines, 2017 (SAPDTG).<sup>11</sup> A total of 207 (37.8%) participants had either given a health talk about PCa or conducted PCa screening with PSA in the past. These participants' (self-reported) practice of SDM is shown in Table 2.

### Assessment of participants' knowledge about prostate cancer

The majority ( $n = 355$ , 64.8%) of participants had poor knowledge (< 60%), 30.1% ( $n = 165$ ) had moderate knowledge (60%–79%),

**TABLE 2:** Participants' (self-reported) practice of shared-decision making ( $n = 207$ ).

Shared-decision making criteria	Participants' (self-reported) practice					
	Never		Partially		Fully	
	<i>n</i>	%	<i>n</i>	%	<i>n</i>	%
I discussed the advantages of the screening blood test with my patients	26	12.6	99	47.8	82	39.6
I discussed the disadvantages of the screening blood test with my patients	94	45.4	69	33.3	44	21.3
I informed my patients that some experts disagree about whether men should have prostate-specific antigen test or not	143	69.1	50	24.2	14	6.8

**TABLE 3:** Knowledge scores per profession or rank ( $n = 548$ ).

Profession	Mean knowledge score (%)	± s.d.	Minimum (%)	Maximum (%)
Family physician	70.1	± 8.95	46	85
Medical officer or GP	67.1	± 12.47	28	93
Community service medical officer	66.4	± 11.6	38	85
Intern	70.7	± 10.02	46	87
Professional nurse	51.1	± 15.45	2	80
Enrolled nurse	36.4	± 25.93	0	77
Enrolled nursing assistant	33.1	± 20.26	0	84
Clinical associate	53.4	± 21.78	13	80
Community health worker	26.1	± 20.37	0	80

GP, general practitioner; s.d., standard deviation.

while 5.1% ( $n = 28$ ) had good knowledge (80%–100%). However, 274 (50.0%) participants had a score of  $\geq 50\%$ . The mean knowledge scores ( $\pm$  s.d.) per profession are shown in Table 3.

### Comparison between different background characteristics and participants' knowledge

As shown in Table 6, compared with the male participants, more women had poor knowledge. Medical officers or GPs had better knowledge compared with other professions and ranks ( $p < 0.001$ ). More state-employed participants had better knowledge than those in the private sector or both sectors ( $p < 0.001$ ). Participants with over 10 years' working experience had better knowledge, although it was not statistically significant ( $p = 0.064$ ).

Participants without prior working experience in urology had poor knowledge ( $p = 0.001$ ). Participants who had never attended PCa-related CME or continuing professional development (CPD) had poor knowledge ( $p < 0.001$ ). Running men's health clinics did not show any statistically significant association with the participants' knowledge ( $p = 0.062$ ). Participants uninvolved with the training of medical students had poor knowledge compared with those involved in providing such training ( $p < 0.001$ ).

Participants unaware of the SAPDTG<sup>11</sup> had poor knowledge ( $p < 0.001$ ). Participants without PCa screening guidelines in their practice had poor knowledge ( $p = 0.044$ ). Participants who had previously conducted PCa screening or given relevant health talks had better knowledge than those who had not ( $p < 0.001$ ).

### Assessment of participants' attitudes towards prostate cancer screening

Most ( $n = 321$ , 58.6%) participants had a neutral attitude (60% – 79%), 40.7% ( $n = 223$ ) had a negative attitude (< 60%), while 0.7% ( $n = 4$ ) had a positive attitude (80% – 100%). Table 4 shows the level of agreement to the statements regarding attitude towards PCa.

### Comparison between different background characteristics and participants' attitudes

The female participants were more uncomfortable with practice relating to men's health than their male counterparts ( $p = 0.003$ ). Professional nurses and CHWs were more uncomfortable with practice pertaining to men's health compared with participants of other professions and ranks ( $p = 0.002$ ). More CHWs had a negative attitude than participants of other professions or ranks ( $p < 0.001$ ).

The bivariate analysis in Table 6 shows that more female participants had a negative attitude compared with their male counterparts. More state-employed participants had a positive attitude compared with those of other work sectors ( $p < 0.001$ ). Participants with 1–5 years' working experience had a positive attitude compared with those with other years of experience ( $p = 0.014$ ). Participants without additional postgraduate qualifications (compared with those who have) had a negative attitude, although this was not of statistical significance ( $p = 0.105$ ).

Participants without previous work experience in urology had a negative attitude compared with those with prior urology work experience, although this association was not of statistical

significance ( $p = 0.239$ ). Participants who had never attended PCa-related CME or CPD had a negative attitude ( $p = 0.047$ ).

More participants aware of the SAPDTG<sup>11</sup> had a positive attitude than those unaware of the guidelines ( $p = 0.027$ ). More participants with poor knowledge had a negative attitude than participants in the other knowledge categories ( $p < 0.001$ ).

### Assessment of participants' practice regarding prostate cancer screening and counselling

The majority ( $n = 219$ , 40.0%) of participants had poor practice (< 60%), 35.8% ( $n = 196$ ) had fair practice (60% – 79%), while 24.3% ( $n = 133$ ) had good practice (80% – 100%). Table 5 shows the participants' self-reported level of confidence regarding PCa screening and counselling practices.

Male participants tended to be more comfortable with DRE than their female counterparts ( $p < 0.001$ ). Unlike the other professions or ranks, the professional nurses were less comfortable with DRE ( $p < 0.001$ ) and felt less competent in detecting abnormalities on DRE ( $p < 0.001$ ). Of the 130 male participants, 100 (75.8%) would consider having PCa screening on themselves.

### Comparison between different background characteristics and participants' practices

As shown in Table 6, compared with their male counterparts, more female participants had poor practice ( $p < 0.001$ ). Medical officers or GPs had good practice compared with the other professions or ranks ( $p < 0.001$ ). State-employed participants had good practice in

**TABLE 4:** Participants' attitudes regarding prostate cancer ( $n = 548$ ).

Attitude statement	Strongly disagree (%)	Disagree (%)	Somewhat disagree (%)	Neutral (%)	Somewhat agree (%)	Agree (%)	Strongly agree (%)
1. Early detection through screening can improve survival for men with PCa	5.8	2.6	0.9	6.4	5.8	20.6	57.8
2. PCa counselling and screening should be routinely used on all men beginning at age 50	5.3	5.1	1.5	8.6	8.0	26.1	45.4
3. The DRE is an accurate screening test for PCa	3.6	6.0	5.3	20.4	16.4	25.9	22.3
4. There is evidence to support using DRE for PCa screening on asymptomatic men with no risk factors	6.0	9.7	3.8	29.6	14.1	23.0	13.9
5. The DRE is unaccepted by South African men, so PHC practitioners should avoid it	29.4	22.1	5.1	23.7	7.8	7.3	4.6
6. I am uncomfortable with practice relating to men's health	24.3	21.7	6.2	23.5	8.0	10.9	5.3
7. The PSA is an accurate screening test for PCa	3.5	7.8	5.1	27.4	14.2	21.9	20.1
8. There is enough evidence to support using PSA for PCa screening on asymptomatic men with no risk factors	5.1	11.3	7.5	28.5	13.7	19.3	14.6
9. It is more appropriate for specialists to screen for PCa	13.0	19.7	5.7	22.1	7.7	15.9	16.1
10. I think that PSA testing leads to excess subsequent unnecessary investigations	14.6	23.5	8.6	28.1	11.7	7.5	6.0
11. The DRE and serum PSA screening of asymptomatic men reduces PCa mortality	4.9	7.8	4.4	27.2	11.1	22.4	22.1
12. Patients with history of lower urinary tract symptoms and clinical suspicion of PCa should have their PSA tested	2.0	3.8	3.1	19.9	12.0	28.5	30.7
13. I will conduct PCa screening on any man requesting it	5.5	8.8	5.5	20.3	10.0	21.5	28.5
14. The PCa screening is unnecessary in men > 70 years	37.2	22.4	5.3	18.2	6.4	6.0	4.4

DRE, digital rectal examination; PCa, prostate cancer; PHC, primary health care; PSA, prostate-specific antigen.

**TABLE 5:** Participants' practices regarding prostate cancer screening and counselling ( $n = 548$ ).

Please rate your confidence on your ability to perform the following:	Very untrue of me (%)	Untrue of me (%)	Somewhat untrue of me (%)	Neutral (%)	Somewhat true of me (%)	True of me (%)	Very true of me (%)
1. I am able to provide effective counselling of asymptomatic men on PCa	9.3	10.2	5.3	19.3	22.1	21.4	12.4
2. I am able to take a proper history in order to identify risk factors and symptoms of PCa from patients	7.3	9.3	3.5	20.3	21.5	22.8	15.3
3. I am able to refer patients at high risk for PCa for screening	7.3	7.5	5.8	17.9	12.6	24.8	24.1
4. I am able to follow up patients at high risk for PCa	9.7	10.6	7.3	23.4	12.4	20.8	15.9
5. I am able to examine the prostate by DRE†	21.5	6.9	4.7	11.4	6.3	28.1	21.1
6. I am able to detect palpable abnormalities on the prostate during DRE†	19.2	9.5	3.2	9.8	12.3	29.3	16.7
7. I am able to find suitable options for treatment of patients with PCa†	17.4	12.3	6.6	20.2	11.7	22.7	9.1
8. I am able to counsel patients on the benefits of PSA testing	14.6	10.8	5.3	22.8	15.5	20.6	10.4
9. I am able to discuss the various treatment modalities of PCa with my patients	19.3	12.8	6.2	25.2	13.7	13.9	8.9

DRE, digital rectal examination; PCa, prostate cancer; PSA, prostate-specific antigen.

†, enrolled nurses, enrolled nursing assistants and community health workers (CHW) were exempted from practice items 5–7 as these are beyond their scope of practice.

comparison to those of other work sectors ( $p < 0.001$ ). Participants with 1–5 years' working experience had good practice compared with those with other years of experience ( $p = 0.019$ ). Participants without additional postgraduate qualifications (compared with those who have) had poor practice ( $p = 0.041$ ).

Participants who had never attended PCa-related CME or CPD had poor practice ( $p < 0.001$ ). Participants without a men's clinic in their practice had poorer practice than those having such a clinic ( $p = 0.005$ ). Participants uninvolved with training of medical students had poorer practice than those involved in giving such training ( $p < 0.001$ ).

Participants aware of the SAPDTG<sup>11</sup> had better practice than those unaware of the guidelines ( $p < 0.001$ ). Participants without PCa screening guidelines in their practice had poorer practice than those with such guidelines ( $p < 0.001$ ). Participants who had previously conducted PCa screening or given relevant health talks had good practice compared with those who had not ( $p < 0.001$ ).

### Overall comparison between knowledge, attitude and practice

Participants with poor knowledge had poor practice compared with other knowledge categories ( $p < 0.001$ ). Participants who had a negative attitude had poor practice compared with other attitude categories ( $p < 0.001$ ).

### Perceived barriers to prostate cancer screening and counselling

Table 7 shows the participants' perceived barriers to PCa counselling and screening. Most participants reported a lack of knowledge among healthcare practitioners and men at risk as possible barriers.

### Need for more knowledge relating to prostate cancer

The majority ( $n = 489$ , 89.4%) of participants felt they needed additional knowledge regarding PCa screening. These aspects included: treatment ( $n = 392$ , 80.2%), risk factors and counselling ( $n = 387$ , 79.1%), value of nutrients ( $n = 367$ , 75.1%), diagnosis ( $n = 351$ , 71.8%), symptoms ( $n = 345$ , 70.6%), value of PSA testing ( $n = 338$ , 69.1%) and value of DRE ( $n = 335$ , 68.5%).

The preferred methods of knowledge delivery were as follows: study material ( $n = 374$ , 76.5%), practical sessions ( $n = 312$ , 63.8%), simulated scenarios ( $n = 288$ , 58.9%), group tasks ( $n = 254$ , 51.9%), didactic lectures ( $n = 218$ , 44.6%) and other – online CPD ( $n = 8$ , 1.6%).

## Discussion

### Sociodemographic and background characteristics

The majority (76.3%) of the participants were women. This may be because PHC clinics in South Africa are nurse-driven. Most nurses and CHWs were women; these two cadres of PHC providers formed about 60% of the participants in this study. The majority of the participants were in the age group 31–40 years old, with a median age of 38 years. The majority (39.4%) had work experience of 1–5 years. Among the medical doctors in this study, the majority were medical officers. Similar demographic patterns were found in a study<sup>37</sup> conducted among medical doctors and nurses in the Free State, where the majority were women and nurses, in the age group 30–39 with a mean age of 39 years, with between 1–5 years' experience, and the majority of the medical doctors were medical officers.

The majority of the participants had never worked in facilities running men's health clinics (94.9%). Most participants (93.2%) had never attended CME related to

TABLE 6: Bivariate analysis of background characteristics versus knowledge, attitude and practice.

Background characteristic	Good knowledge (n = 28)		Moderate knowledge (n = 165)		Poor knowledge (n = 335)		P-value	Positive attitude (n = 4)		Neutral attitude (n = 321)		Negative attitude (n = 223)		P-value	Good practice (n = 135)		Fair practice (n = 196)		Poor practice (n = 219)		P-value
	n	%	n	%	n	%		n	%	n	%	n	%		n	%	n	%	n	%	
<b>Gender</b>																					
Male	14	50.0	66	40.0	50	14.1	<0.001†	2	50.0	87	27.1	41	18.4	0.029‡	55	41.4	44	22.4	31	14.2	<0.001†
Female	14	50.0	99	60.0	305	85.9		2	50.0	234	72.9	182	81.6		78	58.6	152	77.6	188	85.8	
<b>Work sector</b>																					
State	23	82.1	141	85.5	340	96.0	<0.001†	2	50.0	284	88.5	218	98.2	<0.001†	111	84.1	181	92.3	212	96.8	<0.001†
Private	4	14.3	15	9.1	7	2.0		1	25.0	24	7.5	1	0.5		15	11.4	9	4.6	2	0.9	
State and private	1	3.6	9	5.5	7	2.0		1	25.0	13	4.0	3	1.4		6	4.5	6	3.1	5	2.3	
<b>YOWE</b>							0.064							0.014†							0.019†
<1 year	0	0	7	4.2	40	11.3		0	0	20	6.2	27	12.1		7	5.3	14	7.1	26	11.9	
1-5 years	11	39.3	71	43.0	134	37.7		2	50.0	134	41.7	80	35.9		51	38.3	94	48.0	71	32.4	
6-10 years	5	17.9	29	17.6	72	20.3		1	25.0	50	15.6	55	24.7		31	23.3	32	16.3	43	19.6	
>10 years	12	42.9	58	35.2	109	30.7		1	25.0	117	36.4	61	27.4		44	33.1	56	28.6	79	36.1	
<b>Additional qualifications</b>							0.003†							0.105							0.041†
Yes	9	32.1	45	27.3	56	15.8		1	25.0	74	23.1	35	15.7		31	23.3	28	14.3	51	23.3	
No	19	67.9	120	72.7	299	84.2		3	75.0	247	76.9	188	84.3		102	76.7	168	85.7	168	76.7	
<b>CME or CPD</b>							<0.001†							0.04†							<0.001†
Yes	6	21.4	23	13.9	8	2.3		1	25.0	27	8.4	9	4.0		18	13.5	14	7.1	5	2.3	
No	22	78.6	142	86.1	347	97.7		3	75.0	294	91.6	214	96.0		115	86.5	182	92.9	214	97.7	
<b>Men's clinic</b>							0.062							0.193							0.005
Yes	1	3.6	14	8.5	13	3.7		1	25.0	16	5.0	11	4.9		11	8.3	14	7.1	3	1.4	
No	27	96.4	151	91.5	342	96.3		3	75.0	305	95.0	212	95.1		122	91.7	182	92.9	216	98.6	
<b>Training UG or PG students</b>							<0.001†							0.285							<0.001†
Yes	9	32.1	38	23.0	22	6.2		0	0	46	14.3	23	10.3		33	24.8	23	11.7	13	5.9	
No	19	67.9	127	77.0	333	93.8		4	100.0	275	85.7	200	89.7		100	75.2	173	88.3	206	94.1	
<b>Aware of SADTG</b>							<0.001†							0.027†							<0.001†
Yes	12	42.9	83	50.3	97	27.3		3	75.0	123	38.3	66	29.6		69	51.9	74	37.8	49	22.4	
No	16	57.1	82	49.7	258	72.7		1	25.0	198	61.7	157	70.4		64	48.1	122	62.2	170	77.6	
<b>Screening guidelines</b>							0.044†							0.271							0.001†
Yes	10	35.7	41	24.8	66	18.6		1	25.0	76	23.7	40	17.9		40	30.1	46	23.5	31	14.2	
No	18	64.3	124	75.2	289	81.4		3	75.0	245	76.3	183	82.1		93	69.9	150	76.5	188	85.8	
<b>Did previous screening</b>							<0.001†							0.382							<0.001†
Yes	21	75.0	83	50.3	103	29.1		2	50.0	128	40.0	77	34.5		68	51.5	84	42.9	55	25.1	
No	7	25.0	82	49.7	251	70.9		2	50.0	192	60.0	146	65.5		64	48.5	112	57.1	164	74.9	

CME, continuing medical education; CPD, continuing professional development; PG, postgraduate; SADTG, South African Prostate Diagnostic and Treatment Guidelines† UG, undergraduates; YOWE, years of working experience. z, Values are indicative of a statistically significant association.

**TABLE 7:** Perceived barriers to prostate cancer screening and counselling (*n* = 548).

Possible barriers to prostate cancer counselling and screening	True (%)	False (%)	I don't know (%)
A lack of knowledge among healthcare practitioners	74.8	3.6	21.5
A lack of knowledge among 'at risk' men	75.5	5.3	19.2
Inadequate skills among healthcare practitioners	65.4	8.8	25.8
Refusal of patients	57.5	15.1	27.4
Screening tests are inaccurate	28.7	38.8	32.5
Prostate cancer is not a public problem	22.1	57.0	20.8

PCa. This may suggest that this subject and perhaps subjects relating to men's health have not been prioritised among some PHC providers in the study setting.<sup>38</sup> This subject of men's health is also unlikely to have been prioritised when it comes to refresher courses considered for PHC providers.

About a fifth (21.4%) of the participants had guidelines on PCa screening at their practice, and 35% were aware of the SAPDTG.<sup>11</sup> This approximately correlates with the 37.8% who had ever either given a health talk on PCa or conducted a PCa screening with PSA. However, as shown in Table 2, it is unlikely that the participants were aware of the proper conduct of SDM. There is therefore a need for PHC providers to be acquainted with the steps engaged in the conduct of SDM and be trained on how to practise them in sync with good consultation.<sup>22</sup>

### Knowledge, attitude and practice of participants on prostate cancer screening and early diagnosis

#### Knowledge

Almost two-thirds (64.8%) of the participants in this study had poor knowledge. In a similar study<sup>35</sup> among primary care physicians in Saudi Arabia, the mean knowledge score was 54.3%. The overall poor knowledge among the participants in the present study may be because of the varied cadre of PHC providers with varied levels of knowledge. As seen in Table 3, the mean knowledge score for family physicians was 70.1% compared with CHWs with 26.1%. Diverse questions may arise from patients during the process of SDM. Primary health care providers' sound knowledge of the screening tests (and their interpretations), diagnosis, investigations, treatment modalities, complications (of the disease and treatment), among others, is essential to conduct an efficient SDM process.

Good knowledge had a statistically significant association with the following factors: state-employed PHC providers ( $p < 0.001$ ), being a GP or medical officer ( $p < 0.001$ ) and having previously conducted PCa screening or given relevant health talks ( $p < 0.001$ ). Reiterative education and practice of this subject is therefore important.

Poor knowledge, on the other hand, had a statistically significant association with the following factors: female

PHC providers ( $p < 0.001$ ), no previous CME on PCa topics ( $p < 0.001$ ), uninvolved in medical student training ( $p < 0.001$ ), unaware of the SAPDTG<sup>11</sup> ( $p < 0.001$ ) and no PCa screening guidelines at practice site ( $p = 0.044$ ). The same explanation (as given) holds; a lack of opportunities and activities promoting reiterative education on this subject may gradually impact negatively on the knowledge.

#### Attitude

There was an overall prevalence of a neutral attitude (58.6%) among the participants. In a Saudi Arabian study,<sup>35</sup> the mean total attitude score was greater than the midpoint. In the same Saudi Arabian study,<sup>35</sup> most participants believed that early detection of PCa through screening could improve the survival of men. Similarly, the majority of the participants in this study believed there is value in early diagnosis through screening. However, about 40% of the participants felt specialists should perform PCa screening, as observed from their response to the following statement: 'It is more appropriate for specialists to screen for PCa'. This is unlike the finding in the Saudi Arabian study,<sup>35</sup> where most of the participants accepted PCa screening as their role.

Participants' responses to the statements, 'I will conduct PCa screening on any man requesting it' and 'PCa screening is unnecessary in men > 70 years' could imply that some of them may engage in an irrational screening approach. Also, there seems to be an inadequate understanding of the use and interpretation of the screening tests, as the majority of the participants felt that PSA and DRE are accurate screening tests for PCa.

Most of the participants agreed to the following statements: 'There is evidence to support using DRE for PCa screening on asymptomatic men with no risk factors' and 'There is enough evidence to support using PSA for PCa screening on asymptomatic men with no risk factors'. This is in contrast to a study<sup>34</sup> carried out among physicians, where only about a fifth agreed to these statements. Primary health care provider information provided to patients during SDM could therefore be questionable, in the study setting.

Over 40% of the participants were either neutral or agreed to the statement, 'DRE is unaccepted by South African men, so PHC practitioners should avoid it'. This belief might have informed their response to the statement, 'I am uncomfortable with practice relating to men's health', to which over 40% either agreed or were neutral. Being a female PHC provider was associated with being uncomfortable with practices relating to men's health ( $p = 0.003$ ).

Factors found to be significantly associated with a positive attitude towards PCa screening include state-employed PHC providers ( $p < 0.001$ ), 1–5 years' working experience ( $p = 0.014$ ) and awareness of the SAPDTG<sup>11</sup> ( $p = 0.027$ ). Factors associated with a negative attitude towards PCa screening

include being a female PHC provider ( $p = 0.029$ ), no previous CME on PCa topic ( $p = 0.047$ ) and poor knowledge of PCa screening ( $p < 0.001$ ). As stated earlier, female PHC providers (mostly nurses) are gradually avoiding certain clinical functions relating to men's health. This may be because of certain perceptions and beliefs, particularly PHC provider and patient gender differences. This is further compromised by the scarcity of continued healthcare education on this subject. Knowledge was a top determinant of attitude towards PCa counselling and screening, as confirmed in a similar study by Arafa et al.<sup>35</sup>

### Practice

There was an overall prevalence of poor practice (40%) among the participants. The responses of the participants to the following practice statements: 'I am able to counsel patients on the benefits of PSA testing', and 'I am able to discuss the various treatment modalities of PCa with my patients' could imply their inability to conduct an effective SDM process; this is also reflected in their self-reported practice on SDM (Table 2). In a similar study,<sup>26</sup> 60% of the primary care physicians would discuss the implication of an abnormal PSA test before performing it, and 20% would discuss the treatment modalities for PCa before screening. There may be the need to review the consultation styles of PHC providers in this setting.

Almost 60% of the participants responded positively to the practice statement, 'I am able to take a proper history in order to identify risk factors and symptoms of PCa from patients'; this is a reflection of their satisfactory knowledge on the risk factors and symptoms of PCa.

The majority of the participants who responded negatively to the practice statement 'I am able to examine the prostate by DRE' and 'I am able to detect palpable abnormalities on the prostate during DRE' were nurses. According to the former head, School of Nursing, UFS (Prof. Magda Mulder 2020, personal communication, June 13), nurses' practice of DRE is gradually fading, despite being within their scope of practice. Time constraints running busy clinics might hinder this practice in the study setting. With proper training of PHC providers (especially nurses) and time management, opportunistic screening in the form of annual DRE and PSA checks can be included in men's regular care.

More than three-quarters (75.8%) of the male participants in this study would consider having PCa screening on themselves. In a similar study,<sup>26</sup> almost 90% of the participants would consider going for a PSA test. Factors found to be significantly associated with good practice of PCa screening include: being a state-employed PHC provider ( $p < 0.001$ ), 1–5 years working experience ( $p < 0.001$ ), being a medical officer or GP (private practice) ( $p < 0.001$ ), having additional postgraduate qualifications ( $p = 0.041$ ), awareness of the SAPDTG<sup>11</sup> ( $p < 0.001$ ) and previous conduct of PCa screening ( $p < 0.001$ ).

Factors found to be significantly associated with poor practice include: no previous CME on the topic of PCa ( $p < 0.001$ ), not having a men's clinic in practice ( $p = 0.005$ ), being uninvolved with medical student training ( $p < 0.001$ ), no PCa screening guidelines in the practice ( $p < 0.001$ ), poor knowledge on PCa screening ( $p < 0.001$ ) and a negative attitude towards PCa screening ( $p < 0.001$ ). In a similar study,<sup>26</sup> factors associated with an inclination of the primary care physician to screen men for PCa were the older age group, longer duration of practice and those who would consider having PSA conducted on themselves.

### Barriers to prostate cancer counselling and screening

Top self-reported barriers to PCa counselling and screening were a lack of knowledge among healthcare practitioners and 'at risk' men and inadequate skills among healthcare practitioners. In a similar study,<sup>36</sup> apart from the lack of skills and knowledge, refusal of patients and PCa not being viewed as a public health concern were the barriers to screening and counselling for the disease.

### Need for additional learning

The majority of the participants felt the need for additional learning in the following topics relating to PCa: (1) risk factors and counselling, (2) symptoms, (3) the value of nutrients, (4) the value of PSA testing, (5) the value of DRE, (6) diagnosis and (7) treatment. The preferred methods of instruction suggested by the majority included study materials, practical sessions, simulated scenarios and group tasks.

Continuing professional development refers to the education that follows certification and licensure and has been shown to improve healthcare provider practice and, in some instances, healthcare outcomes.<sup>38</sup> Experts suggest the need for the development of more effective courses for PHC providers (especially the nurses, clinical associates and CHWs) to enhance their educational background, thereby improving their collaborative functionality within the PHC system.<sup>40,41</sup>

While the importance of continued healthcare provider education has been described, there is a lack of research on the specific strategies to provide this education. The following have been shown as effective methods of instruction among CHWs: (1) role play, (2) case studies, (3) teach-back, (4) group presentation, (5) interactive didactic, (6) demonstration, (7) group assessment, (8) group discussion, (9) hands-on practice and (10) individual assessment.<sup>42</sup> In the nursing profession, commonly used practices for continuing nursing education are short, repeated education; the use of interactive techniques, for example, simulation models; audio-visual learning modalities; teamwork in healthcare settings; use of cultural context; and the practice of assessment and feedback.<sup>43</sup>

To maximise the outcome of CPD activities, the preferred learning styles and methods of the targeted audience need to

be considered. A survey among PHC physicians showed a higher preference for learning about cancer screening through the following educational formats: conferences; self-directed, small group workshops; hospital rounds; and online CME and CPD.<sup>29</sup>

### Recommendations

The identified KAP gaps and the self-reported additional knowledge needs should be addressed in the medical undergraduate curriculum and CPD activities and refresher courses developed for practising PHC providers, bearing in mind their preferred learning methods. Women constitute the majority among the PHC providers in the study setting; measures should be put in place to improve their confidence during PCa counselling and screening and other practices relating to men's health.

Community health workers in conjunction with the Ward-Based Outreach Team (WBOT) provide PHC services (including health education and promotion) from household to household; there is therefore the need to channel adequate resources towards their proper training, mentoring and coordination. Family physicians who are champions of PHC should be saddled with the coordination and provision of these teaching and learning needs in the community.

### Strengths and limitations

To the best of our knowledge, this is the first KAP study on PCa among a wide range of PHC providers in South Africa. This study offered the participants the opportunity to determine their learning needs as well as their preferred learning methods on the subject of PCa; the study's findings may therefore be a valuable tool in planning the needful intervention.

Study limitations include that the study was conducted among PHC providers in the Free State; therefore, it may not be generalised to other populations or other specialised healthcare providers in the country. The ongoing coronavirus disease 2019 (COVID-19) pandemic limited access to GPs in private practice. As a result of the diversified cadres of healthcare providers, multiple sampling methods were engaged in this study; some degree of selection bias is possible. Of note is the unequal gender distribution among participants in this study, with women dominating; this likely affected some of the bivariate analysis. Although the questionnaire items were basic and unambiguous, the possibility of information bias should be borne in mind because of the diverse scope of practice among various cadres of healthcare providers. Lastly, the use of self-reported data in some aspects of the study made it prone to recall bias.

### Conclusions

Women, who constituted the majority of the participating PHC providers in this study, have appreciable KAP gaps

relating to PCa screening. There is also a likelihood of poor knowledge on the proper conduct of SDM, which is an important subject and prerequisite, owing to the controversies regarding PCa screening; therefore, there is the likelihood of improper conduct of PCa screening. The participants' perceived need for additional knowledge on the subject and preferred learning methods were determined. Factors associated with their KAP were also identified, which indicated the need for reiterative learning and teaching on this subject.

### Acknowledgements

The authors would like to thank the various cadres of primary health care providers who participated in this study. Thanks also go to the departments of Family Medicine, Urology and Biostatistics for their support.

### Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

### Authors' contributions

M.O.A.B. conceptualised the study with input from W.J.S., F.M.C. and N.M. M.O.A.B. collected the data. C.v.R. and M.O.A.B. conducted data analysis. M.O.A.B. wrote the manuscript. All authors reviewed the manuscript, gave critical input and approved the final version.

### Funding information

The study was conducted with financial assistance from the Faculty of Health Sciences, University of the Free State, through the Three Schools of Medicine Research and Postgraduate Committee. The contents of this document are the sole responsibility of the authors.

### Data availability

The data that support the findings of this study are available from the corresponding author, M.O.A.B., upon reasonable request.

### Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

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#### 4.4 ARTICLE 3

### Knowledge, beliefs and intentions of African men in the Free State about prostate cancer screening

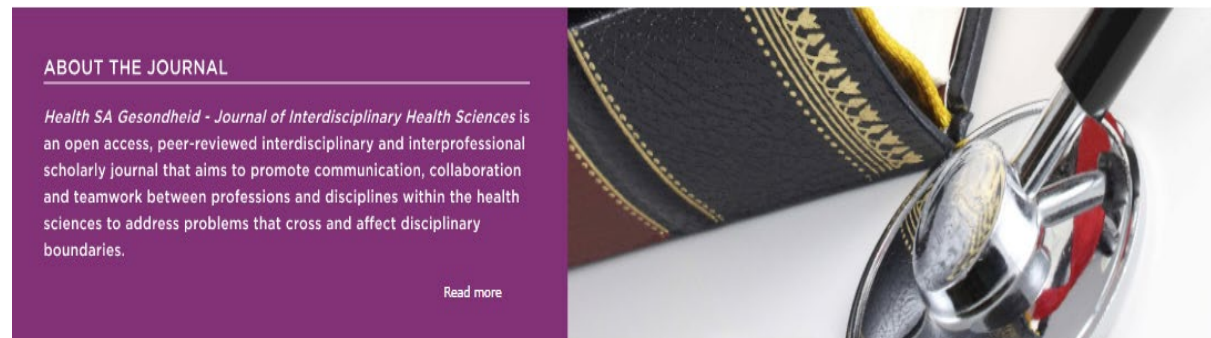
This article was prepared according to the Health SA Gesondheid submission guidelines.

#### *Journal Information*

**Journal:** Health SA Gesondheid

**Publisher:** AOSIS Publishing – African Online Scientific Information Systems  
Country of publication: South Africa

**ISSN:** 2071-9736 (Online); 1025-9848 (Print)



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#### *Published Article*

**DOI:** 10.4102/hsag.v27i0.2081

**Citation:** Benedict MOA, Steinberg WJ, Claassen FM, Mofolo N, van Rooyen C. Knowledge, beliefs and intentions of African men in the Free State about prostate cancer screening. *Health SA Gesondheid*. 2022;27(0), a2081.  
<https://doi.org/10.4102/hsag.v27i0.2081>

**Submitted:** 06 June 2022






**Accepted:** 29 Sep 2022

**Published:** 05 Dec 2022

# Knowledge, beliefs and intentions of African men in the Free State about prostate cancer screening



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## Dates:

Received: 06 June 2022  
 Accepted: 29 Sept. 2022  
 Published: 05 Dec. 2022

## How to cite this article:

Benedict, M.O.A., Steinberg, W.J., Claassen, F.M., Mofolo, N. & Van Rooyen, C., 2022, 'Knowledge, beliefs and intentions of African men in the Free State about prostate cancer screening', *Health SA Gesondheid* 27(0), a2081. <https://doi.org/10.4102/hsag.v27i0.2081>

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**Background:** African men are less likely to participate in prostate cancer (PCa) screening, which may be beneficial to some of them. Gaps in knowledge, cultural factors and beliefs are associated with their screening intentions.

**Aim:** To determine the knowledge, cultural factors and screening intentions of African males regarding PCa screening.

**Setting:** The study was conducted among African men attending randomly selected primary healthcare clinics in the Free State province.

**Methods:** An analytical, cross-sectional survey using self-administered questionnaires developed in line with the Theory of Planned Behaviour constructs.

**Results:** Of the 389 respondents, 18.3% had ever been screened for PCa with prostate-specific antigen (PSA) testing and 6.2% by digital rectal examination (DRE). About a quarter (24.4%) of the respondents had knowledge scores  $\geq 50\%$ . Factors associated with greater intent to screen for PCa were lower degree of fear/apprehension of PCa screening (mean score = 2.03;  $p < 0.001$ ), higher perceived benefits of PCa screening (mean score = 2.69;  $p = 0.002$ ), lower perceived situational barriers to PCa screening (mean score = 2.03;  $p = 0.006$ ) and higher perceived risk of getting PCa (mean score = 2.66;  $p = 0.024$ ).

**Conclusion:** The observed low level of knowledge and practice of PCa screening among the respondents could be enhanced through PCa awareness strategies targeted at these men or those that could influence their decision making, especially healthcare providers. Factors that enhance screening intentions should be promoted.

**Contribution:** This study improves on the scarce literature on factors associated with African men's PCa screening intention.

**Keywords:** knowledge; screening; intentions; African men; culture; beliefs; prostate cancer.

## Introduction

Prostate cancer (PCa) remains a substantial healthcare burden. The global incidence of PCa was the second highest after lung cancer in 2020 (Sung et al. 2021). In 2020, the age-standardised incidence rate for PCa in South Africa was 68.3 per 100 000 men (World Health Organization, International Agency for Research on Cancer 2021). Globally, there were about 1 414 000 new PCa cases and 375 304 deaths in 2020 (Wang et al. 2022).

In South Africa, PCa is the leading neoplasm among men, with an incidence rate of 68 per 100 000 men in 2018 (Cassim et al. 2020). Prostate cancer accounts for about 13% of male deaths from cancer in South Africa (Babb et al. 2020). Though the aetiology of PCa is currently unknown, its non-modifiable risk factors include ageing, African ancestry, genetic factors and family history (Hayes & Bornman 2018; Rawla 2019). Both international (Jiang, Narayan & Warlick 2018; Siegel et al. 2020) and local (Dewar et al. 2018; Mofolo et al. 2015; Tindall et al. 2014) studies have shown racial disparities in PCa presentation (stage at presentation, prognosis and mortality), with men of African ancestry having the worst outcomes. Poor socio-economic status, educational level and lack of knowledge of the disease symptoms are some of the factors responsible for late presentation among South African men (Mofolo et al. 2015).

Prostate cancer screening with prostate-specific antigen (PSA) is controversial because of the associated overdiagnosis and overtreatment. However, more recent studies reveal that the net

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**Note:** For this study, 'African men' refers to self-acclaimed indigenous black South African men.

benefit of PSA screening may be beneficial to black men compared with the general population (Basourakos et al. 2022; US Preventive Services Task Force et al. 2018).

The South African Prostate Cancer Diagnostic and Treatment guidelines recommend PSA testing for black men 40 years and older (45 years and older for men of other races) with a life expectancy of more than 10 years if they have a family history of prostate or breast cancer in a first-degree relative, lower urinary tract symptoms and/or clinical suspicion of PCa, regardless of age group (Segone et al. 2013).

African men are less likely to participate in PCa screening (Kinyao & Kishoyian 2018), which may benefit some of them (Segone et al. 2013; Tracy, Brooks & Said 2021). Their attitude towards screening may be because of gaps in knowledge, cultural factors and beliefs (Bugoye et al. 2019; Mofolo et al. 2015). In a Kenyan study, family influence was found to be significantly associated with PCa screening intent among men (Mutua, Pertet & Otieno 2017).

Despite good knowledge of PCa among men in Central America, they had a poor perception of screening for the disease owing to the fear of the procedure and of receiving positive PCa result (Husaini et al. 2021).

Strong beliefs in the benefits of PCa screening, notwithstanding, some Kenyan men do not perceive men over 40 years at risk of getting PCa. Furthermore, they had relatively high fatalistic beliefs, a high degree of fear and a high level of influence of family members towards PCa screening (Mutua et al. 2017).

In a Tanzanian study, despite the respondents' knowledge about PCa screening and their perception of being at risk of the disease, less than 8% had ever been screened (Bugoye et al. 2019). Likewise, a low PCa screening rate (5%) was found among Kenyan men in a study, although their intention to screen was high; the main barrier to PCa screening was their belief that they were well (Mbugua, Oluchina & Karanja 2012). Other possible barriers to PCa screening, as found in a Nigerian study, were ignorance of the disease, fear of a positive result and financial constraints (Ugochukwu et al. 2019).

In summary, men's intentions towards PCa screening depend on their socio-economic status, the level of knowledge of the disease, culture and beliefs, and socially influential people in their lives.

Behavioural theories and models such as the theory of planned behaviour (TPB), theory of reasoned action (TRA), socio-ecological model (SEM) and health belief model (HBM) have engaged in understanding patients' behaviours and decisions regarding health practices. The present study adopts the TPB to achieve the study objectives (Raingruber 2016).

According to Ajzen and Fishbein (1980), the TPB proposes that the most significant predictors of people's performance of a behaviour are their behavioural intentions concerning its performance. Intentions, in turn, are predicted by three variables: attitudes, subjective norms and perceived behavioural control. Attitude refers to people's overall evaluation of their performing the behaviour. Subjective norm refers to perceptions of social pressure from significant others to perform the behaviour. Perceived behavioural control refers to people's appraisals of their ability to perform a behaviour (Sheeran, Conner & Norman 2001).

Research providing a theoretical approach to PCa screening behaviours among African men in South Africa is currently scarce.

## Aim

This study aimed to determine the knowledge, cultural beliefs and screening intentions of African men in the Free State regarding PCa screening. The primary objectives were to determine (1) the background characteristics of African men in the Free State, (2) their level of knowledge and the knowledge gaps regarding PCa and PCa screening, (3) their culture and beliefs regarding PCa screening and (4) their screening intentions. The secondary objective was to determine the factors that impact their screening intentions for PCa.

## Methods

### Study design

This study was an analytical cross-sectional survey of African men attending selected primary healthcare (PHC) clinics.

### Target population

The target population of the study included African men aged 40–70 years in the Free State.

Extrapolating from data available from StatsSA 2019 (Department of Statistics South Africa 2019), there are about 250 369 African men  $\geq$  40 years old in the Free State.

### Sample size calculation and sampling

Using the Raosoft sample size calculator (Raosoft 2004), setting the margin of error at 5%, confidence level at 95%, response distribution at 50% and with the population size of 250 369, the sample size generated was 384.

The Free State is divided into five district municipalities, each having an average of 46 fixed PHC clinics (a total of 231). It was impractical to visit all the clinics because of financial and time constraints. The list of these clinics was obtained from the respective district offices. Through stratified simple random sampling method, 115 of these 231 fixed PHC clinics were selected (i.e. 23 clinics per health district). Four respondents were targeted per clinic, giving a total of 460 respondents targeted.

### Exclusion criteria

To avoid introduction of bias because of prior knowledge, those already diagnosed with PCa or benign prostatic hyperplasia and those who have had prostate investigations, such as biopsy or ultrasound, were excluded from the study.

### Measurement, data collection and the questionnaire

A self-administered survey questionnaire was used. With the assistance of language translators from the University of the Free State (UFS), the questionnaire was translated from English into Sesotho and Isizulu, which are the common local languages (Wazimap 2016) in the area. The research assistant, fluent (spoken and written) in these three languages, helped some respondents clarify questions.

The questionnaire adopted for this study was a validated modified version of the Thomas Jefferson University Prostate Cancer Screening Survey Questionnaire, which was developed using the constructs of the TPB (Kenerson 2010; Mutua et al. 2017).

The questionnaire consisted of six sections: Sections A - F.

Section A (Table 3) contained demographic and background details: age, ethnic group, level of education, occupation, relationship status, residential area, medical aid cover, family history of PCa, previous PCa screening, perceived risk of getting PCa and preferred healthcare provider.

Section B (Table 5) contained the knowledge items. There were 16-point (one point each) knowledge-testing statements with *True*, *False* or *I don't know* options.

Bloom's cut-off points (Yimer et al. 2014) were used to categorise the knowledge levels as follows:

- good knowledge (80% – 100% correct responses)
- moderate knowledge (60% – 79% correct responses)
- poor knowledge (< 60% correct responses).

Section C consisted of the eligibility criteria for participation in the PCa screening survey. To be eligible, the respondents must: (1) be 40–70 years of age, (2) be African by race, (3) have heard about PCa, (4) not have been previously or currently diagnosed with PCa and (5) not have had a prostate biopsy in the past.

Section D was the PCa screening survey. This section explored the cultural factors (fatalism, fear/apprehension, perceived benefits, subjective norms, situational barriers and certain contributory factors) likely to be associated with respondents' intent to screen for PCa. Total subscale scores were generated for fatalism, fear/apprehension, perceived benefits and subjective norms before statistical inferences were tested.

Section E explored the respondents' source(s) of knowledge about PCa and PCa screening, while Section F checked the

respondents' perceived need for more knowledge about PCa and PCa screening and their preferred method of receiving such knowledge.

### Constructs and variables contained in the questionnaire

Constructs of the TPB were operationalised to examine the role of social and cultural determinants of PCa screening behaviours among African men.

#### Attitude towards prostate cancer screening

This is the degree to which PCa screening is positively or negatively valued. Attitude and beliefs were operationalised by measuring fatalistic views of PCa, PCa screening, fears/apprehension and the perceived benefits of PCa screening.

#### Subjective norms and prostate cancer screening

This represents perceived social pressure to adhere to PCa screening. Normative beliefs were operationalised by measuring the social influence of relevant other(s) (healthcare providers and family members) on PCa screening behaviours.

#### Situational barriers to prostate cancer screening

Situational barriers are factors that hinder the decision to participate in PCa screening. The situational barriers assessed in this study included concerns about cost, time commitment, embarrassment and pain associated with PCa screening.

#### Prostate cancer screening intent

The intent was operationalised by measuring the intention to participate in PCa screening within a six-month period.

#### Contributory or demographic factors

These are factors that may or may not influence the intention to participate in PCa screening tests. Such factors include demographic characteristics, PCa screening history, family history (first-degree relatives) of PCa, perceived risk of PCa and socio-economic status of respondents.

Items relating to attitude, subjective norms, situational barriers, screening intent and contributory or demographic factors as listed above were measured on a four-point Likert scale (1 = *strongly disagree*, 2 = *sort of disagree*, 3 = *sort of agree* and 4 = *strongly agree*).

#### Prostate cancer knowledge

The knowledge construct was added to the TPB model to assess the relationship between understanding PCa and associated beliefs about PCa and PCa screening. Knowledge was operationalised by measuring the knowledge of symptoms of PCa, risk factors for PCa, screening age guidelines and side effects from PCa treatment.

### Reliability and validity of the questionnaire

Questions similar to this study had been tested in a study conducted among African-American men (Kenerson 2010). The internal consistency (Cronbach's  $\alpha$ ) for the subscale scores in the study was 0.76, 0.67, 0.78, 0.70 and 0.95 for fatalism, fear/apprehension, perceived benefits, subjective norms and screening intent, respectively.

Items on PCa knowledge scale measured respondents' knowledge of PCa screening limitations, signs and symptoms, risk factors and guidelines. Each item required a *true, false or I don't know* response. The reliability using factor analysis was 0.61. Construct validity was based on factor analysis and factor loading of 0.35 or greater. Cronbach's  $\alpha$  was 0.77.

The interpretations of the subscale scores are described in Table 1. Table 2 shows the level of impact for subscale scores.

### Pilot study

The questionnaire was pre-tested on 20 respondents attending one of the selected PHC clinics for other non-PCa-related reasons. These respondents were chosen in succession. The purpose of the pilot test was to ensure that the questions were balanced and correctly constructed and that the crucial information would be obtained. The 20 piloted questionnaires were included in the study as no significant changes arose from the pilot study.

### Data analysis

The data were analysed by the Department of Biostatistics, Faculty of Health Sciences, UFS, using SAS Version 9.3 (SAS Institute Inc., Cary, North Carolina, United States of America). Descriptive statistics (e.g. median and standard deviation [SD]) were used for continuous variables, while frequencies and percentages were computed for categorical data. Association between variables was assessed using chi-squared or Fisher's exact tests. A  $p$ -value of  $< 0.05$  was taken to be significant.

### Ethical considerations

This study was approved by the Health Sciences Research Ethics Committee of the Faculty of Health Sciences, UFS, with ethical clearance number: UFS-HSD2020/1481/2411.

Permission to conduct the study was obtained from the head of the Free State Department of Health.

Following a detailed description of the study, signed informed consent was obtained from each respondent before they participated in the study. The self-administered questionnaire was anonymous as no names of respondents were recorded on any of the documents.

## Results

### Background and socio-demographic characteristics of respondents

A total of 389 men participated out of the 460 eligible respondents invited, giving a response rate of 84.6%. Table 3 summarises the respondents' background characteristics.

The median age of the respondents was 48 years (range 40–70 years). Only four of the respondents' relatives had PCa (one father and three brothers).

Most ( $n = 188$ , 48.3%) of the respondents had never had a PSA test, 130 (33.4%) did not know about the test, 42 (10.8%) had the test over a year ago, while 29 (7.5%) had the test within the past one year. For the 71 respondents who had PSA testing in the past, their perception of the healthcare providers' conduct of shared decision-making was assessed (Table 4).

The majority ( $n = 207$ , 53.2%) of the respondents had never had a digital rectal examination (DRE), 158 (40.6%) did not know about the DRE, 16 (4.1%) had a DRE over a year ago, while eight (2.1%) had a DRE in the past one year.

Only 53 (13.6%) respondents felt that they were at risk of getting PCa.

**TABLE 2:** Subscale score (four-point Likert scale) and corresponding level of impact.

Subscale score	Impact
$< 1.5$	No impact
$\geq 1.5$ but $< 2.5$	Little or low impact
$\geq 2.5$ but $< 3$	Moderate impact
$\geq 3$	High impact

Source: Adapted from Von Pressentin, K.B., Mash, R.J., Baldwin-Ragaven, L., Botha, R., Govender, I., Steinberg, W.J. et al., 2018, 'The perceived impact of family physicians on the district health system in South Africa: A cross-sectional survey', *BMC Family Practice* 19(1), 24. <https://doi.org/10.1186/s12875-018-0710-0>

**TABLE 1:** Subscale scores interpretation.

Culture and beliefs	Interpretation of subscale score	
	Higher score	Lower score
Fatalism	Negative attitude/valued beliefs	Positive attitude/valued beliefs
Fear/apprehension	Negative attitude/valued beliefs	Positive attitude/valued beliefs
Perceived benefits	Positive attitude/valued beliefs	Negative attitude/valued beliefs
Subjective norms	Greater perceived social influence for PCa screening	Less perceived social influence for PCa screening
Situational barriers	Greater number of barriers or less perceived behavioural control	Less number of barriers or less perceived behavioural control
Screening intent	Greater intent to go for PCa screening	Less intent to go for PCa screening
Contributory factors	Higher perceived risk of getting PCa	Lower perceived risk of getting PCa

Source: Adapted from Kenerson, D., 2010, 'Use of theory of planned behaviour to assess prostate cancer screening intent among African American men', dissertation, School of Nursing, Vanderbilt University, Nashville, TN  
PCa, prostate cancer.

**TABLE 3:** Background and socio-demographic characteristics of respondents.

Variable	n	%
<b>Age (years)</b>		
40–49	225	57.8
50–59	112	28.8
≥ 60	52	13.4
<b>Ethnic group</b>		
Sesotho	186	47.8
Xhosa	81	20.8
Tswana	57	14.6
Zulu	37	9.5
Pedi	22	5.7
Venda	5	1.3
Other	1	0.3
<b>Level of education</b>		
Grade 12 (Matric)	109	28.0
Some secondary level (Grades 8–12)	101	26.0
Tertiary	61	15.7
Some primary level (Grades 1–7)	60	15.4
Primary level (Grade 7) completed	44	11.3
No formal education	14	3.6
<b>Medical aid</b>		
No	287	73.8
Yes	102	26.2
<b>Level of skill</b>		
Skilled	149	38.3
Unskilled	90	23.1
Semi-skilled	66	17.0
Never employed	50	12.9
Highly skilled and/or professional	34	8.7
<b>Source of income</b>		
Employed by an organisation	153	39.3
Self-employed	86	22.1
Government grant	78	20.1
No income	60	15.4
Retired (on pension)	11	2.8
Other	1	0.3
<b>Monthly household income</b>		
< R5 000	210	54.0
R5 000–R10 000	83	21.3
R10 000–R15 000	45	11.6
R15 000–R20 000	17	4.4
R20 000–R25 000	24	6.1
> R25 000	10	2.6
<b>Relationship status</b>		
Married	189	48.6
Single (never married)	76	19.5
Separated and/or divorced	52	13.4
Living as married (civil union)	38	9.8
Widowed	34	8.7
<b>District of residence</b>		
Mangaung	228	58.6
Thabo Mofutsayane	63	16.2
Lejweleputswa	39	10.0
Xhariep	32	8.2
Fezile Dabi	27	7.0
<b>Residential area</b>		
Rural	309	79.4
Urban	80	20.6
<b>1st degree family member with cancer?</b>		
No	316	81.2
Yes	73	18.8

Table 3 Continues on the next column→

**TABLE 3 (Continues...):** Background and socio-demographic characteristics of respondents.

Variable	n	%
<b>Top 1st degree family members with cancer (n = 63)</b>		
<b>Prostate cancer</b>		
Brother	3	4.8
Father	1	1.6
<b>Other cancers</b>		
Grandmother – breast cancer	14	22.2
Brother – lung cancer	13	20.6
Sister – breast cancer	13	20.6
Father – lung cancer	10	15.9
Grandfather – lung cancer	9	14.3

The respondents' preferred (first choice) healthcare providers were state PHC providers ( $n = 217$ , 55.8%), private general practitioners ( $n = 110$ , 28.3%), spiritual healers ( $n = 39$ , 10.0%) and traditional healers ( $n = 23$ , 5.9%).

### Assessment of respondents' knowledge regarding prostate cancer screening

The mean knowledge score was 5.67 (range 0–14 points,  $\pm$  standard deviation [SD] 2.88) out of 16 points. Based on the Bloom's cut-off points, the majority of respondents ( $n = 355$ , 91.2%) had poor knowledge (i.e. scored < 60%). However, 95 (24.4%) scored  $\geq 50\%$ . Table 5 shows the respondents' responses to the different knowledge statements.

### Assessment of respondents' culture and beliefs about prostate cancer screening

The 'fatalism' mean score was 2.25 ( $\pm$  SD 0.68), indicating that these respondents held little fatalistic beliefs related to PCa and PCa screening. Examples of fatalism items include 'If I am meant to get prostate cancer, I will get it no matter what I do' and 'If I get prostate cancer, nothing can be done to cure me of the disease'. The 'fear/apprehension' mean score was 2.03 ( $\pm$  SD 0.69), indicating a low degree of fear/apprehension associated with PCa and PCa screening among these respondents. Examples of fear/apprehension items include 'I am bothered by the possibility that prostate cancer screening might be physically uncomfortable' and 'Men who go through prostate cancer screening will have more problems than men who do not go through screening'. The 'perceived benefits' of screening's mean score was 2.69 ( $\pm$  SD 0.60), indicating moderate beliefs in the benefits of screening among these respondents. Examples of perceived benefit items include 'I believe that going through prostate cancer screening would help me to be healthy' and 'I believe that I can protect myself from prostate cancer by going through screening'.

The 'social influence' mean score was 2.90 ( $\pm$  SD 0.72), showing a moderate perceived level of influence that family members and healthcare providers have on PCa screening among these respondents. Examples of subjective norm items include 'I want to do what the doctor I see thinks I should do about prostate cancer screening' and 'Members of my immediate family are likely to think I should go through prostate cancer screening'.

**TABLE 4:** Respondents with previous prostate-specific antigen testing's perception of healthcare providers' conduct of shared decision-making (*n* = 71).

Shared decision-making criteria	Respondents' perception of healthcare providers' conduct					
	Never		Partially		Fully	
	#	%	#	%	#	%
The doctor or healthcare worker discussed the advantages of the screening blood test with me	9	12.7	27	38.0	35	49.3
The doctor or healthcare worker discussed the disadvantages of the screening blood test with me	48	67.6	12	16.9	11	15.5
The doctor or the healthcare worker told me some experts disagree about whether men should have prostate-specific antigen test or not	49	69.0	17	24.0	5	7.0

**TABLE 5:** Respondents' responses to knowledge statements.

Knowledge statement	Respondents' response†					
	True		False		I don't know	
	#	%	#	%	#	%
Men who have several family members (blood relatives) with prostate cancer are more likely to get prostate cancer	<b>202</b>	<b>51.9</b>	19	4.9	168	43.2
A man can have prostate cancer and have no problems or symptoms	<b>100</b>	<b>25.7</b>	138	35.5	151	38.8
Men < 40 years old are more likely to get prostate cancer	218	56.0	<b>63</b>	<b>16.2</b>	108	27.8
Difficulty in passing urine may be a symptom of prostate cancer	<b>149</b>	<b>38.3</b>	97	24.9	143	36.7
Certain diet or eating habits might increase one's risk for developing prostate cancer	<b>106</b>	<b>27.3</b>	127	32.6	156	40.1
Obesity (being overweight) and cigarette smoking have no effect on prostate cancer risk	143	36.7	<b>115</b>	<b>29.6</b>	131	33.7
White men are at greater risk of developing prostate cancer	142	36.5	<b>115</b>	<b>29.6</b>	132	33.9
Frequent pain often in your lower back could be a sign of prostate cancer	<b>89</b>	<b>22.9</b>	135	34.7	165	42.4
Prostate cancer screening should be reserved for men over 70 years old	96	24.7	<b>160</b>	<b>41.1</b>	133	34.2
Some treatments for prostate cancer can make it harder for men to control their urine	<b>172</b>	<b>44.2</b>	96	24.7	121	31.1
Some treatments for prostate cancer can cause problems with a man's ability to have sex	<b>207</b>	<b>53.2</b>	64	16.5	118	30.3
Prostate cancer can be cured if diagnosed early enough	<b>233</b>	<b>59.9</b>	51	13.1	105	27.0
Doctors can tell which men may die from prostate cancer and which men will not be harmed by prostate cancer	<b>75</b>	<b>19.3</b>	164	42.2	150	38.5
An abnormal prostate-specific antigen (PSA) blood test means I have cancer for sure	101	26.0	<b>88</b>	<b>22.6</b>	200	51.4
I can have cancer and have a normal PSA blood test	<b>161</b>	<b>41.4</b>	71	18.2	157	40.4
Prostate cancer may grow slowly in some men	<b>185</b>	<b>47.6</b>	46	11.8	158	40.6

PSA, prostate-specific antigen.

†, Values in bold indicate the correct answer for that specific statement.

The situational barrier mean score was 2.03 ( $\pm$  SD 0.64), indicating only a few barriers perceived among these respondents. Examples of situational barrier items include 'I have more important things to do than go for prostate cancer screening' and 'Going through prostate cancer screening would be embarrassing'.

The 'contributory factor' mean score was 2.66 ( $\pm$  SD 0.75), which indicates a moderate perceived risk of getting PCA among these respondents. Examples of contributory factor items include 'I believe it is likely I will get prostate cancer at some time in the future' and 'I think African men are more likely to develop prostate cancer than white men'.

The majority of the respondents had multiple sources of knowledge regarding PCA, which included health education from doctors and nurses (52%), media (e.g. television [TV], radio and the Internet) (50%), literature (books, articles and newspapers) (26%), family members (19%) and friends (17%).

Most of the respondents (82.8%) felt the need for additional knowledge regarding PCA; aspects requiring additional knowledge were symptoms (78%), risk factors (76%), treatment (66%), the value of PSA (63%), the value of DRE (59%), diagnosis (56%) and the importance of certain nutrients in PCA prevention (48%). Methods suggested by the

respondents for the dissemination of additional knowledge included informational leaflets or pamphlets (73%), talking to healthcare providers (e.g. doctors and nurses) (50%), radio (46%), social media (e.g. Facebook and WhatsApp) (46%), home visits by healthcare providers (e.g. the community health workers) (45%), television (41%) and posters in public spaces (26%).

### Prostate cancer screening intentions

The 'screening intent' mean score was 2.88 ( $\pm$  SD 0.70), reflecting a moderate level of intention to screen for PCA among these respondents. Examples of screening intent items include 'I intend to have a prostate cancer screening test (prostate-specific antigen blood test) in the next 6 months' and 'In the next 6 months, I plan to discuss prostate cancer screening with a doctor'.

### Factors associated with prostate cancer screening intentions

The relationship between certain background characteristics, cultural factors and beliefs, knowledge and the intention to screen for PCA was assessed using the chi-square test, as shown in Table 6.

The following factors were associated with greater intent to go for PCA screening: lower degree of fear/apprehension of

**TABLE 6:** Bivariate analysis of attitude and beliefs about prostate cancer versus intention to screen.

Independent variable	Strong intention ( <i>n</i> = 354)		Weak intention ( <i>n</i> = 35)		<i>p</i>
	<i>n</i>	%	<i>n</i>	%	
<b>Fatalistic belief</b>					0.182
Strong	268	75.7	30	85.7	
Weak	86	24.3	5	14.3	
<b>Fear/apprehension</b>					< 0.000*
Great	176	49.7	29	82.9	
Less	178	50.3	6	17.1	
<b>Perceived benefit</b>					0.002*
Great	338	95.5	28	80.0	
Less	16	4.5	7	20.0	
<b>Social influence</b>					0.375
Strong	320	90.4	30	85.7	
Weak	34	9.6	5	14.3	
<b>Situational barrier</b>					0.006*
Great	157	44.4	24	68.6	
Less	197	55.6	11	31.4	
<b>Perceived risk</b>					0.024*
Strong belief	304	85.9	25	71.4	
Weak belief	50	14.1	10	28.6	

\*, Statistically significant association.

PCa screening ( $p < 0.001$ ), higher perceived benefits of PCa screening ( $p = 0.002$ ), lower perceived situational barriers to PCa screening ( $p = 0.006$ ) and higher perceived risk of getting PCa ( $p = 0.024$ ).

The results showed no statistically significant associations between the level of knowledge regarding PCa, fatalistic beliefs, subjective norms, socio-demographic and background variables and PCa screening intent.

## Discussion

This study examined the knowledge, cultural factors and belief and screening intentions of African men in the Free State regarding PCa screening. Factors associated with the respondents' screening intentions for PCa were also examined.

### Socio-demographic characteristics

The median age of respondents was 48 years (range 40–70 years). In a similar Kenyan study, the mean age was 49.8 ( $\pm$  SD 16.7) years (Mutua et al. 2017). Men at lower risk for PCa (40–49 years) were more represented in this study, which may indicate the distribution of health-seeking behaviour among men in the study setting. This is corroborated by a similar study by Mofolo et al. (2015).

Almost half of the respondents (48.6%) were married, 69.7% had at least secondary level education and 35.5% had no income or depended on a government grant. These socio-demographic characteristics seem typical of the study setting, as corroborated by findings of a similar study where 64% of the respondents were married, 53.2% had at least secondary level education and 30% were unemployed (Mofolo et al. 2015).

### Background characteristics relating to prostate cancer screening

Less than a fifth (18.3%) and less than a tenth (6.2%) of the respondents had ever done a PSA test and DRE, respectively, in the past. This may imply a low level of risk perception and the lack of screening opportunities in the community as the respondents included in this study have at least heard about the disease. In the study setting, there may also be the need to reiterate health education on this disease. In a similar study, only 2.4% of the respondents had ever done a PSA test in the past (Mofolo et al. 2015). Also, in a Ghanaian study, only 10% of the respondents had ever done a PSA test (Yeboah-Asiamah et al. 2017). Studies have shown a lack of awareness, fear of a positive result, the discomfort of DRE and financial constraint as possible reasons for low screening rates (Husaini et al. 2021; Ugochukwu et al. 2019; Yeboah-Asiamah et al. 2017). On the other hand, there may be knowledge gaps among healthcare providers and subsequent poor awareness of the disease in the community. There is, therefore, the need to determine and address the factors associated with this low screening rate in the present study setting. The reason for a relatively higher screening percentage in this study may be because 'having previously heard about prostate cancer' was one of the eligibility criteria to participate.

Only 53 (13.6%) respondents felt they were at risk of getting PCa, whereas others felt either they were not at risk or were unsure. This may explain the low screening rate found in this study, as explained above. This is unlike a similar study conducted in Kenya, where 64% of the respondents thought they might be at risk of getting the disease (Mutua et al. 2017). The low perceived risk of getting PCa in this study may be attributed to the poor knowledge of the disease.

As shown in Table 4, the respondents perceived their healthcare providers' conduct of shared decision-making for PCa screening to be poor; therefore, it is unlikely that the PHC providers in the study setting are aware of the proper conduct of shared decision-making. Therefore, there is a need for these healthcare providers to be acquainted with the six steps engaged in the conduct of shared decision-making and be trained on how to practise these steps (Ng & Lee 2021).

About one-fifth (15.9%) of the respondents preferred spiritual or traditional healers as their first-line healthcare providers. This may be a reflection of the religious and cultural beliefs in the study setting. In a study by Chali, Hasho and Koricha (2021), 81.5% of the respondents practised traditional medicine use. Affordability, religious affiliation and distance from home were some reasons for their preference for traditional medicine. There is a need for collaboration with traditional healthcare providers to enhance their knowledge regarding PCa screening, counselling and early diagnosis.

### Respondents' knowledge of prostate cancer screening

Even though 'having previously heard about prostate cancer' was one of the eligibility criteria for this study, less than one-quarter of the respondents (24.4%) scored  $\geq 50\%$ . This is unlike a similar study where a moderate to high level of knowledge was found among 79.1% of those who had previously heard of PCa (Mofolo et al. 2015). In another study from Cameroon, a medium level of knowledge was found among 55.2% of the respondents (Kaninjing et al. 2018). There may be the need to structure more detailed health education on this subject in the community, with frequent reiteration.

Respondents' prior sources of knowledge regarding PCa included health education from healthcare providers, media (TV, radio and the Internet), literature (books, articles and newspapers), family members and friends. This finding is similar to a Kenyan study where respondents' prior sources of knowledge were radio, health facility and healthcare provider and media (newspaper, magazine and TV) (Kinyao & Kishoyian 2018). Over 80% of the respondents felt they needed additional knowledge about PCa screening. Aspects requiring such additional knowledge were symptoms, risk factors, treatment, screening tests (PSA and DRE), diagnosis and the value of nutrients. Respondents' preferred methods for knowledge delivery included informational leaflets and pamphlets, talking to healthcare providers (healthcare facilities and home visits), radio, social media (Facebook and WhatsApp), TV and public posters. Similarly, the preferred sources of information found in a Kenyan study were newspapers, TV, radio, website, community health workers, the hospital and through relatives (Kinyao & Kishoyian 2018). There is, therefore, the need to consider these various aspects as well as the preferred methods of knowledge delivery when developing health education strategies for the community.

### Respondents' attitudes and beliefs about prostate cancer screening

The respondents in this study hold little fatalistic beliefs and fear/apprehension regarding PCa screening. They showed moderate beliefs in the benefits of PCa screening and a moderate perceived level of influence from family members and healthcare providers to go for screening. They indicated few barriers to PCa screening, and a moderate perceived risk of getting PCa. These findings partly align with those from a study among African-American men: the 'fatalism' mean score was 1.36, which indicates that this sample held relatively weak fatalistic beliefs related to PCa and PCa screening, and the 'fear/apprehension' mean score was 1.77, which shows a low degree of fear/apprehension associated with PCa and PCa screening. The respondents' 'perceived benefits' of screening mean score was 3.58, representing strong beliefs in the benefits of screening. The 'social influence' mean score was 3.17, representing a high perceived level of influence family members and physicians had on PCa screening among this sample (Kenerson 2010).

The present study's findings may be a reflection of a positive attitude towards health, which had been gradually inculcated into the respondents, as they are PHC users. In contrast, a Kenyan study showed that the respondents held relatively strong fatalistic beliefs (mean score of 3.8) and a high degree of fear/apprehension (mean score of 3.2). They, however, also had strong beliefs in the benefits of screening (mean score of 4.02), and a great influence of family members on screening (mean score of 3.8) (Kinyao & Kishoyian 2018). Of note is that a similar study conducted a year earlier in the same country yielded very similar results (Mutua et al. 2017).

### Respondents' screening intentions and associated factors

The respondents in this study had a moderate level of intention to screen for PCa, which partially aligns with a study among African-American men where the 'screening intent' mean score was 3.01, reflecting a strong intention to screen for PCa among this sample (Kenerson 2010). The low screening rate in our study notwithstanding, the willingness of the respondents to screen may be indicative of a positive attitude and health-seeking behaviour.

The following factors were associated with greater intent to go for PCa screening: lower degree of fear/apprehension of screening, higher perceived benefits of screening, lower perceived situational barriers to screening and higher perceived risk of getting PCa. In an American study, perceived benefits of screening and social influence were associated with greater intent to screen for PCa (Kenerson 2010). However, in a Kenyan study, only fear had a statistically significant association with PCa screening intent (Kinyao & Kishoyian 2018).

The present study showed no associations of statistical significance between the level of knowledge regarding PCa, fatalistic beliefs, subjective norms and socio-demographic and background variables and PCa screening intent. Similar findings were observed in the Kenyan study regarding the non-association of these factors (Kinyao & Kishoyian 2018). Although the majority of the respondents in this study were married, the non-association of subjective norms and marital status with screening intention may imply the non-involvement of women in issues relating to men's health in the study setting. Most of the respondents had attained at least secondary level education, yet this did not translate into greater screening intention. Factors other than the level of education may therefore determine screening intent among men in the study setting. The respondents in this study were users of PHC clinics, which are accessible and affordable; this may explain the reason for the non-association of income, residential area and medical aid status with screening intention.

Primary healthcare providers should be encouraged to continue promoting an attitude that will encourage greater screening intention among men. Prostate cancer health education should alleviate fear and barriers to screening,

promote the benefits of screening and improve the awareness of PCa among men over the age of 40 years.

### Limitations

Because of the coronavirus disease 2019 pandemic, there were restrictions on the conduct of research at private PHC facilities. Hence, the respondents in this study were state PHC clinic users: the study findings may therefore not be generalisable. However, the state PHC facilities were randomly selected. Also, the use of self-administered questionnaires is not without flaws (e.g. forgetfulness), which may have a negative impact on the reliability of the results. However, the results may further contribute to the body of literature on knowledge, cultural factors (and belief) and screening intentions of African men regarding PCa screening, which is presently scarce in South Africa.

### Conclusions and recommendations

The respondents in this study have a low level of knowledge and practice of PCa screening. Both fatalistic belief and fear/apprehension towards PCa screening are low. The observed low level of knowledge and practice of PCa screening could be amenable to enhanced educational and awareness strategies, including clarification of cultural misconceptions regarding PCa screening – the respondents' self-acclaimed knowledge gaps and preferred methods for knowledge delivery should be borne in mind. Factors shown to be associated with greater screening intent should be promoted. Appropriate strategies should also be directed at socially influential people in the lives of these men, including their preferred healthcare providers.

Lastly, the study findings should be communicated to PHC providers and other relevant stakeholders. Given the necessary support of the government and policymakers, early diagnosis and prevention of aggressive disease can be enhanced in the community through health education and awareness.

### Acknowledgements

The authors would like to thank the participants for their time to partake in the study. They would also like to thank the Departments of Family Medicine, Urology and Biostatistics for their support.

### Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

### Authors' contributions

M.O.A.B. conceptualised the study with inputs from W.J.S., F.M.C. and N.M. M.O.A.B. collected the data. C.V.R. and M.O.A.B. conducted data analysis. M.O.A.B. wrote the

manuscript. All authors reviewed the manuscript, gave critical input and approved the final version of the manuscript.

### Funding information

This study was conducted with financial assistance from the Faculty of Health Sciences, University of the Free State, through the Three Schools of Medicine Research and Postgraduate Committee. The contents of this document are the sole responsibility of the authors.

### Data availability

The data that support the findings of this study are available from the corresponding author, M.O.A.B., upon reasonable request.

### Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy or position of any affiliated agency of the authors.

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## 4.5 ARTICLE 4

### Enhancing public awareness and practice of prostate cancer screening among African men: A scoping review

This article was prepared according to the South African Family Practice submission guidelines.

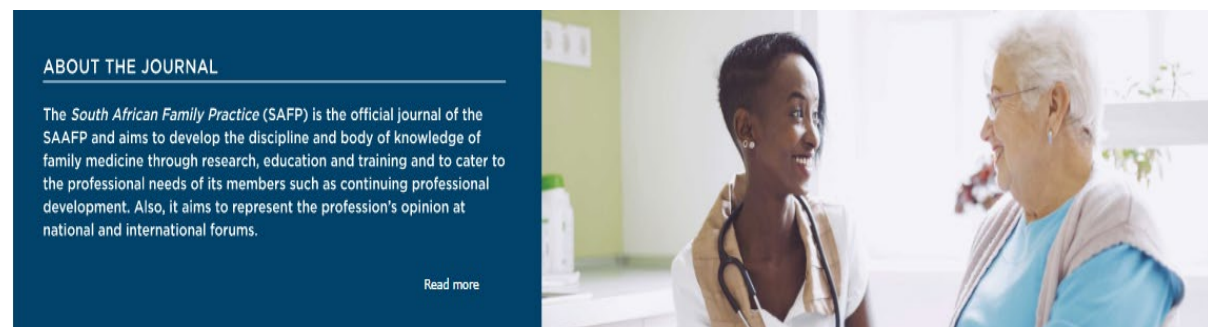
#### *Journal Information*

**Journal:** South African Family Practice

**Publisher:** AOSIS Publishing – African Online Scientific Information Systems

Country of publication: South Africa

**ISSN:** 2078-6204 (Online); 2078-6190 (Print)



**ABOUT THE JOURNAL**

The *South African Family Practice* (SAFP) is the official journal of the SAAFP and aims to develop the discipline and body of knowledge of family medicine through research, education and training and to cater to the professional needs of its members such as continuing professional development. Also, it aims to represent the profession's opinion at national and international forums.

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**DOI:** 10.4102/safp.v65i1.5621

**Citation:** Benedict MOA, Steinberg WJ, Claassen FM, Mofolo N. Enhancing public awareness and practice of prostate cancer screening among African men: A scoping review. *South African Family Practice*. 2023;65(1), a5621.

<https://doi.org/10.4102/safp.v65i1.5621>

**Submitted:** 22 Aug 2022





**Accepted:** 22 Nov 2022

**Published:** 17 Jan 2023

# Enhancing public awareness and practice of prostate cancer screening among African men: A scoping review



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## Dates:

Received: 22 Aug. 2022  
Accepted: 22 Nov. 2022  
Published: 17 Jan. 2023

## How to cite this article:

Benedict MO, Steinberg WJ, Claassen FM, Mofolo N. Enhancing public awareness and practice of prostate cancer screening among African men: A scoping review. *S Afr Fam Pract.* 2023;65(1), a5621. <https://doi.org/10.4102/safp.v65i1.5621>

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**Background:** Prostate cancer (PCa)-related incidence is on the increase, with black South African men presenting disproportionately with aggressive disease. Recent studies show a greater net benefit of prostate-specific antigen (PSA) screening of black men compared with the general population. This scoping review provides an overview of available research on strategies that have enhanced PCa screening awareness and practice in the African setting.

**Methods:** Relevant databases were searched to identify 2010–2021 studies. Following scoping review guidelines, data were extracted, summarised and quantitatively analysed.

**Results:** Of the 21 articles included, 19 were from the United States. Nine were published within the last five years and 14 were pre-test/post-test. Most articles evaluated the effect of health-promoting strategies on awareness and practice of PCa screening among black men. Community-oriented strategies enhanced awareness and practice of PCa screening. Healthcare providers and community members, including PCa survivors, participated in the strategies' planning, development and implementation. Topics that improve PCa knowledge and clear cultural misconceptions were addressed, targeting public spaces unique to these men. Prostate cancer health education methods were diverse, comprehensive, user friendly and culturally sensitive.

**Conclusion:** More research on strategies to enhance PCa screening awareness and practice among African men is needed, as this is scarce. Strategies enhancing PCa screening awareness and practice among African men are community oriented and entail health education methods, topics, presenters and venues. These strategies can be adopted in the South African setting.

**Contribution:** This study recommends strategies to enhance the awareness and practice of PCa screening among African men.

**Keywords:** prostate cancer; screening; knowledge; awareness; health education; African men.

## Introduction

Prostate cancer (PCa) is the fourth most commonly diagnosed cancer worldwide and ranks the second most frequently diagnosed malignancy (after lung cancer) in men worldwide.<sup>1</sup> Evidence shows higher mortality rates from PCa among black African populations than other races. This disproportionate mode of presentation has also been described between regions in Africa. For example, reports show lower PCa incidence and mortality rates of 10.6 and 7.0 per 100 000 men in northern Africa, compared with the average rates of 34.3 and 22.1 per 100 000 men observed in sub-Saharan Africa (SSA). Factors attributable to these variations include poor socioeconomic status, dietary differences, genetic differences and the presence of infectious diseases in SSA.<sup>2</sup> Other socioeconomic and health systems factors attributable to the variance in PCa presentation include the absence of low-cost, community-based screening and health promotion programmes, late presentation of patients to healthcare facilities, fewer treatment options, lack of adequate follow-up and inherent social norms and beliefs.<sup>3</sup> Reasons for the late presentation of men, often with advanced disease, include low health literacy and the cultural concept of the disease, masculinity and disease, poor help-seeking behaviour and failure to take the sick role.<sup>4</sup> Despite the racial disproportion in the morbidity and mortality from PCa, black men are underrepresented in diagnostic and therapeutic clinical trials on this disease.<sup>2</sup>

The incidence of PCa in South Africa is on the upward trend: 29.4 per 100 000 men in 2007 and 67.9 per 100 000 men in 2012.<sup>5</sup> In South Africa, PCa has the highest frequency of all new cancer cases,

with 3896 deaths occurring of the 13152 new patients (29.6%).<sup>6</sup> Compared with men of other races, South African black men present with higher prostate-specific antigen (PSA) levels and higher stage and grade of disease, with the majority of the cases being incurable. Also, compared with African American men, South African black men had a higher prevalence of aggressive disease and higher PSA levels, especially those from rural communities.<sup>7</sup>

Delayed diagnosis has been identified as a likely cause for patients presenting with advanced disease. The mean age of black patients at presentation in two South African studies (KwaZulu-Natal and the Western Cape) was 71.6 and 68.9 years, respectively.<sup>5</sup> This was higher than the mean age of 64.7 years in black patients in the United States Surveillance Epidemiology and End Results (SEER) database. Reasons identified for delayed diagnosis among the patients in a South African study<sup>5</sup> were a lack of PCa screening programme and a referral population that is primarily rural, with poor socioeconomic status, high unemployment rates, and low literacy and education levels. Another contributing factor may be adherence to a strong traditional belief system, with patients preferring to visit traditional healers rather than a clinic or hospital.<sup>5</sup> Many obstacles to accessing health services exist in poor rural communities, resulting in lost-to-follow-up.<sup>5</sup>

A study was performed in the Free State to determine the profile and risk stratification of patients with PCa treated at the Department of Oncology, Universitas Annex in Bloemfontein.<sup>8</sup> The majority (72.8%) of the patients were of the black race, 43.7% had high-grade disease (i.e. Gleason score 8–10), 67.9% had PSA levels > 20 ng/mL and 62.3% had T stage ≥ T3. Nearly half the patients (48.7%) had stage IV disease, and 38.4% received palliative hormonal therapy as initial treatment. The majority of the patients (82.5%) fell into the high-risk group.

### Prostate cancer screening

Prostate cancer screening is an attempt to diagnose PCa in asymptomatic men through digital rectal examination (DRE) and the measurement of serum PSA. Despite the inconclusive benefits of using DRE and PSA as screening tests, large population-based studies showed increased survival benefits in the early treatment of PCa compared with no active therapy in men with moderately and poorly differentiated disease.<sup>9</sup>

The United States Preventive Task Force (USPSTF) has reported a potential benefit of decreasing deaths from PCa in men aged 55–69 years with PSA screening. However, the benefit of screening is doubtful for men above 70 years of age.<sup>10,11,12</sup> The relatively higher mortality from PCa observed in Africa has been partly attributed to the limited availability of screening and early detection.<sup>13</sup> Although PCa screening remains controversial – it is currently a method recognised to control PCa disease through early detection.<sup>14</sup>

According to the American Cancer Society, there is evidence that PSA screening can detect early-stage PCa, and it is

recommended that men at high risk, based on race and family history, should begin early detection with a PSA blood test and DRE at 45 years of age. Men at higher risk (having more than one first-degree relative who had cancer at an early stage) should start early detection at 40 years of age.<sup>15</sup>

Overdiagnosis and overtreatment are the major challenges associated with PSA screening. A diagnosis of PCa usually calls for treatment, and all PCa treatments carry a considerable risk of side effects such as sexual and urinary dysfunction. In as much as diagnosing aggressive cancers can be lifesaving, diagnosing harmless cancers does more harm than good.<sup>16</sup> A recent European study on the harm to benefit of PCa screening in black men showed that although the potential for overdiagnosis and overtreatment remains, the net benefit of PSA screening is greater for black men than the general population. Therefore, policymakers may need to consider the need for race-specific screening guidelines.<sup>2</sup>

In South Africa, PCa screening is equally common across all race groups. South African guidelines<sup>17</sup> recommend that PCa screening be performed in all men from 45 years onwards and in the absence of identifiable risk factors, from 40 years in black African males, where there is a family history of PCa and other identifiable risk factors. In South Africa, PCa screening involves both DRE and PSA.<sup>17</sup> The recommended guidelines notwithstanding, the uptake of PCa screening is low among African men, which raises a suspicion of patterns in knowledge and beliefs towards PCa screening within a subculture.<sup>15</sup> The higher mortality from PCa observed among African men may be a consequence of their screening behaviour.

In as much as it might be financially challenging to screen the entire population for PCa, once a patient deemed to belong in the high-risk category attends a doctor with a complaint (the nature notwithstanding), a simple screening process can be incorporated into the consultation with little extra time or effort.<sup>18</sup> As stated by Glynn:<sup>18</sup>

In health economic terms, a true screening programme for a particular disease across a whole population has to be evaluated as being useful, economic and with no negative effects. (p. 8)

To address the quadruple burden of disease in South Africa, the focus has been on maternal and child (health) care, HIV and pulmonary tuberculosis, trauma and non-communicable diseases.<sup>19</sup> Under-representation of male-related diseases within the healthcare systems and the media has been observed. Even though South Africa has national registries for breast and cervical cancers, none exists for PCa.<sup>20</sup> There seems to be a lack of prioritisation and limited secondary prevention strategies geared towards PCa disease.

### Arguments for an enhanced public awareness of prostate cancer screening

Studies have identified the lack of knowledge on PCa among African men.<sup>21,22</sup> In fact, most South African indigenous languages do not have translations for the term 'prostate

gland'. The racial difference in stage at presentation and therapy shows the need for greater PCa awareness and education among patients and primary healthcare practitioners. Early detection of PCa through more widespread PSA screening may be of value among this identified vulnerable group of men.<sup>21,23</sup>

Among men with some degree of PCa knowledge, there is still a low turn up for screening for this disease. A Kenyan study<sup>13</sup> showed that the screening rate is still low despite massive education campaigns on PCa awareness in Kenya. Apart from knowledge gaps, certain cultural and belief factors were responsible for the low turn up for PCa screening.<sup>13</sup>

An Asian study<sup>24</sup> showed that health promotion plans and educational intervention programmes provided by healthcare practitioners would increase awareness and correct false impressions about PCa, ultimately stimulating screening among men. Education programmes should be designed to identify and correct public misrepresentations for individuals to recognise health concerns and gain more knowledge. The study further showed that educational videos were significantly effective in motivating and educating participants about their beliefs on PSA screening for early detection of PCa.<sup>24</sup>

Locally in South Africa, arguments exist for enhanced health awareness through community participation. The Patients' Rights Charter of South Africa<sup>25</sup> is a charter of the National Department of Health that promotes and protects patients' rights in the healthcare sector. This charter affords patients the right to participate in healthcare decision-making, access healthcare, confidentiality and privacy, informed consent, refuse treatment and the continuity of care.<sup>25</sup> The South African 'Batho Pele Principles'<sup>26</sup> serve as an acceptable policy and legislative framework regarding service delivery in the public service. These principles align with the constitutional ideals of providing service impartially, utilising resources efficiently and effectively and responding to people's needs through participation. One of the prime aims of Batho Pele is to provide a framework geared at increasing access to healthcare information and services to the many South Africans who do not have such access.<sup>26</sup>

Hence, studies have shown gaps in the awareness and practice of black men regarding PCa screening; however, there is a paucity of studies on the specific strategies to close these identified gaps among this vulnerable group of men.

The aim of this scoping review was to provide an overview of the available research on strategies proven to have enhanced PCa screening awareness and practice in the African setting. The following research question was formulated: What health-promoting strategies have been shown to improve African men's awareness and practice of PCa screening?

## Methods

### Study design

This was a scoping review; the details of the conduct are described next.

### Inclusion and exclusion criteria

The conduct of this review adhered to the Preferred Reporting Items for Systematic Reviews and Meta-Analyses – Extension for Scoping Reviews (PRISMA-ScR)<sup>27</sup> and Joanna Briggs Institute guidance for the conduct of scoping reviews.<sup>28</sup> To be included in the review, articles needed to: (1) be about humans (of African descent), (2) have been conducted in an African setting, (3) be in English, (4) be related to focus on PCa health-promoting strategies and (5) have been published during the past 11 years (up to and including 2021). No limits were placed on the type of article.

### Search strategy

To identify potentially relevant documents, the following search terms were used to search for the evidence:

- 'primary health\*' and (Knowledge or attitude\* or practice\*) and (Screen\* or psa or antigen\* or 'rectal\* exam\*' or 'physical\* exam\*' or 'early diagnos\*') and 'Prostate cancer' and ('African men' or 'black men')
- (Screen\* or psa or antigen\* or 'rectal\* exam\*' or 'physical\* exam\*' or 'early diagnos\*') and 'Prostate cancer' and ('African men' or 'black men') and ti (african\* or black\*)
- ((educat\* or Teach\* or learn\* or train\* or inform\*) n3 (tool\* or method\* or interven\*)) and 'prostate cancer' and (Screen\* or psa or antigen\* or 'rectal\* exam\*' or 'physical\* exam\*' or 'early diagnos\*') and (kap or knowledge or attitude\* or practice\*)
- ((educat\* or Teach\* or learn\* or train\*) and (black\* or african\*) and 'prostate cancer' and (Screen\* or psa or antigen\* or 'rectal\* exam\*' or 'physical\* exam\*' or 'early diagnos\*')) not 'african american'

Searches were conducted in the following databases from 2010 to 2021: Academic Search Ultimate, Africa-Wide Information, APA PsycArticles, APA PsycInfo, CINAHL with Full Text, Communication & Mass Media Complete, ERIC, Health Source – Consumer Edition, Health Source: Nursing/Academic Edition, Humanities Source Ultimate, MEDLINE, Sociology Source Ultimate, MasterFILE Premier. The first searches were conducted on 14 August 2020 while the last ones were conducted on 31 August 2021. The search strategy was conducted by the principal researcher with the assistance of a senior university librarian.

### Screening and selection of articles

Each researcher screened the titles and abstracts to exclude studies that fell short of the inclusion and exclusion criteria. The researchers sent their selected studies to the principal researcher, who excluded duplications and

combined the studies into a single list. This list was sent to the librarian who obtained the full-text articles. Full-text articles that fell short of the inclusion and exclusion criteria were excluded.

### Data synthesis

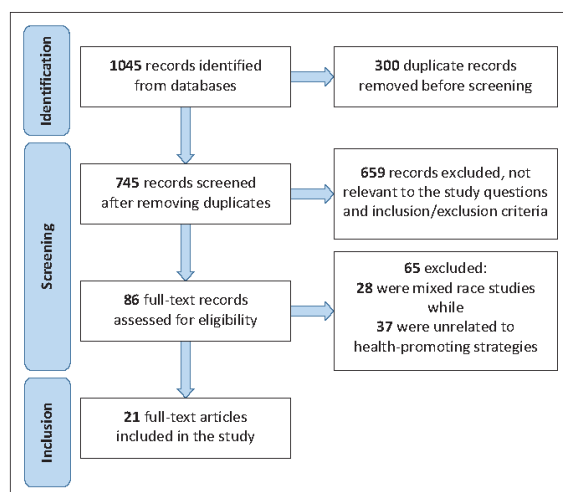
The researchers extracted data using a standardised template (data charting form) developed by two of the researchers. The template included the first author, year of publication, country of origin, publication type, study design, aim of the study, strategies engaged and key findings. Each researcher submitted the completed templates to the principal researcher, who integrated them into one document. As this was a scoping review, no critical appraisal of the quality of the included articles was performed.

### Ethical considerations

The study was approved by the Health Sciences Research Ethics Committee (HSREC) of the University of the Free State (ref. no. UFS-HSD2020/1481/2411). Permission to conduct the study was granted by the Head of the Free State Department of Health.

## Results

The search strategies yielded 1045 publications. Following deduplication (300 duplicates removed), 745 publications were left. After screening by title and abstract, 659 publications were neither specific in terms of population nor context. The full texts of the remaining 86 articles were assessed for eligibility. Sixty-five full-text articles were further found irrelevant; 28 were mixed race studies, while 37 had concepts unrelated to health-promoting strategies, leaving 21 articles in the review. Figure 1 is a flow diagram of article selection.



Source: Adapted from Page MJ, McKenzie JE, Bossuyt PM, et al. The PRISMA 2020 statement: An updated guideline for reporting systematic reviews. *BMJ*. 2021;372:n71. <https://doi.org/10.1136/bmj.n71>

**FIGURE 1:** Flow diagram of article selection.

### Characteristics of the included articles

A total of 21 published articles were included in the review, the majority (90.5%) of which were from the United States (Table 1). About a third were published within the last five years. Two-thirds ( $n = 14$ ) of the articles were pre-test/post-test in nature. All but one (PhD thesis) of the included articles were original research. Most articles aimed to evaluate the effect of certain health-promoting strategies on the awareness and practice of PCa screening among black males.

### Strategies engaged and assessed in the studies

As shown in Table 2, the strategies engaged in the studies reviewed were classified under the following themes: (1) methods of health education, (2) health education topics, (3) presenters of the health education and (4) venue of the health education.

Prostate cancer health education programmes were targeted primarily at rural community members. African American men (and their partners/relatives) were recruited for a PCa education programme using flyers, radio and newspaper advertisements, professional listservs and word of mouth.<sup>38,24</sup>

Both healthcare professionals and lay members of the communities were involved in the planning, development and implementation of the intervention.<sup>29</sup> These health education interventions were mostly culturally targeted and faith based.<sup>34,25,43,49</sup> The venues used, as found by this review, were churches,<sup>29,30,38,40,47</sup> barbershops,<sup>32,35,40,41,42</sup> community health centres (CHCs),<sup>30</sup> rural community<sup>29</sup> and other civic and social organisations.<sup>37,28</sup>

Motivational talks were delivered through live and video-clip testimonies of black survivors of PCa.<sup>29,32,40,42,46,47</sup>

Barbers were trained using a combination of didactic instruction, interactive group exercises and team building. Subsequently, they served as PCa health instructors to their male clients.<sup>41,42</sup>

Other community members involved in delivering motivational talks and health education comprised men and women who were church lay leaders and pastors,<sup>47</sup> lay health advisors,<sup>30</sup> trained lay community educators,<sup>33</sup> PCa advocates, radio personality, barbers, a former legislator, a minister,<sup>32</sup> registered dietitian, physical activity experts and others interested in the health of their community.<sup>34</sup>

The various methods of instruction engaged by these lay community members included educational pamphlets,<sup>31</sup> flipcharts,<sup>42</sup> culturally relevant media (e.g. pictures),<sup>43</sup> educational brochures,<sup>42</sup> tailored telephone education<sup>31</sup> and internet-enabled mobile tablet technology.<sup>48</sup>

Live teachings were given to men in the community by physicians,<sup>29</sup> PCa scientists and urologists,<sup>32</sup> university researchers and other relevant clinicians.<sup>24</sup> These teachings covered PCa statistics such as incidence, mortality and

TABLE 1: Studies included in the scoping review.

Author	Year	Country	Publication type and study design	Aim of the study and strategies engaged	Key findings of the study
1 Howard et al. <sup>29</sup>	2018	US	Original research Pre-test/post-test survey of black men aged ≥40 years	<b>Aim:</b> To provide black men with a culturally targeted faith-based prostate cancer (PCa) education programme and evaluate its efficacy <b>Strategies:</b> <ul style="list-style-type: none"> <li>• Education programmes directed at church members in a rural community.</li> <li>• Black survivors of PCa motivated the community through their live and video-clip testimonies.</li> <li>• Live teachings on PCa statistics, prevention, screening, early detection, treatment and quality of life given by physicians.</li> </ul>	<ul style="list-style-type: none"> <li>• The PCa knowledge improved</li> <li>• Increased intention to have shared decision-making (SDM) with a physician within 12 months</li> <li>• The actual practice of SDM with a physician improved within 3 months</li> </ul>
2 Hunter et al. <sup>30</sup>	2015	US	Original research Grounded theory qualitative research design	<b>Aim:</b> To describe African Americans' perceptions and beliefs regarding PCa risk and (prostate-specific antigen) PSA testing <b>Strategies:</b> <ul style="list-style-type: none"> <li>• Participants were recruited from rural community health centres (CHC) and churches and comprised men and women who were lay health advisors, PCa survivors (and their loved ones) and others interested in the health of their community.</li> <li>• Power-point presentation on steps to informed decision making (IDM) for PCa screening. Thereafter, participants were engaged in conversation with one another about issues related to prostate health.</li> </ul>	<ul style="list-style-type: none"> <li>• Improved knowledge of the benefits of PCa screening</li> <li>• Intention to have PCa screening increased</li> <li>• Involvement of trained female lay health advisors perceived to be effective in helping men obtain prostate care</li> <li>• Community outreach, using culturally sensitive educational materials often effective</li> </ul>
3 Lepore et al. <sup>31</sup>	2012	US	Original research Randomised controlled trial design with pre-test/post-test measures	<b>Aim:</b> To evaluate the efficacy of a decision support intervention focused on PCa screening among certain immigrant black men <b>Strategy:</b> <ul style="list-style-type: none"> <li>• Decision support intervention using educational pamphlets and tailored telephone education on PCa testing.</li> </ul>	<ul style="list-style-type: none"> <li>• Better knowledge of PCa and PCa screening</li> <li>• Decreased PCa screening decision conflict</li> <li>• Increased first-time SDM with physicians</li> <li>• No effect on intentions to get PCa test</li> </ul>
4 Odedina et al. <sup>32</sup>	2014	US	Original research Pre-test/post-test survey of black men	<b>Aim:</b> To evaluate the effect of a culturally relevant video intervention on the prostate health behaviour of black men <b>Strategy:</b> <ul style="list-style-type: none"> <li>• A barbershop served as the venue for this intervention.</li> <li>• Video starring PCa survivors, PCa advocates, a radio personality and barbers.</li> <li>• Motivational remarks were provided by a PCa scientist, a urologist, a PCa advocate, a former legislator and a minister.</li> </ul>	<ul style="list-style-type: none"> <li>• Increased PCa knowledge</li> <li>• Decreased decisional uncertainty</li> <li>• Intention to participate in PCa screening increased</li> </ul>
5 Patel et al. <sup>33</sup>	2013	US	Original research Pre- and post-interventional structured interview of focus groups	<b>Aim:</b> To evaluate the effect of an educational intervention on IDM on PCa screening, screening rates and PCa knowledge among low-income African American men <b>Strategy:</b> <ul style="list-style-type: none"> <li>• Intervention was delivered by trained lay community educators using a PCa educational brochure developed with the community.</li> <li>• Focus group discussion (FGD) involving males 2-40 years who had not had PSA screening in the past year, those who had been screened in the past year and their family members and significant others.</li> </ul>	<ul style="list-style-type: none"> <li>• Average knowledge scores increased</li> <li>• Higher PSA screening rate</li> </ul>
6 Troy et al. <sup>34</sup>	2020	US	Original research Pre-test/post-test survey	<b>Aim:</b> To assess the effects of certain educational programmes on PCa knowledge and decision-making <b>Strategy:</b> <ul style="list-style-type: none"> <li>• African American men (and their partners/relatives) were recruited for a PCa education programme using flyers, radio and newspaper advertisements, professional listservs and word-of-mouth.</li> <li>• Culturally appropriate and community-tailored education programmes were engaged.</li> <li>• Presenters included a PCa survivor, registered dietitians, physical activity experts and a cancer communication researcher.</li> <li>• Workgroup members included university researchers, community members, PCa survivors and clinicians.</li> <li>• A PCa survivor and healthcare professionals administered this education programme.</li> </ul>	<ul style="list-style-type: none"> <li>• The PCa education and awareness improved</li> </ul>

Table 1 continues on the next page →

TABLE 1 (Continues...): Studies included in the scoping review.

Author	Year	Country	Publication type and study design	Aim of the study and strategies engaged	Key findings of the study
7 Frencher et al. <sup>35</sup>	2016	US	Original research Non-randomised pre-test/post-test comparison study	<b>Aim:</b> To investigate the effect of decision support instruments (DSIs) in the form of a video show on African American men's PSA screening decision. <b>Strategy:</b> <ul style="list-style-type: none"> <li>Barbershop-based health education in an African American community.</li> <li>The DSIs were culturally tailored, and their effects were compared with those of culturally non-specific DSIs.</li> </ul> <b>Aim:</b> To assess the effectiveness of educational workshops on black American men's knowledge and health behaviour related to PCA <b>Strategy:</b> <ul style="list-style-type: none"> <li>The FGD and interviews involving cancer survivors, an oncologist, cancer researchers and community health workers to identify barriers to black men's participation in PCA educational workshops.</li> <li>The PCA educational workshops were presented.</li> </ul> <b>Aim:</b> To evaluate the impact of a theory-based health education intervention on awareness of PCA and intention to screen among African men <b>Strategy:</b> <ul style="list-style-type: none"> <li>Health education intervention was administered by a study staff member using a PowerPoint presentation.</li> <li>Topics presented included basic anatomy and physiology of the prostate gland and easy descriptions of its location on a man's body, how PCA spreads, risk factors, signs and symptoms and all possible PCA screening methods.</li> <li>Follow-ups through phone 6 months after the intervention</li> </ul> <b>Aim:</b> To determine the effectiveness of an educational intervention programme on PSA screening behaviour <b>Strategies:</b> <ul style="list-style-type: none"> <li>Three-phased community-based intervention programmes: focus groups, education and follow-up. Each phase provided information on PCA, PSA screening and the importance of early detection.</li> <li>The focus group included female participants.</li> </ul>	<ul style="list-style-type: none"> <li>The PCA knowledge increased following exposure to both DSIs in equivalent proportions</li> <li>The culturally-tailored DSI demonstrated an increase in screening intention</li> <li>Increased certainty in the decision-making process about PCA screening</li> <li>Increased rate of PSA testing</li> <li>Increased belief in the importance of PCA screenings for black American men</li> <li>Positive changes in health behaviour and intentions; greater ease in arranging PCA screenings, and greater ease in following through with appointments</li> <li>Improved SDM knowledge</li> </ul> <ul style="list-style-type: none"> <li>Increased PCA knowledge</li> <li>Increased PSA screening rate within 6 months post-intervention</li> </ul>
8 Livingston et al. <sup>36</sup>	2018	US	Original research Retrospective pre-post survey design		
9 Capanna et al. <sup>37</sup>	2015	Jamaica	Original research Pre-test/post-test design		
10 Cartier et al. <sup>38</sup>	2010	US	Original research Quasi-experimental three phase intervention programme		<ul style="list-style-type: none"> <li>Improved knowledge of PSA screening and the importance of early detection</li> <li>Increased PSA screening rates</li> <li>Women play an important role in supporting male participation in PCA screening</li> </ul>
11 Holt et al. <sup>39</sup>	2017	US	Original research A cluster randomised design	<b>Aim:</b> To determine the effect of female health partner involvement on PCA screening IDM <b>Strategies:</b> <ul style="list-style-type: none"> <li>Quarterly workshops on IDM were conducted in the form of didactic and interactive discussions, stories and testimonies.</li> <li>Baseline IDM outcomes were measured after the first workshop and compared with outcomes of subsequent workshops.</li> <li>Comparing an all-men group with a mixed-gender group to determine the effect of female health partner's involvement on IDM outcomes.</li> </ul> <b>Aim:</b> To determine the effect of combining a standard PCA education video with a testimonial presentation from a community PCA lay survivor on PCA knowledge and self-efficacy for IDM <b>Strategies:</b> <ul style="list-style-type: none"> <li>Combination of a standard PCA education video with a testimonial presentation from a community PCA lay survivor.</li> <li>Participants were recruited from local churches and barbershops.</li> </ul> <b>Aim:</b> To explore the feasibility and receptiveness of African American barbers to become barber health advisors and partner with researchers to test the efficacy of a PCA education intervention programme <b>Aim:</b> To assess the effect of barbershop-based PCA education <b>Strategies:</b> <ul style="list-style-type: none"> <li>Barbershops were used as platforms for PCA health education, where the barbers were the instructors.</li> <li>The barbers were trained using a combination of the following methods: didactic instruction, interactive group exercises and team building, congruent with Empowerment Education learning approaches.</li> <li>Mode of instruction included brochure, video and flipcharts.</li> </ul>	<ul style="list-style-type: none"> <li>Multiple interventions (workshops) resulted in better IDM outcomes</li> <li>Involvement of female health partners showed no change in IDM outcome</li> <li>Lower decisional conflict was evident by an improved decision-making stage</li> <li>Preference in participating in decision-making as against reliance on doctor at baseline</li> </ul> <ul style="list-style-type: none"> <li>Both PCA knowledge and self-efficacy for IDM improved with the combined intervention</li> </ul> <ul style="list-style-type: none"> <li>Rural African American barbershops are appropriate and feasible settings for PCA health promotion</li> <li>Barbers can complete a training curriculum on PCA and gain the knowledge to become barber health advisors</li> <li>Increased self-reported knowledge of PCA among barbershop clients</li> <li>Increased likelihood of clients discussing PCA screening with a healthcare provider</li> </ul>
12 Jones-Dendy et al. <sup>40</sup>	2017	US	Thesis (PhD) A mixed method study (randomised controlled trial and focus group discussion)		
13 Luque et al. <sup>41</sup>	2015	US	Original research Structured interview Pre-test/post-test survey		
14 Luque et al. <sup>42</sup>	2011	US	Original research Post-intervention survey (post-test only) To determine the impact of an educational intervention		

Table 1 continues on the next page →

TABLE 1 (Continues...): Studies included in the scoping review.

Author	Year	Country	Publication type and study design	Aim of the study and strategies engaged	Key findings of the study
15. McCree-Hale et al. <sup>43</sup>	2012	Jamaica	Original research Cross-sectional pre-test/post-test survey	<b>Aim:</b> To evaluate the impact of a theory-based health education intervention among men in Western Jamaica <b>Strategies:</b> <ul style="list-style-type: none"> <li>Theory-based patient education programme.</li> <li>PowerPoint presentation.</li> <li>The use of basic illustrations of PCA screenings and culturally relevant media, including pictures.</li> </ul> <b>Aim:</b> To assess PCA knowledge and explore perceptions on the role of women in PCA prevention <b>Strategies:</b> <ul style="list-style-type: none"> <li>The FGD, including female participants.</li> </ul>	<ul style="list-style-type: none"> <li>Increased PCA screening knowledge</li> <li>Increased intention to screen</li> </ul> <p>The FGD suggested that:</p> <ul style="list-style-type: none"> <li>Involvement of community members in health education; awareness campaign is crucial</li> <li>Print, electronic, social and billboards were suggested media for PCA health promotion</li> <li>Women can make a significant contribution towards reducing PCA mortality among men by being educators and an information resource, ensuring healthier living, 'facilitating regular primary care and generally being supportive'</li> <li>PCA screenings were either received on the recommendation of a doctor or as a job requirement.</li> <li>The use of technology is appropriate in the dissemination of PCA information and in preparing men for IDM</li> <li>Video intervention is suitable for use among African American men with different levels of health literacy</li> </ul>
16. Okoro et al. <sup>44</sup>	2018	US	Original research Mixed-method design	<b>Aim:</b> To assess the appropriateness of a computer-based IDM intervention for PCA screening among African American men <b>Aim:</b> To evaluate the applicability of an evidence-based video intervention to promote IDM for PCA screening among African American men with different levels of health literacy <b>Strategy:</b> <ul style="list-style-type: none"> <li>The use of a video to present PCA health information.</li> </ul>	<ul style="list-style-type: none"> <li>Increased PCA knowledge and decisional self-efficacy</li> <li>Reduced decisional conflict</li> </ul>
17. Owens et al. <sup>45</sup>	2016	US	Original research Qualitative study (FGD)	<b>Aim:</b> To determine the effect of an educational intervention on PCA knowledge and SDM <b>Strategy:</b> <ul style="list-style-type: none"> <li>A PowerPoint presentation of PCA health education.</li> <li>Involvement of church lay leaders and pastors in the planning, development and implementation of the intervention.</li> <li>Topics presented included incidence and mortality rates, risk factors, screening guidelines, benefits versus risks of PSA testing, survival rates, treatment options and prevention strategies.</li> <li>Video featuring two African American PCA survivors.</li> </ul>	<ul style="list-style-type: none"> <li>Improved PCA knowledge and decisional self-efficacy</li> <li>Reduced decisional conflict</li> </ul>
18. Ross et al. <sup>46</sup>	2010	US	Original research Pre-test/post-test survey	<b>Aim:</b> To assess the effect of a mobile tablet-mediated intervention on PCA knowledge and screening decision-making <b>Strategy:</b> <ul style="list-style-type: none"> <li>Delivery of PCA health information using internet-enabled mobile tablet technology.</li> </ul>	<ul style="list-style-type: none"> <li>Increased PCA knowledge and decisional self-efficacy</li> <li>Decrease in barriers to screening</li> <li>No changes in perceived subjective norms and perceived benefits of screening were observed</li> </ul>
19. Sandford et al. <sup>47</sup>	2016	US	Original research Pre-test/post-test survey	<b>Aim:</b> To assess the effect of an educational outreach strategy on PCA knowledge, screening barriers and decisional self-efficacy <b>Strategy:</b> <ul style="list-style-type: none"> <li>Content experts, health educators and community members contributed to developing the outreach curriculum.</li> <li>PowerPoint presentation by public health professionals and PCA survivors.</li> <li>Cultural appropriateness and ease of understanding were ensured.</li> </ul>	<ul style="list-style-type: none"> <li>Improved PCA knowledge and decisional self-efficacy</li> <li>Reduced decisional conflict</li> </ul>
20. Sultan et al. <sup>48</sup>	2014	US	Original research Pre-test/post-test survey	<b>Aim:</b> To assess the effect of a mobile tablet-mediated intervention on PCA knowledge and screening decision-making <b>Strategy:</b> <ul style="list-style-type: none"> <li>Delivery of PCA health information using internet-enabled mobile tablet technology.</li> </ul>	<ul style="list-style-type: none"> <li>Increased PCA knowledge and decisional self-efficacy</li> <li>Decrease in barriers to screening</li> <li>No changes in perceived subjective norms and perceived benefits of screening were observed</li> </ul>
21. Wray et al. <sup>49</sup>	2011	US	Original research Pre-test/post-test survey	<b>Aim:</b> To assess the effect of an educational outreach strategy on PCA knowledge, screening barriers and decisional self-efficacy <b>Strategy:</b> <ul style="list-style-type: none"> <li>Content experts, health educators and community members contributed to developing the outreach curriculum.</li> <li>PowerPoint presentation by public health professionals and PCA survivors.</li> <li>Cultural appropriateness and ease of understanding were ensured.</li> </ul>	<ul style="list-style-type: none"> <li>Improved PCA knowledge and decisional self-efficacy</li> <li>Reduced decisional conflict</li> </ul>

CHC, community health centres; DSJ, decision support instrument; IDM, informed decision-making; FGD, focus group discussion; PCA, prostate cancer; PSA, prostate-specific antigen; SDM, shared decision-making; US, United States.

**TABLE 2:** Strategies engaged to enhance prostate cancer awareness and practice.

'HOW' health education	'WHAT' health education	'WHO' health education	'WHERE' health education
Live and recorded video clips	The PCa statistics, for example, incidence, survival and mortality rates	Black PCa survivors and their loved ones	Churches
Live teachings	Prevention, screening and early detection	Physicians/clinicians	Community health centres
Live and recorded motivational talks	Treatment options	Male and female lay advisors	Barbershops
PowerPoint presentation	Quality of life	Trained lay community educators	Civic and social organisations
Group discussion on issues relating to prostate health	Steps to informed decision-making for PCa screening	Any other community member interested in her or his community's health	Rural community
Culturally sensitive education material	Shared decision-making	Trained barbers	-
Educational pamphlets	Anatomy and physiology of the prostate	Radio personalities	-
Tailored telephone education	Prostate location in the body	Former legislators/ ministers	-
A PCa educational brochure	How PCa spreads	Physical activity experts	-
Flyers, flipcharts	Risk factors for PCa	University researchers	-
Culturally tailored decisional support instruments	Signs and symptoms of PCa	Registered dieticians	-
Repeated educational workshops	Screening methods	Community health workers	-
Didactic and interactive focus group discussion	Screening guidelines	Cancer researchers	-
Use of electronic materials	Benefits versus risks of prostate specific antigen testing	Church lay leaders/ pastors	-
Computer-based informed decision-making	-	Public health professionals	-

PCa, prostate cancer.

survival rates.<sup>29,47</sup> Other aspects of PCa covered were basic anatomy and physiology of the prostate gland, easy description of its location in a man's body, description of PCa and how it spreads, risk factors, signs and symptoms,<sup>37</sup> prevention strategies,<sup>47</sup> early detection<sup>29,38</sup> and a description of all possible PCa screening methods,<sup>37</sup> benefits versus risks of PSA testing,<sup>47</sup> informed decision-making (IDM) for PCa screening,<sup>30</sup> treatment options<sup>47</sup> and quality of life.<sup>29</sup>

Health education methods engaged by these healthcare providers included PowerPoint presentations,<sup>30,37,43,47,49</sup> focus groups (including female participants)<sup>33,36,38,40,44</sup> and educational workshops<sup>36,39</sup> conducted in the form of didactic and interactive discussions, stories and testimonies.

Focus groups and interviews were conducted among community stakeholders such as cancer survivors, oncologists, cancer researchers and community health workers to identify barriers to black men participating in PCa educational workshops and other issues related to prostate health.<sup>13</sup>

### Outcome of the strategies

The effect of the various interventions is listed in Table 3.

Overall, PCa knowledge improved in 13 (61.9%) studies.<sup>29,30,31,32,33,34,35,37,38,39,40,42,47,48,49</sup> There was an increase in the

**TABLE 3:** Outcome of the strategies.

No.	Outcome of the strategies
1	Improved PCa knowledge and awareness
2	Increased knowledge of SDM and informed decision-making
3	Increased intention to have SDM
4	The practice of SDM with physician improved
5	Improved knowledge on benefits of PCa screening
6	Intention to have PCa screening increased
7	Decreased PCa testing decision conflict/decisional uncertainty
8	Positive changes in behavioural efficacy, for example, greater ease in arranging schedules to make time for PCa screening
9	Increased knowledge about personal risk for PCa
10	Decreased barriers to PCa screening

PCa, prostate cancer; SDM, shared decision-making.

knowledge of informed and shared decision-making (SDM); the intention to have SDM with healthcare providers,<sup>29,36,42,47</sup> while its actual practice also increased.<sup>29,31</sup> Multiple interventions (workshops) resulted in better IDM outcomes.<sup>39</sup> Both PCa knowledge and self-efficacy for IDM improved with the combined intervention compared with the standard education video alone.<sup>40</sup> Community outreach using culturally sensitive educational materials was shown to be effective.<sup>30</sup> In one of the studies, the mean knowledge score increased in 12 of the 19 knowledge items.<sup>34</sup>

There was an improvement in knowledge of the personal risk for PCa and the benefits of PCa screening, with a consequent decrease in PCa testing decision conflict/decisional uncertainty.<sup>30,31,47</sup> There were positive changes in behavioural efficacy as well as a decrease in barriers to screening.<sup>36,49</sup>

Ultimately, both the intention to have a PCa screening and the actual PSA screening rate increased in seven studies.<sup>32,33,35,37,38,43,47</sup> For instance, the percentage of men willing to get a PSA test within the next 12 months increased from 57% to 73% in one of the studies.<sup>35</sup> However, there were contrary findings in two studies: one showed no effect on the intentions to get a PCa test,<sup>31</sup> while the other showed no changes in perceived subjective norms and perceived benefits of PCa screening.<sup>49</sup>

Barbers were able to complete a training curriculum on PCa and gain sufficient knowledge to become barber health advisors.<sup>41</sup> There was an increase in self-reported knowledge of PCa among barbershop clients; rural barbershops were both appropriate and feasible settings for PCa health promotion.<sup>42</sup>

Regarding the role of women in prostate health, the involvement of trained female lay health advisors was perceived to be effective in helping men obtain prostate care. Also, women seem to play an important role in supporting male participation in PCa screening.<sup>30,38,44</sup> However, one study showed no change in IDM outcome, despite the involvement of female health partners.<sup>39</sup>

Conclusions from the focus group discussions include the following:

- Involvement of community members in health education and awareness campaign is vital<sup>33,40,44</sup>

- Print, electronic, social and billboards are important media for PCa health promotion<sup>44</sup>
- Women can make a significant contribution towards reducing PCa mortality among men by being educators and an information resource, ensuring healthier living, facilitating regular primary care and generally being supportive<sup>44</sup>
- Technologies should be considered for use in the widespread dissemination of PCa information and preparing men for making informed PCa screening decisions with their doctor<sup>45</sup>
- Video intervention is suitable for use with men with different health literacy characteristics.<sup>32,46</sup>

## Discussion

More than 90% of studies included in this review were conducted among African Americans in the United States, despite efforts in the search strategies to identify other non-American studies among African men, thus indicating a paucity of research on this subject among black men of African nationalities.

One of the key findings from this review was that both healthcare professionals and lay members of the communities were involved in the planning, development and implementation of the intervention. This aligns with primary healthcare initiatives, which allow for the full participation of community members in implementation and decision-making.<sup>50</sup> Social participation, an essential feature in the WHO's Framework on Integrated, People-centred Health Services, strengthens and promotes health governance.<sup>50</sup> Furthermore, the community-oriented primary care (COPC) cycle involves the determination and implementation of adaptive action plans to address individual, family and community health issues; this is followed by monitoring, evaluation and review of engaged activities and plans.<sup>51</sup> Finally, community involvement in the planning, development and implementation of healthcare intervention will ensure the incorporation of its cultural sensitivity, thereby enhancing its comprehension and acceptability and minimising disparity in healthcare.<sup>52,53</sup>

Similar to the findings of this review, churches, CHC and barbershops are also appropriate venues for PCa education and health promotion among men in South Africa. In addition, venues applicable to the South African context in the target of men for PCa health promotion include taxi ranks, physical activity/wellness centres (e.g. gym) and social gatherings, for example, barbecues. Subsequently, the owners and those in charge of these various establishments can be trained to become health education providers. In South Africa, community health workers are a vital cadre of healthcare providers conveying healthcare education and services directly to households in the community. Also, because of accessibility and affordability, up to 80% of South Africans consult traditional and spiritual healers for their primary healthcare needs.<sup>54</sup> Proper training of these healthcare providers on this subject will enhance the

dissemination of health education and a rational approach to PCa screening in the community. As found by this review, other community-based and academic institutional health promoters also apply to the South African context.

Globally, social media platforms such as Facebook, YouTube, Instagram, Pinterest, Twitter and WhatsApp have become effective mediums of communication with the populace.<sup>55</sup> The use of social media platforms has been shown to positively influence awareness of public health behavioural changes, as seen in the current coronavirus disease 2019 (COVID-19) pandemic.<sup>56</sup> Its use in disseminating health education is not without limitations and disadvantages; misleading information can also be easily circulated. Other limitations to the use of social media include inequality, the digital divide, language barriers, gender gaps, privacy concerns, age, cultural beliefs and disability.<sup>55</sup> In South Africa, MomConnect, a mobile health programme initiated by the National Department of Health targeted at improving antenatal and maternal health, is one of the largest mobile health initiatives in the world. It is effective in the widespread dissemination of relevant health education to over half a million users. Such information includes nutrition, diet, drug use, warning signs for medical issues, foetal development, postnatal care and social support.<sup>57</sup> Its helpdesk feature allows registered users to ask maternal and child health-related questions and provide feedback on health services received at public health clinics.<sup>58</sup> Similar mobile health programmes can be developed to promote PCa-related health education among relevant men.

With the controversies surrounding PCa screening, SDM has become a crucial subject to be considered during community health education and awareness. The competence of healthcare providers in the practice of SDM is equally important. As shown in Table 2 and Table 3, SDM was one of the PCa health education topics presented to men in the community. Consequently, the knowledge, intention and practice of SDM improved. There was also a decrease in PCa testing decision conflict.

Effective health education may pose greater challenges in regions with low knowledge and literacy levels; for instance, most indigenous languages in South Africa do not have a translation for the prostate gland. Health education topics such as anatomy (location of the prostate gland) and physiology of the prostate are therefore critical in this setting. Also, interpretation and translation of health education into the common indigenous languages are essential.

## Study's strengths and limitations

As far as we know, this seems to be one of the few studies focused on strategies that have enhanced PCa screening awareness and practice, particularly in the African setting. Strategies identified by this study may also be adapted to promote awareness and practices related to other common cancers in the study setting.

However, the following limitations relate to the study and should be borne in mind: Only studies conducted among men of African origin were included; therefore, relevant strategies promoting awareness and practice of PCa screening among other races might have been missed. Also, only articles written in English were included; relevant articles from different languages might also have been missed. Most of the studies in this review were of a pre-test and post-test study design; the positive impact revealed cannot be guaranteed in the long term as the post-tests were carried out within 6–12 months of the intervention. There is, therefore, the need for the continuity of these health-promoting strategies. Finally, attempts to find and include relevant grey literature were to no avail. Hence, only peer-reviewed articles from academic journals were included in this report.

## Recommendations

- More research on this subject should be encouraged, as they are scarce in the African settings.
- Strategies shown to have enhanced the awareness of PCa screening are community oriented, thus necessitating the involvement of healthcare providers, community members and PCa survivors in the planning, development and implementation of applicable strategies.
- Topics that improve knowledge and clear cultural misconceptions regarding PCa should be addressed, bearing in mind the public spaces unique to these men.
- Prostate cancer health education methods should be diverse, comprehensive, user friendly and culturally sensitive, with the availability of translations into the local languages.
- Similar strategies can be considered in the South African setting, bearing in mind the needful socio-cultural adaptations.
- The government and relevant parastatals should mandate and support family physicians, who are the most senior clinicians in primary healthcare settings, to champion these health promotion strategies.

## Conclusion

This scoping review sought available research on strategies that have enhanced PCa screening awareness and practice in the African setting. More research on this subject is needed as they are scarce. Strategies enhancing PCa screening awareness and practice among African men are community-oriented and entail considering relevant health education methods, topics, presenters and venues. These strategies can be adopted in the South African setting.

## Acknowledgements

The authors would like to thank Mrs Annamarie du Preez, the librarian, Frik Scott Medical Library, Faculty of Health Sciences, University of the Free State, for her support during the course of this review.

## Competing interests

The authors declare that they have no financial or personal relationships that may have inappropriately influenced them in writing this article.

## Authors' contributions

M.O.B. conceptualised the study with inputs from W.J.S., F.M.C. and N.M. All authors participated in the search strategy, screening/selection of articles and data synthesis. M.O.B. drafted the manuscript. All authors reviewed the manuscript, gave critical input and approved the final version.

## Funding information

The study was conducted with financial assistance from the Faculty of Health Sciences, University of the Free State, through the Three Schools of Medicine Research and Postgraduate Committee. The contents of this document are the sole responsibility of the authors.

## Data availability

The scoping review lists all included studies in the manuscript with their references.

## Disclaimer

The views and opinions expressed in this article are those of the authors and do not necessarily reflect the official policy of any affiliated agency of the authors.

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#### 4.6 ARTICLE 5

### Strategies to enhance the approach to prostate cancer screening of South African Black men in the Free State: A Delphi study

This article was prepared according to the Journal of Public Health in Africa submission guidelines.

#### *Journal Information*

**Journal:** Journal of Public Health in Africa  
**Publisher:** African Centre for Disease Control and Prevention  
Country of publication: Ethiopia  
**ISSN:** 2038-9930 (Online); 2038-9922 (Print)



#### **About the Journal**

The **Journal of Public Health in Africa** is a peer-reviewed, academic journal that focuses on health issues in the African continent. The journal editors seek high quality original articles on public health-related issues, reviews, comments and more. The aim of the journal is to move public health discourse from the background to the forefront. The success of Africa's struggle against disease depends on public health approaches.

#### *Published Article*

**DOI:** 10.4081/jphia.2023.2333  
**Citation:** Benedict MOA, Steinberg WJ, Claassen FM, Mofolo N. Strategies to enhance the approach to prostate cancer screening of South African Black men in the Free State: A Delphi study. *Journal of Public Health in Africa*. 2023;14(7) <https://doi.org/10.4081/jphia.2023.2333>

**Submitted:** 4 Oct 2022  
**Accepted:** 19 Dec 2022  
**Published:** 24 May 2023 Online First (Early Access)

## Strategies to enhance the approach to prostate cancer screening of South African black men in the Free State: a Delphi study

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### Abstract

**Background.** The incidence and mortality rates of prostate cancer (PCa) are disproportionately on the increase among South

African black men. Recent studies show a greater net benefit of prostate-specific antigen screening of black men compared with the general population. There are, however, knowledge, attitude, and practice (KAP) gaps among primary healthcare providers (HCPs) and users (black men) on PCa screening. Likewise, there is a scarcity of research on strategies to address these gaps.

**Objective.** This study sought to determine complementing strategies to enhance the approach to PCa screening of African men in the Free State, South Africa, from the perspectives of primary HCPs and users.

**Methods.** This study utilized a three-round modified Delphi survey to achieve its aim. Consensus was determined by an a priori threshold of  $\geq 70\%$  of agreement.

**Results.** The survey involved a multidisciplinary panel of 19 experts. The consensus was reached on 34 items (strategies) to enhance the approach to PCa screening in the study setting. Community health education strategies were proffered, relating to relevant topics, methods, venues of delivery, and persons to deliver the education. Continuing education topics and methods of instruction were suggested for primary HCPs.

**Conclusions.** In view of the existing KAP gaps in PCa screening among primary HCPs and users (black men), an expert consensus was determined, on complementing strategies to enhance the approach to PCa screening of South African black men in the study setting.

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Key words: prostate cancer, strategies, screening, knowledge, attitude and practice, KAP, black men, African.

Acknowledgments: the authors would like to thank the participants for their time. Thanks also go to the departments of Family Medicine, Urology, and Biostatistics for their support.

Contributions: MOAB, conceptualized the study with inputs from WJS, FMC, NM, collected and analyzed the data, and wrote the manuscript. All the authors approved the final version to be published.

Conflict of interest: the authors declare no potential conflict of interest.

Funding: the study was conducted with financial assistance from the Faculty of Health Sciences, University of the Free State, through the Three Schools of Medicine Research and Postgraduate Committee. The contents of this document are the sole responsibility of the authors.

Ethics approval and consent to participate: the study was approved by the Ethics Committee of the Faculty of Health Sciences, University of the Free State (UFS-HSD2020/1481/2411).

Availability of data and materials: all data generated or analyzed during this study are included in this published article.

Informed consent: participants gave written informed consent before they were enrolled in the study.

Received for publication: 27 September 2022.  
Accepted for publication: 19 December 2022

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Journal of Public Health in Africa 2023; 14:2333  
doi:10.4081/jphia.2023.2333

### Introduction

Prostate cancer (PCa) ranks as the second most frequent cancer diagnosis and the fifth leading cause of death among men worldwide. The impact is greater in Africa and low- and middle-income countries due to specific genetic, socioeconomic, and sociocultural factors, among others.<sup>1,2</sup> In South Africa, the PCa incidence rate has increased from 29 per 100,000 men in 2007 to 68 per 100,000 men in 2018.<sup>3,4</sup> As observed globally, PCa incidence and mortality are higher among South African Black men compared with men of other races.<sup>5,6</sup>

Prostate-specific antigen (PSA) screening - though controversial due to the associated false positive results, over-diagnosis, overtreatment, and related complications - remains a practicable method of controlling the disease through early detection;<sup>7,8</sup> especially in Africa, where there is higher mortality compared to other regions of the world.<sup>9</sup> More recent studies have shown that PSA screening may be of greater net benefit among black men compared with the general population.<sup>7,10</sup>

The realization of an improved approach to PCa screening will require the combined effort of primary healthcare providers (HCPs) and users (black men). Adequate knowledge and awareness of men on risk factors and symptoms of the disease will pro-

mote their early presentation. Likewise, the HCPs are more likely to promptly identify at-risk men and appropriately intervene if they know certain important aspects of the disease, *e.g.*, risk factors, symptoms, screening tests, diagnosis, and treatment options. Such knowledge is a prerequisite for the proper conduct of shared decision-making (SDM), a process whereby HCPs support healthcare users to make healthcare choices.<sup>11</sup> Besides knowledge, certain cultural beliefs and attitudes may inform the practice of HCPs and users of PCa screening. Such misconceptions need to be addressed.

Despite the under-resourced state of African health systems, there is undue focus on the hospitals at the expense of primary health clinics serviced by low-level and poorly trained HCP.<sup>12</sup> In South Africa, there are varied categories and cadres of HCPs working in primary healthcare settings. These include medical doctors, *i.e.*, interns, medical officers (including community service medical officers), family medicine registrars, and specialist family physicians, whose role, among others, are to support community-oriented primary care and ensure its functionality.<sup>13</sup> The nursing staff includes enrolled nurse assistants, enrolled nurses, and professional nurses. Another recently introduced HCP category is the clinical associates, who work under the supervision of doctors. Lastly are the community healthcare workers. Nurses form the largest segment of the healthcare system in South Africa.<sup>14</sup> Due to the low doctor-to-patient ratio and difficulties in allocating doctors to rural areas, primary healthcare in South African state facilities remains nurse-led.<sup>12,15</sup>

Studies have established knowledge, attitude, and practice (KAP) gaps regarding PCa screening among African men and their primary HCPs.<sup>9,16-19</sup> Although KAP gaps have been identified, there is a paucity of studies specifying the interventions needed to address these gaps.

The continuum of education for HCPs may be viewed from the perspective of four educational settings over the lifetime of their career: formal education at undergraduate and postgraduate levels; maintenance of competence through continuing professional development (CPD); development of new or extended roles, such as academic research or professional leadership; and finally the skills needed for teaching, mentoring and supervising others.<sup>20</sup> Continuing professional development consists of educational activities that maintain, develop, and increase the skills, professional practice, and relationships that HCPs need to optimize patient care. Continuing professional development refers to the education that follows qualification or licensure. Numerous studies have confirmed that it improves HCP practice and, in some instances, healthcare outcomes.<sup>21</sup>

Experts suggest the need to develop more effective courses for primary HCPs, especially nurses, clinical associates, and community health workers (CHWs), to enhance their educational background and strengthen their collaborative functionality within the primary healthcare system.<sup>22</sup>

The following have been shown as effective methods of instruction among CHWs: role play, case studies, teach back, group presentation, interactive didactic, demonstration, group assessment, group discussion, hands-on practice, and individual assessment.<sup>23</sup>

In the nursing profession, commonly used practices for continuing nursing education are short, repeated education; interactive techniques, *e.g.*, simulation models, and audio-visual learning modalities; teamwork in healthcare settings; use of cultural context and the practice of assessment and feedback.<sup>24</sup> A survey among primary care physicians showed a higher preference for learning about cancer screening through the following educational formats: conferences, self-directed, small group workshops, hospital rounds, and online CPD/CME (continuing medical education).<sup>21</sup>

To be effective, health education strategies should be tailored to the target population. Health topics should be appropriate for the targeted population and delivered in an appropriate setting.<sup>25</sup>

This study presents an expert consensus on strategies to enhance the approach to PCa screening of African men in the Free State, South Africa, from the perspectives of HCPs and users.

### Establishing consensus using the Delphi method

In a Delphi technique, a reliable consensus opinion of a group of experts is generated through an iterative process of questionnaires, with intervals of controlled feedback.<sup>26</sup> It is based on the belief that a group of experts' collective views are of greater credence than an individual's. Studies have used Delphi methods to determine the educational needs of HCPs.<sup>27,28</sup> Several rounds of questionnaires are sent out to the group of experts, and the anonymous responses are collated and shared with the group after each round. The experts may adjust their answers in subsequent rounds based on their interpretation of the 'group response' shared with them. The Delphi method aims to arrive at a reliable response through consensus.<sup>26</sup>

Unlike the classical Delphi, the modified Delphi technique begins, in the first draft of the questionnaire, with a series of closed-ended sentences or questions related to the study title. These questions are carefully selected by the convenor through literature reviews and expert consultation. The modified Delphi study allows for the collection of panelists' input through open-ended questions by asking if they have suggestions or additions to the list prepared by the convenor.<sup>29,30</sup>

While no standard exists regarding the number of panelists required for a Delphi, between 10 and 18 experts are recommended to ensure the needed productive group dynamics leading to a reasonable consensus.<sup>29</sup> Consensus is usually determined by an a priori threshold of about 70% of agreement.<sup>30</sup>

### Setting

The Free State is geographically the third-largest province in South Africa and constitutes 5.1% of the national population. The province comprises Mangaung Metropolitan Municipality and four district Municipalities namely: Xhariep, Lejweleputswa, Thabo Mofutsanyana and Fezile Dabi. Most of the population resides in Mangaung and Thabo Mofutsanyana. The economy is dominated by agriculture, mining, and manufacturing.

The primary healthcare facilities in the Free State include primary health local clinics, community health centers, and district hospitals. In the Free State, there are 24 district hospitals and 231 fixed clinics (*i.e.*, local clinics and community health centers). Most of the population using public health services attend these healthcare facilities.<sup>31</sup> Ward-Based Primary Health Care Outreach Teams (WBPHCOTs) undertake outreach household visits to provide basic PHC services, including counseling and health promotion.<sup>31</sup> The WBPHCOTs are linked to the PHC facilities and consist of CHWs led by nurses. The CHWs assess the health status of individuals in households and provide health education and promotion services. They identify and refer those in need of preventive, curative, or rehabilitative services to relevant PHC facilities.<sup>31</sup>

## Materials and Methods

### Ethical considerations

Permission to conduct the study was granted by the Head of the Free State Department of Health, and ethical approval was obtained from the Health Sciences Research Ethics Committee (HSREC) of the University of the Free State (UFS-

HSD2020/1481/2411).

Following a detailed description of the study, signed informed consent was obtained from each participant before participating. The voluntary nature of participation and the right to refuse to participate or to withdraw at any time was also explained.

### Study design and setting

A modified Delphi technique was used to engage an expert panel of HCPs, to gain consensus on strategies required to enhance the approach to PCa screening of African men in the Free State from the perspectives of HCPs and users. In compliance with the tenets of the Delphi approach, methodological rigor was maintained, viz: anonymity, iteration, controlled feedback, and group response.

### Panel recruitment

The researcher invited 22 healthcare experts; two were international; the rest were from the Free State. They were selected from healthcare disciplines relevant to PCa screening: 'medical' (family medicine, urology, oncology, and health professions education) and 'nursing' (primary care, nursing education, and nursing oncology).

Before the commencement of the Delphi study, the experts were contacted and introduced to the study via email. The information leaflet and informed consent document were emailed, and the experts were requested to read, complete, and sign if they agreed to participate in the study. The signed informed consent documents were emailed back to the researcher. The experts received a link to the online survey upon consenting to participate.

Participants were only included as part of the expert panel if they fulfilled the following criteria: i) at least 10 years experience in the aspects of PCa screening and early diagnosis; ii) current registration with the relevant professional councils; iii) willingness to participate in the study and signing of consent; proficiency in English.

### Overview of the Delphi process

The consensus was achieved through a three-round modified Delphi survey. An overview of the Delphi process for this study is depicted in Figure 1.

The first-round Delphi questionnaire contained a series of close-ended sentences or questions related to the study title; these questions were carefully selected by the researcher through literature reviews. The Faculty of Health Sciences evaluation committee consisting of consultant family physicians, a urologist, medical educators, a professional nurse, and a biostatistician, subjected the questionnaire to review.

The questionnaire is divided into seven sections; the first six sections start with a leading question followed by corresponding items, while the seventh section accommodated additional suggestions from the experts, as depicted in Table 1.

### Round 1

On 18 May 2021, this questionnaire was sent to the selected experts in the first round. The participants responded to each item on a 3-point Likert scale (1=Yes; 2=Maybe; 3=No). The questionnaire items included possible strategies to enhance the approach to PCa screening of African males in the Free State. As a characteristic of a modified Delphi approach, there was also an open-ended section for the participants to include any further suggestions.

The researcher collected and analyzed the completed data using the EvaSys® survey management system. The result of the first round was summarised and disclosed to the participants. For this study, the consensus was regarded to have been achieved on

questionnaire items on which  $\geq 70\%$  of the participants agreed to be 'Yes' and such items were excluded from the subsequent rounds.

### Round 2

Statements in which consensus had been reached in the first round were excluded from the second round. Items on which consensus was not reached during the first round, as well as additional comments suggested by the participants, were included in the second round. The second round Delphi questionnaire was sent out on 24 June 2021. The same data analysis and result disclosure process to participants were followed.

### Round 3

Statements in which consensus had been reached in the second round were excluded from the third round. Items on which consensus was not reached during the second round, as well as additional comments suggested by the participants, were included in the third round. The third round of the Delphi questionnaire was sent out on 06 August 2021.

Stability was achieved when participants did not change their responses from round to round, making it unnecessary to resend such questions.

A time interval of 2 weeks was allowed for the participants to respond during each round. Reminders were sent electronically and telephonically to non-responding participants. The participants responded within 5 weeks for each round, making the duration of the Delphi survey approximately 4 months.

## Results

The modified Delphi survey was conducted in three rounds. Out of the 22 experts invited, 19 (86.4%) participated in the three rounds. A brief demographic profile of the participants is shown in Table 2.

The summary of the three rounds is depicted in Table 1. The survey started with 33 questionnaire items in Round 1. Twelve new items were suggested by the participants, *i.e.*, 11 and one during the first and second rounds, respectively, giving a total of 45 questionnaire items. Consensus was reached on 34 (75.6%) items. There was a high level of consensus (more than 80% of the participants) for 22 out of the 34 items. This section presents a more detailed report on the participants' responses to each of the seven sections of the questionnaire.

### Consensus on questionnaire items

Section 1: 'Shared decision-making (SDM) for prostate cancer (PCa) screening: What risk factors or criteria should warrant SDM for PCa screening among African men 40 years and older?'

As shown in Table 1, there were five items in this section, one of which was suggested by an expert during Round 1. The consensus was reached on only two items, *i.e.*, 'Men with one or more 1<sup>st</sup> degrees relative with PCa' and 'Men with one or lower urinary tract symptoms (LUTS)'. The consensus was not reached on the following three items: 'Men with frequent pain or stiffness in the lower back', 'Men with unexplained weight loss', and 'Family history of breast cancer'.

Section 2: 'Which community health education topics are relevant to enhance PCa screening knowledge attitude and practice (KAP) among African men?'

This section contained 11 items, two of which were suggested during Round 1. The consensus was reached on eight items (Round 1 = six items; Round 2 = two items). The consensus was not

reached on the following three items: 'Fatalism (fatalistic attitude) regarding PCa', 'Situational barriers to PCa screening', and 'Disadvantages of PCa screening (false positives and false negatives)'.

Section 3: 'Which community health education methods can be engaged to enhance PCa KAP among African men?'

This section contained six items, two of which were suggested during Round 1. The consensus was reached on five items (Round 1 = four items; Round 2 = one item). The consensus was not reached on the following item: 'Outreach by health system care coordinators and payer patient navigators'.

Section 4: 'What community strategies should be engaged to enhance PCa health education?'

This section contained six items, four of which were suggested during Round 1. The consensus was reached on five items (Round 1 = two items; Round 2 = three items). The consensus was not reached on the following item: 'Traditional leaders can also be used especially those in charge of initiation schools'.

Section 5: 'Which continuing educational topics should be included in refresher courses to enhance PCa KAP among primary healthcare providers?'

This section contained eight items. There were no new suggestions from the experts. The consensus was reached on all the items (Round 1 = five items; Round 2 = three items).

Section 6: 'Which continuing education methods should be engaged to enhance PCa KAP among primary healthcare providers?'

This section contained seven items, one of which was suggested during Round 2. Consensus was reached on four of these items (Round 1 = three items; Round 3 = one item). The consensus was not reached on the following three items: 'Workshop/group tasks', 'Didactic lectures', and 'Practical sessions / simulated learning'.

Section 7: Other suggestions.

This section contained two items that do not necessarily fit under the above-stated six sections:

'Healthcare workers, like other professions, should be responsible for staying up to date with the literature in their field' and 'This subject should be considered for undergraduate teaching, learning and assessment'.

Both were suggested by the experts in Round 1. Consensus was reached on both in Round 2.

### The strategies to enhance the approach to prostate cancer screening

The strategies suggested by the experts to enhance the approach to PCa screening were classified into two groups: i) Group 1 (Table 3): Strategies targeted at primary healthcare users (*i.e.*, African men), which were sub-classified under the following themes: a) WHAT health education topics; b) HOW (methods of) health education; c) WHO (persons) to give the health education; d) WHERE (venue of the) health education; ii) Group 2 (Table 4): Strategies targeted at primary HCPs, which were sub-classified under the following themes: a) WHAT continuing education topics; b) HOW (methods of) continuing education.

## Discussion

This Delphi study aimed to develop a consensus on strategies to enhance the approach to PCa screening of African men in the Free State, South Africa. A multidisciplinary group of experts was selected to participate in this study as the subject of PCa cuts across several fields of medicine. Most participating experts were over 50 years, which correlates with their years of experience, *i.e.*, >20 years.

Shared decision-making is a process whereby HCPs collaborate with patients to make health decisions based on available scientific evidence and patient values, *i.e.*, risk communication and value clarification.<sup>32</sup> This process is essential when screening for conditions associated with a close trade-off between harms and benefits.<sup>32</sup>

There was consensus that 'Men with one or more 1<sup>st</sup> degree relative with PCa' and 'Men with one or more LUTS should be considered for SDM for PCa screening. Pain and/or stiffness in the lower back and unexplained weight loss are non-specific symptoms; this may explain the reason for the non-consensus on these items. Though studies have shown that first-degree family history of breast cancer is a risk factor for PCa,<sup>33,34</sup> consensus was not reached on this item.

Health topics such as epidemiology, anatomy, and physiology of the prostate gland, risk factors, symptoms and signs, informed decision-making, prevention, and screening methods have been shown to improve community knowledge and awareness regarding PCa.<sup>35-37</sup>

While consensus was reached on most health topics to enhance KAP on PCa screening, consensus was not reached on fatalistic attitudes, situational barriers, and disadvantages of PCa screening. Fatalistic beliefs could either be a barrier to the uptake of PCa screening,<sup>38</sup> or have no effect.<sup>9</sup> This inconclusive effect of fatalistic beliefs may be the reason for non-consensus on its inclusion as a relevant topic. Likewise, the perceived barriers to screening may vary from one individual to another. The process of SDM in PCa screening is incomplete without discussing its disadvantages. The experts' decision notwithstanding, it might be valuable to address these topics in workshops or focus group discussions.

Patient navigation is sometimes viewed as the support given to persons who already have health challenges (*e.g.*, abnormal cancer screening or a new cancer diagnosis), enabling them to promptly access the relevant healthcare system in a culturally sensitive manner.<sup>39</sup> This study focused on PCa screening; thus, the experts might have viewed patient navigators as irrelevant in the context of this study. Some authorities view traditional leaders as essential in promoting PCa screening awareness in the community;<sup>40</sup> it is unclear why there was no consensus on the inclusion of this item as a strategy for promoting PCa health education.

Studies have identified certain knowledge gaps regarding PCa among HCPs;<sup>18,19</sup> all eight topics suggested for continuing education among HCPs achieved consensus.

Consensus was not reached on including workshop and/or group tasks, didactic lectures and practical sessions, and/or simulated learning as methods of continuing education among HCPs. In contrast, studies have shown group work, simulation, repeated lectures, and workshops to be effective methods of continuing education among HCPs.<sup>21,23,24</sup>

Prostate cancer is on the list of topics engaged for teaching and learning among medical and nursing undergraduates from the University of the Free State, Faculty of Health Sciences. This subject is also featured in the training manual and workbook for CHWs in South Africa. Emphasis should be laid on topics and learning methods shown to have a positive impact on knowledge.

**Table 1. Summary of the three rounds of the Delphi study.**

Questionnaire item	Consensus percentage (%)	Round consensus reached
<b>Section 1: Shared decision-making (SDM) for prostate cancer (PCa) screening. What risk factors or criteria should warrant SDM for PCa screening among African men 40 years and older?</b>		
Men with one or more of the following lower urinary tract symptoms (LUTS): urine frequency, urgency of micturition, poor stream, urinary hesitancy, dribbling of urine, incomplete voiding, blood in semen, hematuria, painful ejaculation, impotence	94.7	1
Men with one or more 1+ degree relative with PCa	84.2	1
Men with frequent pain or stiffness in the lower back	No consensus	
Men with unexplained weight loss	No consensus	
Family history of breast cancer*	No consensus	
<b>Section 2: Which community health education topics are relevant to enhance PCa screening knowledge, attitude and practice (KAP) among African men?</b>		
Benefits of PCa screening	100.0	1
Risk factors for PCa	100.0	1
Symptoms of PCa	100.0	1
Screening tests for PCa: prostate-specific antigen (PSA) and digital rectal examination (DRE)	94.7	1
Testimony of community members living with PCa or has undergone treatment*	89.5	2
Shared decision-making in PCa screening	84.2	1
Fear regarding PCa screening	75.7	1
Function of the prostate	75.7	2
Disadvantages of PCa screening (false positives and false negatives)*	No consensus	
Fatigue (fatistic attitude) regarding PCa	No consensus	
Structural barriers to PCa screening	No consensus	
<b>Section 3: Which community health education methods can be employed to enhance PCa KAP among African men?</b>		
Audio-visual media, e.g. TV, internet, videos	100.0	1
Testimony of patients in communities. Contact sessions with patients who discuss their experience and disease*	94.7	2
Radio and other audio media	94.4	1
Contact sessions with primary healthcare workers	77.8	1
Literature, e.g. books, leaflets, articles, newspapers	72.2	1
Outreach by health system care coordinators and patient navigators*	No consensus	
<b>Section 4: What community strategies should be employed to enhance PCa health education?</b>		
Involve women in the outreach, to enhance understanding and to promote support of the effort*	89.5	2
Homogenizing PCa health education (repetition into community social gatherings involving men, e.g., religious gatherings, barbecues, bar nights, etc.	78.9	1
Workplace/ vehicle-related events for health promotion*	75.9	2
Health education pamphlets would support verbal education and should be provided in the three components in quotes spoken in the community*	73.7	2
Religious leaders, lay health counselors and owners of community social gatherings should be trained and involved in PCa health education	73.7	1
Traditional leaders can also be used, especially those in charge of initiation schools*	No consensus	
<b>Section 5: Which continuing educational topics should be included in refresher courses to enhance PCa KAP among doctors, nurses and community health workers?</b>		
Shared decision-making in PCa screening	100.0	1
Risk factors for PCa	94.7	1
Symptoms of PCa	94.7	1
Screening tests for PCa (PSA and DRE)	94.7	1
PCa treatment and complications	89.5	1
Prostate biopsy and complications	89.5	2
Function of the prostate	73.7	2
PCa staging and grading	73.7	2
<b>Section 6: Which continuing education methods should be employed to enhance PCa KAP among doctors, nurses and community health workers?</b>		
In-service training/workforce learning	94.7	1
Audio-visual media	84.2	1
Develop and disseminate online, accredited training programmes for healthcare providers, patient navigators, and community health workers†	84.2	3
Study materials	72.2	1
Didactic lectures	No consensus	
Practical sessions/simulated learning	No consensus	
Workshops/group tasks	No consensus	
<b>Section 7: Additional suggestions</b>		
Healthcare workers, like other professions, should be responsible for staying up to date with literature in their field*	84.2	2
This subject should be considered for undergraduate teaching, learning and assessment*	78.9	2

\*New items suggested by participants during Round 1 and were therefore included in the Round 2 questionnaire. †Item was suggested during Round 2 and was included in the Round 3 questionnaire.

Family physicians function in the community as champions of community-oriented primary care, care providers, capacity builders, consultants, clinical trainers, and clinical governance leaders.<sup>41</sup> Therefore, in conjunction with the other relevant HCPs and stakeholders, family physicians are pivotal in the planning, implementation, and evaluation of the strategies recommended in this study.

### Strengths and limitations

As far as we know, this is the first study in this setting aiming to recommend strategies to enhance the PCa screening approach. The recommended strategies addressed both the HCPs and users. There was a high response rate of multidisciplinary groups of participants, who were local and international HCPs, with a wealth of experience in the subject.

The strategies stemming from this study may be adapted to improve the approach of screening for other common cancers in the study setting. However, being a Delphi study, the viewpoints and decisions of the experts collated in this report are subjective and may not necessarily be accurate.

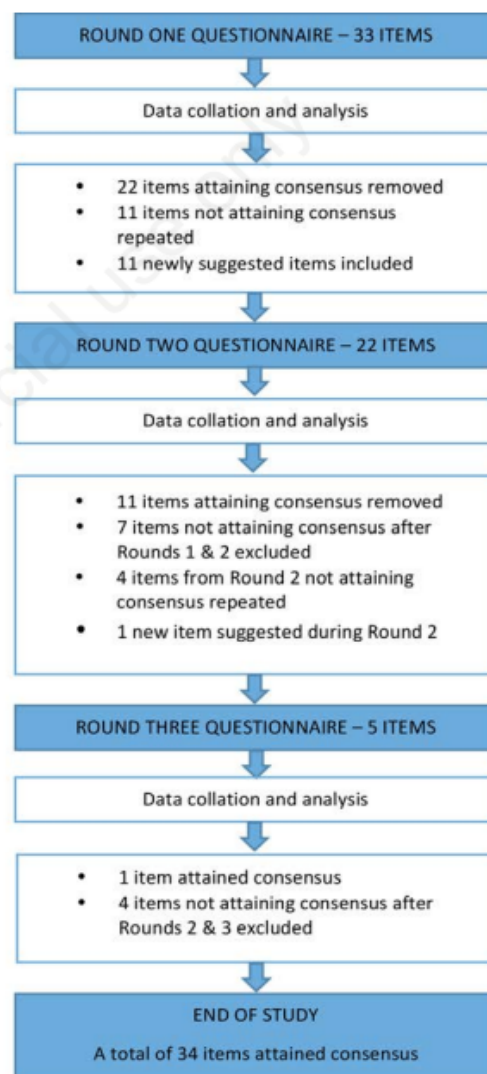
### Conclusions

This study is a sequel to the need to address the existing KAP gaps on PCa screening among primary HCPs and users. Consensus was reached by a multidisciplinary expert panel on strategies to enhance the approach to PCa screening in the study setting. Community health education strategies were proffered, relating to relevant topics, methods of delivery, venue of delivery and persons to deliver the education. Continuing education topics and methods

of instruction were suggested for primary HCPs. Further research should be done to implement these strategies and evaluate PCa screening awareness and practice in the study setting.

**Table 2. Demographic profile of the participants.**

Variable	n (%)
Gender	
Male	7 (36.8)
Female	12 (63.2)
Age in years	
31-50	8 (42.1)
>50	11 (57.9)
Profession	
Medical	12 (63.2)
Nursing	7 (36.8)
Rank	
Professor / Consultant	4 (21.0)
Senior lecturer / Consultant	8 (42.1)
Matron	1 (5.3)
Professional Nurse	6 (31.6)
Highest academic qualification	
PhD	5 (26.3)
Masters	9 (47.4)
Postgraduate diploma	5 (26.3)
Discipline (some experts are into multiple disciplines)	
Family medicine	3 (15.8)
Urology	5 (26.3)
Oncology	4 (21.1)
Medical education	1 (5.3)
Primary care nursing	4 (21.1)
Nursing education	3 (15.8)
Nursing oncology	2 (10.5)
Years of experience	
10-15	1 (5.3)
16-20	7 (36.8)
>20	12 (63.2)



**Figure 1. Overview of the Delphi process.**

**Table 3. Strategies targeted at African men to enhance the approach to prostate cancer screen, as suggested by experts.**

Strategies targeted at African men			
WHAT health education	HOW health education	WHO health education	WHERE health education
Risk factors for prostate cancer	Print media, e.g. books, leaflets, pamphlets, articles and newspapers	Survivors of prostate cancer in the community	Community social gatherings, e.g. religious gatherings, barbershops, barbecues, taxi ranks
Symptoms of prostate cancer	Translate the above-mentioned to the common local languages	Primary healthcare providers	Workplace
Functions of the prostate	Audio-visual media e.g. TV, internet, videos	Religious leaders	
Screening tests for prostate cancer	Radio and other audio media	Lay health counsellors	
Fear regarding prostate cancer	Contact sessions with primary healthcare providers	Owners of community social gatherings	
Benefits of prostate cancer screening			
Shared decision-making in prostate cancer screening			

Source: author's own data.

**Table 4. Strategies targeted at primary healthcare providers to enhance the approach to prostate cancer screening, as suggested by experts.**

Strategies targeted at primary healthcare providers	
WHAT continuing education	HOW continuing education
Function of the prostate	Audio-visual media
Risk factors for prostate cancer	Workplace learning / in-service training
Symptoms of prostate cancer	Study materials
Screening tests for prostate cancer	Online training / learning
Shared decision-making in prostate cancer screening	Aspects of prostate cancer screening to be considered for undergraduate teaching and assessment
Prostate biopsy and its complications	
Prostate cancer staging and grading	
Prostate cancer treatment and complications	

Source: author's own data.

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## **4.7 CHAPTER SUMMARY**

This chapter presented the five articles that form the foundation of the study. Subsequently, the following chapter synthesises the findings from these articles, drawing conclusions and providing recommendations aligned with the study's objectives. It closes with an emphasis on the study contribution as well as areas for future research.

## CHAPTER 5 – CONCLUSIONS AND RECOMMENDATIONS

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### 5.1 INTRODUCTION

In this concluding chapter, the key findings and conclusions derived from the thesis in relation to the study objectives and frameworks are presented. Subsequently, recommendations are proposed to enhance the approach to prostate cancer (PCa) screening among Black South African men in the Free State.

### 5.2 CONCLUSIONS RELATED TO THE STUDY OBJECTIVES

This study aimed to develop strategies to enhance the approach to PCa screening of African men in the Free State Province of South Africa. The conclusions based on the study objectives are summarised as follows:

#### **Objective 1: To describe the profile of African men diagnosed with prostate cancer in the Free State**

The findings of this study highlight the concerning prevalence of late-stage (T3 or T4), poor-grade (Gleason  $\geq$  8), and metastatic PCa among Black men in our study setting. It is evident that a substantial number of Black men with PCa experienced lower urinary tract symptoms (LUTS) before diagnosis, indicating the presence of the disease, but exhibited poor health-seeking behaviour. Certain modifiable risk factors associated with advanced disease were identified, including smoking, decreased sunlight exposure, decreased physical activity, and increased consumption of red meat and dairy products. These risk factors emphasise the importance of implementing generic preventive measures to reduce cancer's overall burden.

Despite the overall poor awareness of PCa among Black men in the study population, once a diagnosis was made, there was no delay in treatment initiation. However, poor awareness and the prevalence of aggressive PCa disease among Black men underscores the urgent need for a targeted community-specific health promotion strategy. Such a strategy should increase awareness, knowledge and understanding of PCa among Black men, emphasising the importance of early detection through seeking medical attention promptly.

Moreover, targeted prostate-specific antigen (PSA) screening should be considered for men with non-modifiable risk factors. Also, LUTS should prompt immediate evaluation, including consideration for PSA testing, given its potential association with PCa, as shown in this study. Timely and appropriate screening can aid in early detection and subsequent management of the disease, potentially improving outcomes for Black men at higher risk.

**Objective 2: To determine the knowledge, attitude and practice on screening and early diagnosis of prostate cancer of primary healthcare providers in the Free State**

The findings of this study reveal significant knowledge, attitude and practice (KAP) gaps related to PCa screening among primary healthcare (PHC) providers in the Free State, with a particular emphasis on female providers. This suggests the need for targeted interventions to enhance their understanding and competence in PCa screening practices.

Of particular concern is the potential lack of knowledge regarding the proper conduct of shared decision-making (SDM), which is a crucial component and prerequisite for effective PCa screening, owing to the controversies surrounding PCa screening. Therefore, it is essential to address this issue by providing PHC providers with comprehensive and up-to-date information on SDM in the context of PCa screening.

The study also explored the perceived need for additional knowledge among PHC providers regarding PCa screening and identified their preferred learning methods. This information can guide the development of targeted educational interventions to effectively bridge the identified knowledge gaps. Moreover, factors associated with the KAP of PHC providers regarding PCa screening were identified, which points to the need for reiterative learning and teaching on PCa screening.

**Objective 3: To determine African men's knowledge, cultural beliefs and intentions in the Free State about prostate cancer screening**

The findings of this study highlight the low level of knowledge and practice of PCa screening among Black men in the Free State. The study also revealed important insights into the factors associated with greater intent to screen for PCa among this population.

The results indicate that Black men in the Free State have a limited understanding of PCa screening. This lack of knowledge underscores the need for enhanced education and awareness strategies to improve their understanding of the importance and benefits of PCa screening. In particular, efforts should address misconceptions and cultural beliefs that may hinder their engagement with screening programmes. By clarifying misconceptions and providing culturally sensitive information, educational initiatives can help dispel fears and increase awareness about the significance of PCa screening.

Notably, fatalistic beliefs regarding PCa screening were found to be low among the participants. This suggests that Black men in the Free State may be open to receiving information and discussing PCa screening. Therefore, there is an opportunity to capitalise on this openness and promote the benefits of screening, highlighting its potential to detect PCa early when treatment options are more effective.

Factors associated with greater intent to screen for PCa were identified in the study. These factors include a lower degree of fear or apprehension toward PCa screening, a higher perceived benefit of PCa screening, a lower perceived situational barrier to screening, and a higher perceived risk of developing PCa. These findings provide valuable insights for designing targeted interventions that address the specific barriers and promote the facilitators of PCa screening uptake among Black men in the Free State.

**Objective 4: To explore and compile strategies shown to have improved African men's awareness and practice of prostate cancer screening**

The vulnerability of African men and the limited research on strategies to improve their awareness and uptake of PCa screening prompted a scoping review in this study. The aim was to provide an overview of existing research on strategies that have proven effective in enhancing PCa screening awareness and practice in the African setting.

The scoping review findings highlight the importance of community-oriented strategies in promoting PCa screening awareness and practice among African men. These strategies involve considering appropriate health education methods, topics, presenters and venues tailored to the target population's cultural and social contexts. By engaging the community and addressing their specific needs and preferences, these strategies have the potential to effectively improve PCa screening rates among African men in the South African setting.

However, the scoping review also revealed a scarcity of research on this subject in Africa. Most studies included in the review were conducted among African American men, indicating a lack of specific evidence and interventions designed for African men. This emphasises the need for further research in the African context to develop and evaluate culturally appropriate and effective strategies in addressing the unique challenges and barriers to PCa screening among African men.

**Objective 5: To develop strategies to enhance the approach to prostate cancer screening of African men in the Free State**

In response to the identified KAP gaps in PCa screening among PHC providers and users, particularly Black men, a Delphi study was conducted to address these gaps and propose strategies to enhance the approach to PCa screening in the study setting.

Through a modified Delphi process involving a multidisciplinary expert panel, consensus was reached on strategies to improve PCa screening practices in the study setting effectively. The panel recommended community health education strategies tailored to the target population's specific needs and characteristics. These strategies encompassed relevant topics related to PCa screening, appropriate methods of delivery, suitable venues for education sessions, and the identification of competent individuals to deliver the education.

Furthermore, the Delphi study identified the need for continuing education among PHC providers regarding PCa screening. The panel suggested specific topics for continuing education programmes and highlighted the importance of utilising effective methods of instruction to ensure optimal knowledge and skill development among these healthcare providers.

The recommended community health education strategies can potentially improve awareness, knowledge and participation in PCa screening among Black men and other target populations. Additionally, the emphasis on continuing education for healthcare providers emphasises the importance of empowering them with up-to-date knowledge and skills to deliver effective PCa screening services.

### **5.3 CONCLUSIONS RELATED TO THE STUDY CONTEXT AND FRAMEWORKS**

This section summarises the study findings with reference to the frameworks.

The study focuses on health promotion and disease prevention, aligning with the second community-oriented primary care (COPC) principle – comprehensive care. Building on the first COPC principles of local health and institutional analysis, the initial article started by assessing the profile of Black men with PCa in the study setting. Findings revealed poor awareness of PCa as well as the screening methods, with consequent low uptake of screening for the disease among Black men in the Free State. These men, therefore, present late and with aggressive PCa disease. Further inquiries from Article 3 showed gaps in PCa knowledge, cultural beliefs and practice. On the other hand, Article 2 showed KAP gaps relating to PCa screening among PHC providers in the study setting.

Recommendations suggested to address the identified gaps were a combination of strategies directed towards PHC providers and users. Therefore, the importance of patient values, rights and patient-centeredness in healthcare delivery is emphasised, validating the third COPC principle on equity and PHC principles.

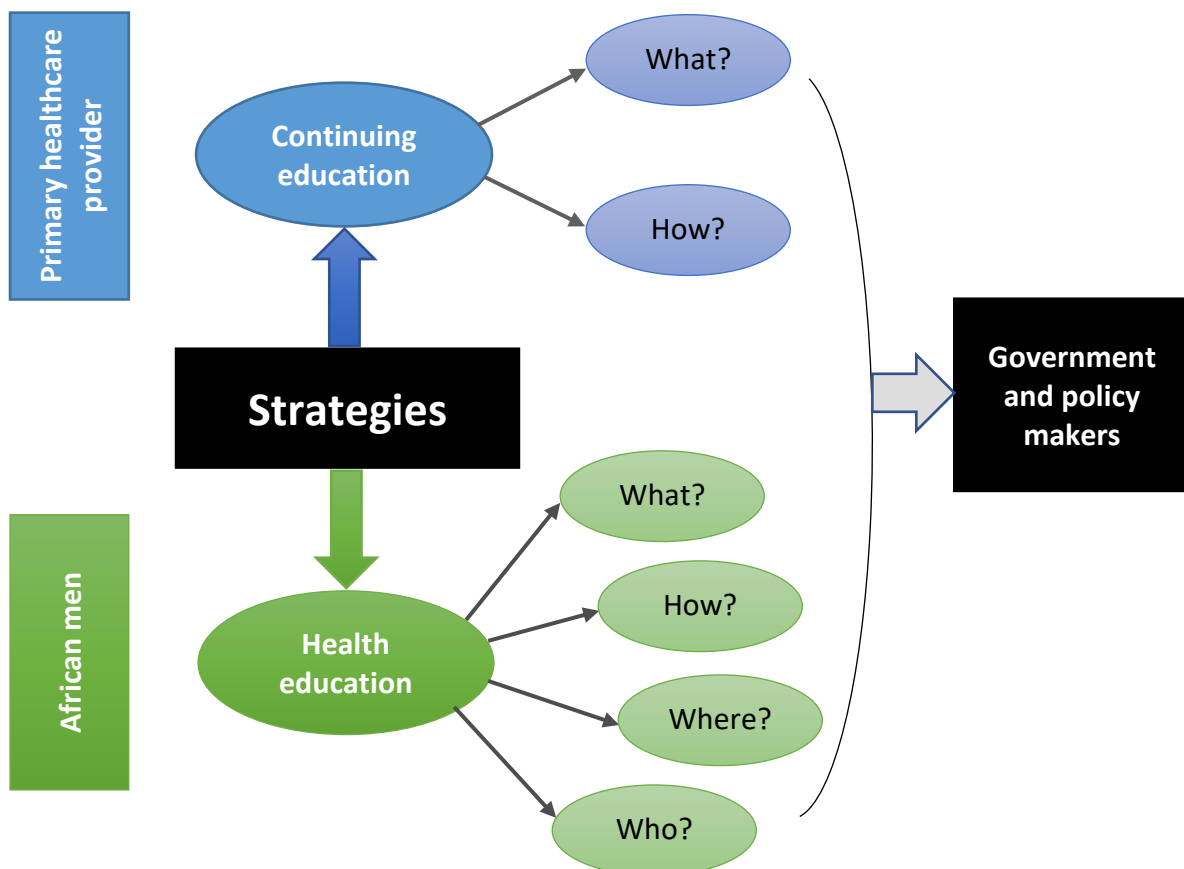
Using the Thomas Jefferson University Prostate Cancer Screening Survey Questionnaire, which adopts the Theory of Planned Behaviour (TPB) constructs, the study (Article 3) established factors associated with greater screening intention among Black South African men in the study setting.

The study thus employed multiple frameworks – KAP, COPC and TPB to arrive at its goals, establishing their usefulness and applicability in addressing relevant healthcare problems.

## 5.4 RECOMMENDATIONS

Having presented the key findings and conclusions drawn from the study, this section presents the strategies proposed to enhance the approach to PCa screening of Black South African men from the perspectives of PHC providers and users.

These recommended strategies, as presented in this section, were derived from a combination of the following sources: (i) suggestions from experts, (ii) a literature review and (iii) findings from participants, i.e., PHC providers and Black South African men in the Free State. Strategies recommended for PHC providers entail the following: (i) continuing education topics and (ii) methods of continuing education, while the strategies recommended for PHC users entail the following: (i) appropriate methods of health education, (ii) health education topics, (iii) presenters of the health education and (iv) venue of the health education sessions. Figure 6 represents a summary of the recommendations.



**Figure 7.** Summary of recommendations.

*Source:* Compiled by the researcher Benedict 2022.

#### 5.4.1 Strategies recommended for primary healthcare providers

1. **Establishment of prostate cancer health teams:** Each of the 19 local municipalities in the Free State should form a PCa health team through a training-of-trainers programme. These teams should include doctors, nurses, community health workers (CHWs), lay health advisers and PCa survivors. The teams will provide PCa continuing healthcare provider education (CHPE) and conduct health education and promotion activities in local PHC facilities and the community.
2. **Prostate cancer continuing healthcare provider education topics:** The PCa CHPE curriculum should cover essential topics such as the function of the prostate, risk factors, symptoms, SDM, screening tests (PSA and digital rectal examination (DRE)), prostate biopsy and associated complications, staging and grading, treatment modalities, complications, and determinants of aggressive PCa disease.
3. **Delivery of continuing healthcare provider education:** CHPE should be delivered through various methods, including audio-visual media, workplace learning/in-service training, study materials and online training/learning platforms.
4. **Training on screening tests:** Healthcare providers should receive training on the proper use and interpretation of screening tests. DRE training can be enhanced through technology-enhanced simulation, utilising synthetic models and manikins.
5. **Supporting female primary healthcare providers:** Since most PHC clinics in South Africa are nurse-driven, training female PHC providers in practices related to men's health is crucial. This will enable opportunistic screening of men through annual PSA and DRE examinations in the PHC settings.
6. **Incorporating prostate cancer screening in undergraduate teaching:** Aspects of PCa screening should be integrated into undergraduate medical and nursing curricula, including assessment methods to ensure competency in this area.

7. **Summarised version of SAPDTG:** Develop a summarised version of the South African Prostate Diagnostic and Treatment Guidelines (SAPDTG) and incorporate it into the standard treatment guidelines and essential medicine lists. This will facilitate easy access and reference for healthcare providers.
8. **Cultural competency training:** Healthcare providers should receive training on cultural competency and awareness of the unique healthcare needs of African men. This will help them provide more culturally sensitive and effective care.
9. **Improved provider-patient communication:** There is a need for improved provider-patient communication and the establishment of trust. Healthcare providers should strive to create open and supportive environments encouraging patients to ask questions and express their concerns.

#### 5.4.2 Strategies recommended for African men and the community

1. **Prostate cancer health education topics for men:** In PCa health education for men, topics should cover relevant PCa statistics, the location and function of the prostate gland, risk factors, symptoms, early detection, determinants of aggressive disease, SDM, screening guidelines, screening tests (including benefits and risks) and treatment options.
2. **Culturally tailored and sensitive methods of prostate cancer health education and awareness:** To enhance PCa health education and awareness, it is crucial to employ culturally tailored and sensitive methods. This can include utilising live and recorded audio and audio-visual media (TV, radio, video, and internet) for relevant teachings and motivational talks, conducting focus group discussions and workshops, and using PowerPoint presentations and flipcharts. Additionally, developing print media (leaflets, posters, pamphlets, fliers, newspapers, brochures), utilising decisional support instruments, considering tailored telephone education, and translating and presenting health educational information in the common local languages are essential to ensure effective communication and engagement.

3. **Involvement of healthcare professionals and community members:** To ensure comprehensive involvement in PCa health initiatives, it is essential to engage various stakeholders. This includes Black PCa survivors and their loved ones, who can provide valuable insights and support. Additionally, training male and female lay members of the community, health advisors, barbers, taxi rank managers, gym instructors, religious leaders and spiritual/traditional healers as community educators can further enhance awareness and education. Furthermore, collaborating with popular and influential personalities in the community (radio presenters, legislators and ministers), as well as involving healthcare professionals (public health professionals, family medicine/general practitioners, clinical associates, nursing professionals, CHWs and community allied health practitioners), will contribute to a holistic and impactful approach.
4. **Venue for community health education:** Education should be delivered at various community settings, including workplaces, religious gatherings, community health centres, men's clinics, medical male circumcision centres, barbershops, taxi ranks, barbecues and other popular community social gatherings and events such as the annual Mangaung African Culture Festival (MACUFE) in Bloemfontein, Free State.
5. **Emphasise factors associated with greater intent for prostate cancer screening:** To enhance PCa screening, it is crucial to emphasise factors that contribute to greater screening intent. This includes addressing fear and apprehension, highlighting the benefits of PCa screening, and addressing situational barriers that may hinder screening. Additionally, increasing awareness of the perceived risk of developing PCa can help motivate individuals to undergo screening.
6. **Continuum of prostate cancer health education and awareness:** Continuous and ongoing PCa health education and awareness strategies should be ensured in the community through long-term programmes, regular campaigns, workshops and community events.

7. **Shared decision-making and prostate cancer screening:** Black men aged 40 and above should be educated about the importance of SDM in PCa screening, emphasising its relevance and benefits. Prostate cancer screening questionnaires should be incorporated into consultations at PHC facilities to facilitate informed discussions and decision-making. Additionally, men presenting with LUTS, irrespective of age, should be considered for PSA testing after engaging in SDM to assess the need for further evaluation.
8. **Collaboration with spiritual and traditional healers:** Spiritual and traditional healers should be engaged in collaborative partnerships to enhance their knowledge of PCa screening and actively participate in community awareness and education efforts.
9. **Community engagement and partnerships:** Engagement and partnerships with trusted community leaders or organizations will enhance and impact PCa health education and awareness initiatives.

#### **5.4.3 Strategies recommended for government and policy makers**

1. **Addressing barriers to healthcare access:** To address barriers to healthcare access, increasing the availability of PCa screening services in underserved areas and healthcare facilities is recommended. Additionally, implementing financial assistance programmes, such as those offered through the National Health Insurance (NHI), can improve the affordability and accessibility of screening services.
2. **Collaboration with relevant non-governmental bodies:** It is crucial to establish partnerships and collaborations with organisations such as the Prostate Foundations of South Africa to enhance awareness and support healthcare providers. These collaborations can facilitate the development and implementation of community-based initiatives that promote awareness, provide education and encourage early detection of PCa.

3. **Support, facilitate and monitor implementation:** To successfully implement the recommended strategies, providing comprehensive support and resources to healthcare facilities and community organisations is essential. This support can include training programmes and educational resources that empower healthcare providers with the necessary knowledge and skills in PCa screening and management. Additionally, it is crucial to monitor the implementation process, regularly evaluate the effectiveness of the strategies, and make any required adjustments based on feedback and outcomes to ensure continuous improvement and optimal outcomes.

## 5.5 STUDY CONTRIBUTION

The study contributes to the existing literature in several ways. Firstly, it identifies determinants of aggressive PCa disease specific to Black men in the study setting. Secondly, it explores the KAP regarding PCa screening among a diverse group of PHC providers in the Free State Province of South Africa. Additionally, the study contributes to the limited literature on PCa screening intention and associated factors among African men. Based on these findings, the study provides recommendations for implementing complementary strategies that target both PHC providers and users to enhance the approach to PCa screening among South African Black men. In summary, the study not only identifies gaps in PCa screening but also offers strategies to address these gaps, aiming for an improved screening approach in the Free State.

## 5.6 STUDY LIMITATIONS

The study has several limitations that should be considered. Firstly, the participants in the first three articles were solely from the Free State Province of South Africa, limiting the findings' generalisability to a broader population. The Free State Province's specific characteristics and healthcare context may not be representative of other regions or countries.

Secondly, the study predominantly leaned on quantitative data, complemented by limited qualitative aspects. While incorporating qualitative research could have potentially yielded invaluable insights into participants' experiences and viewpoints, the prominence of the COVID-19 pandemic during the study period hindered such an approach. The exigencies of the pandemic, including constraints on face-to-face engagements and the necessity for

maintaining physical distance, presented considerable challenges in conducting more comprehensive qualitative research without compromising safety.

Thirdly, the study relied on self-reported data, which is susceptible to recall bias. Participants may have inaccurately remembered or reported their knowledge, attitudes and practices related to PCa screening, potentially affecting the validity and reliability of the findings.

Lastly, the study focused specifically on African men in the Free State province of South Africa, which may limit the generalisability of the findings to other ethnic or racial groups. Prostate cancer experiences and screening practices may vary across different populations, and caution should be exercised when applying these findings to people with different sociocultural backgrounds.

## **5.7 AREAS FOR FUTURE RESEARCH**

The COPC steps, among others, entail the implementation, monitoring and evaluation of action plans (Marcus & Hugo 2017). Therefore, implementing the recommendations and strategies derived from this study would be essential. Afterwards, relevant clinical audits can be conducted to monitor PHC providers' compliance with the recommendations. A post-implementation evaluation can be conducted after a specified time space to assess the effect of the implemented strategies.

It would be helpful to conduct related qualitative research, such as focus group discussion among African Men, which was not entirely appropriate during the study due to the COVID-19 pandemic, as stated above.

In all, further research is required on PCa screening, with emphasis on the African population, as shown in the scoping review.

## **5.8 IMPACT OF THE FINDINGS**

This section describes the impact of study findings to date. Several opportunities to disseminate the study findings have been seized to negotiate the future implementation of the relevant identified strategies, culminating in an enhanced approach to PCa screening of Black South

African men. Audiences targeted at the various opportunities include the Free State Department of Health, PHC facility managers and the corresponding healthcare providers.

### **5.8.1 Publications**

The five articles presented in Chapter 4 have all been published in peer-reviewed journals: two in international journals and the other three in national journals.

### **5.8.2 Conferences**

The research findings were also presented at the following international and local conferences:

- Poster presentation at the Association of Medical Councils of Africa (AMCOA) conference: 2–6 October 2022 (Appendices N and O).
- Oral presentation at the 10<sup>th</sup> Annual Free State Provincial Department of Health research day: 17 November 2022 (Appendices J and K).

### **5.8.3 Continuing healthcare provider education**

Following the permission and support of the Head of the Department of Family Medicine at the University of the Free State (UFS), continuing medical education (CME) on PCa screening has commenced since the last quarter of 2022 through the platform of the weekly refresher lectures at National District Hospital, Bloemfontein, with the attendance of family physicians, family medicine registrars, medical officers, interns and final year medical students on their family medicine rotation. A plan is also in place to incorporate relevant CME into the quarterly refresher courses offered by the Department of Family Medicine to a broader range of healthcare providers within and outside the Free State Province.

Also, the permission and support of the Free State Department of Health have been obtained towards the roll-out of the recommendation mentioned above in the Free State Province.

#### **5.8.4 Steps to further facilitate stakeholder engagement and support**

Upon abstract submission, the researcher has been invited to the forthcoming World Organization of Family Doctors (WONCA) world conference (WONCA 2023, Sydney, Australia), where the research findings will be presented to a global audience (Appendix M).

The Prostate Cancer Foundation of South Africa has promised to further disseminate the study findings through their online magazine - Urology, Uro-Oncology and Sexology Update Magazine (<https://prostate-ca.co.za/urologyupdatesummer2022/>). The foundation will also collaborate with the Free State Department of Health to enhance awareness in the Free State (Appendix L).

The other avenues targeted to disseminate the research findings include the UFS Faculty of Health Sciences research forum, the South African Association of Family Physicians (SAAFP) conference, as well as relevant social media platforms and other internet-based platforms such as the UFS webpage and The Conversation (<https://theconversation.com/africa>).

### **5.9 CHAPTER SUMMARY**

In this chapter, the researcher concluded the thesis, summarised its contribution, and presented key recommendations for the PHC providers and users, the government and policymakers to enhance the approach to PCa screening of African men in the Free State Province of South Africa. The study's impact, limitations and areas for future research were also highlighted.

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# APPENDICES

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## APPENDIX A Health Sciences Research Ethics Committee approval letter



Health Sciences Research Ethics Committee

12-Nov-2020

Dear **Dr Matthew Benedict**

Ethics Clearance: **Strategies to enhance the approach to prostate cancer screening among African men in the Free State**

Principal Investigator: **Dr Matthew Benedict**

Department: **Family Medicine Department (Bloemfontein Campus)**

**APPLICATION APPROVED**

Please ensure that you read the whole document

With reference to your application for ethical clearance with the Faculty of Health Sciences, I am pleased to inform you on behalf of the Health Sciences Research Ethics Committee that you have been granted ethical clearance for your project.

Your ethical clearance number, to be used in all correspondence is: **UFS-HSD2020/1481/2411**

The ethical clearance number is valid for research conducted for one year from issuance. Should you require more time to complete this research, please apply for an extension.

We request that any changes that may take place during the course of your research project be submitted to the HSREC for approval to ensure we are kept up to date with your progress and any ethical implications that may arise. This includes any serious adverse events and/or termination of the study.

A progress report should be submitted within one year of approval, and annually for long term studies. A final report should be submitted at the completion of the study.

The HSREC functions in compliance with, but not limited to, the following documents and guidelines: The SA National Health Act. No. 61 of 2003; Ethics in Health Research: Principles, Structures and Processes (2015); SA GCP(2006); Declaration of Helsinki; The Belmont Report; The US Office of Human Research Protections 45 CFR 461 (for non-exempt research with human participants conducted or supported by the US Department of Health and Human Services- (HHS), 21 CFR 50, 21 CFR 56; CIOMS; ICH-GCP-E6 Sections 1-4; The International Conference on Harmonization and Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH Tripartite), Guidelines of the SA Medicines Control Council as well as Laws and Regulations with regard to the Control of Medicines, Constitution of the HSREC of the Faculty of Health Sciences.

For any questions or concerns, please feel free to contact HSREC Administration: 051-4017794/5 or email [EthicsFHS@ufs.ac.za](mailto:EthicsFHS@ufs.ac.za).

Thank you for submitting this proposal for ethical clearance and we wish you every success with your research.

Yours Sincerely

Dr. SM Le Grange

Chair : Health Sciences Research Ethics Committee

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Health Sciences Research Ethics Committee

Office of the Dean: Health Sciences

T: +27 (0)51 401 7795/7794 | E: [ethicsfhs@ufs.ac.za](mailto:ethicsfhs@ufs.ac.za)

IRB 00011992; REC 230408-011; IORG 0010096; FWA 00027947

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## APPENDIX B Free State Department of Health approval letter



health  
Department of  
Health  
FREE STATE PROVINCE

06 November 2020

Dr M Benedict  
Dept. of Family Medicine  
UFS

Dear Dr M Benedict

**Subject: Strategies to enhance the approach to prostate cancer screening in the Free State.**

- Please ensure that you read the whole document. Permission is hereby granted for the above mentioned research on the following conditions
- Participation in the study must be voluntary
- A written consent by each participant must be obtained.
- Serious Adverse events to be reported to the Free State department of health and or termination of the study
- Ascertain that your data collection exercise neither interferes with the day to day running of **Only Free State Health Public Institution** nor the performance of duties by the respondents or health care workers.
- Confidentiality of information will be ensured and please do not obtain information regarding the identity of the participants.
- **Research results and a complete report should be made available to the Free State Department of Health on completion of the study (a hard copy plus a soft copy).**
- Progress report must be presented not later than one year after approval of the project to the Ethics Committee of the University of the Free State and to Free State Department of Health
- Any amendments, extension or other modifications to the protocol or investigators must be submitted to the Ethics Committee of the University of the Free State and to Free State, Department of Health.
- **Conditions stated in your Ethical Approval letter should be adhered to and a final copy of the Ethics Clearance Certificate should be submitted to [scholars@fshealth.gov.za](mailto:scholars@fshealth.gov.za) / [makenam@fshealth.gov.za](mailto:makenam@fshealth.gov.za) before you commence with the study**
- No financial liability will be placed on the Free State Department of Health
- **Please discuss your study with Institution Manager on commencement for logistical arrangements see 2<sup>nd</sup> page for contact details.**
- Department of Health to be fully indemnified from any harm that participants and staff experiences in the study
- Researchers will be required to enter in to a formal agreement with the Free State department of health regulating and formalizing the research relationship (document will follow)
- **As part of feedback you will be required to present your study findings/results at the Free State Provincial health research day**

Trust you find the above in order.

Kind Regs

Dr D Motau  
HEAD: HEALTH  
Date: 6/11/2020

Head: Health  
PO Box 227, Bloemfontein, 5300  
4<sup>th</sup> Floor Executive Suite, Bophelo House, cnr Maitland and Harvey Road, Bloemfontein  
Tel: (051) 408 1546 Fax: (051) 408 1556 e-mail: [chusemy@fs.health.gov.za](mailto:chusemy@fs.health.gov.za) / [fs.health.gov.za@fs.health.gov.za](mailto:fs.health.gov.za@fs.health.gov.za) / [achikobvup@fshealth.gov.za](mailto:achikobvup@fshealth.gov.za)

[www.fs.gov.za](http://www.fs.gov.za)

## APPENDIX C Head of Department: Family Medicine approval letter

Enquiry: Dr Reji E  
HOD: Family Medicine  
Dept. of Family Medicine  
Faculty of Health Sciences  
University of the Free State  
Email: [rejie@ufs.ac.za](mailto:rejie@ufs.ac.za)  
12/08/2020

To,  
The Chair of Ethic committee,  
Health Sciences Research Ethics Committee  
UFS.

Dear Dr. SM le Grange,

### **Request for Ethic Committee approval for Dr M O A Benedict PHD. Family Medicine**

Student Number: 2009138922

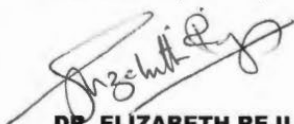
Supervisor: Prof F Claassen

TITLE OF THE PHD PROPOSAL: **Strategies to enhance the approach to prostate cancer screening in the Free State**

This is to confirm that the above-mentioned student's proposal was evaluated by the PHD committee and the study is ready for submission to Ethic Committee.

The Department recommends the protocol for Ethic approval.

Yours faithfully



**DR. ELIZABETH REJI**  
**MMED FAM. MED(UP), FCFP(SA), PGDIP. H. SCIENCE EDU(WITS).**  
**Head of Department: Family Medicine**  
**Faculty: Health Sciences**  
**Tel: 051 401-2707**  
[RejiE@ufs.ac.za](mailto:RejiE@ufs.ac.za)

Copies to:  
Prof N Mofolo (Head: School of Clinical Medicine).

## **APPENDIX D Participant information leaflet and consent**

### **Participant information leaflet and consent form**

**Title of the research project:** Strategies to enhance the approach to prostate cancer screening of African men in the Free State

**Principal investigator:** Dr M.O.A Benedict

**Address:** Department of Family Medicine, 103 CR De Wet building, Faculty of Health Sciences, University of the Free State, South Africa

**Contact number:** +27 83 858 0237; [benedictma@ufs.ac.za](mailto:benedictma@ufs.ac.za)

You are being invited to take part in a research project. Please take some time to read the information presented here, which will explain the details of this project. Please ask the study staff or doctor any questions about any part of this project that you do not fully understand. It is very important that you are fully satisfied that you clearly understand what this research entails and how you could be involved. Also, your participation is **entirely voluntary** and you are free to decline to participate. If you say no, this will not affect you negatively in any way whatsoever. You are also free to withdraw from the study at any point, even if you do agree to take part.

#### **What is this research study all about?**

Prostate cancer (PCa) is the most common malignancy occurring in men and the second most common of all diagnosed cancers. In Africa, it is the leading cancer in both occurrence and the number of deaths. Due to limited screening and early diagnosis, prostate cancer in Africa is associated with higher mortality compared to other regions of the world. Studies have shown that African men are the most affected globally and in South Africa.

Despite the available international and local guidelines for PCa screening geared at early diagnosis, most African men present late, and with incurable disease.

The reasons for this scourge may be due to poor knowledge, attitude and practice regarding prostate cancer screening among primary healthcare workers and African men

This research project therefore aims to determine strategies that will enhance the approach to prostate cancer screening by improving on the knowledge, attitude and practice/ perception of primary healthcare workers and African men in the Free State regarding prostate cancer screening.

This project is comprised of 4 complementing research activities; you will be requested to participate in only one of them. The titles of the 4 research activities are as follows:

1. The profile of African men diagnosed with prostate cancer in the Free State
2. Prostate cancer screening and early diagnosis: Knowledge, attitude and practice amongst primary health care practitioners in the Free State
3. Knowledge and screening intentions of African men in the Free State with regards to prostate cancer
4. Strategies to enhance prostate cancer screening approach among primary healthcare workers and African men: A Delphi study

The research will be submitted as scientific articles to peer-reviewed journals and will contribute to a PhD degree.

### **What will your responsibilities be?**

If you agree to participate in this study, you will be requested to complete one of the questionnaires which will be handed to you by the researcher or his assistant. It will be available in English, Sesotho and Afrikaans languages; you may complete it in any language of your choice. The process of completing the questionnaire would take about 40 minutes of your time and you would be requested to hand it in immediately upon completion.

### **Will you benefit from taking part in this research?**

There will be no financial gain from participating in this research.

The combined findings of the 4 projects will carry a greater weight and offer more scientific and social value. The report ensuing from this research may be discussed at relevant forums and may guide reflection on future improvement in the approach to prostate cancer screening of African men in the Free State Province.

### **Are there risks involved in your taking part in this research?**

There is risk to the primary healthcare workers and the men participating in the knowledge-determining projects (i.e. 2 & 3 above) in that they may feel intimidated or challenged by such

questions. Thus confidentiality will be preserved and you will not need to fear being publicly exposed or embarrassed.

**If you do not agree to take part, what alternatives do you have?**

Participation is completely voluntary and your choice to participate or not will be respected by the research team.

**Who will have access to your questionnaire results?**

The information collected will be treated as confidential and protected. When used in an aggregated report, published article or project report, the identity of the participant will remain anonymous. Only the research team will have access to the questionnaires and study codes will be allocated to each participant to preserve anonymity during the data entry and analysis.

**Will you be paid to take part in this study and are there any costs involved?**

No, you will not be paid to take part in the study. There will be no costs involved for you, if you do take part.

**Is there anything else that you should know or do?**

You can contact Dr. M.O.A Benedict (cell: 0838580237) if you have any further queries or encounter any problems.

You can also contact the Health Sciences Research Ethics Committee on 051-4017794/5 or email: [EthicsFHS@ufs.ac.za](mailto:EthicsFHS@ufs.ac.za) if you have any concerns or complaints that have not been adequately addressed by the researcher.

You will receive a copy of this information and consent form for your own records.

**PARTICIPANT CONSENT**

**Declaration by participant**

By signing below, I ..... agree to take part in the above-mentioned research study.

**I declare that:**

I have read or had read to me this information and consent form and it is written in a language with which I am fluent and comfortable.

I have had a chance to ask questions and all my questions have been adequately answered.

I understand that taking part in this study is **voluntary** and I have not been pressurized to take part. I understand this research study and am willing to take part in it.

I may choose to pull out of the study at any time. I may be asked to leave the study before it has finished, if the researcher feels it is in my best interests, or if I do not follow the study plan, as agreed to.

Signed at (*place*) ..... On (*date*) .....

Signature of participant.....

Signature of witness.....

**APPENDIX E Questionnaire 1 (Article 1)**

**The Profile of African Males Diagnosed with Prostate Cancer in the Free State**

**SECTION A – GENERAL INFORMATION / DEMOGRAPHICS**

In this questionnaire, you will have to fill in the blanks and/or tick  the box for the applicable option or options to you.

*Here are some examples for a patient:*

- a. Where were you born? Bloemfontein
- b. What is your one favourite sport?

<sup>1</sup> Soccer	<input checked="" type="checkbox"/>
<sup>2</sup> Rugby	<input type="checkbox"/>
<sup>3</sup> Cricket	<input type="checkbox"/>

**\*\*\*From his answers, we now understand that he was born in Bloemfontein and that his favourite sport is soccer.**

1. What is your age? ..... years

2. To what ethnic group do you belong? (tick  only one option)

<sup>1</sup> Pedi	<input type="checkbox"/>
<sup>2</sup> Sesotho	<input type="checkbox"/>
<sup>3</sup> Tswana	<input type="checkbox"/>
<sup>4</sup> Venda	<input type="checkbox"/>
<sup>5</sup> Xhosa	<input type="checkbox"/>
<sup>6</sup> Zulu	<input type="checkbox"/>
<sup>7</sup> Other, please specify.....	<input type="checkbox"/>

3. What is your highest level of education? (tick  only one option)

<sup>1</sup> No formal education	<input type="checkbox"/>
<sup>2</sup> Some primary level education (Grade 1 – 7)	<input type="checkbox"/>
<sup>3</sup> Primary school (Grade 7) completed	<input type="checkbox"/>
<sup>4</sup> Some secondary level education (Grade 8 – 12)	<input type="checkbox"/>
<sup>5</sup> Grade 12 (Matric) completed	<input type="checkbox"/>
<sup>6</sup> Tertiary	<input type="checkbox"/>
<sup>7</sup> Other, please specify.....	<input type="checkbox"/>

4a. What level of skill does/did your job require of you for most of the time that you have worked?

(tick  only one option)

1 Unskilled	
2 Semi-skilled	
3 Skilled	
4 Highly skilled / Professional	
5 I was never employed	

4b. Please explain or briefly describe the nature of your work with regards to Question 4a above (e.g. engineer, farmer, piece worker, etc.)

.....

5. What is your current relationship status? (tick  only one option)

1 Single / never married	
2 Married	
3 Living as married / civil union	
4 Separated / divorced	
5 Widowed	

6a. In what residential area do you currently live? (tick  only one option)

1 Fezile Dabi	
2 Thabo Mofutsayane	
3 Mangaung	
4 Lejweleputswa	
5 Xhariep	
6 Northern Cape	
7 North West	
8 Eastern Cape	
9 Lesotho	
10 Other, please specify.....	

6b. **NB: The researcher will assist with categorising your residential area under one of the following**

1 Township / Rural	
2 Inner city / CBD	
3 Suburb	
4 Farms	
5 Informal settlement	

**SECTION B – PROSTATE CANCER RELATED INFORMATION**

7a. Did you have any symptoms before you were diagnosed with prostate cancer? (tick  only one option)

<sup>1</sup> Yes	
<sup>2</sup> No	

7b. What or who made you decide to seek medical help? (tick  only one option)

<sup>1</sup> My doctor suggested that I go for a prostate cancer screening	
<sup>2</sup> My family or friend's suggested that I go for a prostate cancer screening	
<sup>3</sup> I was concerned about some unusual symptoms I was having, so I went to the clinic	

8. If you had symptoms before you were diagnosed with prostate cancer, which of the following symptoms were you having (tick  all the symptoms that you experienced)

<sup>1</sup> No symptom, the diagnosis of prostate cancer was incidental	
<sup>2</sup> You needed to urinate more than usual during the day ( <b>urinary frequency</b> )	
<sup>3</sup> You needed to wake up to urinate more than usual at night ( <b>nocturia</b> )	
<sup>4</sup> You had unstoppable urge to urinate ( <b>urgency of urine</b> )	
<sup>5</sup> It was painful or difficult passing urine ( <b>dysuria</b> )	
<sup>6</sup> Your flow of urine reduced ( <b>poor stream</b> )	
<sup>7</sup> You had delay in starting off to pass urine ( <b>urinary hesitancy</b> )	
<sup>8</sup> Urine slowly leaked out towards the end of urinating ( <b>dribbling of urine</b> )	
<sup>9</sup> You felt your bladder is not empty after urinating ( <b>incomplete voiding</b> )	
<sup>10</sup> Blood in semen	
<sup>11</sup> Blood in the urine	
<sup>12</sup> Frequent pain or stiffness in the lower back	
<sup>13</sup> Painful ejaculation	
<sup>14</sup> You had inability to achieve erection of your penis ( <b>impotence</b> )	
<sup>15</sup> Other, please specify .....	

9. How long after your symptoms started (before you were diagnosed with prostate cancer) did you go and look for medical help? (tick  only one option)

<sup>1</sup> I did not have any symptoms	
<sup>2</sup> Within 6 months after the symptoms started	
<sup>3</sup> 7 to 12 months after the symptoms started	
<sup>4</sup> 1 to 2 years after the symptoms started	
<sup>5</sup> 2 to 5 years after the symptoms started	
<sup>6</sup> More than 5 years after the symptoms started	

10a. Are you aware of any close family member / relative (father, mother, children, siblings, grandparent) diagnosed with cancer? (tick  only one option)

<sup>1</sup> Yes	
<sup>2</sup> No	

→ **Please complete Question 10b first**

→ **Please go to Question 11**

10b. If you answered **Yes** to Question 10a above, please show us your relationship with these family / relative(s) and their type of cancer – e.g. Sister - breast cancer (tick  **all that apply**)

<sup>1</sup> Grandfather - lung cancer	
<sup>2</sup> Grandfather - prostate cancer	
<sup>3</sup> Grandfather - cancer of other body part	
<sup>4</sup> Father - lung cancer	
<sup>5</sup> Father - prostate cancer	
<sup>6</sup> Father - cancer of other body part	
<sup>7</sup> Brother - lung cancer	
<sup>8</sup> Brother - prostate cancer	
<sup>9</sup> Brother - cancer of other body part	
<sup>10</sup> Grandmother - breast cancer	
<sup>11</sup> Grandmother - cervix or uterus cancer	
<sup>12</sup> Grandmother - cancer of other body part	
<sup>13</sup> Mother - breast cancer	
<sup>14</sup> Mother - cervix or uterus cancer	
<sup>15</sup> Mother - cancer of other body part	
<sup>16</sup> Sister - breast cancer	
<sup>17</sup> Sister - cervix or uterus cancer	
<sup>18</sup> Sister - cancer of other body part	
<sup>19</sup> Female child - breast cancer	
<sup>20</sup> Female child - cervix or uterus cancer	
<sup>21</sup> Female child - cancer of other body part	
<sup>22</sup> Male child - lung cancer	
<sup>23</sup> Male child - prostate cancer	
<sup>24</sup> Male child - cancer of other body part	

11. Which medical conditions did you already have before you were diagnosed with prostate cancer? (tick  **all that apply**)

<sup>1</sup> I didn't have any medical conditions	
<sup>2</sup> Diabetes	
<sup>3</sup> Hypertension (high blood pressure)	
<sup>4</sup> Depression	
<sup>5</sup> High cholesterol in the blood	
<sup>6</sup> HIV infection	
<sup>7</sup> Tuberculosis (TB)	
<sup>8</sup> Other, please specify.....	

12a. Were you ever diagnosed with any sexually transmitted diseases (e.g. gonorrhoea, syphilis, chlamydia or genital herpes) before you were diagnosed with prostate cancer? (tick  **only one option**)

<sup>1</sup> Yes		→ <b>Please complete Question 12b first</b>
<sup>2</sup> No		→ <b>Please go to Question 13</b>

12b. If you answered **Yes** to Question 12(a) above, how many times were you diagnosed with this / these sexually transmitted disease(s) (e.g. gonorrhoea, syphilis, chlamydia or genital herpes)?

<sup>1</sup> Once	
<sup>2</sup> 2 to 5 times	
<sup>3</sup> More than 5 times	

**Instructions**

1. In the following 5 questions, we will ask you to think back over the past few decades, all the way back to when you were in your 20's.

2. We will be looking at different areas of your life including the following 5 themes:

1. Cigarette smoking
2. Body size
3. Exposure to sunlight
4. Weekly physical activities and exercises
5. Eating habits

3. Let's go through the steps:

- First look at the question. It is about physical activities you spend each week.
- Look at the activity. It is mountain climbing.
- Then look at all the options listed below. Here we have 5 options starting at 'less than 2 hours each week' to 'I am not in that age group yet'.
- Now you are going to start with your 20s. Ask yourself, 'how many hours did I mountain climb each week when I was in my 20s'?
- Chose the option in the list which you feel is the one that gives a good idea of your normal day to day activities.

**Remember: there are no wrong answers.**

Let's look at an example:

Example: 52-year-old male who did a lot of mountain climbing in his 20s and 30s. In his 40s he could only climb a short time as his children was small. He never mountain climbed in his 50s as he broke his leg. He is not in his 60s yet.

Q. How much time do you think (as you remember it) you spend each week doing the physical activities in the list below?

		Life stage (years)				
		20s	30s	40s	50s	60 and older
<b>Physical activities</b>						
<b>Mountain climbing</b>						
1	Less than 2 hours each week			x		
2	2 to 5 hours each week					
3	More than 5 hours each week	x	x			
4	Never				x	
5	I am not in that age group yet					x

13. **Cigarette smoking history:** How many sticks of cigarettes do you think (as you remember it) you smoked every day during the different stages of your life? (tick  one option for each stage of your life)

Smoking – number of sticks		Life stage (years)				
		20s	30s	40s	50s	60s +
1	1 stick every day					
2	2 to 5 sticks every day					
3	6 to 10 sticks every day					
4	11 to 20 sticks every day					
5	more than 20 sticks every day					
6	Never smoked					
7	Stopped smoking					

14. **Body size:** What do you think (as you remember it) your body size was during the different stages of your life? (tick  one option for each stage of your life)

Body size estimate		Life stage (years)				
		20s	30s	40s	50s	60s +
1	Thin / small (underweight)					
2	Normal size (normal weight)					
3	Big (overweight)					
4	Very big (very overweight/obese)					

15. **Exposure to sunlight:** How long do you think (as you remember it) did you spend in the sunlight every week? (tick  one option for each stage of your life)

Exposure to sunlight		Life stage (years)				
		20s	30s	40s	50s	60s +
1	less than 2 hours					
2	2 to 5 hours each week					
3	6 to 10 hours each week					
4	more than 10 hours each week					

### 16. Weekly physical activities and exercises

How much time do you think (as you remember it) you spend each week doing the physical activities in the list below? (tick  one option for each stage of your life)

Activity	Life stage (years)				
	20s	30s	40s	50s	60s +
<b>Walking</b> each week					
1 less than 2 hours					
2 2 to 5 hours					
3 more than 5 hours					
4 Never					
5 I am not in that age group yet					
<b>Own home gardening</b> each week					
1 less than 2 hours					
2 2 to 5 hours					
3 more than 5 hours					
4 Never					
5 I am not in that age group yet					
<b>Gym</b> each week					
1 less than 2 hours					
2 2 to 5 hours					
3 more than 5 hours					
4 Never					
5 I am not in that age group yet					
<b>Own house work</b> – e.g. cleaning, sweeping each week					
1 less than 2 hours					
2 2 to 5 hours					
3 more than 5 hours					
4 Never					
5 I am not in that age group yet					
<b>Social sport</b> – e.g. soccer, basketball, tennis each week					
1 less 2 hours					
2 2 to 5 hours					
3 more than 5 hours					
4 Never					
5 I am not in that age group yet					
<b>Other</b> each week .....					
1 less than 2 hours					
2 2 to 5 hours					
3 more than 5 hours					
4 Never					
5 I am not in that age group yet					

## 17. Eating habits

How often do you think (as you remember it) you ate/eat the different types of food in the list below? (breakfast, lunch, dinner and snacks should be accounted for) **(tick  one option for each stage of your life)**

Group		Life stage (years)				
		20s	30s	40s	50s	60s +
<b>Staple carbohydrates, e.g. rice, potatoes, maize / corn meal</b>						
1	>3 times per day					
2	2 – 3 times per day					
3	Once a day					
4	5 – 6 times per week					
5	2 – 4 times per week					
6	Once a week					
7	Less than once a week					
8	Never					
<b>Dairy products, e.g. cheese, milk</b>						
1	>3 times per day					
2	2 – 3 times per day					
3	Once a day					
4	5 – 6 times per week					
5	2 – 4 times per week					
6	Once a week					
7	Less than once a week					
8	Never					
<b>Fruits and vegetables</b>						
1	>3 times per day					
2	2 – 3 times per day					
3	Once a day					
4	5 – 6 times per week					
5	2 – 4 times per week					
6	Once a week					
7	Less than once a week					
8	Never					

***Please complete the rest of the table on the next page.***

Group		Life stage (years)				
		20s	30s	40s	50s	60s +
<b>Red Meat</b> , e.g. wors / sausage, steak, pork, lamb, bully beef						
1	>3 times per day					
2	2 – 3 times per day					
3	Once a day					
4	5 – 6 times per week					
5	2 – 4 times per week					
6	Once a week					
7	Less than once a week					
8	Never					
<b>Poultry</b> , e.g. chicken, turkey						
1	>3 times per day					
2	2 – 3 times per day					
3	Once a day					
4	5 – 6 times per week					
5	2 – 4 times per week					
6	Once a week					
7	Less than once a week					
8	Never					
<b>Fish</b> , e.g. tuna, curry fish, hake						
1	>3 times per day					
2	2 – 3 times per day					
3	Once a day					
4	5 – 6 times per week					
5	2 – 4 times per week					
6	Once a week					
7	Less than once a week					
8	Never					
<b>Fast foods</b> , e.g. takeaways, restaurants						
1	>3 times per day					
2	2 – 3 times per day					
3	Once a day					
4	5 – 6 times per week					
5	2 – 4 times per week					
6	Once a week					
7	Less than once a week					
8	Never					

**\*\*You have now completed the questionnaire. Please return the questionnaire to the researcher or research assistant.**

***Thank you for your time. Your participation is appreciated.***

---

**For office use:**

**To be completed by researcher and/or research assistant**

18. Excluding Q6a – did the participant need verbal or written assistance to complete the questionnaire?

<sup>1</sup> Yes	
<sup>2</sup> No	

19. Year patient was first diagnosed with prostate cancer

<sup>1</sup> 2015	
<sup>2</sup> 2016	
<sup>3</sup> 2017	
<sup>4</sup> 2018	
<sup>5</sup> 2019	

20. Duration: urology appointment to diagnosis (histology)

<sup>1</sup> < 1 month	
<sup>2</sup> 1 - 3 months	
<sup>3</sup> 4 - 6 months	
<sup>4</sup> 7 - 12 months	
<sup>5</sup> > 12 months	

21. Duration: diagnosis to treatment initiation

<sup>1</sup> < 1 month	
<sup>2</sup> 1 - 3 months	
<sup>3</sup> 4 - 6 months	
<sup>4</sup> 7 - 12 months	
<sup>5</sup> > 12 months	

22. PCa stage.....

23. Tumour grading (Gleason scoring) .....

**APPENDIX F Questionnaire 2 (Article 2)**

**Knowledge, Attitude and Practice of Free State Primary Health Care Practitioners on Screening and Early Diagnosis of Prostate Cancer**

**1. This questionnaire consists of 7 sections:**

- Section A: General information/demographics
- Section B: Knowledge items
- Section C: Primary health care practitioners' attitude towards screening for prostate cancer
- Section D: Primary health care practitioners' self-efficacy/practice regarding prostate cancer counselling and screening
- Section E: Perceived barrier to prostate cancer counselling and screening
- Section F: Need for more knowledge/information on prostate cancer

**2. Instructions for completion will be provided for each section.**

**SECTION A – GENERAL INFORMATION / DEMOGRAPHICS**

1. Please complete open fields shown as .....
2. Unless stated otherwise, please tick  only one option per question.
3. Where multiple options should be selected, this will be specified for the question.

1. What is your age? .....years

2. What is your gender?

<sup>1</sup> Male	
<sup>2</sup> Female	

3. What is your current profession?

<b>Medical doctors</b>	
<sup>1</sup> Family physician	
<sup>2</sup> Medical officer / General practitioner	
<sup>3</sup> Community service medical officer	
<sup>4</sup> Intern	
<b>Nurses</b>	
<sup>5</sup> Professional nurse	
<sup>6</sup> Staff nurse	
<sup>7</sup> Enrolled nurse	
<sup>8</sup> <b>Clinical associate</b>	
<sup>9</sup> <b>Community health worker</b>	

4. **Which year** did you obtain your primary qualification? .....

5. In which sector do you currently work?

<sup>1</sup> Government	
<sup>2</sup> Private	
<sup>3</sup> Both government and private	

6. For how long have you been practising since you obtained your primary qualification?

<sup>1</sup> < 1 year	
<sup>2</sup> 1 – 5 years	
<sup>3</sup> 6 – 10 years	
<sup>4</sup> >10 years	

7(a). Do you have any health-related postgraduate qualification?

<sup>1</sup> Yes		→ <b>Please complete Question 7(b) first</b>
<sup>2</sup> No		→ <b>Please go to Question 8</b>

7(b). If **Yes** to Q7(a), which of the following health-related postgraduate qualification(s) do you have? (tick  all that apply)

<sup>1</sup> Postgraduate diploma	
<sup>2</sup> Master's degree	
<sup>3</sup> PhD	
<sup>4</sup> Other, please specify.....	

8. Did you complete any of your training outside South Africa?

<sup>1</sup> Yes	
<sup>2</sup> No	

9. Have you ever practiced your profession outside South Africa?

<sup>1</sup> Yes	
<sup>2</sup> No	

10(a). Have you ever held a post or worked in a urology unit?

<sup>1</sup> Yes		→ <b>Please complete Question 10(b) first</b>
<sup>2</sup> No		→ <b>Please go to Question 11</b>

10(b). If **Yes** to Q10(a), for how long have you / did you work in the urology unit?

<sup>1</sup> < 1 year	
<sup>2</sup> 1 – 5 years	
<sup>3</sup> 6 – 10 years	
<sup>4</sup> > 10 years	

11. Have you ever attended continuing medical education (CME) or continuing professional development (CPD) session where the main topic was on prostate cancer?

<sup>1</sup> Yes		→ <b>Please complete Question 12 first</b>
<sup>2</sup> No		→ <b>Please go to Question 13</b>

12. If **Yes** to Q11, when was the last CME / CPD session?

<sup>1</sup> Within the last year	
<sup>2</sup> 1 – 5 years ago	
<sup>3</sup> > 5 years ago	

13. Does your practice run a men's health clinic?

<sup>1</sup> Yes		→ <b>Please complete Question 14 first</b>
<sup>2</sup> No		→ <b>Please go to Question 15</b>

14. If **Yes** to Q13, how many men (on estimate) attend the men's health clinic on a monthly basis?

<sup>1</sup> < 10	
<sup>2</sup> 10 – 20	
<sup>3</sup> 21 – 30	
<sup>4</sup> > 30	

15. Are you involved in the training of medical students and / or postgraduate students?

<sup>1</sup> Yes	
<sup>2</sup> No	

16. Are you aware of the South African prostate cancer diagnostic and treatment guidelines?

<sup>1</sup> Yes	
<sup>2</sup> No	

17. Do you or your practice have a guideline on prostate cancer screening?

<sup>1</sup> Yes	
<sup>2</sup> No	

## **SECTION B - KNOWLEDGE ITEMS**

1. Please complete open fields (Question B10).
2. For *Yes, No, I don't know, or True, False, I don't know*, questions, please tick  the applicable option.
3. Statements in tables will have different options to select from. Read each statement/question and tick  the best option for that statement/question.

### **B1. Function of the prostate gland**

The following are some of the functions of the prostate gland:

<b>B1</b>	<b>Function</b>	<b>True<sup>1</sup></b>	<b>False<sup>2</sup></b>	<b>I don't know<sup>3</sup></b>
<sup>1</sup>	The slightly alkaline fluid produced by the prostate forms part of the seminal fluid and allows sperm motility and viability			
<sup>2</sup>	The smooth muscles in the prostate help to expel semen during ejaculation			
<sup>3</sup>	No definite function of the prostate has been described			

**B2. Risk factors for prostate cancer**

A 58-year old African male presents to you for motivational interview for lifestyle modification, being obese due to unhealthy eating habits. You decide to evaluate him for prostate cancer risks.

The following are risk factors for prostate cancer in this man:

<b>B2</b>	<b>Risk factors</b>	<b>True<sup>1</sup></b>	<b>False<sup>2</sup></b>	<b>I don't know<sup>3</sup></b>
1	Being African			
2	Over 50 years old			
3	Unhealthy eating habits			

**B3.** For each of the following, please indicate the effect / influence on the risk of developing prostate cancer:

**1 = does not affect risk, 2 = reduces risk, 3 = increases risk, 4 = I don't know**

<b>B3</b>	<b>Indicate your level of acceptance on the possible influence of the following on the risk of prostate cancer development</b>	<b>Does not affect risk</b>	<b>Reduces risk</b>	<b>Increases risks</b>	<b>I don't know</b>
1	1 <sup>st</sup> degree relative with prostate cancer	1	2	3	4
2	High dietary fat intake	1	2	3	4
3	Current smoking	1	2	3	4
4	White race	1	2	3	4
5	Obesity	1	2	3	4
6	1 <sup>st</sup> degree relative with breast cancer	1	2	3	4
7	Benign prostatic hyperplasia	1	2	3	4
8	A man having multiple sexual partners	1	2	3	4

#### B4. Symptoms of prostate cancer

A 58-year old male presents to you at the local clinic. For which of the following symptoms will you recommend prostate cancer screening for him:

**1 = recommend, 2 = don't recommend, 3 = I don't know**

B4	Symptom	Recommend	Don't recommend	I don't know
1	<b>Urinary frequency</b> (needs to urinate more than usual during the day)	1	2	3
2	<b>Nocturia</b> (needs to wake up to urinate more than usual at night)	1	2	3
3	<b>Urgency of urine</b> (unstoppable urge to urinate)	1	2	3
4	<b>Dysuria</b> (painful or difficult passing urine)	1	2	3
5	<b>Poor stream</b> (flow of urine reduced)	1	2	3
6	<b>Urinary hesitancy</b> (delay in starting off to pass urine)	1	2	3
7	<b>Dribbling of urine</b> (urine slowly leaks out towards the end of urinating)	1	2	3
8	<b>Incomplete voiding</b> (bladder is not empty after urinating)	1	2	3
9	Blood in semen	1	2	3
10	Blood in the urine	1	2	3
11	Frequent pain or stiffness in the lower back	1	2	3
12	Painful ejaculation	1	2	3
13	<b>Impotence</b> (inability to achieve erection of penis)	1	2	3

#### B5. The role of nutrients in prostate cancer development

What is the likely effect of the following with regards to prostate cancer development?

**1 = no effect, 2 = decreases likelihood, 3 = increases likelihood, 4 = I don't know**

B5	Indicate the effect of the following nutrients on the risk of prostate cancer development	No effect	Decreases likelihood	Increases likelihood	I don't know
1	Selenium	1	2	3	4
2	Vitamin E	1	2	3	4
3	Green tea extracts	1	2	3	4
4	Vitamin D	1	2	3	4
5	Beta carotenes	1	2	3	4

**B6. Screening tests for prostate cancer**

What is the likelihood that a positive result indicates prostate cancer?

1 = < 10%, 2 = 10 – 30%, 3 = 30 – 50%, 4 = > 50%, 5 = not sure, 6 = not heard of these test(s)

B6	For the following tests, what is the likelihood that a positive result indicates prostate cancer?	< 10%	10 - 30%	30 - 50%	> 50%	Not sure	Not heard of these test(s)
1	PSA level	1	2	3	4	5	6
2	DRE	1	2	3	4	5	6
3	PSA level and DRE	1	2	3	4	5	6

(PSA = Prostate Specific Antigen; DRE = Digital Rectal Examination)

**B7.** A normal DRE excludes prostate cancer:

1 True	
2 False	

**B8.** A 62-year old male has prostate specific antigen (PSA) level of 5.5 ng/ml. Digital rectal examination (DRE) conducted on him is also abnormal. What investigation should be conducted to confirm **or** rule out the diagnosis of prostate cancer? (**only one answer is correct**)

1 Chest X-ray	
2 Prostate biopsy	
3 Repeat PSA after 1 year	
4 Clinical monitoring is sufficient	
5 I don't know	

**B9.** How often would you carry out periodic prostate cancer reassessment (PSA and DRE) on healthy men aged 50 years and over? (**only one answer is correct**)

1 It depends on the initial PSA and DRE results	
2 Only in the presence of lower urinary tract symptoms	
3 No need for reassessment	
4 I don't know	

**B10.** Mention **three (3) abnormal findings** that may be suggestive of prostate cancer on a digital rectal examination (DRE).

.....

.....

.....

**B11. The effect of the following conditions on PSA level**

*1 = no effect, 2 = false elevation, 3 = false decrease, 4 = I don't know*

<b>B11</b>	<b>What would be the effect of the following conditions on PSA level?</b>	<b>No effect</b>	<b>False elevation</b>	<b>False decrease</b>	<b>I don't know</b>
1	Benign prostatic hyperplasia	1	2	3	4
2	Active urinary tract infection	1	2	3	4
3	Urinary retention	1	2	3	4
4	Recent urinary tract instrumentation	1	2	3	4
5	Prostatitis	1	2	3	4
6	Recent ejaculation	1	2	3	4

**B12. Prostate cancer staging**

Which of the following is / are staging investigation(s) for localised prostate cancer:

<b>B12</b>	<b>The following are investigations for staging prostate cancer:</b>	<b>True<sup>1</sup></b>	<b>False<sup>2</sup></b>	<b>I don't know<sup>3</sup></b>
1	Bone scan			
2	Computerized tomography (CT) scan			
3	Trans-rectal ultrasound			
4	Lymph node dissection			
5	Magnetic Resonance Imaging (MRI)			

**B13. Treatment modalities for prostate cancer**

<b>B13</b>	<b>The following are possible treatment modalities for prostate cancer:</b>	<b>True<sup>1</sup></b>	<b>False<sup>2</sup></b>	<b>I don't know<sup>3</sup></b>
1	Radical prostatectomy			
2	Radiotherapy			
3	Cryotherapy			
4	Androgen deprivation therapy			
5	Chemotherapy			
6	Active surveillance			
7	Watchful waiting			

**B14. Complications of prostate cancer treatment**

<b>B14</b>	<b>The following are possible complications of prostate cancer treatment:</b>	<b>True<sup>1</sup></b>	<b>False<sup>2</sup></b>	<b>I don't know<sup>3</sup></b>
1	Erectile dysfunction			
2	Incontinence			
3	Urinary retention			
4	Hot flushes			
5	Gynaecomastia			
6	Depression			
7	Osteoporosis			

**SECTION C – PRIMARY HEALTH CARE PRACTITIONERS’ ATTITUDE TOWARDS  
SCREENING FOR PROSTATE CANCER**

To what extent do you agree or disagree with the following statements (tick  only one option for each statement): **1 = strongly disagree; 2 = disagree; 3 = somewhat disagree; 4 = neutral; 5 = somewhat agree; 6 = agree; 7 = strongly agree**

C1	To what extent do you agree or disagree with the following statements?	Strongly disagree	Disagree	Somewhat disagree	Neutral	Somewhat agree	Agree	Strongly agree
1	Early detection through screening can improve survival for men with prostate cancer	1	2	3	4	5	6	7
2	Prostate cancer counselling and screening should be routinely used on all men beginning at age 50	1	2	3	4	5	6	7
3	Digital rectal examination is an accurate screening test for prostate cancer	1	2	3	4	5	6	7
4	There is evidence to support using digital rectal examination for prostate cancer screening on asymptomatic men with no risk factors	1	2	3	4	5	6	7
5	Digital rectal examination is unaccepted by South African men, so primary health care practitioners should avoid it	1	2	3	4	5	6	7
6	I am uncomfortable with practice relating to men’s health	1	2	3	4	5	6	7
7	Prostate specific antigen is an accurate screening test for prostate cancer	1	2	3	4	5	6	7
8	There is enough evidence to support using prostate specific antigen for prostate cancer screening on asymptomatic men with no risk factors	1	2	3	4	5	6	7
9	It is more appropriate for specialists to screen for prostate cancer	1	2	3	4	5	6	7
10	I think that prostate specific antigen testing leads to excess subsequent unnecessary investigations	1	2	3	4	5	6	7
11	DRE and serum prostate specific antigen screening of asymptomatic men reduces prostate cancer mortality	1	2	3	4	5	6	7
12	Patients with history of lower urinary tract symptoms and / or clinical suspicion of prostate cancer should have their prostate specific antigen tested	1	2	3	4	5	6	7
13	I will conduct prostate cancer screening on any male requesting it	1	2	3	4	5	6	7
14	Prostate cancer screening is unnecessary in males > 70 years	1	2	3	4	5	6	7

**SECTION D – PRIMARY HEALTH CARE PRACTITIONERS' SELF-EFFICACY / PRACTICE REGARDING PROSTATE CANCER COUNSELLING AND SCREENING**

Please rate your confidence on your ability to perform the following (tick  only one option for each statement): **1 = very untrue of me; 2 = untrue of me; 3 = somewhat untrue of me; 4 = neutral; 5 = somewhat true of me; 6 = true of me; 7 = very true of me**

<b>D1</b>	<b>Please rate your confidence on your ability to perform the following:</b>	<b>Very untrue of</b>	<b>Untrue of me</b>	<b>Somewhat untrue of</b>	<b>Neutral</b>	<b>Somewhat true of me</b>	<b>True of me</b>	<b>Very true of me</b>
1	I am able to provide effective counselling of asymptomatic men on prostate cancer	1	2	3	4	5	6	7
2	I am able to take proper history in order to identify risk factors and symptoms of prostate cancer from patients	1	2	3	4	5	6	7
3	I am able to refer patients with high risk for prostate cancer for screening	1	2	3	4	5	6	7
4	I am able to follow up patients with high risk for prostate cancer	1	2	3	4	5	6	7
5	I am able to examine the prostate by digital rectal examination	1	2	3	4	5	6	7
6	I am able to detect palpable abnormalities on the prostate during digital rectal examination	1	2	3	4	5	6	7
7	I am able to find suitable opinions for treatment of patients with prostate cancer	1	2	3	4	5	6	7
8	I am able to counsel patients on the benefits of prostate specific antigen	1	2	3	4	5	6	7
9	I am able to discuss the various treatment modalities of prostate cancer with my patients	1	2	3	4	5	6	7

**Answer question D2 if you are a male participant.**

**D2.** Would you consider having prostate cancer screening on yourself?

1 Yes	
2 No	

**SECTION E – PERCEIVED BARRIER TO PROSTATE CANCER COUNSELLING AND SCREENING**

Tick  only one option for each statement.

<b>E1</b>	<b>The following are possible barriers to prostate cancer counselling and screening:</b>	<b>True<sup>1</sup></b>	<b>False<sup>2</sup></b>	<b>I don't know<sup>3</sup></b>
1	Knowledge lack amongst health care practitioners			
2	Knowledge lack amongst "at risk" men			
3	Inadequate skills amongst health care practitioners			
4	Refusal of patients			
5	Screening tests are inaccurate			
6	Prostate cancer is not a public problem			

**SECTION F – NEED FOR MORE KNOWLEDGE / INFORMATION ON PROSTATE CANCER**

**F1.** Do you think you need additional knowledge / information with regards to prostate cancer?

1 Yes		→ <b>Please complete Questions F2 and F3</b>
2 No		→ <b>Questionnaire completed, please return to the researcher or research assistant</b>
3 Not sure		→ <b>Questionnaire completed, please return to the researcher or research assistant</b>

**F2.** If **Yes** to Question F1 above, in which aspect(s) do you need more information with regards to prostate cancer? (tick  all that apply)

1 Risk factors and counselling	
2 Symptoms	
3 The value of nutrients	
4 The value of PSA testing	
5 The value of digital rectal examination	
6 Diagnosis	
7 Treatment	
8 Other, please specify .....	
.....	

**F3.** If **Yes** to Question F1 above, through which method(s) would you want this additional knowledge / information? **(tick  all that apply)**

<sup>1</sup> Didactic lectures	
<sup>2</sup> Study materials	
<sup>3</sup> Practical sessions	
<sup>4</sup> Simulated scenarios	
<sup>5</sup> Group tasks	
<sup>6</sup> Other, please specify .....	
.....	

***Thank you for your time. Your participation is much appreciated.***

**APPENDIX G Questionnaire 3 (Article 3)**

**Knowledge and Screening Intentions of Senior African Males in the Free State with regards to Prostate Cancer Screening**

**SECTION A – GENERAL INFORMATION / DEMOGRAPHICS**

In this questionnaire, you will have to fill in the blanks and/or tick  the box for the applicable option or options to you.

*Here are some examples for a patient:*

- a. Where were you born? Bloemfontein
- b. What is your one favourite sport?
  - <sup>1</sup> Soccer
  - <sup>2</sup> Rugby
  - <sup>3</sup> Cricket

**\*\*\*From his answers, we now understand that he was born in Bloemfontein and that his favourite sport is soccer.**

1. What is your age? ..... years

2. To what ethnic group do you belong? (tick  only one option)

<sup>1</sup> Pedi	<input type="checkbox"/>
<sup>2</sup> Sesotho	<input type="checkbox"/>
<sup>3</sup> Tswana	<input type="checkbox"/>
<sup>4</sup> Venda	<input type="checkbox"/>
<sup>5</sup> Xhosa	<input type="checkbox"/>
<sup>6</sup> Zulu	<input type="checkbox"/>
<sup>7</sup> Other, please specify.....	<input type="checkbox"/>

3. What is the highest level of education you have completed? (tick  only one option)

<sup>1</sup> No formal education	<input type="checkbox"/>
<sup>2</sup> Some primary level education (Grade 1 – 7)	<input type="checkbox"/>
<sup>3</sup> Primary school (Grade 7) completed	<input type="checkbox"/>
<sup>4</sup> Some secondary level education (Grade 8 – 12)	<input type="checkbox"/>
<sup>5</sup> Grade 12 (Matric) completed	<input type="checkbox"/>
<sup>6</sup> Tertiary	<input type="checkbox"/>
<sup>7</sup> Other, please specify.....	<input type="checkbox"/>

4. Do you have medical aid? (tick  only one option)

<sup>1</sup> Yes	
<sup>2</sup> No	

5a. What level of skill does/did your job require of you for most of the time that you have worked?

(tick  only one option)

<sup>1</sup> Unskilled	
<sup>2</sup> Semi-skilled	
<sup>3</sup> Skilled	
<sup>4</sup> Highly skilled / Professional	
<sup>5</sup> I was never employed	

5b. Please explain or briefly describe the nature of your work with regards to Question 5a above (e.g. engineer, farmer, piece worker etc.)

.....

6. Please indicate your current source(s) of income (tick  all that apply)

<sup>1</sup> No income	
<sup>2</sup> Self-employed	
<sup>3</sup> Employed by an organisation	
<sup>4</sup> Government grant	
<sup>5</sup> Retired (on pension)	
<sup>6</sup> Other, please specify.....	

7. On average, how much money does your family have each month to pay for living expenses?

(tick  only one option)

1 Less than R5 000 per month	
2 Between R5 000 to R10 000 per month	
3 Between R10 000 to R15 000 per month	
4 Between R15 000 to R20 000 per month	
5 Between R20 000 to R25 000 per month	
6 More than R25 000 per month	

8. What is your current relationship status? (tick  only one option)

1 Single / never married	
2 Married	
3 Living as married / civil union	
4 Separated / divorced	
5 Widowed	

9a. In what residential area do you currently live? (tick  only one option)

1 Fezile Dabi	
2 Thabo Mofutsayane	
3 Mangaung	
4 Lejweleputswa	
5 Xhariep	
6 Northern Cape	
7 North West	
8 Eastern Cape	
9 Lesotho	
10 Other, please specify.....	

9b. **NB: The researcher will assist with categorising your residential area under one of the following**

1 Township / Rural	
2 Inner city / CBD	
3 Suburb	
4 Farms	
5 Informal settlement	

10a. Are you aware of any close family member / relative (father, mother, children, siblings, grandparent) diagnosed with cancer? (tick  only one option)

1 Yes	
2 No	

➔ **Please complete Question 10b first**

➔ **Please go to Question 11**

10b. If you answered **Yes** to Question 10a above, please show us your relationship with these family / relative(s) and their type of cancer – e.g. Sister - breast cancer (tick  **all that apply**)

1 Grandfather - lung cancer	
2 Grandfather - prostate cancer	
3 Grandfather - cancer of other body part	
4 Father - lung cancer	
5 Father - prostate cancer	
6 Father - cancer of other body part	
7 Brother - lung cancer	
8 Brother - prostate cancer	
9 Brother - cancer of other body part	
10 Grandmother - breast cancer	
11 Grandmother - cervix or uterus cancer	
12 Grandmother - cancer of other body part	
13 Mother - breast cancer	
14 Mother - cervix or uterus cancer	
15 Mother - cancer of other body part	
16 Sister - breast cancer	
17 Sister - cervix or uterus cancer	
18 Sister - cancer of other body part	
19 Female child - breast cancer	
20 Female child - cervix or uterus cancer	
21 Female child - cancer of other body part	
22 Male child - lung cancer	
23 Male child - prostate cancer	
24 Male child - cancer of other body part	

11. Did you have a prostatic specific antigen (PSA) blood test to screen for prostate cancer?

**(tick  only one option)**

<sup>1</sup> No, I have never had this test	
<sup>2</sup> Yes, I had this test within the last 12 months	
<sup>3</sup> Yes, I had this test, but it was more than 12 months ago	
<sup>4</sup> I don't know about this test	

12. Did you have a digital rectal examination (DRE) where a health care practitioner examined your rectum with a gloved finger to screen for prostate cancer? **(tick  only one option)**

<sup>1</sup> No, I have never had this test	
<sup>2</sup> Yes, I had this test within the last 12 months	
<sup>3</sup> Yes, I had this test more, but it was than 12 months ago	
<sup>4</sup> I don't know about this test	

13. Do you think you might be at risk of getting prostate cancer? **(tick  only one option)**

<sup>1</sup> Yes	
<sup>2</sup> No	
<sup>3</sup> I don't know	

14. Where or who would you say is your preferred (first choice) health care provider? **(tick  only one option)**

<sup>1</sup> Primary healthcare facility (such as your district hospital or local clinics)	
<sup>2</sup> General practitioner	
<sup>3</sup> Traditional healer	
<sup>4</sup> Spiritual healer	

## **SECTION B - KNOWLEDGE OF PROSTATE CANCER SCREENING SURVEY**

1. It is **important** for us to understand what you know about prostate cancer and prostate cancer screening or testing.
2. Remember that your answers are confidential and you do not need to feel embarrassed over your responses or be concerned that you can fail the survey.
3. Below is a table with 16 statements. Each statement has three (3) options for you to choose from – ‘true’ (you agree with the statement), ‘false’ (you don’t agree with the statement) and ‘I don’t know’ (you do not know whether it is true or false).
4. Read each statement carefully and then decide what your answer is going to be.
5. Only tick  one option for every statement.

<b>B1</b>	<b>Statement</b>	<b>True<sup>1</sup></b>	<b>False<sup>2</sup></b>	<b>I don't know<sup>3</sup></b>
1	Men who have several family members (blood relatives) with prostate cancer are more likely to get prostate cancer			
2	A man can have prostate cancer and have no problems or symptoms			
3	Younger men are more likely to get prostate cancer			
4	Difficulty in passing urine may be a symptom of prostate cancer			
5	Certain diet or eating habits might increase one's risk for developing prostate cancer			
6	Obesity (being overweight) and cigarette smoking have no effect on prostate cancer risk			
7	White men are at greater risk of developing prostate cancer			
8	Frequent pain often in your lower back could be a sign of prostate cancer			
9	Prostate cancer screening should be reserved for men over 70 years old			
10	Some treatments for prostate cancer can make it harder for men to control their urine			
11	Some treatments for prostate cancer can cause problems with a man's ability to have sex			
12	Prostate cancer can be cured if diagnosed early enough			
13	Doctors can tell which men may die from prostate cancer and which men will not be harmed by prostate cancer			
14	An abnormal prostate specific antigen (PSA) blood test means I have cancer for sure			
15	I can have cancer and have a normal PSA blood test			
16	Prostate cancer may grow slowly in some men			

**SECTION C – ELIGIBILITY FOR PROSTATE CANCER SCREENING SURVEY**

Please answer (**tick ☒**) each of the following sentences with either “True” or “False”.

1. You are younger than 40 years or older than 70 years.

<sup>1</sup> True	
<sup>2</sup> False	

2. You are not a black South African by race.

<sup>1</sup> True	
<sup>2</sup> False	

3. You have never heard of cancer as a disease.

<sup>1</sup> True	
<sup>2</sup> False	

4. Before now, you have never heard of prostate cancer.

<sup>1</sup> True	
<sup>2</sup> False	

5. You currently or have previously been diagnosed with prostate cancer.

<sup>1</sup> True	
<sup>2</sup> False	

6. You have been told in the past, by a doctor that you have an enlarged prostate.

<sup>1</sup> True	
<sup>2</sup> False	

7. You had a prostate ultrasound scan done on you in the past.

<sup>1</sup> True	
<sup>2</sup> False	

8. You had prostate biopsy (small bit of your prostate taken out and checked for cancer) done on you in the past.

<sup>1</sup> True	
<sup>2</sup> False	







***Please check the box on the next page for further instructions.***







If you answered **TRUE** to any of the eight (8) questions above in Section C, you do not need to complete Section D below. We would like to thank you for your time. Please return your completed questionnaire to the researcher or research assistant.

If you answered **FALSE** to all of the eight (8) questions above in Section C, **please complete** Section D below.





**SECTION D – ATTITUDES AND BELIEFS ABOUT PROSTATE CANCER SCREENING**

**Thomas Jefferson University prostate cancer screening survey**





1. it is important for us to understand how you feel and what your opinion is about prostate cancer and prostate cancer screening or testing.
2. Below are five (5) tables with different statements. Each statement has four (4) options for you to choose from. They are
  1. 'Strongly disagree'  
  2. 'Sort of disagree' 
  3. Sort of agree' 
  4. 'Strongly agree'  
3. To *what extent* means – how strongly you feel about something.
4. Read each statement carefully and then decide how you feel about the statement.
5. Only tick  one option for every statement.

6. Below is an example:		 			 
	To what extent do you agree or disagree with each of the following statement?	Strongly disagree	Sort of disagree	Sort of agree	Strongly agree
1	<b>Dogs should not be given water.</b> <i>(We strongly disagree as dogs will die if they do not get water.)</i>	<input checked="" type="checkbox"/>	2	3	4
2	Jik should be hidden so that babies can't find it. <i>(We strongly agree as a baby may die if he ingests Jik.)</i>	1	2	3	<input checked="" type="checkbox"/>
3	<b>Children should not watch any television before bedtime.</b> <i>(We sort of agree with this, we know that children should not watch television before bedtime, but if they do watch for a little while, it will be okay with us.)</i>	1	2	<input checked="" type="checkbox"/>	4
4	<b>Petrol bakkies are better than diesel bakkies.</b> <i>(We sort of disagree with this as we feel diesel bakkies are better. But we like petrol bakkies as well, so it is not a big issue.)</i>	1	<input checked="" type="checkbox"/>	3	4





**Table 1: Attitude towards prostate cancer screening**

					
<b>AT</b>	To what extent do you agree or disagree with each of the following statement?	Strongly disagree	Sort of disagree	Sort of agree	Strongly agree
<b>Fatalism</b>					
1	If I have prostate cancer, I would just as soon not know about it	1	2	3	4
2	If I am meant to get prostate cancer, I will get it no matter what I do	1	2	3	4
3	If I get prostate cancer, nothing can be done to cure me of the disease	1	2	3	4
<b>Fear / apprehension</b>					
4	I am bothered of the possibility that prostate cancer screening might be physically uncomfortable	1	2	3	4
5	Men who go through prostate cancer screening will have more problems than men who do not go through screening	1	2	3	4
6	I am afraid that if I have a prostate cancer screening test, the test result will show that I have prostate cancer	1	2	3	4
<b>Perceived benefits</b>					
7	Being treated for prostate cancer is likely to increase my chances of living a <i>healthier</i> life	1	2	3	4
8	I think the benefits of prostate cancer screening outweigh any difficulty I might have in going through the tests	1	2	3	4
9	Being treated for prostate cancer is likely to increase my chance of living a <i>longer</i> life	1	2	3	4
10	I believe that going through prostate cancer screening would help me to be healthy	1	2	3	4
11	I believe that prostate cancer screening is an effective way to find prostate cancer early	1	2	3	4
12	I believe that when prostate cancer is found early, it can be cured	1	2	3	4
13	I believe that I can protect myself from prostate cancer by going through screening	1	2	3	4





**Table 2: Subjective norms and prostate cancer screening**

					
<b>SN</b>	To what extent do you agree or disagree with each of the following statement?	Strongly disagree	Sort of disagree	Sort of agree	Strongly agree
1	The doctor I see is likely to think I should go through prostate cancer screening	1	2	3	4
2	I want to do what members of my immediate family think I should do about prostate cancer screening	1	2	3	4
3	I want to do what the doctor I see thinks I should do about prostate cancer screening	1	2	3	4
4	Members of my immediate family are likely to think I should go through prostate cancer screening	1	2	3	4





**Table 3: Situational barriers to prostate cancer screening**

					
<b>SB</b>	To what extent do you agree or disagree with each of the following statement?	Strongly disagree	Sort of disagree	Sort of agree	Strongly agree
1	Arranging my schedule to go through prostate cancer screening would be an easy thing for me to do	1	2	3	4
2	I have more important things to do than go for prostate cancer screening	1	2	3	4
3	I think prostate cancer screening would be painful	1	2	3	4
4	Going through prostate cancer screening would be embarrassing	1	2	3	4
5	Arranging to get prostate cancer screening would be costly	1	2	3	4

**Table 4: Prostate cancer screening intent**

					
<b>SI</b>	To what extent do you agree or disagree with each of the following statement?	Strongly disagree	Sort of disagree	Sort of agree	Strongly agree
1	I intend to have a prostate cancer screening test (prostate specific antigen blood test) in the next 6 months	1	2	3	4
2	I plan on having prostate cancer screening examination (digital rectal examination) in the next 6 months	1	2	3	4
3	In the next 6 months, I plan to discuss prostate cancer screening with a doctor	1	2	3	4
4	In the next 6 months, I plan to discuss prostate cancer screening with a nurse	1	2	3	4

**Table 5: Contributory factors**

					
<b>CF</b>	To what extent do you agree or disagree with each of the following statement?	Strongly disagree	Sort of disagree	Sort of agree	Strongly agree
1	I believe it is likely I will get prostate cancer at some time in the future	1	2	3	4
2	I think African men are more likely to develop prostate cancer than white men	1	2	3	4
3	I believe that men who have a father or brother with prostate cancer are more likely to develop prostate cancer than men who do not have a father or brother with prostate cancer	1	2	3	4

**SECTION E – SOURCE OF KNOWLEDGE ON PROSTATE CANCER**

**E1.** Where did you get your knowledge about prostate cancer from? (tick  all that apply)

<sup>1</sup> Media, e.g. television, radio, internet	
<sup>2</sup> Friends	
<sup>3</sup> Family members	
<sup>4</sup> Health education from doctors, nurses, etc	
<sup>5</sup> Literatures, e.g. books, articles newspapers	
<sup>6</sup> Other, please specify.....	

**SECTION F – NEED FOR MORE KNOWLEDGE / INFORMATION ON PROSTATE CANCER**

**F1.** Do you think you need additional knowledge / information about prostate cancer?

<sup>1</sup> Yes		<b>→ Please complete Question F2 and Question F3</b>
<sup>2</sup> No		<b>→ Questionnaire completed, please return the questionnaire to the researcher or research assistant</b>
<sup>3</sup> Not sure		<b>→ Questionnaire completed, please return the questionnaire to the researcher or research assistant</b>

**F2.** If you answered **YES** to Question F1 above, in which aspect(s) do you need more information about prostate cancer? (tick  all that apply)

<sup>1</sup> Risk factors of prostate cancer	
<sup>2</sup> Symptoms of prostate cancer	
<sup>3</sup> The value of regularly taking nutrients to reduce the risk of prostate cancer	
<sup>4</sup> The value of prostate specific antigen (PSA) testing	
<sup>5</sup> The value of digital rectal examination (DRE)	
<sup>6</sup> Diagnosis of prostate cancer	
<sup>7</sup> Treatment of prostate cancer	
<sup>8</sup> Other, please specify .....	

**F3.** If you answered **YES** to Question F1 above, through which method(s) would you want this additional knowledge / information? (tick  all that apply)

<sup>1</sup> Informational leaflets / pamphlets handed out to you	
<sup>2</sup> Posters on the walls of your clinic and public places such as the taxi ranks	
<sup>3</sup> Over the radio	
<sup>4</sup> On the television	
<sup>5</sup> On social media, including Facebook, WhatsApp	
<sup>6</sup> Talking directly with my doctor, nurse or health care provider	
<sup>7</sup> Health care providers coming to my house to give information	
<sup>8</sup> Other, please specify.....	

**Thank you for your time. Your participation is much appreciated.**

---

**For office use:**

**To be completed by researcher and/or research assistant**

G1. Excluding Q9a – did the participant need verbal or written assistance to complete the questionnaire?

<sup>1</sup> Yes	
<sup>2</sup> No	

**APPENDIX H Questionnaire 4 (Article 5)**

**Strategies to enhance knowledge, attitude and practice of prostate cancer screening amongst PHC practitioners and African men: A Delphi study**

**1. This questionnaire consists of 2 sections:**

- Section A: General information/demographics
- Section B: strategies to enhance knowledge, attitude and practice of primary healthcare workers and African men on prostate cancer screening

**2. Instructions for completion will be provided for each section.**

**SECTION A – GENERAL INFORMATION / DEMOGRAPHICS**

1. Please complete open fields shown as .....
2. Unless stated otherwise, please tick  only one option per question.

1. What is your age? .....years

2. What is your gender?

Male	<input type="checkbox"/>
Female	<input type="checkbox"/>

3. What is your profession?

Medical	<input type="checkbox"/>
Nursing	<input type="checkbox"/>

4. What field or discipline does your practice entail? (Please tick all that apply)

Family medicine	<input type="checkbox"/>	1
Medical education	<input type="checkbox"/>	2
Medical oncology	<input type="checkbox"/>	3
Medical urology	<input type="checkbox"/>	4
General nursing	<input type="checkbox"/>	5
Primary healthcare nursing	<input type="checkbox"/>	6
Nursing education	<input type="checkbox"/>	7
Nursing oncology	<input type="checkbox"/>	8
Other, please specify.....	<input type="checkbox"/>	9

5. Which of the following health-related post-graduate qualification(s) do you have (please tick all that apply)

Post-graduate certificate	1
Post-graduate diploma	2
Master's	3
PhD (or other doctoral degree)	4

6. What is your current position? .....

7. Where do you practice?

South Africa, Free State	
South Africa, other province, please specify .....	
Outside South Africa, please specify .....	

8. In which sector do you practice?

Private sector	
Public sector	
Both private and public sectors	

9. Years of experience

<5 years	
5-10 years	
>10 years	

10. Registration number.....

11. In which aspect(s) of prostate cancer are you involved (please tick all that apply)

Patient counselling and education	
Training and instruction of medical students	
Training and instruction of nursing students	
Training and instruction of community health workers	

**SECTION B – Strategies to enhance knowledge, attitude and practice of primary healthcare workers and African men on prostate cancer (PCa) screening**

1. Please complete open fields shown as .....
2. Unless stated otherwise, please tick  only one option per question.
3. Please select an option (“Yes”, “Maybe” or “No”) to each of the following statements regarding the enhancement of Knowledge, Attitude and Practice of prostate cancer screening

<b>B1</b>	<b>Shared-decision Making (SDM) for prostate cancer (PCa) screening: What risk factors or criteria should warrant SDM for PCa screening among African men 40 years and older?</b>	<b>Yes</b>	<b>Maybe</b>	<b>No</b>
	Men with one or more 1 <sup>st</sup> degree relative with PCa.	1	2	3
	Men with one or more of the following Lower Urinary Tract Symptoms (LUTS): Urine frequency, urgency of urine, dysuria, poor stream, urinary hesitancy, dribbling of urine, incomplete voiding, blood in semen, haematuria, painful ejaculation, impotence)	1	2	3
	Men with frequent pain or stiffness in the lower back	1	2	3
	Men with unexplained weight loss	1	2	3
	Other, please specify.....	1	2	3
<b>B2</b>	<b>Which community health education topics are relevant to enhance PCa screening Knowledge Attitude and Practice (KAP) among African men?</b>			
	Function of the prostate	1	2	3
	Risk factors for PCa	1	2	3
	Symptoms of PCa	1	2	3
	Screening tests for PCa: Prostate Specific Antigen (PSA) and Digital Rectal Examination (DRE)	1	2	3
	Fatalism (fatalistic attitude) regarding PCa	1	2	3
	Fear regarding PCa screening	1	2	3
	Benefits of PCa screening	1	2	3
	Situational barriers to PCa screening	1	2	3
	Shared decision making in PCa screening			
	Other, please specify.....	1	2	3
<b>B3</b>	<b>Which community health education methods can be engaged to enhance PCa KAP among African men?</b>			
	Literature e.g. books, leaflets, articles, newspapers	1	2	3

	Audio-visual media e.g. TV, internet, videos	1	2	3
	Radio and other audio media	1	2	3
	Contact sessions with primary healthcare workers	1	2	3
	Other, please specify.....	1	2	3
<b>B4</b>	<b>What community strategies should be engaged to enhance PCa health education?</b>			
	Incorporating PCa health education/ promotion into community social gatherings involving men e.g. religious gatherings, barbershops, barbecues, taxi ranks etc.	1	2	3
	Religious leaders, lay health counsellors and owners of community social gatherings should be trained and involved in PCa health education			
<b>B5</b>	<b>Which continuing educational topics should be included in refresher courses to enhance PCa KAP among doctors, nurses and community health workers?</b>			
	Function of the prostate	1	2	3
	Risk factors for PCa	1	2	3
	Symptoms of PCa	1	2	3
	Screening tests for PCa (PSA and DRE)	1	2	3
	Shared decision making in PCa screening	1	2	3
	Prostate biopsy and complications	1	2	3
	PCa staging and grading	1	2	3
	PCa treatment and complications	1	2	3
	Other, please specify.....	1	2	3
<b>B6</b>	<b>Which continuing education methods should be engaged to enhance PCa KAP among doctors, nurses and community health workers?</b>			
	Workshops/ group tasks	1	2	3
	In-service training/ workplace learning	1	2	3
	Didactic lectures	1	2	3
	Study materials	1	2	3
	Audio-visual media	1	2	3
	Practical sessions/ simulated learning	1	2	3
	Other, please specify.....	1	2	3

**SECTION C – Additional suggestions to Section B above**

**B1 – Shared-decision Making (SDM) for prostate cancer (PCa) screening:**

**What risk factors or criteria should warrant SDM for PCa screening among African men 40 years and older?**

.....  
.....  
.....

**B2 – Which community health education topics are relevant to enhance PCa screening Knowledge Attitude and Practice (KAP) among African men?**

.....  
.....  
.....

**B3 – Which community health education methods can be engaged to enhance PCa KAP among African men?**

.....  
.....  
.....

**B4 – What community strategies should be engaged to enhance PCa health education?**

.....  
.....  
.....

**B5 – Which continuing educational topics should be included in refresher courses to enhance PCa KAP among doctors, nurses and community health workers?**

.....  
.....  
.....

**B6 – Which continuing education methods should be engaged to enhance PCa KAP among doctors, nurses and community health workers?.....**

.....

# APPENDIX I Turnitin summary report

## Chapter 1 - Introduction

ORIGINALITY REPORT

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## Chapter 3 - Methodology

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5	Kamel Khaldi. "Quantitative, Qualitative or Mixed Research: Which Research Paradigm to Use?", Journal of Educational and Social Research, 2017 Publication	1%

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## Chapter 2 - Framework and literature review

ORIGINALITY REPORT

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9	"Encyclopedia of Cancer", Springer Science and Business Media LLC, 2009 Publication	<1%

## Chapter 5 - Conclusion

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**APPENDIX J Presentation at Free State Department of Health research day  
(Article 1)**

Dear Dr M.O.A Benedict

Thank you for presenting the topic: “***The profile of black South African men diagnosed with prostate cancer in the Free State, South Africa***” at the 10<sup>th</sup> Annual Free State Provincial Health Research Day Conference.

The event could not have been a success without your participation and contributions. We are grateful for the time and effort you took to share your results and knowledge with us.

Much appreciation

The Research Organising Committee



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Health  
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FREE STATE  
UNIVERSITEIT VAN DIE  
VRYSTAAT  
YUNIVESITHI YA  
FREISTATA



**APPENDIX K Presentation at Free State Department of Health research day  
(Article 2)**

---

Dear Dr MOA Benedict

Thank you for presenting the topic: “**Knowledge, attitude and practice of prostate cancer screening and early diagnosis among Free State primary healthcare providers**” at the 10<sup>th</sup> Annual Free State Provincial Health Research Day Conference.

The event could not have been a success without your participation and contributions. We are grateful for the time and effort you took to share your results and knowledge with us.

Much appreciation

The Research Organising Committee



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## APPENDIX L Avenue for collaboration with Prostate Cancer Foundation of South Africa

### Matthew Benedict

---

**From:** Andrew Oberholzer <ceo@prostate-ca.co.za>  
**Sent:** Wednesday, May 17, 2023 9:23 AM  
**To:** Matthew Benedict  
**Cc:** Freddie Claassen Free State Urol Prof; Willem Dahms; Shingai Mutambirwa; shinqaimutambirwa@yahoo.com; Josephus Myburgh; Lance J Coetzee  
**Subject:** Paper on The profile of Black South African men diagnosed with prostate cancer  
**Attachments:** 2023 Free State Study SAFP-65-5553.pdf

Hi Dr Benedict,

I run The Prostate Cancer Foundation of South Africa and am co-publisher of the online magazine: Urology, Uro-Oncology and Sexology Update  
Prof Shingai Mutambirwa is the editor and The Chairman of our Medical and Scientific Advisory Board.  
Dr Lance Coetzee is our Prostate Cancer Foundation Chairman

Please see links to previous issues below:

Links to Urology, Uro-Oncology and Sexology Update Magazine:

Issue 1 – Winter 2022 <https://fabienc1.sg-host.com/Urology-Winter-2022/>

Issue 2 – Summer 2022 <https://prostate-ca.co.za/urologyupdatesummer2022/>

Issue 3 – Autumn 2023 <https://prostate-ca.co.za/urologyupdateautumn2023/>

Congratulations to you and the other authors of the study published in South African Family Practice in Jan 2023

1 Would it be possible to interview one of the authors about the study for the upcoming Winter Issue of our magazine  
If we can get permission to republish it that would be great as it would ensure that urologists and oncologists would be exposed to the article, otherwise I will do a summary of the findings?

**Please advise?**

2 As CEO of The Prostate Cancer Foundation, it is very worrying that the levels of awareness about prostate cancer were so low (22%) – But thank you for including this questions as it is really valuable for The Prostate Cancer Foundation

Both Jos Myburgh and Willem Dahms are members of our Medical and Scientific Advisory Board and head up our Free State branch, however we have never been able to get a prostate cancer survivor involved.

We would like to assist with raising more awareness about prostate cancer in the Free State. This is normally done by prostate cancer survivor volunteers so if you come across any who may be willing to get involved, **please ask them to contact me.**

Sometimes a professional nurse with passion for men's health can also assist with this.

We have patient information materials that we can send assist with raising awareness, please let me know where I can send these materials for wider distribution in the communities most affected.

We will look translating these into some of the indigenous languages. In the case of the Free State, I am assuming Sesotho and Tswana? **Please advise?**

Regards  
Andrew Oberholzer

## APPENDIX M Invitation to present study findings at the WONCA 2023 conference

### Matthew Benedict

---

**From:** WONCA 2023 World Conference <wonca2023@racgp.org.au>  
**Sent:** Thursday, April 13, 2023 10:56 AM  
**To:** Matthew Benedict  
**Subject:** Complete your registration | WONCA 2023 World Conference



Dear Matthew Olukayode Abiodun

Thank you for confirming you would like to accept the presentation offered for the WONCA 2023 World Conference.

#### Next steps

Please complete your registration by clicking the button below. This will take you to a registration form which includes the discounted speaker registration rates and options to purchase tickets to any of the social functions you would like to attend.

[Complete your registration](#)

If you have any questions please let me know.

Kind regards  
Melissa Avard

---

T +61 3 8699 0300  
[wonca2023@racgp.org.au](mailto:wonca2023@racgp.org.au) | [wonca2023.com.au](http://wonca2023.com.au)

**The Royal Australian College of General Practitioners Ltd**  
Wurundjeri Country  
100 Wellington Parade, East Melbourne VIC 3002

## APPENDIX N Invitation to present study findings at the AMCOA conference

**Matthew Benedict**

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**From:** Sadicka Komey <SadickaB@hpcsa.co.za>  
**Sent:** Saturday, September 10, 2022 8:57 PM  
**To:** Matthew Benedict  
**Subject:** #AMCOA2022 - Invitation to Participate in a Poster Presentation

### **#AMCOA2022 INVITATION TO PARTICIPATE IN A POSTER PRESENTATION**

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**Matthew Olukayode Abiodun Benedict**  
South Africa

Sent Per Email [benedictMA@ufs.ac.za](mailto:benedictMA@ufs.ac.za)

10<sup>th</sup> September 2022

Dear Matthew Olukayode Abiodun Benedict

Thank you for submitting an abstract for presentation at the 24th Association of Medical Councils of Africa (AMCOA) International Conference under the theme "Health Workforce of the Future and its Regulation" proudly hosted by the Health Professions Council of South Africa from 2nd - 6th October 2022 at the Sun City Resort, North West, South Africa.

We are pleased to inform you that upon review of your abstract by the Programming and Planning Committee, your paper has been scheduled for a **Poster Session**.

Poster sessions provide an excellent forum for interaction and informal discussions between presenters and their audience on the subject matter of your presentation. Successful Poster Presentations are those which achieve both coverage and clarity.

Abstract ID#:	12801
<b>Format (paper):</b>	<b>Poster Presentation</b>
Title of Poster:	The Profile of Black South African Men Diagnosed with Prostate Cancer in The Free State; South Africa
Poster Board No.	Poster11 @ Exhibition Area (Nedbank Green Room)
Poster Dates:	3 – 5 October 2022
Poster Viewing Times:	09h00 to 15h00

## APPENDIX O Attendance of AMCOA conference



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**Department:** OFFICE OF THE PRESIDENT  
**Designation:** PRESIDENT  
**Reference:** ASSOCIATION OF MEDICAL  
COUNCILS OF AFRICA  
(AMCOA)  
**Date:** 18 October 2022

### *Certificate of Attendance*

We, the Health Professions Council of South Africa (HPCSA) on behalf of the Association of Medical Councils of Africa (AMCOA), proudly present this certificate of attendance to

**Matthew Olukayode Abiodun Benedict**

For their attendance at the Association of Medical Councils of Africa 24th Annual Conference 2022 which took place from 02 October 2022 to 06 October 2022 at Sun City Resort.

Yours Sincerely

A handwritten signature in black ink, appearing to read 'Simon Nmutandani', is written over a light-colored rectangular background.

PROF SIMON NEMUTANDANI  
HPCSA PRESIDENT



*Protecting the public and guiding the professions*

President: Prof M S Nmutandani, Vice President: Dr S Sobuwa, Acting Registrar: Dr T Pinkoane, Executive Company Secretariat: Adv N Sipeka

## APPENDIX P Declaration of language editor

### DECLARATION OF TECHNICAL AND EDITORIAL ASSISTANCE

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#### TO WHOM IT MAY CONCERN

I, Theanette Mulder, hereby declare that with regard to the following document that:

**Author:** Dr Matthew O. A. Benedict

**Title:** STRATEGIES TO ENHANCE THE APPROACH TO PROSTATE CANCER SCREENING OF  
AFRICAN MEN IN THE FREE STATE

- I performed the language editing (grammar, vocabulary and syntax).
- I assisted the author with the technical preparation of the thesis, including layout and formatting.
- I cross-checked the in-text references with the references in the bibliography and formatted all references to meet the selected reference style.

Important notice: The verification of the accuracy of citations in the list of references (authors and title of the article, journal name, date, volume, issue and page numbers, and DOI; or similar information and the URL for internet references; or textbooks used as references) does not include authentication of the content that was cited from the reference. The editor cannot be held accountable for any changes made to the text, including language, formatting and layout, or any addition or deletion of text performed by the author after the document has been returned by the editor. The application or rejection of queries, comments and recommendations made during the editing process remains the responsibility of the author and is decided based on the author's discretion. It is the author's obligation to adhere to the similarity index requirements and policies of the UFS. The author is responsible to review the final document prior to submission for assessment and cannot hold the editor accountable for any errors occurring in the document.



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**Date:** 20 June 2023