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# Prostate cancer awareness and screening among men in a rural community in Kenya: a cross-sectional study

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## Abstract

**Background:** Globally, prostate cancer ranks as the second most frequently diagnosed cancer among men with the highest mortality rates being in Asia and Africa. The screening rates have been very low among men from developing countries with the majority presenting in advanced stages of the disease. The study aimed to assess the awareness of prostate cancer and screening among men aged 40–69 years in a rural community in Kenya.

**Methods:** This cross-sectional mixed-method survey was conducted among men aged 40–69 years. Data were collected using a pretested questionnaire among 576 men and a Focus Group Discussion guide among 44 men. The study was conducted in all the community units in Gatundu North and Kiambu Sub-counties, Kenya.

**Results:** Five hundred and seventy-six men participated with a response rate of 100%. Of the men interviewed, 84% had ever heard of prostate cancer. Slightly below half (40.6%) of the respondents had ever heard of prostate cancer screening. There was the existence of myths and misconceptions which predominantly associated prostate cancer with sexual behaviors. Overall, 57.3% of the respondents had a low level of awareness of prostate cancer. The prevalence of prostate cancer screening was 5%. Willingness to undergo screening in the future was high (81%) among the participants. The most frequently cited (56.9%) reason for lack of willingness to screen was the participant's belief that they were well. Participants who were aware of prostate cancer screening were more likely to take up screening (OR = 8.472; 95% CI: 1.554– 46.186;  $P = 0.014$ ).

**Conclusion:** Awareness of prostate cancer symptoms, treatment, and screening was low with the existence of myths and misconceptions. The level of prostate cancer screening was abysmally low. It is vital for the Ministry of Health, county governments, and other stakeholders to consider the use of multifaceted approaches to increase public awareness on prostate cancer to enhance informed shared decision making. The study provides relevant information for designing prevention and control programs for prostate cancer.

**Keywords:** Awareness, Knowledge, Prostate cancer, Screening, Kenya

## 1 Background

Prostate cancer (PC) is the second most common cancer, and it ranks fifth as a cause of mortality among men globally and is the leading cause of death in Sub-Saharan Africa and the Caribbean [1]. Disparities exist

in mortality related to PC with black men having higher mortality in comparison with other races [2]. In Kenya, PC is the most common cancer among males with an Age-Standardized Incidence Rate (ASR) of 40.6 per 100,000 [3]. Prostate cancer contributes remarkably to the public health burden in Africa and is anticipated to continue increasing as a result of urbanization and growth in the population [4].

In Africa, mortality related to PC has been on the rise which is mainly attributed to late diagnosis [1]. Prostate

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cancer is mostly asymptomatic in the early stages. It is diagnosed in the majority of the cases after progression to an advanced stage when the prognosis is poor. The major challenge experienced in developing countries is the late presentation of PC patients in the health facilities [4, 5]. In Kenya, 80% of PC patients are diagnosed with advanced disease and more aggressive tumors. This results in poor clinical outcomes as very little can be done to enhance the survival of the patients [6, 7].

Globally, PC screening remains a much-debated issue with various discrepancies regarding recommendations for the uptake of screening. Nevertheless, screening remains the key strategy for the reduction of mortality through early detection of PC among men considered at risk [2]. The cancer screening guidelines in Kenya recommend informed shared decision making among men aged 40–69 years [7]. However, despite high mortality occurring in developing countries like Kenya due to PC, the screening rates are still very low. This has been associated with various barriers including low knowledge and awareness level and negative beliefs [8–11].

Early detection is a key pillar to the achievement of the goal of the cancer control strategy 2017–2022 in Kenya [6]. Unfortunately, the rate of uptake of screening remains very low among Kenyan men. According to the Kenya Demographic Health Survey, the screening rate for PC is 3%, 4.3% and 2.6% among men aged 15–49 years, 40–44 years and 45–49 years, respectively. Men residing in rural areas were reported to have low levels of PC awareness and screening in comparison with those residing in the urban regions [12]. Other studies conducted among Kenyan men of varying ages and residence have reported PC screening rates between 1.3% and 2.6% [13, 14]. Assessment of PC awareness and screening among at-risk men in the community is a critical step toward enhancing early detection. There is a paucity of studies on PC awareness and screening among Kenyan men. There exists no study to our knowledge that has included men considered eligible for PC screening from a rural community. Qualitative studies on PC awareness are important for further exploration of the utilization of screening services. The study, therefore, used a mixed-method approach to assess the level of PC awareness and screening among men aged 40–69 years in a rural community.

## 2 Methods

### 2.1 Study design

This descriptive cross-sectional survey assessed the level of awareness and uptake of PC screening among men aged 40–69 years in a rural community. The study was conducted as a baseline survey for a pretest–posttest non-equivalent quasi-experimental study. The aim of the study was to assess the effectiveness of community-based

health education on enhancing uptake of PC screening. The intervention arm of the study was in Gatundu North Sub-county. The intervention arm received a structured health education which was delivered face to face by community health workers (CHW). The control arm of the study was in Kiambu Sub-county. The primary outcome of the study was uptake of PC screening, while the secondary outcomes included knowledge, perception of self-vulnerability and fatalism. The variables were assessed at baseline and 6 months post-intervention in both arms of the study to assess the effectiveness of the intervention.

### 2.2 Study participants

The target population included men aged 40–69 years residing in the study area. The age was selected as it is the recommended age for screening according to the cancer screening guidelines in Kenya [7].

### 2.3 Study setting

The study was conducted in April 2019 in Gatundu North and Kiambu Sub-counties in Kiambu County which is located in the central region of Kenya. The main socio-economic activity in the area is agricultural. The study area is composed of 17 community units (CUs) for implementation of community health strategy at the level I of health delivery system in Kenya. Each CU serves a population of approximately 5000 people which are headed by a Community Health Extension Worker and Community Health Volunteers who serve approximately 20 households each. All the CUs in the study area were included in the study. Kiambu county comprises 505 health facilities which include three level five hospitals, eleven level four hospitals, four health centers and 70 government dispensaries which are well distributed within the county. Prostate cancer screening services are provided in the study area in Kiambu Hospital and Igegania Hospitals in Kiambu and Gatundu North Sub-counties, respectively.

### 2.4 Sample size

The sample size was determined based on the formula indicated below [15]:

$$n = \frac{\left[ (Z_{\alpha/2} + Z_{\beta})^2 \times (p_1(1 - p_1) + p_2(1 - p_2)) \right]}{(p_1 - p_2)^2}$$

$\alpha$  (the probability of a type I error) was 0.05, and  $Z_{\alpha/2}$  (the critical value of the normal distribution of participants at  $\alpha/2$ ) was 1.96 at a confidence interval of 95%.  $\beta$  (the probability of a type II error) was 0.2, and the  $Z_{\beta}$  (the critical value of the Normal distribution at  $\beta$ ) was 0.84 for a power of 80%. The  $p_1$  (the expected sample proportion who have participated in PC screening at baseline) was

3.4% based on previous reported screening rates in the study area [12]. The p2 (the expected sample proportions who have participated in PC screening post-intervention) was 10% estimated from screening rates reported in a similar study that assessed the effectiveness of education intervention on prostate examination [16]. An addition of 30% was done to cater for attrition at follow-up. The calculated sample size for the study was 576 which represented 288 participants in each arm of the study. The sample size for the Focus Group Discussion (FGD) reached saturation with 44 participants.

## 2.5 Sampling

The study area is demarcated into 17 community units (CUs). All the CUs were included in the study. A list of all households in each CU with men aged 40–69 years was then generated, and using a table of random numbers, simple random sampling was used to select the study participants from all the CUs. Purposive sampling was used to select the FGD participants to ensure heterogeneity with the representation of various socio-demographic and economic characteristics in all the CUs.

## 2.6 Data collection

Quantitative data were collected by the researchers and research assistants through face-to-face interviews in the participant's households. The research assistants underwent training before data collection to minimize bias. A pretested structured interviewer-administered questionnaire was utilized to collect the data. The structured questionnaire was pretested among 58 men in Thika Sub-county. The questions were assessed for their appropriateness and clarity. The questionnaire was then revised and corrections done to some questions that were found to be ambiguous to ensure they tested what was intended for the study. The tool was further reviewed by two experts before data collection. The response rate was 100% among 576 participants. The questionnaire consisted of three sections: Section I: socio-demographic characteristics which included the respondents age, marital status, religion, education level, and household income. Section II: assessment of the level of awareness of PC which included questions on whether or not they had ever heard about PC and were aware of PC symptoms, treatment, modes of treatment, screening and the screening methods. Section III: history of screening and its related determinants which included asking the respondents whether or not they had ever gone for prostate examination, they were screened, the duration since they screened, the method used, the clinician explained the risk and benefits, the clinician involved them in decision making, their intention to screening in future and the reasons for their lack of willingness to screen.

The qualitative data were collected through Focus Group Discussions (FGDs) using a pretested semi-structured guide. The FGD guide was pretested through one FGD session conducted among 11 men in the Thika sub-county. The tool was further refined before the actual study through review by a team of experts in the subject. The key themes in the guide included awareness of PC, symptoms, etiology, treatment, and screening. The participants were assembled in a private area in the link health facilities in the study area and sessions conducted by a moderator and two repertoires. The interviews were audio-recorded and transcribed verbatim.

## 2.7 Data analysis

Quantitative data were analyzed using the Statistical Package of Social Sciences Version 22 (SPSS Armonk, NY: IBM Corp). Data cleaning and coding were done before analysis. Our finding was that none of the variables had been excluded. Awareness of PC was categorized into low (values below mean) and high (values  $\geq$  mean). Pearson's Chi-square test was used to assess for the association of the variables and a *P* value of  $<0.05$  was considered statistically significant at 95% confidence interval. The dependent variable assessed was uptake of PC screening. The variables that were found to be significant ( $P < 0.05$ ) were then subjected to further analysis using logistics regression. The qualitative data from FGDs were analyzed using inductive content analysis based on grounded theory following the six steps as guided by Braun and Clarke based on the key themes of the study [17].

## 3 Results

### 3.1 Demographic characteristics

A total of 576 men participated in the study with a response rate of 100%. Demographic and socioeconomic data are presented in Table 1.

### 3.2 Awareness of prostate cancer

Among all the participants, 84% had heard about PC. Among these participants, the most frequently cited sources of information were mass media and friends at 70.4% and 11.9%, respectively. Only 3.8% reported healthcare providers as the source of information.

Only 22.2% of the respondents were aware of the symptoms of PC. Six point three percent (6.3%) of the respondents reported experiencing urinary symptoms at the time of the study. Seventy point one percent (70.1%) of the respondents were aware that PC can be treated. Among these respondents, 25% were not aware of any modes of treatment of PC and 4.7% reported the use of herbal medicine as a mode of PC treatment. Slightly below half (40.6%) of the respondents had heard of PC screening. Among these respondents, only 20.5%

**Table 1 Socio-demographic characteristics of respondents**

Socio-demographic Characteristic	Frequency (N = 576)	Percentage (%)
Age		
40 to < 50 years	249	43.2
50 to < 60 years	197	34.2
60 to < 70 years	130	22.6
Religion		
Christian	565	98.1
Traditionalist	6	1
Muslim	5	0.9
Marital status		
Married	469	81.4
Single	34	5.9
Separated/divorced	40	6.9
Widowed	33	5.7
Occupation		
None	25	4.3
Business	130	22.6
Formal employment	47	8.2
Farmer (small scale)	231	40.1
Casual worker	143	24.8
Income		
< 10,000	374	64.9
10,000 to < 30,000	166	28.8
30,000 to < 50,000	25	4.3
> 50,000	11	1.9
Education level		
None	6	1%
Primary	238	41.3
Secondary	267	46.4
Tertiary	65	11.3

Data are presented in frequency (n) and percentage (%)

reported awareness of any PC screening methods. Seventy-one point seven percent (71.7%) of the respondents were not aware of anyone who had undergone PC screening. Overall, 57.3% of the respondents had a low level of awareness of PC, while 42.7% had a high level of awareness on PC (Table 2).

### 3.3 Prostate cancer screening

Regarding PC screening, only 5% (29) of the respondents had undergone PC screening at the time of our study. The most frequently reported method of screening was Prostate Specific Antigen (58.6%). The main motivator reported for screening was routine medical examination (72.4%). Only 10.3% of the respondents reported the recommendation by a healthcare provider as a motivator for screening. None of the participants reported the utilization of shared decision making by the clinician during

screening. Slightly above half of the respondents (58.6%) reported the healthcare providers had explained the risks and benefits to them before the screening. Intention to undergo screening was high as 81% of the respondents who had never been screened reported willingness to undergo screening in the future. The main reasons reported for the lack of willingness to undergo screening in the future were; the men's belief that they were well (56.9%), inability to afford the test (14.7%) and thinking it is not beneficial (13.7%) (Table 3).

### 3.4 Association of prostate cancer awareness on uptake of screening

Prostate cancer awareness was significantly associated with screening. Respondents who were aware of the symptoms of PC were more likely to take up screening ( $X^2 = 19.183$ ,  $P = < 0.001$ ). Respondents who were aware of PC treatment were more likely to screen ( $X^2 = 7.689$ ,  $P = 0.002$ ). Similarly, respondents who were aware of PC screening ( $X^2 = 26.304$ ,  $P = < 0.001$ ) and those aware of PC screening methods ( $X^2 = 50.55$ ,  $P = < 0.001$ ) were more likely to undergo screening (Table 4).

The significant variables were subjected to further analysis using multivariate logistics regression. Participants who were aware of PC screening were eight times more likely to screen than those who were not aware [OR = 8.472(1.554, 46.186)  $P = 0.014$ ]. The awareness of PC screening methods was significantly associated with PC screening. Participants who were aware of PC screening methods were seven times more likely to take up screening in comparison with those who were not aware [OR = 7.012(1.219, 40.350)  $P = 0.029$ ] (Table 5).

### 3.5 Qualitative results

#### 3.5.1 Prostate cancer awareness

The findings from the FGDs indicated the majority of the participants had ever heard about PC. The main source of information reported was mass media. The awareness of the etiology of PC among the participants was low. The themes which emerged regarding the etiology of PC indicated the existence of myths and misconceptions in this rural population. The predominant cause of PC highlighted by the participants was the denial of conjugal rights as was illustrated by one FGD participant:

*"Most of us do not know much about this cancer and what causes it. I heard from social media that men with many sexual partners cannot get prostate cancer. In the community, people say that this disease is caused by the denial of conjugal rights....."*

Other causes of PC reported included women getting to menopause when men were still sexually active, bacteria, masturbation, having several sexual partners and

**Table 2 Knowledge and awareness of prostate cancer**

Variable	Category (N = 576)	Frequency (%)
Ever heard about prostate cancer	Yes	481 (83.5%)
	No	95 (16.5%)
Source of information	Mass media	338 (70.4%)
	Friend	57 (11.9%)
	Relative	29 (6%)
	Hospital/healthcare workers	18 (3.8%)
	Church	21 (4.4%)
	Community Health Volunteer	17 (3.5%)
Family history of PC	Yes	56 (9.7%)
	No	520 (90.3%)
Aware of symptoms of PC	Yes	128 (22.2%)
	No	448 (77.8%)
Symptoms of PC	Frequent/painful/difficulty in urination	114 (89.1%)
	Erectile dysfunction	33 (25.8%)
	Weight loss	14 (10.9%)
	Blood in urine	13 (10.2%)
	Bone pain	10 (7.8%)
Prostate cancer can be treated	Yes	404 (70.1%)
	No	172 (29.9%)
Mode of treatment	Drugs	123 (30.4%)
	Surgery	152 (37.6%)
	Radiotherapy	20 (5%)
	Herbal remedies	19 (4.7%)
	Chemotherapy	54 (13.4%)
	Don't know	101 (25%)
Ever heard about prostate cancer screening	Yes	234 (40.6%)
	No	342 (59.4%)
Aware of PC screening methods	Yes	118 (20.5%)
	No	458 (79.5%)
Methods of PC screening	PSA screening	64 (54.2%)
	Digital rectal exam	37 (31.4%)
	Biopsy	17 (14.4%)
Aware of anyone who has undergone screening	Yes	163 (28.3%)
	No	413 (71.7%)

punishment from God. The majority of the participants were not aware of the symptoms and treatment of PC. Regarding the prevention of PC, several myths and misconceptions were reported. This included; a man having several sexual partners, being hygienic, showering every day, loving their wives, being faithful to one partner, eating traditional foods that enhance sexual performance and trusting in God.

One FGD participant stated;

*“When a man has the urge to have sex and is denied by the wife the accumulation of sperms causes bacteria to enter the system causing the disease. I totally blame our women for denying men their conjugal*

*rights which is now causing men to get prostate cancer. The only way men can prevent themselves is getting another sexual partner to meet their needs”*

The majority of the participants reported they were not aware of the methods utilized for PC screening. The participants reported that men felt that they are always left out in health education programs which limits their understanding of the diseases as the focus is predominantly on women and children as indicated by one participant:

*“We hear of prostate cancer but it is still a mystery to many of us. I have not been screened since I don't*

**Table 3 Prostate cancer screening behaviors**

Variable	Category	Frequency (%) T= 576
Ever gone for prostate gland examination	Yes	38 (6.6)
	No	538 (93.4)
Screened for prostate cancer*	Yes	29 (76.3)
	No	9 (23.7)
Method of screening used**	PSA testing	17 (58.6)
	Digital Rectal Examination	9 (31.0)
	Biopsy	1 (3.4)
	Don't know	2 (6.9)
When were you screened **	< 1 year	15 (51.7)
	1–2 years	11 (37.9)
	> 2 years	3 (10.3)
Motivation of screening**	Routine checkup	21 (72.4)
	Recommendation by doctor/nurse	3 (10.3)
	Advice by CHV	3 (10.3)
	Advert	2 (6.9)
Who made the decision to screen**	Healthcare provider	5 (17.2)
	Self	24 (82.8)
Did the provider explain the benefits and risks of screening**	Yes	17 (58.6)
	No	12 (41.4)
Willingness to screen in future***	Yes	436 (81)
	No	102 (19)
Reasons for not willing to screen****	Belief they are well	58 (56.9)
	Inability to afford	15 (14.7)
	Thinking it is not beneficial	14 (13.7)
	Lack of information	8 (7.8)
	Consider screening too risky	7 (6.9)

Data are presented in frequency (n) and percentages (%)

\*Only those who had the prostate examined

\*\*Only those screened for PC

\*\*\*Only those who had never gone for prostate examination

\*\*\*\*Only those not willing to be screened

*know what method will be used. I've heard of some men in the community who talk about getting fingers inserted in the anus during screening and I don't know whether this is true or not."*

*though I have heard about it in many forums including the radio and newspaper. I am not aware of any man who has been screened for the disease. I think many men in my community have not been screened including myself."*

### 3.6 Prostate cancer screening

When participants were probed on their personal history of PC screening and other men in their community, only two reported ever having been screened for PC. The majority of participants stated they had never been screened for PC and neither were they aware of anyone who had been screened in the community. The main source of information reported was mass media as described by a participant:

*"I have never been screened for prostate cancer*

The majority of the participants cited willingness to undergo screening in the future. The reasons reported for lack of willingness to undergo screening by the participants included; lack of information about the disease, not finding it necessary, not knowing where to get the test, being too costly, association of cancer with death, avoidance of a Digital Rectal Examination (DRE), masculinity, lack of time, cultural beliefs, and stigma and discrimination associated with the disease.

**Table 4 Association of knowledge and awareness on uptake of prostate cancer screening**

Variable	Category	Ever been screened		$\chi^2$	Df	P value
		No	Yes			
Aware of PC symptoms	Yes	112	16	19.183	1	<0.001
	No	435	13			
Aware of PC treatment	Yes	377	27	7.689	1	0.002
	No	170	2			
Ever heard of PC screening	Yes	209	25	26.304	1	<0.001
	No	338	4			
Source of information	Mass media	134	11	12.296	1	0.004
	Friend	23	1			
	Relative	6	1			
	Hospital	20	8			
	Church	12	2			
Aware of PC screening methods	Yes	97	21	50.551	1	<0.001
	No	450	8			
Family/friend history of PC	Yes	54	2	2.575	1	0.109
	No	493	27			

PC Prostate cancer; CHV Community Health Volunteer

**Table 5 Logistics regression analysis of awareness and prostate cancer screening**

Variable	Category	P value	Odds ratio	95% CI
Aware of PC treatment	Yes	0.378	2.309	(0.360, 14.820)
	No	Ref		
Aware of PC symptoms	Yes	0.323	0.625	(0.246, 1.588)
	No	Ref		
Aware of PC screening	Yes	<b>0.014</b>	8.472	(1.554, 46.186)
	No	Ref		
Source of PC screening information	Newspaper/radio/TV	0.24	2.773	(0.505, 15.213)
	Friend	0.212	5.124	(0.395, 66.500)
	Relative	0.975	0.952	(0.045, 20.077)
	Hospital	0.647	0.653	(0.106, 4.042)
	Church	0.811	1.312	(0.142, 12.110)
	CHW	Ref		
Aware of PC screening methods	Yes	<b>0.029</b>	7.012	(1.219, 40.350)
	No	Ref		

Ref reference; CI confidence interval

#### 4 Discussion

The purpose of our study was to assess the level of awareness of prostate cancer and screening among Kenyan men in a rural community. The majority of the respondents in the study had ever heard about prostate cancer with the mass media being the main source of information reported. A similar study conducted among Kenyan men in an urban population of low socioeconomic status reported similar findings [13]. Similarly, the Kenya Demographic Health Survey, reported that two-thirds of

men in Kenya had heard about PC [12]. A similar study conducted in Nigeria reported a lower level of awareness, and the main source of information was mass media [9]. The recommendation by a healthcare provider has been reported as a strong predictor to the uptake of PC screening in previous studies [18, 19]. Only 3.8% of the respondents in the study reported a healthcare provider as the source of information. Ugochukwu et al. reported similar findings in a study conducted in Lagos, Nigeria [20]. There is a need for the healthcare providers to

participate in the increase in awareness of PC among men at risk to enhance the decision-making process for screening. This also denotes the effectiveness of mass media as a strategy to enhance awareness on PC.

Despite a majority of the respondents having heard about PC, overall, 57.3% of the respondents had a low level of awareness of PC. Our study findings are congruent with Mutua & Kishoyian in their study among men in a rural community in Kenya where low levels of awareness of PC were reported [21]. A similar study conducted in Tanzania reported low levels of awareness on PC. [11] Similarly, a study conducted in South Africa reported low levels of awareness on PC and screening [22]. These findings are also congruent with other studies conducted among men of African origin across countries. [23–26] Studies comparing the level of knowledge and awareness among black and Caucasian men have found black men to have lower levels of knowledge and awareness on PC. [19, 27] This is despite black men having a higher risk of dying from the disease. [2, 28] Increase in awareness on PC among African men is therefore imperative as it has been associated with participation in PC risk-based screening. [29, 30]

The study findings indicate the existence of myths and misconceptions which associated PC with sexual behavior. The predominant cause of PC cited during the discussions by the participants was the denial of conjugal rights. This finding is not unique to Kenyan men as other studies conducted in Uganda, Nigeria and Burkina Faso reported similar findings. [10, 31, 32] Such misconceptions are likely to deter men from taking up screening due to the stigma associated with the disease in the community. The misconception of the prevention of PC through having multiple sexual partners is equally likely to predispose men to sexually transmitted diseases. These knowledge deficiencies noted among the respondents can be used as a framework to enlighten men and hence reduce the knowledge gaps through the dissemination of relevant information. This is envisioned to enhance informed decision making regarding uptake of PC screening among at-risk men.

In our study, the screening for PC was low as only 5% of the participants had undergone screening. This is despite a significant number having urinary symptoms at the time of the study. A similar low screening rate was reported in a study conducted in the Eastern region of Kenya among men aged above 25 years where the screening rate was 2.6% [21]. Our findings are congruent with a study conducted in Tanzania which reported a screening rate of 7.7% among men aged above 40 years [11]. Similar studies conducted among African men have reported low levels of screening [9, 10]. Intention to undergo screening can serve as a bridge to the transition of men from

the level of decision making to taking action. The finding of high intention to screen and low levels of screening have been reported in other studies conducted among Nigerian men and Kenyan men [13, 20]. However, a study conducted in a rural community in Makueni County, Kenya, found a moderately lower level of intention than our current study [14]. Men citing a willingness to screen for PC in the future have been associated with a lack of adequate knowledge on PC which limits their ability for decision making [33]. These findings could be an indication of the existence of barriers to the transition in the decision-making process for screening which require to be addressed. Our study recommends further research to explore the barriers to uptake of PC screening.

In the study, none of the respondents who were screened for PC reported utilization of shared decision making during screening. Only slightly above half reported an explanation of the risks and benefits of screening before the screening. Similar findings were reported by the American Cancer Society [2] where the majority of men reported a lack of utilization of shared decision making among clinicians. Similarly, Farhat and Arafa reported that only 54% of the physicians were practicing shared decision making during PC screening in Saudi Arabia [34]. This finding could be attributed partly to a proportion of the men being screened before the implementation of the current guidelines of screening in the country, failure of sensitization of clinicians on the recent guidelines, or other facility-related factors like demanding workload. This indicates the urgent need for sensitization of all clinicians in the country on the current PC screening guidelines. The study, therefore, recommends the investigation of the implementation of the decision-making process for risk-based PC screening and the development of decision aids.

In our current study, awareness of PC screening was associated with increased likelihood of uptake of PC screening. Other studies have corroborated similar findings. [35] This finding may be an indication that men require to have adequate knowledge as the decision-making process for PC screening is a complex phenomenon that requires a well-informed man. An interesting finding in our study was men reporting being left out in cancer prevention programs with much focus being on women for breast and cervical cancer. There is need for men to be considered when planning for cancer prevention and control programs in the community. The survival of PC patients is highly dependent on timely diagnosis and uptake of preventive measures. Currently, the only available tool for early detection is screening. Effective implementation of the current screening guidelines in Kenya which recommends informed shared decision making requires

men to have adequate knowledge on PC. There is a need for the development of educational interventions to empower men with more information on PC. This study recommends the increase in public awareness on PC using multifaceted approaches to enhance uptake of screening. The study further recommends the development of decision aids to enhance implementation of shared decision making among clinicians.

This study had limitations as it was cross-sectional; therefore, the association of dependent and independent variables could not be clearly explained. The study was conducted in a rural community, and hence, further research should be done among men in urban communities. Nonetheless, the key strength of the study was the use of a mixed-method approach which aided in further exploration of the findings. The study provides relevant information for designing and implementation of prevention and control programs for prostate cancer in Kenya with adequate consideration of the context of the study.

## 5 Conclusion

The level of awareness on prostate cancer was low despite the majority of the men hearing about PC. There was existence of myths and misconceptions regarding the etiology of PC with denial of conjugal rights being predominant. The level of uptake of prostate cancer screening was abysmally low. There is a need to address the deficiencies noted in knowledge to overcome myths and misconceptions that may deter men from the uptake of prostate cancer screening through well-tailored multifaceted approaches. There is a need for an increase in public health awareness on PC to enhance early detection.

### Abbreviations

PC: Prostate cancer; ASR: Age-standardized rate; CHV: Community Health Volunteer; FGD: Focus Group Discussion; PSA: Prostate-specific antigen; DRE: Digital Rectal Examination.

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### Authors' contribution

RMG, SO and SK developed the concept and designed the study. RMG collected the data, SK assisted in data analysis, and RMG and SO developed the manuscript. SK revised the draft manuscript. All the authors read and approved the final manuscript.

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### Availability of data and material

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request.

### Ethics approval and consent to participate

Ethical approval and permission to conduct the study were sought from Jomo Kenyatta University of Agriculture & Technology Institutional Ethics Review Committee (JKU/2/4/896B) and the Ministry of Health, Kenya, before the study commenced. Written consent was sought from the participants before data collection following the explanation of the purposes, benefits and risks of the study. Participation in the study was voluntary, and confidentiality of participants was ensured throughout the entire process.

### Consent for publications

Not applicable.

### Competing interest

The authors declare no conflict of interest.

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