

Effects of Community Strategy-Based Educational Intervention on Prostate Cancer Knowledge and Screening Practices among Men in Tharaka-Nithi County, Kenya

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Accepted: 08 September 2026 || Published: 21 October 2026

Abstract

Prostate cancer is the second most commonly diagnosed cancer in men. Early diagnosis improves treatment outcomes. Late diagnosis is linked to poor knowledge of the disease among men, especially in developing countries, and is sometimes compounded by limited access to diagnostic facilities. This study assessed the effects of community-based prostate cancer education on knowledge and screening practices among adult males from rural areas of Eastern Kenya. This study used a pretest–posttest non-equivalent quasi-experimental design. Two independent groups were involved: an intervention group that received prostate cancer education and a control group that received no intervention. The study used multi-stage sampling, resulting in 382 participants (188 in the intervention group and 194 in the control group). Most participants in both groups were under 60 years old (54.8% in the intervention group and 63.4% in the control group). After the intervention, prostate cancer awareness increased significantly in the intervention group ($p=0.001$), whereas it did not change significantly in the control group ($p=0.448$). Knowledge of prostate cancer also improved significantly post-intervention in the intervention group ($P<0.001$), but not in the control group ($P=0.456$). Similar changes were noted in testing practices, with the screening rate changing marginally in the control group from 4.1% at baseline to 5.2% post-intervention, while in the intervention group the screening rate increased from 4.8% at baseline to 11.3% post-intervention. In conclusion, community strategy-based prostate cancer education improved prostate cancer knowledge and screening practices among men in Tharaka-Nithi County, Eastern Kenya. Strengthening community education based on established programs like community strategy is necessary, as it is an effective way of improving PCa knowledge and changing people's screening behaviour.

Keywords: *Community Health Promoters, Prostate Cancer Knowledge, Screening*

How to Cite: Mwangi, J. K., Mwanzo, I., & Okello, A. B. M. (2026). Effects of Community Strategy-Based Educational Intervention on Prostate Cancer Knowledge and Screening Practices among Men in Tharaka Nithi County, Kenya. *Journal of Medicine, Nursing and Public Health*, 6(9), 1-13.

1. Introduction

Cancer continues to be among the leading causes of morbidity and mortality globally. In the year 2022, approximately 20 million new cancer cases were reported, and 9.7 million people died from it globally. During the same period, among the new cancer cases reported, lung cancer was the leading cause, accounting for 12.4% of the total cases, followed by female breast cancer (11.6%), then colorectal cancer and prostate cancer followed at 9.6% and 7.3%, respectively (WHO, 2022). Prostate cancer (PCa) ranks second most commonly diagnosed male cancer after lung cancer, and it is estimated that in 2022, 1.5 million men were diagnosed with it and 397,000 men died from it (Bray et al., 2024). In almost two-thirds of the world's countries, it is the most frequently diagnosed cancer among men (Bray et al., 2024) and is the leading cause of death among men in about a quarter of the world's countries (Bergengren, 2022).

In the African continent, prostate cancer (PCa) is the leading cause of cancer death among men. According to the WHO, PCa was the most common cancer diagnosed among African men in 2020 and was also the leading cause of cancer-related death among African men (Ferlay et al., 2024). Incidence and mortality rates in Africa increased from 23.2 and 17.0 per 100 000 in 2012 to 36.8 and 18.3 per 100 000, respectively, in 2020 (Ferlay et al., 2015; Sung et al., 2021). This increase in incidence has partly been attributed to increased awareness of prostate cancer, progressive improvement in health care, and increased use of prostate-specific antigen (PSA) testing in the region (Ferlay et al., 2015). There are, however, regional disparities within the continent in terms of prostate cancer patterns, with some regions having higher incidence and mortality rates than others (Sung et al., 2021). According to GLOBOCAN 2020, Northern Africa had the lowest prostate cancer incidence and mortality rates in Africa, at 16.6 and 8.2 per 100,000, respectively, followed by Eastern Africa at 27.9 and 16.3 per 100,000, respectively, while the highest rates were recorded in Southern Africa at 65.9 and 22.0 per 100,000 (Sung et al., 2021). Africa also reports a higher percentage of PCa cases in young patients and a more aggressive form of the disease compared to high-income countries (Corbex et al., 2014).

In Kenya, prostate cancer is the leading male cancer, followed by esophageal cancer (MoH, 2023). The majority of those diagnosed (over 60%) with PCa are under the age of 70 and usually present late with advanced disease, when cure is difficult to achieve, and prognosis is poor (Nairobi Cancer Registry, Feb 2018). Beyond late diagnosis, PCa screening levels in Kenya remain low, with studies across the country showing screening rates below 5% (KDHS 2014; Wanyaga et al., 2015; Mutua et al., 2017; Mbugua et al., 2022). Low levels of screening in Kenya have been attributed to a lack of knowledge about prostate cancer, a lack of awareness of PCa screening services, and the unavailability of accessible or affordable screening services (Mutua et al., 2017; Wachira et al., 2018; Mbugua et al., 2022).

One way to address limited knowledge of health-related matters, especially in rural communities, is to conduct community education in targeted areas. Population-based education studies have shown improved knowledge of various health issues and overall positive changes in people's health-seeking behavior, with better health outcomes (Abhar et al., 2022; Shoushtari-Moghaddam et al., 2023; Mahboobighazaani, 2024). Kenya has implemented a community strategy, a community-based approach to care provision in which community

health promoters are trained and given responsibility for providing basic health promotion services at the community level. Health promoters are members of community who are taken through short course training on basic health care. One of their key responsibilities is creating awareness and educating the community on various health issues and also mobilising the community to use available health services. Given the high prevalence of PCa in Kenya, including rural areas, and low screening rates, this study therefore aimed to investigate the effects of community-based education on PCa among people at the grassroots level (villages) using a community strategy. Being proactive in helping the community get to know what is ailing them helps the community make informed decisions about dealing with the problem, and in this case, the late presentation and diagnosis of cancer with poor prognosis and eventual loss of life that is being experienced in Kenya and other developing countries can be abated. The findings of this study therefore aim to inform policymakers on how to use available programs, such as community strategy, to better address prevalent problems at the community level.

2. Methodology

2.1 Study design

This study used a community strategy-based education intervention and a pretest–posttest non-equivalent quasi-experimental design. The study involved two independent groups: an intervention group and a control group, with no intervention in the control group. The intervention involved face-to-face education on prostate cancer for five months in the intervention group, while no such education was given in the control group. Community health promoters, the main implementers of the community strategy, delivered prostate cancer education at the household level.

2.2 Setting

The study was carried out in Tharaka Nithi County, one of Kenya's forty-seven counties. It is located in Kenya's Eastern region. The County lies within the geo-codes 0°18'S and 38°0'E and covers an area of 2564.4 km². The County's main economic activity is crop growing: farmers in high-altitude areas grow cash crops such as tea and coffee, while those in lower, drier areas grow sorghum, maize, green grams, and millet. The County is served by four major hospitals, a number of health Centers and dispensaries. Prostate cancer is the most prevalent male cancer in the County, with a prevalence of 10.2%, followed by esophageal cancer. To ensure health services reach the grassroots level, the Kenyan government adopted a community strategy. In community strategy, health care is organized in community units (CU's), where a community unit is a health service delivery unit within a defined geographical area, usually covering a village with a population of approximately 5,000 people. Each unit is staffed by a Community Health Assistant/Officer, under whom 10 community health promoters provide promotive, preventive, and basic curative services (MOH, 2020). Community members select community health promoters, who then receive basic health care training from the government and are expected to serve in their community. Community units are attached to nearby health facilities, which serve as their referral units.

2.3 Sample size determination

Charan and Biswas, (2013) formula was used for sample size determination in this study.

$$n = \frac{2(Z_{\alpha} + Z_{\beta})^2 * p(1-p)}{(p_2 - p_1)^2}$$

Eventually getting a sample of 174 participants per group. To account for attrition, 10% was added, giving 191 participants per group and 382 participants in the study.

2.4 Sampling

Multi-stage sampling was carried out. The researchers purposively selected Tharaka Nithi County because it has a high prevalence of prostate cancer in Kenya (Mutiso et al., 2023). Tharaka Nithi has six sub-counties, which were treated as clusters; four clusters (sub-counties) were then selected using simple random sampling as study sites. The clusters (sub-counties) selected included Tharaka South, Muthambi, Chuka and Mwimbi. After selecting the clusters, we randomly selected 2 community units from each of the four clusters, for a total of 8 community units. For each community unit, we developed a sampling frame listing households with men who met the selection criteria, then used systematic random sampling to select 50 participants per community unit. Since every community unit is covered by 10 community health promoters (CHP'S), 5 CHPs were selected per community unit to participate in the study and therefore each CHP taught 10 households/participants that were selected.

2.5 Intervention

The intervention phase involved training community health promoters and providing face-to-face teaching to participants at the intervention sites. The principal researcher conducted training for community health Promoters (CHPs) and their respective supervisors (community health assistants, CHA) from the intervention sites, assisted by the county community strategy coordinator. Training took two days because the objective was to introduce CHPs to prostate cancer, which is not covered in detail during their community strategy training. The principal investigator developed the training manual with support from the County team and validated it with research supervisors and a team of experts from the Ministry of Health.

Training used PowerPoint presentations, group discussions, role-plays, and flipcharts. Following training, CHPs from intervention sites incorporated prostate cancer education into their weekly community health work program. The intervention ran for five months. The principal investigator and community strategy coordinator supervised and followed up every two weeks to assess how teaching was delivered. The CHPs also met monthly to discuss progress and implementation challenges. Of the 382 participants who started the study, 379 completed it, and 3 (2 in the intervention group and 1 in the control group) were lost to attrition.

2.6 Data collection

Researchers used structured, researcher-administered questionnaires for data collection and, toward the end of the study, also conducted focus group discussions. The same questionnaire was used at baseline and post-intervention. The questionnaire had four parts. The first part collected participants' demographic data; the second collected data on prostate cancer awareness and family history of prostate cancer. The third part assessed prostate cancer

knowledge, and the last part assessed prostate cancer screening practices and associated factors. The questionnaire's knowledge section was adapted from a questionnaire designed and used by Wienrich et al. (2004). For focus group discussions (FGD), the discussion was led by the lead researcher and had five major discussion areas, including the extent to which PCa is a problem in the region, the role of County/national government concerning the same, cultural influence, factors that could be hindering screening, and their interventions.

2.7 Data analysis

Data was analyzed using SPSS version 22. Data were coded, entered, and cleaned after each data collection exercise. Descriptive analysis of socio-demographic characteristics was performed (frequencies and percentages); bivariate analysis was conducted to determine associations between independent and dependent variables, and P values were used to assess the significance of these associations. T-tests were used to compare the mean difference in Knowledge between the groups. To determine the strength and nature of the relationship, we subjected all variables significant in bivariate analysis to regression analysis.

2.8 Ethical approval

The Kenyatta University Ethics Review Committee granted ethical clearance (Ref: PKU/2405/11614). Permission to conduct the study was sought from the National Commission for Science, Technology and Innovation (NACOSTI). Before consenting to participate, each participant was clearly informed of the study's purpose and objectives.

3. Results

3.1 Socio-demographic characteristics of the respondents

A total of 382 men participated in the baseline study (188 in the intervention group and 194 in the control group). Most participants in both groups were under 60 years old (54.8% and 63.4%, respectively). Most were married (72.9% in the intervention group and 76.8% in the control group) and had attained at least primary education (50.5% and 44.9% in the intervention and control groups, respectively). More than 60% of participants (63.8% and 67.5% in the intervention and control groups, respectively) were employed in some form. Overall, the groups did not differ significantly in socio-demographic variables. Other characteristics are shown in Table 1.

Table 1: Socio-demographic characteristics of study participants

Characteristic	Intervention Group (n=188) Frequency (%)	Control Group (n=194) Frequency (%)	Total (n=382) Frequency (%)	χ^2 , df	P value
Age (years)					
40-49	60 (31.9%)	58 (29.9%)	118(30.9%)	7.464, 4	0.113
50-59	43 (22.9%)	65 (33.5%)	108 (28.3%)		
60-69	39 (20.7%)	38 (19.6 %)	77(20.2%)		
70-79	35 (18.6%)	28(14.4%)	63 (16.5%)		
80-above	11 (5.9%)	5 (2.6%)	16 (4.2%)		
Marital Status					
Married	137 (72.9%)	149 (76.8%)	286 (74.9%)	5.873, 4	0.209
Single	17 (9%)	20 (10.3%)	37 (9.7%)		
Widow	19 (10.1%)	14 (7.2%)	33 (8.6%)		
Divorced/separated	15 (7.8%)	11 (5.7%)	13(3.4%)		
Education Level					
Upto Primary	95 (50.5%)	87 (44.9%)	182 (47.6%)	3.550, 3	0.470
Secondary	61 (32.4%)	64(33.0%)	125(32.7%)		
Tertiary	22 (11.7%)	35 (18.0%)	57(14.9 %)		
University	10 (5.3%)	8 (4.1%)	18 (4.7%)		
Employment status					
Formal employment	20 (10.6%)	33 (17.0%)	53(13.9%)	3.349, 2	0.187
Self employed	100 (53.2%)	93 (50.5%)	193 (50.5%)		
Not employed	68 (36.2%)	68 (35.1%)	136 (35.6%)		
Religion					
Catholic	49 (26.1%)	73 (37.6%)	122(31.9%)	6.000, 2	0.112
Protestants	126 (67.0%)	111 (57.2%)	237(62%)		
Others	13 (6.9%)	10 (5.2%)	23 (6.0%)		

3.2 Awareness of prostate cancer

Post-intervention, prostate cancer awareness increased significantly in the intervention group ($p < 0.05$), while it did not change significantly in the control arm ($p = 0.448$). Similar changes were noted in awareness of prostate cancer screening, with the intervention arm showing significant improvement ($p = 0.001$), while the control arm showed no significant change ($p = 0.317$). Awareness of specific Prostate cancer screening tests also improved significantly in the intervention group ($p < 0.001$), but did not change in the control group ($p = 0.461$). Table 2 below summarizes these findings.

Table 2: Awareness of Prostate cancer

Variable	Category	Baseline (Intervention n=188: Control n=194)	Post intervention (Intervention n=186: Control n=193)	χ^2	P value
		Frequency (%)	Frequency (%)		P value
Ever heard of Prostate cancer	Intervention group	162 (86.2)	184 (98.9)	12.639	<0.05
	Control Group	164 (84.5)	165 (85.5)	1.617	0.448
Ever heard of Prostate cancer screening	Intervention group	126 (67)	176 (94.4)	25.895	0.001
	Control group	133 (68.6)	140 (72.5)	1.195	0.317
Awareness of specific Prostate cancer screening tests	Intervention group	29 (15.4)	133(71.5)	44.489	<0.001
	Control Group	35 (18)	71 (36.5)	0.544	0.461

3.3 Knowledge on prostate cancer

At baseline, both groups had poor knowledge of prostate cancer, with each group having only 30.9% of their participants having good knowledge. Post-intervention, knowledge of prostate cancer improved significantly in the intervention group ($P < 0.001$), with good knowledge increasing to 68.8%, whereas in the control group there was no significant change ($P = 0.456$), with good knowledge slightly decreasing to 28.5%. A paired t-test comparing the overall mean score again revealed a significant improvement in the intervention group ($t = -10.934$, $df = 185$, $P < 0.001$), with the mean score increasing from 50.85 at baseline to 69.52 post-intervention. In the control group, overall mean performance did not change significantly between pre- and post-intervention ($t = -1.986$, $df = 192$, $P = 0.09$), with the mean score increasing from 50.43 to 53.16. Table 3 summarizes these findings.

Table 3: Overall knowledge comparison within the group's pre- and post-intervention

Overall Knowledge	Intervention Group				Control group			
	Baseline (n=188)	Post-intervention (n= 186)	Chi Square	T-Test	Baseline (n=194)	Post-intervention (n= 193)	Chi Square	T-Test
Good	58 (30.9%)	128 (68.8%)	P < 0.001	t = 10.934, df = 185, P<0.001	60 (30.9%)	55 (28.5%)	P=0.456	t = 1.986, df = 192, P=0.09
Poor	130 (69.1%)	58 (31.2%)			134 (69.1%)	138 (71.5%)		

3.4 Overall knowledge comparison between intervention group and control group post-intervention

Post-intervention comparison of overall knowledge between the groups revealed a significant difference in performance. The chi-square test of association revealed a significant association between overall PCa knowledge level and study group ($\chi^2 = 61.665$, $df = 1$, $P < 0.001$). An independent-samples t-test showed a significant difference in overall mean knowledge score between the study groups ($P < 0.001$, $df = 377$, $t = 10.627$).

Table 4: Prostate cancer knowledge comparison between groups post-intervention

Overall score post-intervention	Intervention Group (n=186)	Control Group (n=193)	Chi Square	T Test
Good Knowledge	128 (68.8%)	55 (28.5%)	$\chi^2 = 61.665$, $P < 0.001$.	t= 10.627, df= 377, P < 0.001
Poor Knowledge	58 (31.2%)	138 (71.5%)		

3.5 Prostate cancer screening Practices

At baseline, PCa screening levels were low in both groups (4.1% and 4.8% for the control and intervention groups, respectively). Post-intervention, screening rates improved significantly in the intervention group ($P < 0.05$), but did not change significantly in the control group ($P = 0.067$). Post-intervention testing levels differed significantly between the groups ($\chi^2 = 4.707$, $df = 1$, $P = 0.030$). Figure 1 below summarizes these findings.

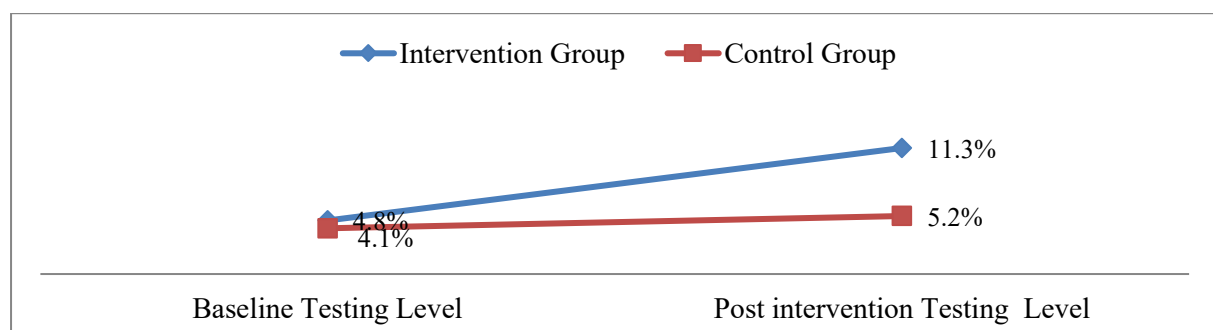


Figure 1: PCa Screening levels among respondents during Pre and Post intervention Period

3.6 Discussion

The study assessed the effects of community education on prostate cancer on both prostate cancer knowledge and prostate cancer screening levels among men. Overall, the education intervention had positive effects on the intervention group, as most of the study variables improved post-intervention. The two groups were similar at baseline across all measures, with no significant differences in socio-demographic variables, PCa awareness, PCa knowledge, or screening practices.

The intervention increased awareness, as awareness of prostate cancer, prostate cancer screening, and specific prostate cancer screening tests increased significantly in the intervention arm. In the control arm, no change in awareness was reported. This finding underscores the importance of education in improving awareness of prostate cancer. This finding was consistent with results from several related studies. A 2016 study in Shiraz by Molazem et al. found improved awareness of PCa in the intervention arm following the intervention. Other studies reporting similar findings include a study in Jamaica by Capana et al. (2015), an American study by Zeigler-Johnson et al. (2022), and a study in Central Kenya by Mbugua et al. (2022), all of which reported improved awareness following the intervention.

Prostate cancer knowledge of the study population was low at the baseline. This finding was consistent with findings of several studies conducted in the region. Studies by Yeboah-Asiamah et al. in Ghana (2017), Maladze et al. in South Africa (2023), and Ngowi et al. in Tanzania (2024) all found poor prostate cancer knowledge among their study participants. Following intervention, significant improvement in knowledge was noted in the intervention group ($P < 0.001$), with those with good knowledge increasing from 30.9% to 68.8% while in the control group the change in knowledge was not significant ($P=0.456$), showing that intervention played a role in improving the PCa knowledge score in the intervention group. This finding is consistent with findings of a study carried out among African Americans on informed decision-making about prostate cancer testing in predominantly black immigrant men by Zeigler-Johnson et al. in 2022, which found significant improvement in knowledge level in the intervention group. Studies by Molazem et al. in Shiraz (2016) and Mbugua et al. (2022) in Central Kenya reported findings consistent with this study. Other related studies on the effects of education interventions on breast cancer knowledge and screening practices also concluded that educational interventions can improve knowledge (Abhar et al., 2022; Shoushtari-Moghaddam et al., 2023).

In this study, baseline screening levels were low in both groups. This was consistent with several regional studies reporting low screening levels (Wanyaga et al., 2015; Mutua et al., 2017; Bugoye et al., 2019; Mbugua et al., 2022). Low screening rates have been associated with factors such as lack of knowledge about prostate cancer, unavailability of screening services, and other factors (Ojewola et al., 2017; Wachira et al., 2018; Mbugua et al., 2021). After the intervention, screening levels in the intervention group increased significantly, with the percentage screened rising from 4.8% at baseline to 11.3% post-intervention. Increased exposure to PCa information and knowledge may have influenced testing, contributing to the improvement seen in the intervention group. This finding was consistent with several related studies showing that increased PCa knowledge is likely to increase PCa screening behavior (Molazem et al., 2016; Capanna et al., 2015; Mbugua et al., 2022). Knowledge is power and

can help people make informed choices about their health; therefore, it is important to engage people in community-driven initiatives that empower them with information and knowledge so they can make informed choices about their health and life.

Strengths and limitations

One major strength of this study was its interventional design with two comparison groups, which allowed researchers to compare outcomes across the groups. Another strength was that the researchers collected data using different methods, which enhanced the study's validity. However, because the study was conducted in rural settings, the findings may not fully represent men in urban settings.

4. Conclusion

This study has demonstrated that targeted community education on prostate cancer can improve both prostate cancer knowledge and screening rates among the participants. At baseline, participants had poor knowledge of prostate cancer, and uptake of screening services was also low, but following the intervention, both improved in the intervention sites, while not much change was noted in the control sites.

5. Recommendations

Based on these findings, we recommend strengthening and broadening community-based education using available resource persons, such as community health promoters and their supervisors, to cover health areas like cancer, which is affecting every community today. There is also a need to scale up prostate cancer screening services at the community level so as to enable early diagnosis and treatment.

Acknowledgements

The authors acknowledge the Tharaka Nithi County Department of Health Services staff, especially those involved in community strategy, for their support throughout the exercise. We also acknowledge community health volunteers for their commitment and support during the study. We also acknowledge the research assistants and participants for their contributions during the study.

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