Uptake of Prostate Cancer Screening and Associated Intra-Personal Factors among Men Aged 40-69 Years:
A cross-sectional study in a rural community in Kenya

*Ruth Gathoni Mbugua[1], Sherry Oluchina[2], Simon Karanja[2], Solomon Cheboi[3]

1.   *Mount Kenya University, Department of Community Health, P.O. Box 342-01000, Thika.*
2.   *Jomo Kenyatta University of Agriculture & Technology, P.O. Box 62 000 – 00200, Nairobi, Kenya.*
3.   *National Museum of Kenya, P.O. Box 40658-01000, Nairobi, Kenya.*

Corresponding Author: Ruth Gathoni Mbugua, Mount Kenya University, Depart. of Community Health, P.O. Box 342-01000, Thika, Kenya. Tel: +254 722 297 188. Email: rmbugua15@gmail.com

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Summary

INTRODUCTION

Prostate Cancer (PC) is mostly asymptomatic despite mortality rate highly dependent on early diagnosis and treatment which might have been hindered by existing barriers. By the year 2018, PC ranked second globally among the most diagnosed cancers in males attributing to 13.5% of deaths. Disparities existed regarding the mortality rates of PC with a slight predominance in blacks compared to other races. The level of PC screening in Kenya like any other Sub-Sahara African country was terribly low [2-,10]. A community-based study carried out in a rural area reported only 2.4% of the participants had been screened, while in the capital city of Kenya (Nairobi City County), only 4.1% of the respondents had ever been screened.

OBJECTIVE

The aim of the study was to determine the intra- personal factors influencing uptake of prostate cancer screening among men aged 40-69 years in Kiambu County, Kenya.

METHODOLOGY

In April 2019, the study adopted a descriptive cross-sectional survey design in Kiambu County. A total of 576 men aged between 40-69 years except those already diagnosed with prostate cancer from the Community units within Gatundu North and Kiambu Sub- counties were recruited. Data was collected through an interviewer-administered questionnaire. It was coded, cleaned and analyzed using Statistical Package of Social Sciences (SPSS) version 22. Bivariate analysis with Pearson's chi -square test was used to compare the proportions. A P-value of <0.05 was considered statistically significant at 95% Confidence Interval. The significant variables were then subjected to Multi-variate logistics regression for further analysis of the association with uptake of screening of Prostate Cancer. Participant's autonomy and anonymity was maintained, and any information shared by them was confidential.

RESULTS

The level of screening was low. Only 5% of the respondents had ever been screened for prostate cancer. Socio-demographic factors were not associated with prostate cancer screening but Socio-economic factors made an impact. Owning 1-3 acres of land was significantly associated with screening. Respondents who owned 1-3 acres were 15 times more likely to take up screening in comparison with those having less than 1 acre of land. [OR =15.672 CI 95% (1.256- 195.47) P=0.033]

CONCLUSION

The level of prostate cancer screening was low. Socio- economic factors were found to influence uptake of prostate cancer screening. Socio-economic factors when designing prostate cancer prevention programs need to be emphasized. Prostate Cancer screening remained a controversial issue due to the documented risk of over diagnosis and harm associated with biopsy and treatment in developed countries.

RECOMMENATIONS

An early diagnosis of Prostate cancer will give an opportunity for treatment. Preventive Services Task Force report recommends the screening of men for PC among those considered at risk within the age of 40-69 years through shared a decision-making process.

Introduction

Prostate Cancer (PC) ranks second globally, among the most diagnosed cancers in males and that attributed to 13.5% of deaths by the year 2018. Disparities existed regarding the mortality rates of PC with a slight predominance in blacks in comparison with men from other races. Prostate Cancer is the leading cause of death among men particularly in Sub-Saharan Africa and the Caribbean [1].

In Kenya, prostate cancer was ranked as the most common cancer in males at 17.3% with majority of men presenting for treatment in advanced stages of the disease [2]. This could be attributed to existence of barriers on seeking early diagnosis and treatment. Prostate cancer is mostly asymptomatic; hence the reduction in mortality is highly dependent on early diagnosis and treatment of the disease before its *metastasis.* Early detection through screening remains an important strategy to reduce mortality from PC among men.

Internationally, Prostate Cancer screening remained a controversial issue due to the documented risk of over diagnosis and harm associated with biopsy and treatment in developed countries [3]. Notwithstanding the controversy, black men who were at a higher risk would benefit from PC screening [4]. Nonetheless, the predominant agreement worldwide has been on the need to adopt informed shared decision-making during PC screening. The current guidelines in Kenya in line with the U.S.. Preventive Services Task Force report recommends the screening of men for PC among those considered at risk within the age of 40 -69 years through shared a decision-making process [2].

Mortality from prostate cancer has been on the decline in developing countries resulting from early diagnosis by screening and treatment. Hence, limited access to timely diagnosis was greatly associated with higher mortality rates among African men. Studies conducted in Sub-African countries reported low levels of screening among men. For instance, from a population-based study done in Nigeria, only 10.2% of Nigerian men had ever taken up screening [5]. Ghana reported only 10% of the respondents had undergone PC screening [6]. Similarly, Ugandan men, only 2.6% respondents had ever taken up PC screening [7].

The level of Prostate Cancer screening in Kenya like any other African country was terribly low [2,8,9,10]. A community-based study carried out in a rural community in Kenya reported only 2.4% of the respondents had been screened for PC [11]. Likewise, a study conducted in the capital city of Kenya (Nairobi City County), reported that, only 4.1% of the respondents confirmed having ever undergone PC screening [12].

Despite the current guidelines in Kenya recommending screening of men aged 40-69 years through informed shared decision -making process, the level of uptake remains low [2]. A population-based survey in Kenya concluded that 65% of Kenyan men were aware of prostate cancer. Despite the increase in awareness regarding prostate cancer, the level of uptake of screening remains incredibly low in Kenya like other developing countries [8].

Aim

The study sought to investigate salient factors that could be hindering the uptake of Prostate Cancer

screening to decrease the disparities that exist in relation to mortality especially in a rural community. There was scarcity of community-based studies conducted among Kenyan men especially those considered to be at risk (aged 40 -69 years). Further, to investigate the intra-personal factors associated with the screening in a rural community in Kenya.

Materials and Methodology
Study Design and Setting

That was a household cross -sectional study conducted in Kiambu County, as part of a large quasi experimental intervention study. It was undertaken in two sub-counties: Gatundu North Sub-County and Kiambu Sub-County in April 2019. Kiambu County is in the central region of Kenya and is composed of twelve sub-counties with the main socio-economic activity being agriculture. The study area consisted of a total 17 Community Units which were all included in the study.

Sample Size Estimated, Sampling Procedure and Data Collection

A total of 576 men aged between 40-69 years from the Community Units within the study area were recruited. This was the recommended age for screening of men according to the screening guidelines in Kenya [2]. Stratified random sampling was used to select respondents from the respective lists of all households with men aged 40-69 years in the Community units in the study area using a table of random numbers. Those men already diagnosed with prostate cancer were excluded from the study.

Data Collection Tools

The study adopted quantitative method of data collection. A structured pre-tested questionnaire was utilized to collect quantitative data through face to face interviews with the respondents. The structured questionnaire entailed the sociodemographic characteristics, socio-economic factors and history of uptake of PC screening.

Data Analysis

The data collected was entered coded, cleaned and analyzed using Statistical Package of Social Sciences (SPSS) version 22. Bivariate analysis with chi-square test was used to compare the proportions. A p-value of <0.05 was considered statistically significant at 95% Confidence Interval. The significant variables were then subjected to Multi-variate logistics regression for further analysis of the association with uptake of screening.

Ethical Statement

Ethical review was obtained from Jomo Kenyatta University of Agriculture & Technology Institutional Ethical Review Committee, Kenya (Ref JKU/2/4/896B). Permission to carry out the research was also sought from the Ministry of Health and the National Council of Science Technology & Innovation. Participant's autonomy and anonymity was maintained and any information shared by them was confidential. The participants were given an explanation of the purpose and benefits of the study after which the investigator sought a written consent.

Results
Socio-Demographic Characteristics of Respondents

The results are derived from 576 men indicating a response rate of 100%. *Table 1*. Presents the demographic characteristics of the respondents. The results show that majority (43.2%) of the respondents were aged between 40-49 years with 81.4% and 98.1% of the respondents being married and Christian.

Table 1: *Socio-Demographic Characteristics*

Variable	Category	Frequency (%)
Age	40-49 Years	249(43.2%)
	50-59 Years	197(34.2%)
	60-69	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%)

Data presented in frequency(n) and proportions (%)

Socio-Economic Characteristics of Respondents

Regarding the level of education, 46.4% had acquired secondary education according to the Kenyan system of education. There were 40.1% of the respondents doing small scale farming. The total household monthly income reported by majority (64.9%) was less than Kshs. 10,000. The Tenure of household was mainly Owner occupied which represented 82.6% of the respondents with 49.8% having constructed permanent houses, 58.5% of them owned a piece of land with 56.1% owning less than 1 acre. The main source of water for the majority (42.9%) was public piped source. Firewood was the main type of cooking fuel used by the respondents. While 86.6% of the household's main type of lighting was electricity.

Level of Uptake of Prostate Cancer Screening

We assessed the PC screening history among the respondents. The level of uptake of PC screening was abysmally low. Only 29 out of 576 (5%) respondents had ever undertaken PC screening at the time of the study. The most cited method of screening reported was Prostate Specific Antigen (PSA) testing (58.6%) followed by the Digital Rectal Examination (31%).

Intra - Personal Factors Associated with Prostate Cancer Screening
Socio-Demographic Characteristics

From the study findings, age (P=0.226), marital status (P=0.097) and religion (P=0.095) were not significantly associated with PC screening (P> 0.05) as indicated in *Table 2*.

Table 2: *Association of Socio-Demographic Characteristics with Screening*

Variable	Category	Uptake	Non uptake	Total	Chi square /Fishers Exact
Age in years	40-49	9(3.6)	240 (96.4)	249 (43.2)	$\chi2$ (2) =2.972, P=0.226
	50-59	10 (5.1)	187(94.9)	197 (34.2)	
	60-69	19(7.7)	120 (92.3)	130 (22.6)	
Marital status	Married	29(6.2)	440(93.8)	469(81.4)	Exact = 0.097
	Single	0(0)	34(100)	34 (5.9)	
	Widowed	0(0)	33(100)	33 (5.7)	
	Separated	0(0)	40 (100)	40(6.9)	
Religion	Christian	37(6.5)	528 (93.5)	565(98.1)	Exact = 0.095
	Traditionalist	0 (0.0)	6(100)	6 (1.0)	
	Muslim	1 (20)	4 (80)	5 (0.9)	

Table 3: Association of Socio-Demographic Characteristics with Screening

Variable	Category	Not screened	Screened	X2	Df	P value
Education	None	6 (100)	0 (0)	3.073	3	0.381
	Primary	228 (95.8)	10 (4.2)			
	Secondary	254 (95.1)	13 (4.9)			
	Tertiary	59 (90.8)	6 (9.2)			
Occupation	None	24 (86.0)	1 (4.0)	10.541	4	0.032*
	Business	124 (95.4)	6 (4.6)			
	Formal employment	42 (89.4)	5 10.6)			
	Farmer	215 (93.1)	16 (6.9)			
	Casual worker	142 (99.3)	1 (0.7)			
Total income	<10,000	357 (95.5)	17 (4.5)	7.085	3	0.069
	10,000-30,000	159 (95.8)	7 (4.2)			
	31,000-50,000	21 (84.0)	4 (16.0)			
	>51,000	10 (90.9)	1 (9.1)			
Household tenure	Owner occupied	450 (94.5)	26 (5.5)	1.048	1	0.306
	Rented/Provided	97 (97.0)	3 (3.0)			
Type of housing	Permanent	268 (93.4)	19 (6.6)	4.204	2	0.122
	Semi-permanent	238 (96.0)	10 (4.0)			
	Temporary	41 (100)	0 (0)			

Significant at p=values <0.05

Table 3: Association of Socio-Demographic Characteristics with Screening

Variable	Category	Not screened	Screened	X2	Df	P value
Own land	Yes	317 (94.1)	20 (5.9)	1.376	1	0.241
	No	230 (96.2)	9 (3.8)			
Land acreage	<1 acre	179 (94.7)	10 (5.3)	18.107	3	<0.001**
	1-3 acres	128 (95.5)	6 (4.5)			
	4-5 acres	8 (80.0)	2 (20.0)			
	>5 acres	2 (50.0)	2 (50.0)			
Main water source	Public piped	242 (98.0)	5 (2.0)	10.165	3	0.017*
	Private piped	157 (93.5)	11(6.5)			
	Well/Borehole	100 (93.5)	7 (6.5)			
	River/Dam	48 (88.9)	6 (11.1)			
Main cooking fuel	Electricity	8 (100)	0 (0)	4.579	4	0.333
	Gas	127 (94.1)	8 (5.9)			
	Paraffin	23 (100)	0 (0)			
	Charcoal	44 (100)	0 (0)			
	Firewood	345 (94.3)	21 (5.7)			
Main lighting	Electricity	471 (94.4)	28 (5.6)	2.64	2	0.267
	Lamps	65 (98.5)	1 (1.5)			
	Solar	11 (100)	0 (0)			

Significant at p=values <0.05

Socio-Economic Factors Associated with Prostate Cancer Screening

The influence of various socio-economic factors on uptake of PC screening for example; Occupation (X2=10.541, df =4, P=0.032), the acreage of the land (X2=18.107, df=3, P <0.001) and the main source of water (X2 =10.165, df=3, P=0.017) for the respondents was significantly associated with uptake of PC screening (P>0.05) as indicated in *table 3*.

Further analysis of the significant variables by multivariate logistics regression showed that, the acreage of land owned by the participants significantly influenced PC screening. The owning of 1 acre to 3 acres of land was a significant association. Respondents who owned 1 acre to 3 acres of land were 15.7 times more likely to undergo PC screening in-comparison to those with land acreage less than one (1) acre. [OR =15.672 CI 95% (1.256 - 195.47) P=0.033] as indicated in *table 4*. That could be due to the life style.

Some economically stable respondents' lifestyle made them consume anything including chemically contaminated foodstuff and drinks that could trigger cancer cells. Hence, they were able to check their health status while meeting the minimal medical bills and that brought about the association with the upkeep of PC screening. They were also sensitive to any early symptom such as; erectile dysfunction, pain or burning during urination or a small lamp or swelling between the thighs.

Table 4: *Multivariate Logistics Regression Analysis of Association of Socio-Economic Characteristics and Prostate Cancer Screening*

Ever had prostate cancer screening	Odds ratio	95% CI	P value
Occupation			
Casual/None	**Reference**		
Farmer	3.833	(0.476 -30.855)	0.207
Business	2.309	(0.487-10.946)	0.292
Formal employment	0.49	(0.124 -1.946)	0.311
Land acreage			
<1 Acre	**Reference**		
1-3 acres	15.672	(1.256- 195.478)	0.033*
4-5 acres	2.981	(0.190-46.871)	0.437
> 5 acres	11.081	(0.937 -130.991)	0.056
Main source of water			
River/ stream/ dam	**Reference**		
Public piped	4.017	(0.834 - 19.349)	0.083
Private piped	1.613	(0.353 - 7.378)	0.538
Well/ borehole	1.488	(0.291 -7.613)	0.633

Significant at p = values <0.05

Discussion

The study assessed the level of screening and associated intra-personal factors among men aged 40-69 years in Kiambu County, Kenya . The results showed that, the level of Prostate Cancer screening for this rural population was abysmally low. Such that only 5% had ever taken up PC screening.

Those findings were congruent with the Kenyan Demographic Health Survey, 2014 which reported that only 3% of Kenyan men aged 15-49 years within the population had undergone PC screening [9]. Despite over 80% presented with advanced prostate cancer at the health facilities for treatment as documented by the Nairobi Cancer registry [3]. The low level of PC screening was not a unique finding for Kenyan men as similar findings had been reported in other African countries [6,7,8].

The low level of screening might be attributed to low levels of awareness and accessibility to screening services. It was postulated that, men residing in the rural areas had minimal knowledge and uptake of Prostate Cancer screening [9]. The most common method of screening utilized in the study was Prostate Specific Antigen (PSA) test which was offered at a cost in selected health facilities in the study area. That could have been the cause of low uptake of screening.

The late presentation and low uptake of PC screening calls for urgent measures to enhance early detection. First priority and special consideration for the provision of affordable services given to the rural populations and improve the outcomes of Prostate Cancer at early stage to control the scourge.

The study reported that, there was no significant association between age, marital status or religion and Prostate Cancer screening. Those findings were corroborated in a study in Ghana which reported the same [7]. A similar study conducted among men aged 30 years and above in the capital city of Kenya, the Nairobi City County, where socio-demographic factors were not associated with PC screening . Likewise, a study in a rural community Makueni County in Kenya reported the same [12, 13].

Despite conflicting views on whether socio-demographic factors influence PC screening. The findings of this study differed with what had been postulated previously in regard to determinants of PC screening among black men whereby, several individual factors which include older age, and being married had been reported to influence PC screening [14 - 16].

Lack of association with marital status and screening could be attributed to the male dominance factor that existed among African men that limits their female spouse an influence on decision making.

The study population being predominantly Christians, religion might not have influenced any decision making. Age was not found to influence screening neither in spite of some studies reporting an increase in screening among older men [17]. That requires further investigation as it might have been attributed to older men presenting with symptoms seeking alternative treatment.

Socio-economic factors which include better education, occupation and personal income were postulated to influence Prostate Cancer screening [18,19]. In our study the acreage(size) of land owned was significantly associated as that could inform the socio-economic status of the respondent. The study population being of a rural community, the likelihood of screening increased as the acreage of land increased.

Our findings were similar to the Kenya Demographic Health Survey that corroborated with, an increase in the likelihood of PC screening with an increase in wealth [9]. That was in agreement with a study in Tanzania which concluded that men with low socio-economic status were less likely to take up PC screening [17]. An indication for need to consider the provision of affordable or free screening services to men considered to be at risk of Prostate Cancer to enhance the uptake of screening across the board. Currently, PSA screening offered at a cost might be hindering the uptake. We need to explore further the accessibility of screening services in regard to their afford-ability among men of different socio-economic status.

Prostate cancer remains a major global public health concern due to the rising deaths attributed by presentation of men in advanced stages of the disease. Early diagnosis highly dependent on screening of men who are considered at risk through a shared decision making process. [3,4] The study provided important learning moments for designing and planning of

screening programs for prostate cancer considering that the level of screening still remained very low in Kenya.

It is crucial for the Ministry of Health and county governments to consider scaling up affordable PC screening services in health facilities coupled with increased advocacy on symptoms to enhance the implementation of the current guidelines which recommend shared decision making. That is anticipated to improve the outcomes of treatment of PC and a decrease in mortality. The prostate cancer prevention and control programs require to be tailored to address the differences in socio-economic status to reduce the already existing disparities in screening and mortality related to PC within the population especially among men of rural and low socio-economic status.

Conclusion

The level of uptake of PC screening was very low in a population of men aged 40-69 years from that rural community. Socio- demographic characteristics were not associated with uptake of screening. Socio-economic factors which included the occupation, size of land owned and the main source of water for the household were found to be influential.

Consideration for tailor-made PC screening programs for the social economic circumstances of the men considered to be at risk through provision of affordable or free screening services was crucial. That can overdo the disparities in screening especially among men in rural communities and of low socio-economic status.

Conflict of interest

The authors have no conflicts of interest associated with the material presented in this paper.

Acknowledgement

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