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Research Article

Factors Influencing Prostate Cancer Screening Among Men from Eastern Kenya

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Abstract

Prostate cancer is the most prevalent urological cancer and causes a significant global health burden, especially in developed countries. It is the most frequently diagnosed cancer among men in more than half of the countries in the world. Early diagnosis minimizes complications and mortalities associated with it. In Kenya it is the most commonly diagnosed cancer among men and usually characterized with low rates of screening and late diagnosis. Several factors have been found to influence prostate cancer screening. This study sought to establish factors influencing prostate cancer screening in the rural settings of Tharaka Nithi County in Eastern Kenya. The study adopted cross-sectional design in which researcher-administered questionnaires were used to collect data. Multi-stage sampling was used to recruit 379 men who were 40 years old and above who participated in the study. Data analysis was done using the statistical package of Social Science version 22. Frequencies and percentages were used for data presentation. Chi square ($\chi2$) and Fisher's exact test were used test relationship between dependent and independent variables. P-value of <0.05 were used to declare factors as significantly associated with the outcome variable. Results showed that the awareness level of prostate cancer was high (85.2%) and screening levels for prostate cancer were low (4.5%). Factors found to be significantly associated with PCa testing were education level (Fisher's exact P< 0.001), awareness of PCa screening (Fisher's exact P=0.028), awareness of specific prostate cancer tests (Fisher's exact p < 0.001), family history of prostate cancer ($\chi2 = 36.14$, P< 0.001), cost of prostate cancer test (Fisher's exact *p*=0.001), insufficient information on PCa ($\chi2 = 13.55$, *p*=0.001) and cultural factors ($\chi2 = 5.63$, *p*=0.023). Conclusions: Although prostate cancer awareness level was high, prostate cancer screening rates were low among men from Tharaka Nithi County. Several factors influencing screening were identified, some of which were hindrances. There is therefore need for the county government to come up with appropriate strategies to address these hindrances and scale up screening services at the community level to facilitate early diagnosis and treatment of prostate cancer.

Keywords

Prostate Cancer, Screening Tests, Prostate-specific Antigen (PSA) Test, Community Units

1. Introduction

Prostate cancer is the most prevalent urological cancer and causes a significant global health burden, especially in developed countries [1]. It is the most frequently diagnosed cancer among men in more than half of the countries in the world (112 of 185 countries/territories), with an estimated 1.4 million new cases in 2020 [2]. Its incidence rates vary widely across the world. Incidence rates are almost three times higher in transitioned than in transitioning countries (35.5 and 12.6 per 100,000, respectively), whereas the difference in mortality rates is much smaller (7.3 and 6.6 per 100,000, respectively) [3].

In Africa, prostate cancer is the most prevalent male cancer both in incidence and mortality. According to the 2020 GLOBOCAN database, the highest incidence of cancer in Sub-Saharan Africa was prostate cancer (77,300 cases), followed by liver cancer (24,700 cases) and colorectal cancer (23,400 cases). Additionally, it was the leading cause of cancer-related deaths among men in the region [4]. Rapidly increasing trends in incidence and mortality from prostate cancer (PCa.) have been found in sub‐Saharan Africa, with annual increases reported in Southern and Eastern African countries from 1995 to 2018 [5]. As a result of this, countries in these regions have started taking initiative to control the high incidence rates and this may primarily reflect the progressive increase in awareness and improvements in the respective healthcare systems that have permitted greater use of PSA testing and trans-urethral resections [5].

In Kenya, non-communicable diseases are becoming more prevalent and cancer is among them. According to the Ministry of Health Kenya, the leading causes of death in the country are infectious diseases and cardiovascular diseases, followed by cancer which comes in third [6]. GLOBOCAN 2020 estimated the annual incidence rate of cancer in Kenya to be 42,116 and a mortality of 27,092 and also indicated that prostate cancer is the most common cancer among Kenyan males (21.9%), followed by colorectal cancer (8.3%) and esophageal cancer (8%) [7]. Despite the fact that PCa is the leading male cancer, its screening levels remain very low, especially in Kenyan rural areas [8]. This low uptake could be as a result of multiple factors. Recent studies carried out in Central Kenya and in the neighboring countries of Uganda and Tanzania found poor knowledge on PCa, fatalistic beliefs, low risk perception, cultural factors and unavailability of screening services as some of the factors hindering testing [9-11].

Besides the challenge of low screening level the other major problem in Kenya is late diagnosis of PCa. Prostate cancer has an indolent course and is usually asymptomatic in its early stages. Most cases especially in low-income countries are diagnosed when the disease has reached advanced stages with poor prognosis. Prostate cancer screening is meant to identify PCa cases before they start manifesting clinically and there is also evidence that prostate specific antigen (PSA) screening can detect early stages of prostate cancer [12]. Data from the regional cancer registry at Kenya Medical Research Institute (KEMRI) reveals that majority of cancer cases in Kenya (about 80%) are diagnosed late when the disease has already spread to other parts of the body and nothing much can be done at this stage in terms of treatment [13]. This late diagnosis and seeking of treatment could be as a result of the same reasons leading to low screening rates.

In Kenya, there is limited research on prostate cancer and more so on the factors that could be leading to low screening levels and late diagnosis especially in the rural areas. This study therefore aims to investigate the factors influencing prostate cancer screening practices among men in the rural areas of Tharaka Nithi County. By identifying key factors influencing prostate cancer screening and the barriers faced by men in accessing these services, this study seeks to inform policy and practice on areas they need to target to come up with strategies that can enhance utilization of prostate cancer screening practices especially in the rural areas.

2. Materials and Methods

2.1. Study Design

This was a descriptive cross-sectional study which assessed the factors influencing the uptake of prostate cancer screening services. The study was conducted as a baseline survey for a larger intervention study that was assessing the effects of education intervention on uptake of prostate cancer screening.

2.2. Study Area

The study was conducted in the rural areas of Tharaka Nithi County in Eastern Kenya. The main social economic activity of the area is agricultural, with 80% of those living in the area either practicing small scale crop farming, daily farming or mixed farming. Crop farming in the region is mainly rainfall dependent and is therefore characterized by frequent crop failures especially in lower parts of the County. Over 70% of the roads are not tarmacked and the commonest means of transport is motorbikes. The study region has high prevalence of prostate cancer [14] and is served by four main hospitals including Chuka County Referral Hospital, Presbyterian Church of East Africa Chogoria Hospital, Magutuni Sub-County Hospital and Marimanti Sub-Couty Hospital. At the grass-root level, health care is organized into community units. A Community unit is a health service delivery structure within a defined geographical area covering a population of approximately 5000 people. Each unit is assigned two Community Health Extension workers (CHEWs) who are either trained nurses or public health officers and a community health volunteer, who is a member of the community who have received basic training in health and whose main responsibility is to provide promotive, preventive and basic

curative services.

2.3. Study Population

Target population was men aged 40 years and above from the County and who were eligible for prostate cancer screening as per the Kenyan ministry of health prostate cancer screening guidelines [15]. Inclusion criteria was men aged 40 years and above from the sampled areas within Tharaka- Nithi County who were willing to participate in the study. Exclusion criteria was adult males who were either mentally or physically sick at the time of study. Of the 400 men sampled initially based on sampling procedure 21 declined to participate when they were explained the study was to continue for six months. (Figure 1 below) Those who declined were equally distributed from both arms of the study and so not likely to affect the outcome of the study and the number that participated was within the limits of the calculated sample of 348.
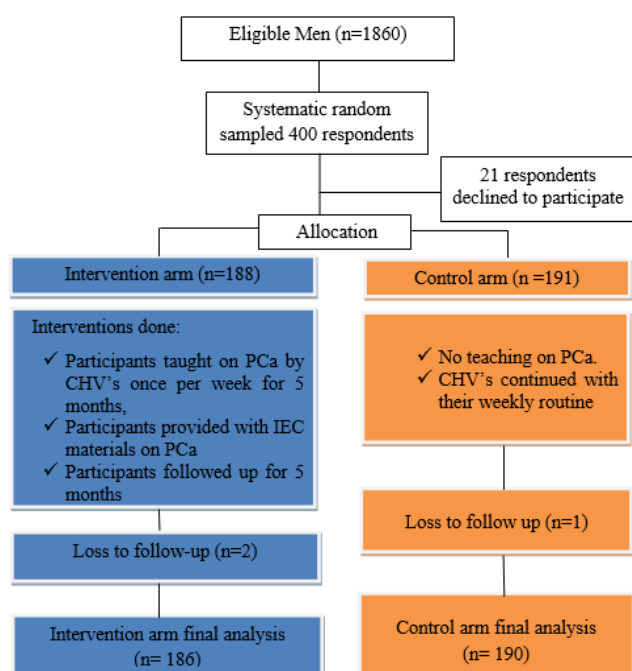

Figure 1. *Consort diagram showing recruitment to analysis.*

2.4. Sample Size Determination.

This being a part of a larger intervention study, the sample size calculation formula by Charan and Biswas, (2013) was used to determine the sample size [16].

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

Where,

n = sample size required from each condition (pre-and post-intervention).

Z_α = critical value for the normal distribution of population

at 95% confidence interval for two tailed ($Z_{.05}$ is 1.96)

Z_β=critical value for the normal distribution for the probability of type II error at 80% power for this study (Z_2 is 0.842).

p = pooled prevalence (prevalence in case group (p_1) + prevalence in control group) (p_2)/2

p_1- p_2 = difference in proportion of events in two groups in an experimental study

A similar study carried out in 2022 which assessed the effectiveness of education intervention on prostate examination, was used to estimate p1(the expected sample proportion who participated in PC screening at baseline) and p2 (the expected sample proportion who participated in PC screening post-intervention) [17]. This gave a sample size of 348 before adding 15% to cater for the non-response rate, giving this study a calculated sample size of 400.

2.5. Sampling Technique

The study targeted adult males living in the rural areas of Tharaka Nithi county. The County has six Sub-counties from which four were selected randomly. Two community units were then randomly picked from each of the four sub-counties making a total of 8 community units in which the study was carried out. A list of households with men who met the selection criteria was then developed in each of the selected community unit and systematic random sampling was used to select 50 participants per community unit.

2.6. Data Collection and Instrumentation

The study was conducted between October and December 2022. Data was collected using researcher-administered questionnaires which had both open and close-ended questions. The questionnaire was developed by the author and a team from Ministry of Health working in the County and was validated by experts from Ministry of Health national office and Kenyatta University. The questionnaire was also reviewed by the academic supervisors of this research study to confirm its conformity to study objectives and its usability. Before use, the questionnaire was first pre-tested in a community unit in the neighboring county of Embu and any ambiguities and inconsistencies noted were corrected before producing the final version of the questionnaire. The questionnaire consisted of four sections: Section 1: Socio-demographic characteristics which included age of the respondent, level of education, employment status, marital status and religion. Section II: Assessment of the level of awareness of prostate cancer which included questions such as whether they had heard of prostate cancer, their source of information, awareness of signs and symptoms of prostate cancer, awareness of screening tests and aware of any family members who could be suffering from prostate cancer. Section III: History of PCa screening and related factors which included asking respondents whether they have ever been screened for prostate cancer, reasons that lead to their

screening, the type of screening test they went through and whether they believe prostate cancer screening is beneficial or not. Section IV: Assessment on barriers to screening which included questions on hindering factors such as fear of finding out someone has cancer, unavailability of test, cost of the test, pain and discomfort caused by the screening test and cultural factors among other. Data was collected by four trained assistants who were guided through the study area by Community Health Volunteers between October and November 2022.

2.7. Data Analysis

After checking for completeness data was first entered into an Excel sheet and then exported to the Statistical Package of Social Sciences Version 22 for analysis. Descriptive statistics such as frequencies and means were used to summarize the data. The Pearson's chi square (χ^2) and Fisher's exact test analysis were used to examine the association between independent variables (socio-demographic variables, awareness of prostate cancer, hindering factors) and the dependent variable (prostate cancer screening practices). The variables that were found to be significant ($P < 0.05$) were then subjected to further analysis using logistics regression.

2.8. Ethical Considerations

Ethical approval for conducting the study was sought and obtained from Kenyatta University Ethics Review Committee, REF Number: PKU/2405/11614. Research authorization was also sought from Tharaka Nithi Department of Health Services and Sanitation. Informed consent was obtained from every participant after they were explained and understood what the research entailed and that participation was voluntary and they could withdraw at will without reprisal.

3. Results

3.1. Socio-demographic Characteristics of the Respondents

A total of 379 men participated in the study. The majority of the participants, 58.6% were aged between 40 to 59yrs, and the remaining 41.4% were above 60 years. Most of the participants, 74.7% were married, 47.5% had attained at least primary-level education and 64.4% were employed. Other characteristics are shown in Table 1

Table 1. Socio-demographic characteristics of study participants.

Characteristic	Population (N=379)	Percentage (%)
Age (years)		
40-59	222	58.6
60-Above	157	41.4
Marital Status		
Married	283	74.7
Single	35	9.2
Widow	35	9.2
Separated	26	6.9
Education Level		
Up-to Primary	180	47.5
Secondary	125	33
Post secondary	74	19.5
Employment status		
Employed	244	64.4
Not employed	135	35.5
Religion		
Catholic	122	32.2
Protestants	234	61.7
Others	23	6.1

3.2. Awareness of Prostate Cancer

Majority of the study participants, 85.2% had heard about prostate cancer and the most common source of information cited was health workers 32.7% followed by radio 23.5%. Out of 69.4% who had ever heard of prostate cancer screening, only 16.6% were aware of the specific screening tests used in screening for PCa. PSA test was mentioned by majority of the participants 46% as the test they were aware of, followed by digital rectal exam at 36.5% (23). 14.5% had family history of prostate cancer. (Table 2).

Table 2. Awareness of Prostate cancer.

Variable	Category (N=379)	Frequency (%)
Ever heard of Prostate cancer	Yes	323 (85.2%)
	No	56 (14.8%)

Variable	Category (N=379)	Frequency (%)
Source of Information	Radio	89 (23.5%)
	Television	53 (14.0%
	Newspaper	13 (3.4%)
	Friends	45 (11.9%)
	Health workers	123 (32.5%)
Ever heard of Prostate cancer screening	Yes	263 (69.4%)
	No	116 (30.6%)
Awareness on specific Prostate cancer screening tests	Yes	63 (16.6%)
	No	316 (83.4%)
Prostate cancer screening method	PSA screening	29 (46.0%)
	Digital Rectal Exam	23 (36.5%)
	Ultrasound	11 (17.5%)
Family history of prostate cancer	Yes	55 (14.5%)
	No	324 (85.5%)

3.3. Prostate Cancer Screening Practices

Only 4.5% of all the participants had been screened for prostate cancer. Majority of those screened 64.7% had gone through PSA screening test and the main reason given for screening was either because the participants was not feeling well or doctor recommended screening for whatever reason 82.4% (Table 3 below).

Table 3. Prostate cancer screening Practices.

Variable	Category	Frequency (%)
Ever been Screened for prostate cancer (N=379)	Yes	17 (4.5%)
	No	362 (95.5%)
Method of screening (n=17)	PSA Testing	11(64.7%)
	Digital Rectal Examination	2 (11.8%)
	Biopsy	4 (23.5%)
Why were you screened	Not feeling well/ Doctors recommendation	14 (82.4%)
	Heard from media	2 (11.8%)
	Encouraged by friend	1 (5.9%)
Is prostate cancer screening beneficial	Yes	361 (95.3%)
	No	18 (4.7%)

3.4. Factors Hindering Prostate Cancer Screening

The respondents identified several factors as hindrances to prostate cancer screening. Among the factors identified, poor knowledge or lack of enough information on prostate cancer was leading with 77.6% of the respondents citing it as a hindrance, followed by high cost of screening tests (71.8%) and unavailability of screening tests (64.4%). Other factors in-

cluded fear of finding out one has cancer (57.5%), not feeling at risk (46.7%), culture (57.3%), and pain and discomfort associated with screening (31.4%) (Table 4).

Table 4. Factors hindering prostate cancer screening.

	Factors that hinder Prostate cancer testing	Percentage of the respondents who mentioned the factor Intervention group (n=379)
1	Fear of finding out I have cancer	218 (57.5%)
2	Test not available,	244 (64.4%)
3	Not feeling at risk	177 (46.7%)
4	Cost of cancer screenings	272 (71.8%)
5	Pain and discomfort of screenings	119 (31.4%)
6	Not having enough information on PCa and screenings	294 (77.6 %)
7	Cultural factors	217 (57.3%)

3.5. Association Between both Demographic Characteristics and Awareness Factors; and Prostate Cancer Screening Practices

Chi-square and Fisher's Exact tests were done to establish the relationship between various factors and prostate cancer screening as shown in Table 5. Factors found to be significantly associated with prostate cancer screening included education level (X^2 = 17.898, df=2, P< 0.001), awareness of PCa screening (X^2 = 5.123, df=1, P=0.028), awareness of PCa specific screening tests (X^2 = 77.122, df=1, P< 0.001) and family history of PCa. (X^2 = 36.145, df=1, P< 0.001).

Table 5. Association between demographic characteristics and awareness with prostate cancer screening practices.

Variables	Categories	Prostate cancer screening		
		Yes (%)	No (%)	
Age	40-59 yrs	7 (1.8)	215 (56.7)	X^2 = 2.220 df=1, p=0.206
	60yrs and above	10 (2.6)	147(38.8)	
Marital Status	Married	15	268	X^2 = 1.732 df=1, p=0.259 (Fisher's Exact)
	Not married	2	94	
Education Level	Up-to Primary	3 (0.8)	177 (46.7)	
	Secondary	4 (0.1)	121 (31.9)	X^2 = 17.898 df=2, P< 0.001 (Fisher's Exact)
	Post Secondary	10 (2.6)	64 (16.9)	
Employment Status	Not employed	3 (0.8)	132 (34.8)	X^2 = 2.507 df=1, p=0.128 (Fisher's Exact)
	Employed	14 (3.7)	230 (60.7)	
Awareness of PCa	No	2(0.5)	54(14.2)	X^2 = 1.28 df=1, p=0.720 (Fisher's Exact)
	Yes	15(3.9)	308 (81.3)	
Awareness of PCa screening	No	1	115	X^2 = 5.123 df=1, p=0.028 (Fisher's Exact)
	Yes	16	247	
Awareness of PCa specific	No	1 (0.3)	315 (83.1)	X^2 = 77.122 df=1, P< 0.001 (Fisher's Exact)

Variables	Categories	Prostate cancer screening		
		Yes (%)	No (%)	
Tests	Yes	16 (4.2)	47 (12.4)	
	No	6 (1.6)	318 (83.9)	$X^2 = 36.145$ df=1, P< 0.001
Family History of PCa	Yes	11 (2.9)	44 (11.6)	

3.6. Association Between Hindering Factors and Prostate Cancer Screening Practices

Chi square and Fisher's Exact tests were done to establish the relationship between the various hindering factors and prostate cancer screening as shown in Table 6. A significant relationship was found between prostate cancer screening and cost of test ($X^2 = 20.440$ df=1, p=0.001); not having enough information on prostate cancer ($\chi2=13.552$, df=1, p=0.001) and cultural factors ($\chi2=5.638$, df=1, p=0.023).

Table 6. Cross tabulation of Hindrance factors and Prostate cancer Screening.

Variables	Categories	Prostate cancer screening		
		Yes	No	
Fear of finding out I have cancer	Yes	12 (3.1)	206 (54.4)	$X^2 = 1.244$ df=1, p=0.322
	No	5 (1.3)	156 (41.2)	
Test not available	Yes	11 (2.9)	233 (61.5)	$X^2 = 0.495$ df=1, p=0.720
	No	6 (1.6)	129 (34)	
Not feeling at risk	Yes	9 (2.4)	168 (44.3)	$X^2 = 0.278$ df=1, p=0.598
	No	8 (2.1)	194 (51.2)	
Cost of cancer screenings	Yes	4 (1.1)	268 (70.7)	$X^2 = 20.440$ df=1, (P< 0.001), (Fisher's Exact)
	No	13 (3.4)	94 (24.8)	
Pain and discomfort of screenings	Yes	6 (1.6)	113 (29.8)	$X^2 = 1.25$ df=1, p=0.790
	No	11 (2.9)	249 (65.7)	
Not having enough information on Pca and screenings	Yes	7 (1.8)	287 (75.7)	$X^2 =13.552$, df=1, p=0.001
	No	10 (2.6)	75 (19.7)	
Cultural Factors	Yes	5 (1.3)	212 (55.9)	$X^2 = 5.638$ df=1, p=0.023
	No	12 (2.9)	150 (39.6)	

4. Discussion

This study assessed the screening practices and factors influencing prostate cancer screening among men from Eastern Kenya. In this study, the screening level was very low and only 4.5% of the study participants had been screened for prostate cancer. This finding was not peculiar given that a number of recent studies on screening practices among rural populations in a number of countries in Sub-Saharan Africa have found similar results. Recent studies carried out in Central Kenya, Ethiopia, South Africa and Tanzania found 5%, 7.2%, 7.7% and 3.3% of their study participants had been screened respectively [9, 18-20]. This low level of screening could be a result of lack of screening facilities and services in these rural areas and also lack of knowledge on prostate cancer. Prostate cancer screening remains the best available method of detecting prostate cancer early, and therefore there is a need to teach and encourage people on the same.

The awareness level of prostate cancer was high in this

study as the majority of the participants (85.2%) had heard of prostate cancer and their main source of information was the media. This finding was consistent with studies carried out in Central Kenya, Uganda and Rwanda [9, 10, 21]. Although general awareness of PCa was high, awareness of specifics like the types of screening tests was poor. The disparity between the two levels of awareness could be explained by the participant's main source of information which was media (radio and television) which is usually very good in awareness creation but does not give details.

Factors found to be significantly associated with prostate cancer screening were level of education, family history of prostate cancer and awareness of screening tests. Level of education had been found to be influencing prostate cancer screening in other sub-Saharan African countries as observed in Nigeria and Zambia [22, 23]. This could be as a result of the fact that those with higher levels of education are more exposed and are likely to be more inquisitive on whatever they hear about matters health and are likely to take precautionary measures to protect themselves. Family history of prostate cancer have also been found to influence prostate cancer screening in other studies [11, 23]. This demonstrates that the family members of a patient with prostate cancer take a keen interest in the disease and get as much health education on the disease as they can and are likely to be more cautious about the disease leading them to go for PCa screening. Socio-economic factors such as, employment or having an insurance cover have been found to be positively associated with prostate cancer screening in studies carried out in Tanzania and Nigeria [11, 24], but this did not have any association in our study.

In our study a number of factors hindering testing were mentioned by the participants including lack of knowledge, high cost of screening tests, unavailability of screening tests and fatalistic beliefs among others. Lack of enough information on prostate cancer and screening, cost of screening tests and cultural factors were found to have significant association with prostate cancer screening practices. The other factors showed no significant association with prostate cancer screening practices and this could partly be due to the low levels of testing witnessed in our study. These factors however, have been identified as hindrances to testing in a number of studies carried out in Sub Saharan Africa [10, 11, 25, 26]. They have also been associated with low levels of testing in rural areas of many Sub-Saharan African Countries [9, 10, 14]. It is therefore important for the policymakers in our country to come up with strategies that address these factors to help overcome the challenge of low levels of PCa screening which has also been associated with late diagnosis being witnessed in our country.

5. Conclusion

Findings from this study demonstrated high level of prostate cancer awareness and low uptake of screening services.

Factors found to be significantly associated with prostate cancer screening were education level, Awareness of PCa screening, awareness of screening tests, family history of prostate cancer, cost of PCa test, cultural factors and lack of enough information on prostate cancer and screening. Other factors identified in this study as hindrances to prostate cancer screening included high cost of screening tests, unavailability of screening tests, fatalistic beliefs and low risk perception. Based on above conclusions the study recommends that the government needs to come up with appropriate strategies to address these hindrances and scale up screening services at the community level to facilitate early diagnosis and treatment of prostate cancer.

6. Limitations and Strengths

This being a cross-sectional study, the association of dependent and independent variables could not be clearly explained. There was also a challenge of recall bias especially among the aged men as the data was collected by self-report. Nevertheless, the study provides relevant information that can be used in designing strategies to help overcome some of the challenges leading to low prostate cancer screening levels and help improve prostate cancer screening in the community.

Abbreviations

PCa	Prostate Cancer
PSA	Prostate-specific Antigen
GLOBOCAN	Global Cancer Observatory
USPSTF	United States Preventive Services Task Force
PCEA	Presbyterian Church of East Africa
CHEWs	Community Health Extension Workers

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Author Contributions

Joshua Kabugi: Conceptualization, Data curation, Formal Analysis, Funding acquisition, Investigation, Methodology, Project administration, Resources, Writing – original draft

Okello Agina: Supervision, Writing – review & editing

Isaac Mwanzo: Methodology, Supervision, Validation

Data Availability Statement

The data supporting the outcome of this research work has been reported in this manuscript.

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Conflicts of Interest

The authors declare no conflicts of interest.

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Biography

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