

Research Article

Prostate Cancer Knowledge, Attitudes, and Beliefs amongst Women: The Application of a Psychometrically Valid Tool (PCaKAB-Gh) in a Large Population

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Background. The involvement of women, as health influencers, has been instrumental in improving health outcomes and quality of life. In sub-Saharan Africa, poor knowledge, attitudes, and beliefs about cancers have contributed to late detection and increased mortality. Although pharmacists have provided optimum pharmaceutical care in ensuring that prostate cancer (PCa) patients obtain maximum clinical benefits from pharmacotherapy, late detection has hindered pharmacotherapeutic outcomes. The application of the PCaKAB-Gh tool to women has the potential to investigate their lapses in PCa knowledge, attitudes, and beliefs and further equip pharmacists and other healthcare professionals to design educational interventions. Ultimately, Ghanaian women will be well-positioned to advise and motivate their men to screen for PCa. **Method.** Our pilot and psychometric studies recruited 400 and 500 participants from the Kumasi Central Market and the New Agogo Community Market, respectively. In this large population application of the PCaKAB-Gh tool, 2000 women were simply randomly enrolled from these markets and data were collected using paper questionnaires with ethical approval. Data were entered into IBM SPSS (version 24) after cleaning and coding for analysis. The knowledge on signs and symptoms was scored and graded as “low” (≤ 2), “moderate” (3–5), and “high” (5–8), whilst the knowledge on causes and risk factors was stratified as “low” (≤ 1), “moderate” (2–3), and “high” (4–5). Pearson’s correlation was conducted to investigate the relationship between women’s educational status and knowledge, attitudes, and beliefs. Statistical significance was established as a $p < 0.05$. **Results.** Christians and Muslims accounted for about 70% and 24% of the participants, respectively, whilst over 50% of the participants were Akans. Over 50% and 30% of the 2000 participants had high and moderate knowledge about the signs and symptoms of PCa, respectively. Knowledge about the causes and risk factors was approximately 30% high and 50% moderate amongst the participants. Negative attitudes and beliefs outcomes were observed in about 25% and 55% of the participants. A $p < 0.001$ was achieved in Pearson’s correlation between the educational level of respondents and knowledge on signs and symptoms ($r = -0.102$), knowledge on causes and risk factors ($r = 0.111$), attitudes ($r = -0.122$), and beliefs ($r = 0.228$). **Conclusions.** Our study established that market women had better knowledge on the signs and symptoms of PCa compared to the causes and risk factors. Their beliefs about PCa were worse compared to their attitudes. The development and administration of educational interventions, relying on the outcomes of this study, must involve markets, churches, and mosques as educational sites with special attention to addressing negative beliefs through a broader community-based engagement.

1. Introduction

The absence of a nationwide cancer registry in Ghana has negatively impacted the real-time availability of prostate cancer (PCa) epidemiological data. In a sub-Saharan Africa (SSA) PCa incidence study, PCa data from Ghanaian registries were amongst the excluded data due to population coverage and data completeness limitations [1]. Compared to developed geographies such as Europe and America, current data indicate that Africa has a PCa mortality rate of approximately double its incidence rate [2]. Although there is evidence suggesting global PCa screening disparities, SSA men are not regularly advised and encouraged to screen for PCa [3]. As established in our study [4], metastatic PCa diagnosis and management is associated with higher financial burden than nonmetastatic PCa. Therefore, an enhanced screening strategy is required.

Should SSA governments provide free nationwide PCa screening and diagnostic services, and there is evidence that poor knowledge, attitudes, and beliefs about the disease negatively impact the screening practices of SSA men [3]. These screening limitations have been associated with the high prevalence of advanced PCa, poor prognostic outcomes, and high cost of management. Evidence of improved PCa knowledge, attitudes, and beliefs translates into improved screening practices, early detection, low cost of management, and improved management outcomes [5–7]. A results-oriented strategy to motivate men to screen for PCa has been through community-based education involving trusted networks such as those of female significant others [8, 9]. These studies have proven the benefits of the involvement of women in health promotion with a focus on the influence they have on men's health. However, the incorporation of the cost implications of late PCa diagnosis into educating women to motivate men to screen for the disease could be more beneficial.

The economic burden of PCa has been proposed to increase regardless of the availability of strategies aimed at reducing mortality and improving quality of life [10]. As a recommendation, newer cost-effective approaches could contribute to a reduction in this health economic threat. The utilization of pharmacoeconomic findings, more specifically, results from direct cost-of-illness studies, could serve as an information motivator and trigger women to advise and motivate their men to screen for PCa. In a breast cancer study, researchers concluded an association between improved breast cancer literacy and screening [11]. The unique role of pharmacists in cancer management is not limited to improving access to safe and effective pharmaceutical agents, the management of intoxication, and the preparation of chemotherapeutic agents for administration [12–14] but includes the development and administration of early detection interventions. Since the stage and grade of cancers at diagnosis affect the response to pharmacotherapy [15], pharmacists must take an interest in contributing to the early detection of cancers in an attempt to improve management outcomes and reduce the cost of pharmacotherapy. For these motives, we strategically recognize women as potential PCa screening promoters and take an interest in equipping them to play this role.

In recognition of the contributions women make to men's health and the need to equip women through education, a Serbian study [16] agrees with a Ghanaian study [17] that a few studies have investigated the knowledge of women on PCa. Our pilot study remains the only Ghanaian women's study [18] with a few studies conducted in men [19–22]. Nevertheless, none of these Ghanaian studies, including our pilot study, made use of a psychometrically valid or locally developed and culturally acceptable tool. To close this research gap and contribute to knowledge, we embarked on the development of a psychometrically valid Akan tool [23].

The availability of the psychometrically valid Ghanaian tool (PCaKAB-Gh) motivated us to apply the tool to a large population of women. This strategy was in effect to position women at the centre of PCa early detection, improve management outcomes, and reduce the financial burden that is associated with the management of advanced PCa. We targeted the following objectives to achieve the set aim:

- (1) To assess the knowledge of women on the signs and symptoms, and the causes and risk factors of prostate cancer.
- (2) To determine the attitudes and beliefs about prostate cancer amongst women.
- (3) To evaluate the impact of the educational level of respondents on knowledge items, attitudes, and beliefs.

2. Methods

The ethical approval, per the Declaration of Helsinki, was awarded by the Committee on Human Research, Publications and Ethics (CHRPE) of the Kwame Nkrumah University of Science and Technology (KNUST)-CHRPE/AP/110/21, and the Biomedical Research Ethics Committee (BREC) of the University of KwaZulu-Natal (UKZN)-BREC/00002740/2021.

2.1. Study Settings and Participants. The study had previously recruited participants from the Kumasi Central Market (KCM) and the New Agogo Community Market (NACM). The descriptions of the markets have been detailed elsewhere [4, 23]. In the application of the tool, we aimed to sample participants from both markets in an attempt to have a representation of both sites.

2.2. Sample Size Determination and Justification. The development of the PCaKAB-Gh tool involved the piloting of the tool at stage 3, employing 400 participants from one-fourth of the demarcated KCM [18]. The psychometric study (stage 4), which was sited at NACM, recruited 500 participants from one-third of the market [23]. The psychometric tool, excluding the sociodemographic parameters of participants, had 19 questionnaire items. Therefore, we multiplied the 19 questionnaire items by 100 with a 5% upward adjustment to set the sample size at 2000. This strategy was to increase statistical power and term the application of the tool, a large population survey. Previously, studies that recruited 1204 [24] and 2671 [25] participants have

successfully been classified as large population surveys. In achieving this, 400 participants were simply randomly selected from each of the three unsampled parts of KCM and the two unsampled parts of NACM. It is imperative to note that the original sample size for the final stage of the tool development was adjusted from 410 to 500 to manage the possibility of participants' nonrespondents [23]. Hence, with the 5% upward adjustment in this study, the researchers justify the recruitment of 400 participants per unsampled part of NACM. The study successfully recruited 1200 participants from KCM and 800 from NACM, representing a 100% response rate.

2.3. Data Collection Instrument and Application. The PCaKAB-Gh tool is a psychometrically valid local tool with an English version [23]. As previously described, the tool has 5 demographic items and 19 tool-specific items. The tool-specific items have four sections: knowledge on signs and symptoms (8 items), knowledge on causes and risk factors (5 items), attitudes (3 items), and beliefs (3 items). The 19 tool-specific items have two Likert scales: "agree" and "disagree." The tool was applied to 1200 women and 800 women on KCM and NACM, respectively, in a simple random sampling manner indicating a 100% response rate and complete data.

2.4. Data Management and Analytic Strategies. The data from the 2000 participants were cleaned, coded, and exported to version 24 of the IBM SPSS (IBM Corp., Armonk, NY, USA) for analysis. Except for the demographic features, correct/positive and wrong/negative responses were coded as "1" and "0," respectively. The knowledge on signs and symptoms was scored and stratified into "low" (≤ 2), "moderate" (3–5), and "high" (5–8), whilst the knowledge on causes and risk factors was similarly grouped as "low" (≤ 1), "moderate" (2–3), and "high" (4–5). The attitudes and beliefs items were scored with the stratification: "negative" (≤ 1), "neutral" (2/3), and "positive" (3/3). According to the literature review by Akoglu [26] and previously reported by Schober and colleagues [27], we conducted a Pearson's correlation and interpreted the findings.

3. Results

3.1. Participants' Characteristics. As indicated in Table 1, the majority of the participants were 35 to 39 years old and represented 19.00% ($n = 379$). We discovered women who were at most 19 years old at the time of the data collection accounted for 2.20% ($n = 44$) of the 2000 participants. The approximated top 10% of the stratified age ranges were within 20–54 years old with participants within 50–54 years recording the lowest proportion of 9.70%. A further look at the demographic pattern of the participants indicated that approximately 50% of the women were married. The proportion of women who were never married was about triple the proportion that cohabited, whilst widows and divorcees accounted for 5.90% ($n = 117$) and 5.50% ($n = 109$), respectively. Absolute illiteracy was at 9.00% ($n = 179$) with

TABLE 1: Sociodemographic characteristics of study participants ($n = 2000$).

Variables	n (%)
Age (years)	15–19
	44 (2.20)
	20–24
	201 (10.10)
	25–29
	231 (11.60)
	30–34
	220 (11.00)
	35–39
Marital status	379 (19.00)
	40–44
	217 (10.90)
	45–49
	237 (11.90)
	50–54
	193 (9.70)
	55–59
Highest educational level	136 (6.80)
	≥ 60
	142 (7.10)
	Married
	928 (46.40)
Religious affiliation	Never married
	621 (31.10)
	Cohabiting
	225 (11.30)
Ethnic background	Widowed
	117 (5.90)
	Divorced/separated
	109 (5.50)
	No education
Religious affiliation	Primary
	589 (29.50)
	Secondary
	803 (40.20)
Ethnic background	Tertiary
	429 (21.50)
	Christianity
	1395 (69.80)
Religious affiliation	Islam
	492 (24.60)
	Traditionalist
	73 (3.70)
Ethnic background	Others
	40 (2.00)
	Akan
	1053 (52.70)
	Ga/Dangme
	300 (15.00)
Ethnic background	Ewe
	168 (8.40)
	Gurma/Guan
	215 (10.80)
	Mole-Dagbane
Ethnic background	209 (10.50)
	Others
	55 (2.80)

about 62.00% of the participants having received at least secondary education, whilst approximately 30.00% had basic education. Christianity and Islam accounted for 69.80% ($n = 1395$) and 24.60% ($n = 492$) of the respondents, respectively. Although the markets exhibited ethnic diversity, Akans accounted for over 50.00% of the participants and reflected the relevance of the tool.

3.2. Prostate Cancer Knowledge amongst Ghanaian Women. Positive responses to the knowledge items on the signs and symptoms of the disease were between 63.60% and 77.50%. However, 67.70% of the participants wrongly considered sexual weakness or impotence as a sign and symptom of PCa. Correct responses to the knowledge items on the causes and risk factors were between 50.40% and 64.40%. We additionally observed an approximated split between the number of respondents who recognized the mobile phone as a possible cause/risk factor to the disease or otherwise. A similar approximated split was observed on the recognition of family history as a risk factor for the disease. Table 2 expands the knowledge of the participants about PCa.

When the knowledge items were scored and related to the demographic features of the respondents, as shown in Table 3, there was a statistically significant relationship ($p < 0.001$) between all the knowledge scores and marital status, religious affiliation, and ethnic background.

TABLE 2: Knowledge of study participants about prostate cancer ($n = 2000$).

Knowledge of signs and symptoms of prostate cancer	Agree n (%)	Disagree n (%)
Blood in urine	1271 (63.60)	729 (36.40)
Urgent need to pass urine	1407 (70.40)	593 (29.70)
Sexual weakness or impotence	1354 (67.70)	646 (32.30)
Poor urine flow	1549 (77.50)	451 (22.60)
Abrupt inability to urinate	1379 (69.00)	621 (31.10)
Waist pain	1309 (65.50)	691 (34.60)
Frequent urination at night which disturbs sleep	1402 (70.10)	598 (29.90)
Abdominal pains	1410 (70.50)	590 (29.50)
Knowledge of the causes and risk factors of prostate cancer		
Some drugs for the treatment of diseases	1185 (59.30)	815 (40.80)
Excessive smoking of cigarette	1287 (64.40)	713 (35.70)
Excessive alcohol consumption	1214 (60.70)	786 (39.30)
Putting mobile phones in your pocket	961 (48.10)	1039 (51.90)
Family history of the disease	1009 (50.40)	991 (49.60)

TABLE 3: Knowledge scores and association with relevant sociodemographic characteristics of study participants ($n = 2000$).

Total <i>n</i> (%)	Knowledge on signs and symptoms of prostate cancer				Knowledge on the causes and risk factors of prostate cancer			
	Low 250 (12.50)	Moderate 669 (33.45)	High 1081 (54.05)	<i>p</i> value	Low 363 (18.15)	Moderate 1012 (50.60)	High 625 (31.25)	<i>p</i> value
<i>Marital status</i>								
Married	74	270	584	<0.001	134	491	303	<0.001
Never married	68	250	303		99	315	207	
Cohabiting	53	88	84		67	106	52	
Widowed	30	27	60		33	49	35	
Divorced/separated	25	34	50		30	51	28	
<i>Religious affiliation</i>								
Christianity	119	426	850	<0.001	208	709	478	<0.001
Islam	85	204	203		108	252	132	
Traditionalist	36	16	21		40	26	7	
Others	10	23	7		7	25	8	
<i>Ethnic background</i>								
Akan	83	247	723	<0.001	137	532	384	<0.001
Ga/Dangme	55	135	110		68	150	82	
Ewe	34	64	70		50	75	43	
Gurma/Guan	39	113	63		61	106	48	
Mole-Dagbane	33	91	85		41	112	56	
Others	6	19	30		6	37	12	

Highlighting statistical significance.

Respondents obtained 12.50%, 33.45%, and 54.05% of low, moderate, and high knowledge scores on signs and symptoms. The results indicated that 87.50% of the respondents correctly scored at least 3 out of the 8 knowledge assessment items on signs and symptoms of PCa. Low knowledge scores on the causes and risk factors of PCa were observed in 18.15% of the participants, indicating that 81.85% of the respondents had at least 2 correct responses out of the 5 items. Low, moderate, and high knowledge scores on the causes and risk factors of PCa were 18.15%, 50.60%, and 31.25%, respectively. Generally, the participants did better on the knowledge on signs and symptoms assessment compared to the knowledge on the causes and risk factors as indicated in Table 2 and confirmed in Table 3.

3.3. Women's Attitudes and Beliefs about Prostate Cancer. The attitudes and beliefs items have been indicated elsewhere [23] with appropriate positive responses [4]. Amongst the 2000 study participants who responded to the questionnaire, 72.90%, 72.20%, and 35.70% gave positive attitudinal responses to "a woman can recommend to men to screen for prostate cancer," "prostate cancer screening must be free for every man," and "men diagnosed with prostate cancer must not have sex with their wives," respectively. The belief items comprising "prostate cancer is a spiritual disease," "prostate cancer is a family disease," and "nothing can be done to save a person with prostate cancer" obtained 58.95%, 46.30%, and 47.70% positive responses, respectively.

The association between demographic features comprising marital status, religious affiliation, ethnic background, and attitudes and beliefs was statistically significant ($p < 0.001$), as shown in Table 4. We reported negative, neutral, and positive attitudinal scores amongst 24.80%, 31.75%, and 43.45% of the participants, respectively. Negative (56.25%), neutral (37.15%), and positive (6.60%) were the belief assessment outcomes the investigators observed amongst the participants.

3.4. The Impact of the Educational Level of Respondents on Knowledge, Attitudes, and Beliefs about PCa. A correlation analysis of questionnaire items excluding all sociodemographic features except educational level was conducted. This was done because investigators were interested in the impact of the educational level of respondents on knowledge items, attitudes, and beliefs. There was a statistically significant ($p < 0.001$) weak inverse relationship between educational level and knowledge on signs and symptoms ($r = -0.102$), and attitudes ($r = -0.122$). The researchers observed a statistically significant ($p < 0.001$) weak Pearson's correlation between educational level and knowledge on causes and risk factors ($r = 0.111$), and beliefs ($r = 0.228$). A similar observation was made with the correlation between beliefs and knowledge on signs and symptoms ($r = -0.289$, $p < 0.001$), knowledge on causes and risk factors ($r = -0.046$, $p < 0.039$), and attitudes ($r = -0.324$, $p < 0.001$), although weak ($r = -0.380$, $p < 0.001$), knowledge on signs and symptoms, and causes and risk factors were inversely related. The investigation into the relationship between attitudes and knowledge on signs and symptoms, and knowledge on causes and risk factors yielded a moderate ($r = 0.558$, $p < 0.001$) and weak ($r = 0.352$, $p < 0.001$) direct relationship, respectively.

4. Discussion

The stratified age ranges, Table 1, suggested that the development and application of an educational intervention could target and benefit women aged 20 to 54 years. The observed age distribution was similar to what we reported in our pilot study [18] and a recent market survey [28]. The approximated 60% of participants who had confirmed male significant others, married or cohabited, further reflected the need to involve women with male significant others in the early detection of PCa. In studies that investigated PCa screening influencers [29] and attitudes towards screening amongst Ghanaian teachers [22], over 80% of the male participants had female significant others as described in our study. Although 5.50% ($n = 109$) of the participants were divorced/separated, we are unable to ignore the connection they had and could continuously have with their male significant others. Unmarried women ($n = 621$) were significantly more than women whose ages were outside the proposed educational intervention target age of 20 to 54 years ($n = 322$). Hence, it is imperative to consider unmarried women, aged 20–54 years old, in the selection of target populations in the development and application of

a PCa educational intervention. Summarily, the study highlighted the consideration of women aged 20 to 54 years old regardless of their marital and educational statuses as the target population in the strategy to involve women in the early detection of PCa.

In exploring suitable sites for the administration of educational interventions on target women populations, we studied the religious affiliations of participants. As documented and previously confirmed in a Ugandan market study [30], Christians and Muslims accounted for over 90% of the participants and highlighted the recognition of churches and mosques as potential sites to engage women in the cost-effective approach to improve the early detection of PCa. The design of an educational intervention must target educational facets that aim to close knowledge gaps, cause positive attitudinal change, and implant in women positive health beliefs [31]. In Table 3, we established that 17.28% and 21.95% of Muslim women had low knowledge on the signs and symptoms and the causes and risk factors of PCa, respectively. Comparatively, 8.53% of Christian women had low knowledge on the signs and symptoms of PCa, whilst 14.91% could not correctly identify at least three of the causes and risk factors of PCa. This statistically significant ($p < 0.001$) observation probably means that Muslim women need more education on the signs and symptoms, and causes and risk factors of PCa. A previous Ghanaian breast cancer study, comparing Muslim women to Christian women, reported significant knowledge gaps amongst Muslim women compared to Christian women [32]. Our study successfully recruited 2000 participants with diverse ethnic backgrounds of which Akans constituted 52.70%. In a study conducted on male Ghanaian teachers, Akans constituted 65.60% of the participants [22]. This justified the development of the tool in the Akan language, its application, and a recommendation to develop knowledge assessment tools in local languages. The ethnic diversity of the participants, which indicated that the various ethnic groups could communicate in the Akan language, confirmed the relevance of the Akan tool in studying the KAB of PCa amongst women.

We studied the knowledge of the respondents on the signs and symptoms, and causes and risk factors of PCa. As previously reported by Wiafe et al. [4], this study confirmed that the respondents knew about the signs and symptoms of PCa and were comparatively more favourable than a group of Serbian sportsmen who reported divided positions on the classical symptoms of PCa [16]. A local study on military men, although the majority of respondents got health information from the media, reported that these men poorly recognized the signs and risk factors of PCa [21]. Our favourable findings could be due to the constant exposure of market women to health education offered by the media [30]. However, we identified statistically significant ($p < 0.001$) knowledge gaps amongst 12.50% of the respondents due to their inability to identify at least 3 out of the 8 signs and symptoms of PCa. Addressing the identified knowledge gaps is imperative due to the tendency to negatively affect risk perception and the motivation to screen for the disease [33]. A notable knowledge item on the signs and symptoms of PCa which called for the need to address

TABLE 4: Attitudes and beliefs scores, and association with relevant sociodemographic characteristics of study participants ($n = 2000$).

Total <i>n</i> (%)	Attitudes about prostate cancer				Beliefs about prostate cancer			
	Negative 496 (24.80)	Neutral 635 (31.75)	Positive 869 (43.45)	<i>p</i> value	Negative 1125 (56.25)	Neutral 743 (37.15)	Positive 132 (6.60)	<i>p</i> value
<i>Marital status</i>								
Married	178	249	501	<0.001	634	243	51	<0.001
Never married	158	257	206		290	285	46	
Cohabiting	97	65	63		86	115	24	
Widowed	29	31	57		57	55	5	
Divorced/separated	34	33	42		58	45	6	
<i>Religious affiliation</i>								
Christianity	257	463	675	<0.001	829	475	91	<0.001
Islam	180	151	161		254	202	36	
Traditionalist	42	9	22		24	48	1	
Others	17	12	11		18	18	4	
<i>Ethnic background</i>								
Akan	154	326	573	<0.001	648	346	59	<0.001
Ga/Dangme	112	94	94		166	113	21	
Ewe	65	54	49		85	69	14	
Gurma/Guan	85	70	60		95	106	14	
Mole-Dagbane	74	71	64		96	92	21	
Others	6	20	29		35	17	3	

Highlighting statistical significance.

knowledge gaps was the misconception that 67.70% of respondents had that sexual weakness or impotence is a sign and symptom of PCa. Erectile dysfunction, inability to achieve orgasm, a reduction in penis length, and poor interest in sex are known PCa treatment-related sexual limitations. Notably, sexual weakness or impotence was not captured amongst disease-related signs and symptoms of PCa [34, 35]. The assessment of respondents' knowledge on the causes and risk factors of PCa indicated that 18.15% of the participants had low knowledge scores ($p < 0.001$). This analytic outcome meant 363 participants could not correctly identify at least one of the causes and risk factors of PCa. The results showed approximately 50.00% of the participants failed in recognizing that "putting mobile phone in your pocket" and "family history of the disease" do not and do increase a man's risk of getting PCa, respectively.

Over 55% and approximately 25% of the participants had negative beliefs and attitudes ($p < 0.001$) about PCa, respectively. This indicated that the participants had worse beliefs compared to attitudes, and an educational intervention must strategically target the beliefs of women in comparison with attitudes. This observation buttresses the consideration of churches and mosques as educational sites. We reported that Muslims had better belief outcomes compared to Christians, whilst in attitudinal scores, the trend of the knowledge scores was maintained. Except for "a woman can recommend to men to screen for prostate cancer," "prostate cancer screening must be free for every man," and "prostate cancer is a spiritual disease," which had 72.90%, 72.20%, and 58.95% positive attitudinal or beliefs responses, respectively, all other parameters had positive responses between 35.70 and 47.70%. The design of an educational intervention must, amongst others, focus on informing women that there is nothing wrong if men diagnosed with prostate cancer have sex with their wives.

Women must be informed that prostate cancer, just like other cancers, is genetic and could be considered a family disease [36]. We confidently report that Christians outperformed Muslims in knowledge and attitudes assessment except for beliefs assessment where Muslims marginally outperformed Christians.

A systematic review of the knowledge of PCa presentation and aetiology, conducted by the investigators, reported that educated women had moderate knowledge about the disease [17]. An improved educational status in males was strongly associated with PCa risk reduction according to a study in Alabama [37]. In the investigators' quest to improve the early detection of PCa, we investigated the relationship between the educational level of respondents and knowledge items, attitudes, and beliefs. We obtained a statistically significant ($p < 0.001$) Pearson's correlation between the educational level of respondents and knowledge items, attitudes, and beliefs. Regardless of the weak Pearson's correlation, inverse or otherwise, that existed between educational level and knowledge on signs and symptoms ($r = -0.102$), knowledge on causes and risk factors ($r = 0.111$), attitudes ($r = -0.122$), and beliefs ($r = 0.228$), we are confident that educating women on prostate cancer could improve their knowledge, attitudes, and beliefs and subsequently transmit this knowledge to their male significant others [8, 29]. Although our study indicated that an improvement in the beliefs of participants weakly reduced their knowledge on signs and symptoms ($r = -0.289$, $p < 0.001$), knowledge on causes, and risk factors ($r = -0.046$, $p < 0.039$) and attitudes ($r = -0.324$, $p < 0.001$), we propose that a robust educational intervention, targeting the beliefs of women [38, 39], could override these weak inverse relations because women generally have better health-seeking behaviour than men. We expected a direct relationship between knowledge on signs and symptoms and causes and

risk factors. However, a weak inverse relation was observed ($r = -0.380$, $p < 0.001$). The weakness in the inverse relation supports our claim that the two parameters could be improved, directly, with robust educational intervention targeting attitudes and beliefs. This claim was supported by the direct relationship between attitudes and knowledge on signs and symptoms ($r = 0.558$, $p < 0.001$), and knowledge on causes and risk factors ($r = 0.352$, $p < 0.001$).

Although the study applied a psychometric tool to investigate the knowledge, attitudes, and beliefs of women about PCa, and further proposed educating women to influence their male significant others to improve early PCa detection, cultural aspects of masculinity present limitations. Traditionally, men exhibit dominance over women and perceive help-seeking as a sign of weakness [40, 41]. Hence, the empowerment of women to encourage their male significant others to screen for PCa is expected to face barriers rooted in masculinity as reported by Nobis et al. [42].

4.1. Implications of the Findings

The study implied that:

- (1) Women aged 20 to 54 years old, irrespective of their marital statuses, are potential targets in the development and application of a PCa educational intervention to improve early detection.
- (2) The administration of educational interventions on target women populations must consider markets, churches, and mosques as suitable sites.
- (3) The highest correct knowledge responses on the causes and risk factors were approximately equivalent to the lowest correct responses on the signs and symptoms of PCa.
- (4) Better attitudinal outcomes compared to beliefs are exhibited by women regarding PCa.
- (5) An improvement in the educational status of women potentially improves their knowledge, attitudes, and beliefs about PCa.

4.2. Strengths

Compared to our pilot and psychometric studies, the following strategies improved the quality of this study:

- (1) The utilization of a psychometrically valid and robust Akan tool in the data collection contributed to the acceptability of the results.
- (2) The application of the simple random sampling technique to recruit 2000 participants improved the statistical power and generalizability of the study findings.
- (3) The participants had enough time to respond to the tool due to the reduction of the items from 41 to 24.

4.3. Limitations

The following were some of the limitations of the study:

- (1) The participants might have provided socioculturally acceptable responses.
- (2) The lack of an Akan word for prostate and the recruitment of only Akan-speaking women remain limitations as previously stated in our studies.

4.4. Clinical Relevance, Recommendations, and Conclusion.

As demonstrated in several studies, including a recent rural London study involving women [43], community engagement has the potential to improve health education and social networks to ultimately promote health and well-being. Our study highlighted the lapses in the knowledge of Ghanaian market women on the causes and risk factors and signs and symptoms of PCa. Additionally, we successfully studied attitudes and beliefs regarding the disease. Potentially, the Ghanaian health system could benefit from the development and application of a PCa educational intervention to women through stakeholder engagement and the utilization of markets, churches, and mosques as educational sites. Based on our findings, we conclude that the psychometrically valid Akan tool has been successful at studying prostate cancer knowledge, attitudes, and beliefs amongst women.

Data Availability

The data that support the findings of this study are available on request from the corresponding author. The data are not publicly available due to privacy or ethical restrictions.

Conflicts of Interest

The authors declare that they have no conflicts of interest.

Authors' Contributions

Ebenezer Wiafe conceptualized the study, collected data, involved in statistical analysis, and prepared the original draft of the manuscript. Kofi Boamah Mensah conceptualized the study, reviewed the manuscript for scientific content, and supervised the study. Neelaveni Padayachee, Frasia Oosthuizen, and Varsha Bangalee reviewed the manuscript for scientific content and supervised the study. All authors have read and approved the manuscript for publication.

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