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Predicting Breast Self-Examination Practices among Catholic Nuns in Tanzania's Lake Zone: A Health Belief Model Approach

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ABSTRACT

Background: Early breast cancer detection is crucial for improving breast cancer outcomes. Breast Self-Examination (BSE) is a valuable tool that can empower Catholic nuns to take charge of their health, particularly in constrained resource countries like Tanzania. This study aims to use the Health Belief Model (HBM) to predict SBE practices among Catholic nuns in Tanzania's Lake Zone.

Methods: This study employed a cross-sectional design whereby a total of 385 catholic nuns were enrolled to participate in the study. The Health Beliefs Model (HBM) guided the study of the interrelated variables related to self-breast examination. Data was collected using a self-administered questionnaire and analyzed using Stata version 18.0. Bivariate and multivariate logistic regression was used to test for association at a 5% significant level.

Results: The prevalence of non-performance self-breast examination was 64.2% (95% CI, 59.1%-69.0%). The multivariate logistic regression revealed that nuns who are in the non-health field were more likely not to perform self-breast cancer examination with an AOR of 1.67 (95% CI, 1.02-2.73, p=0.041). Likewise, nuns with high barrier were more likely not to perform self-breast cancer examination with an AOR of 1.88 (95% CI, 1.17-3.02, p=0.009), also, an AOR of 2.25 (95% CI, 1.39-3.65, p=0.001) for nuns with low self-efficacy.

Conclusion: The study revealed that the HBM constructs can predict the SBE behavior of catholic nuns. In addition, educational health interventions are highly recommended to enhance SBE practice among this special group.

INTRODUCTION

In 2022, there were 2.3 million women diagnosed with breast cancer and 670,000 deaths globally[1]. By 2040, the burden from breast cancer is predicted to increase to over 3 million new cases and 1 million deaths every year because of population growth and aging alone[2]. In Tanzania, breast cancer is the second most common cancer representing 14.4% of new cancers and is the second leading cause of cancer mortality among women[3]. The incidence of breast cancer in Tanzania is projected to increase by 82% by 2030[3]. However, our understanding of breast cancer specifically among Catholic nuns in Tanzania is limited due to several key factors. First, research on breast cancer has traditionally focused on the general population, neglecting to examine the experiences of distinct groups like nuns. Second, even though congregations are located in both urban and rural areas, access to healthcare facilities, including crucial breast cancer screening programs, may be limited.

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This limited access, coupled with potential factors like inadequate early detection strategies, lack of breast cancer knowledge and effective self-examination practices, fear of diagnosis, cultural beliefs, and a lack of targeted health education interventions, could lead to later diagnoses and potentially impact survival rates for nuns. Finally, challenges associated with data collection in Tanzania make it difficult to isolate comprehensive health information on this specific group.

Breast self-examination (BSE) remains a cornerstone of breast cancer awareness and early detection[4]. This simple, at-home practice procedure empowers women to actively monitor their breast health for any abnormal changes in the breast, BSE is cost-effective, noninvasive, inexpensive, and affordable and potential for early diagnosis and allows for more effective treatment regimens and better survival rates and makes BSE a crucial tool in the fight against breast cancer[5]. The Breast Cancer Prevention and Early Detection guidelines incorporating BSE into routine self-care can significantly contribute to improved breast health outcomes among women including nuns[6].BSE can be a helpful tool for nuns to become familiar with the look and feel of their breasts so that they can notice any changes that may occur[7].

Nuns, who dedicate themselves to religious life, have a higher risk of breast cancer compared to the general population, especially after age 80[8]. Despite being identified as a 'high-risk' group, there is limited breast health studies have been undertaken in this population[9]. A study in America on how often Catholic nuns perform self-breast examination showed that half of them had a complete physical examination in the past 1 year, and 11% had not had one in 7 years while 44% had no recent examination. Thirty-seven percent carried out monthly BSE while 26% never carried out BSE[10]. Another study by Basaza *et al.*[11] in Kampala Archdiocese, Uganda found that most respondents (96.4%) did not receive a mammogram, 54.1% never performed breast self-examination (BSE), and only 34.2% performed it regularly at bedtime**,** This could be due to several factors, including Lack of awareness**,** some of nuns may feel uncomfortable performing BSE due to religious beliefs or modesty concerns and others may not have access to regular healthcare screenings due to financial constraints or geographical limitations[12]. Overall, incorporating BSE into routine self-care can be a valuable tool for Catholic nuns to improve their breast health outcomes. However, it's crucial to address potential barriers and ensure culturally sensitive and accessible approaches.

Studies suggest the Health Belief Model (HBM) can be a valuable tool to encourage self-breast examination (BSE) among Catholic nuns. HBM posits that health behaviors are influenced by perceived susceptibility, severity, benefits, and barriers[13]. Nuns might underestimate their susceptibility and the severity of breast cancer due to age, lifestyle, and religious beliefs. Addressing these perceptions through culturally sensitive education and training can increase perceived benefits of BSE, like early detection and improved well-being, while reducing barriers like modesty concerns and lack of access to healthcare[14]. By tailoring interventions to the unique context and beliefs of Catholic nuns through the HBM framework, we can empower them to make informed choices about their breast health and promote the practice of BSE for better health outcomes.

The Health Belief Model (HBM) sheds light on why individuals engage in health behaviors like breast cancer screening. It identifies six key factors: perceived susceptibility (feeling vulnerable to the disease), perceived seriousness (understanding its potential severity), perceived benefits (recognizing the advantages of early detection**),** perceived barriers (identifying challenges to action), health motivation (having a general interest in maintaining well-being), and self-efficacy (believing in one's ability to take charge)[15]**.** Studies have shown how these factors influence women's beliefs and screening behavior, and the HBM has even been successfully applied to design interventions that increase breast cancer screening rates, demonstrating its practical value in public health improvement[16]. This study investigated the factors influencing breast self-examination (BSE) practices among Catholic nuns in Tanzania's Lake Zone region. It specifically employed the Health Belief Model (HBM) as a framework to analyze the nuns' perceptions and behaviors related to BSE.

METHODS

Study design

This study employed a cross-sectional design among catholic nuns residing in the Lake Zone of Tanzania. A total of 385 nuns were recruited through convenience sampling. We focused on the four highly populated Congregation centers of catholic nuns within the lake zone. Inclusion criteria were Catholic nuns aged between 20 and above years who were living in convents at the time data was collected with no previous cancer diagnosis and who were ready to participate in the study. The actual data collection of this study was conducted from June to November 2023.

Sample size and sampling procedure

The study recruited 385 Catholic nuns residing in the Lake Zone of Tanzania. This sample size was adjusted to account for an anticipated 10% non-

response rate. The sample size calculation employed Cochran's formula for estimating a single proportion[17] with a desired level of precision of 5% significance level and a prevalence of knowledge of self-breast examination of 33.6%[18].

Data Collection Tools

The data were collected using a structured questionnaire developed based on a literature review of similar studies on self-breast cancer examination and the Health Belief Model (HBM) construct for behavior change (19-21). We highly focus on the studies that used the Champion Health Belief Model Scale (CHBMS) to measure breast cancer screening practices, particularly the SBE practices. Understating and combining questions from these studies helps us to come up with a collection tool for the study. The questionnaire consisted of three (3) main sections, Section One included demographic questions (5 items), Section Two (2) included knowledge questions regarding breast cancer screening methods (7 items), and Section Three (3) was designed according to HBM constructs with 38 items whereby susceptibility domain includes 4 items, perceived seriousness (6 items), perceived benefits (7 items), perceived barriers (9 items), perceived cue to action (8 items), and self-efficacy (4 items).

Pretest

To ensure the questionnaire accurately captured the intended data, we employed a careful two-step process. First, we established content validity by having a panel of four experts review the questionnaire for comprehensive coverage of the target concepts and clarity of language suitable for the target audience. Second, we conducted a pilot test with 35 participants to identify any potential issues with the questionnaire's wording, instructions, or missing elements. This combined approach of content validity assessment and pilot testing strengthened the overall validity of the questionnaire.

Internal consistency

To assess the questionnaire's internal consistency Cronbach's alpha test was calculated. The coefficient from the Cronbach's alpha test was used to assess the internal consistency of the questions used to assess health belief model domains. The health belief model has five (5) domains named, perceived susceptibility, seriousness, benefits, barriers, cue to action, and self-efficacy/motivation. The results from the Cronbach's alpha test yielded satisfactory results as perceived susceptibility (0.7403), perceived severity (0.8010), perceived benefits (0.8550), perceived barriers (0.8595), perceived self-efficacy (0.8330), and cues to action (0.7531). All the internal consistency coefficients are above the threshold of 0.70 or 70% implying that the HBM data are reliable[22,23].

Data Analysis

The survey data collected were managed using Microsoft Excel. We use a frequency distribution table to check if there for missing and erroneous data. Luckily, after data cleaning, we encountered no missing data in our dataset. Thereafter, data cleaned were imported to STATA 18.0 for further analysis.

The items to assess the respondents' knowledge of self-breast examination were added up to generate a new variable named knowledge score with a range of 0 to 7 score. The overall knowledge status regards self-breast examination was established as a dummy variable whereby respondents with a score below the mean score (<3.1455)[24] were regarded to have inadequate knowledge, otherwise were regarded to have adequate knowledge. On the other hand, in the health brief model domains, the 4 Likert scale responses were grouped into dummy variables by grouping "strongly agree & agree" and "strongly disagree & disagree". The total score of each six domains was obtained by sum-up the response from the dummy variable established with a ranging 0-4 score, 0-6 score, 0-7 score, 0-8 score, and 0-8 score, and 0-4 score for susceptibility, seriousness, benefits, barriers, cue to action, and motivation domains respectively. On the score established upper quartile or seventy-five (75^{th}) percentile from each domain was used as the cutoff point "75^{th} (25, 26) to establish the overall status of each domain. Thus, for the susceptibility domain (75^{th} percentile=4), seriousness (75^{th} percentile=3), benefits (75^{th} percentile=7), barriers (75^{th} percentile=7), cue to action (75^{th} percentile=4), and motivation domains (75^{th} percentile=4). Except for the barrier domain, if the score was below the 75^{th} percentile the overall status was regarded as low, otherwise high. For the barrier domain, respondents with a score above 75^{th} were regarded to have a high barrier, low otherwise.

Then, descriptive statistics of demographic characteristics, knowledge of self-breast cancer, and Health Belief Model (HBM) constructs were presented using the Frequency distribution table. The age of respondents was presented using mean (±SD) and category to get a full distribution of respondents' age. In addition, multivariable logistic regression for all variables with a p-value less than 0.2 during bivariate analysis adjusted by the respondent's demographic characteristics was used to assess the health belief model domains associated with self-breast examination practices among Catholic Nuns. Notably, all statistical tests were conducted at a 5% significance level.

RESULTS

Socio-demographic characteristics

As summarized in Table 1, a total number of 385 nuns participated in this study, with an age range of 20 to above 60 years, and a mean age of 45.8 (± 15.4) years. The leading age group was 41-50 years old which constituted 26.2% (n=101) of all study participants. 40% (n=154) of participants had secondary education, 31.7% (n=122) were secondary school teachers, and 13.0% (n=50) participants had a pastoral religious qualification. 32.5% (n=125) of Catholic nuns obtained breast health information from fellow nuns, and only 3.4% (n=13) of the participants obtained the information from the Internet (Table 1).

Table 1. Participants' socio-demographic characteristics (n=385)

Variable	N (%)
Respondents' Age category	
20 – 30	89 (23.1)
31 – 40	55 (14.3)
41 – 50	101 (26.2)
51 – 60	69 (17.9)
Above 60	71 (18.5)
Education Level	
Primary	76 (19.7)
Secondary	154 (40.0)
Degree	139 (36.1)
Master/Ph.D.	13 (3.4)
Others	3 (0.8)
Occupation	
Primary teacher	11 (2.8)
Secondary teacher	122 (31.7)
Pastoral religious	50 (13.0)
Cooker	34 (8.8)
Spiritual counselor	28 (7.3)
Nurse	40 (10.4)
Doctors	19 (4.9)
Clinical officers	38 (9.9)
Others like accountants, secretaries	43 (11.2)
Working period (Years)	
01 – 10	100 (26)
11 – 15	67 (17.4)
16 – 20	81 (21.0)
Above 20	137 (35.6)
Source of information about breast cancer and breast cancer screening	
Family members	44 (11.4)
Sisters within congregation	125 (32.5)
Health workers	92 (23.9)
TV Media	11 (28.8)
Others like internet	13 (3.4)

Knowledge of Self Breast Examination

Over half of the catholic nuns demonstrated inadequate knowledge (58.4%, n=225, 95% CI, 53.3%-63.4%). While nearly half (49.6%, n=191) had heard of self-breast examinations, only 42.6% (n=191) of participants understood its meaning. Similarly, while awareness of early detection existed in 43.4% (n=167), only 12.7% (n=49) of participants knew the appropriate starting age for self-examination. However, nearly half (49.4%, n=190) of participants heard about the self-breast cancer examination (Table 2).

Table 2. Knowledge of Self Breast Examination (n=385)

Variable	Response	
	No N (%)	Yes N (%)
Ever heard of self-breast cancer examination	194(50.4)	191(49.6)
Do you know the meaning of self-breast cancer examination	221(57.4)	164(42.6)
Breast cancer can be detected early	218(56.6)	167(43.4)
Age breast self-examination should begin less than 19 years	336(87.3)	49(12.7)
Self-breast examination should be carried out monthly	235(61.0)	38(39.0)
Self-breast examination is performed by palpating with the palm and a minimum of three fingers	215(55.8)	170(44.2)
Is it possible to perform a self-breast examination	195(50.6)	190(49.4)
Over knowledge	N (%)	
Adequate knowledge	160(41.6)	
Inadequate knowledge	225(58.4)	

Perceived Behavior of catholic Nuns used the Health Belief Domains towards SBE

We aimed to assess the perceived behavior of catholic nuns towards SBE using the health belief model with six major domains. It was revealed that 76.9% (n=296, 95% CI, 72.3%-81.0%) of catholic nuns had low cue to action regards SBE, 64.9% (n=250, 95% CI, 59.9%-69.7%) had low seriousness, 48.8% (n=188, 95% CI, 43.7%-53.9%) had high barrier, and 39.9% (n=173, 95% CI, 39.9%-50.1%) had low self-efficacy (Table 3).

Health Believe model domains associated with knowledge of self-breast cancer examination

Multivariate logistic regression to assess the association between health belief model (HBM) domains and nuns' self-breast examination (SBE) practices of all variables with p-values less than 0.2 during bivariate analysis (i.e., COR) adjusted for age, education, and occupation revealed several significant predictors. Thus, Catholic nuns working outside the healthcare field were more likely not to

perform SBE with an AOR of 1.67 (95% CI, 1.02-2.73, p=0.041).

Table 3. Perceived Behavior of catholic Nuns used the Health Belief Domains (n=385)

Variable	N (%)	95% CI
Perceived susceptibility		
High susceptibility	175(45.5)	40.5%-50.5%
Low susceptibility	210(54.5)	49.4%-59.6%
Perceived serious		
High seriousness	135(35.1)	30.4%-39.9%
Low seriousness	250(64.9)	59.9%-69.7%
Perceived Benefits		
High benefits	194(50.4)	45.4%-55.4%
Low benefits	191(49.6)	44.5%-54.7%
Perceived Barriers		
Low Barriers	197(51.2)	46.2%-56.1%
High Barriers	188(48.8)	43.7%-53.9%
Perceived Cue to Action		
High Cue to action	89(23.1)	19.2%-27.6%
Low cue to action	296(76.9)	72.3%-81.0%
Perceived self-efficacy		
High self-efficacy	212(55.1)	50.0%-59.9%
Low self-efficacy	173(44.9)	39.9%-50.1%

Additionally, catholic nuns with high perceived barriers (AOR 1.88, 95% CI 1.17-3.02, p=0.009) and low self-efficacy (AOR 2.25, 95% CI 1.39-3.65, p=0.001) were more likely not to perform SBE. While catholic nuns with low benefits were less likely to not perform SBE by an AOR of 0.65 (95% CI, 0.41-0.98, p=0.041) (Table 4).

DISCUSSION

This study aimed to explore the factors influencing breast self-examination (BSE) practices among Catholic nuns. We utilized the Health Belief Model (HBM) framework, which examines how individual perceptions of susceptibility, severity, benefits, and barriers to health behavior, along with cues to action and self-efficacy, influence the likelihood of adopting that behavior.

Our main finding revealed a critical knowledge gap regarding proper BSE techniques among Catholic nuns. A significant portion of the participants reported inadequate knowledge of self-breast examination, and most did not practice it regularly. This lack of knowledge emerges as a major barrier within the HBM framework (perceived barriers). This aligns with previous research, such as a study by Nde FP *et al.*[27] in Cameroon, where only 9.0% knew how to perform BSE. Furthermore, among those who had performed BSE before, only 3% practiced it regularly on a monthly bases, which is not different from what was observed in the study in Malaysia[28]. Another study done by, Assfa Mossa K. *et al.*[29] found that 49.87% of young women in southwest Ethiopia had never heard of BSE. Furthermore, a study done by Robert K. Basaza[11], in Kampala Archdiocese, Uganda revealed that the majority (96.4%) of the respondents did not do a mammography, 54.1% never practiced breast self-examination (BSE) and 34.2% performed it regularly during bedtime. These findings underscore the critical need for increased education on SBE among Catholic nuns. By implementing targeted interventions, we can empower nuns with the information and confidence needed to perform regular BSE. This, in turn, can significantly improve early detection rates, leading to better breast cancer outcomes and survival rates.

This study revealed an interesting contrast in how Catholic nuns perceive breast cancer susceptibility and seriousness within the Health Belief Model framework. While more than half of the participants reported feeling less likely to develop breast cancer (low susceptibility), most nuns acknowledged it as a significant threat (high seriousness). This disconnect presents valuable insights for improving breast health interventions. The nuns' heightened perception of seriousness likely stems from a focus on mortality inherent in their religious beliefs, potentially making them acutely aware of breast cancer's lethality. Witnessing illness within their communities could further solidify this perception. However, a low perceived susceptibility might indicate a lack of understanding about personal risk factors or a misconception about the disease's prevalence. The findings are consistent with the study done on African Americans by Allen JD *et al.*[30] among African American Catholic Nuns, where the study revealed that most nuns acknowledged breast cancer as a serious illness, and they expressed low levels of perceived personal risk. Interestingly, the study found that nuns who perceived themselves at a higher risk of developing breast cancer were more likely to have had a mammogram and clinical breast exam. However, overall, the prevalence of breast cancer screening tests was low among Catholic nuns.

As expected, our study found a positive significant association between perceived barriers and SBE among catholic nuns. Thus, lack of knowledge on how to perform SBE and feelings of embarrassment when performing self-breast examination influence the behavior practices of most nuns. This is contrary to research by Charkazi *et al.*[31] where Turkish women who had higher self-efficacy, greater breast cancer knowledge, and fewer perceived barriers demonstrated increased SBE practice.

Table 4. Health Believe model domains associated with associated with knowledge of self-breast cancer examination

Variable	Ever perform self-breast cancer examination		COR, (95% CI)	p-value	AOR, (95% CI)	p-value
	Yes N (%)	No N (%)				
Age category						
Below 60 years	42(29.2)	102(70.8)	1		1	
Above 60 years	96(39.8)	145(60.2)	0.62, 0.39-0.97	0.035*	0.72, 0.46-1.15	0.167
Education Background						
Primary education	28(35.4)	51(64.6)	1			
Secondary education	49(31.8)	105(68.2)	1.18, 0.66-2.09	0.578		
College and above	61(40.1)	91(59.9)	0.82, 0.47-1.44	0.488		
Occupation status						
Health field	44(45.4)	53(54.6)	1		1	
Non-health field	94(32.6)	194(67.4)	1.71, 1.07-2.74	0.025*	1.67, 1.02-2.73	0.041*
Perceived Susceptibility						
High Susceptibility	60(34.3)	115(65.7)	1			
Low Susceptibility	78(37.1)	132(62.9)	0.88, 0.58-1.34	0.561		
Perceived Seriousness						
High Seriousness	51(37.8)	84(62.2)	1			
Low Seriousness	87(34.8)	163(65.2)	1.14, 0.74-1.76	0.561		
Perceived Benefits						
High Benefits	61(31.4)	133(68.6)	1		1	
Low Benefits	77(40.3)	114(59.7)	0.68, 0.45-1.03	0.070	0.65, 0.41-0.98	0.041*
Perceived Barriers						
Low Barriers	77(39.1)	120(60.9)	1		1	
High Barriers	61(32.5)	127(67.6)	1.34, 0.88-2.03	0.175	1.88, 1.17-3.02	0.009*
Perceived Cue to Action						
High action	37(37.1)	56(62.9)	1			
Poor action	105(35.5)	191(64.5)	1.07, 0.66-1.75	0.785		
Perceived Self- efficacy						
High Self- efficacy	88(41.5)	124(58.5)	1		1	
Low Self- efficacy	50(28.9)	123(71.1)	1.74, 1.13-2.68	0.011*	2.25, 1.39-3.65	0.001*

COR=Crude Odds Ratio; AOR=Adjusted Odds Ratio; CI=Confidence interval; p-value=Probability value; p<0.05*

Similarly, study done by El-Hosary EAS [32] found that negative attitudes towards SBE in Myanmar women stemmed from embarrassment and privacy concerns. Another study done by Sharifikia I *et al.*[33] who identified a link between perceived benefits and barriers and recommended tailoring educational programs to address these factors. Likewise, perceived self-efficacy towards breast self-examination increased the odds of not practicing SBE by 74%. An explanation could be the assumption of the Health Belief Model, which states that women have confidence or a greater perception of self-efficacy in their ability to perform BSE[34,35]. Furthermore, perceived self-efficacy, the belief in one's ability to perform SBE effectively, also motivates individuals to engage in this practice[36].While barriers are recognized as a major obstacle to behavior change across various studies[37], this research suggests that addressing both perceived barriers and self-efficacy is crucial for promoting regular SBE practice among nuns.

In addition, the findings for perceived barriers and self-efficiency highlight the importance of educational programs that equip nuns with the knowledge and skills to perform SBE confidently. The interactive breast health intervention led by healthcare professionals can equip nuns with the knowledge and practical skills to perform BSE confidently and effectively by explaining and demonstrating proper BSE techniques with ample opportunity for practice encouraging questions and addressing any concerns or anxieties related to the examination. Also, we can establish peer support networks within the nun community can be a powerful tool. Nuns can share experiences, encourage

each other, and address any feelings of isolation or fear related to breast cancer.

A recent study examined the relationship between the perceived risk of breast cancer and self-examination behaviors among Catholic nuns. The findings revealed that nuns who perceived themselves at lower risk of developing breast cancer were more likely not to perform regular self-breast examinations (SBE). This suggests that simply perceiving self as low risk may not always translate into taking preventive actions. Our study is similar to the study done in Nairobi Kenya by Alfena Julie Joseph *et al.*[38] revealed that Catholic nuns had breast cancer screening which is a relatively lower breast cancer screening practice considering higher risk among nuns. Other studies conducted by Allen *et al.*[30] in the US among Catholic Latino nuns revealed that breast cancer screening uptake was low at 24%. Other studies have shown that contrary to our findings which revealed that African-American women who perceived themselves at high risk of developing breast cancer were more likely to engage in SBE and another study done by Petro-Nustus *et al*.[39,40], United States found that women who perceived themselves at a higher risk of developing breast cancer were more likely to practice BSE regularly.

However, the study also found that nuns who were excessively worried about developing breast cancer also exhibited a decreased likelihood of performing SBE. This suggests that excessive worry might be associated with negative emotions and a stronger perception of breast cancer severity, which could hinder individuals from engaging in preventive behaviors. Breast health-promoting interventions on SBE should be emphasized among Catholic nuns to address the emotional burden of breast cancer and provide culturally sensitive, accessible information about SBE practices. Similar studies have shown that fear of breast cancer may not be a motivator for SBE, even among women who perceive themselves as at high risk[41].

This study's findings indicate that Catholic nuns who perceive low benefits from breast cancer screening and self-breast examination (SBE) were more likely to perform self-breast examination. The researcher thought on raise on the aspect of decision and motivation to health behavior change that if the individual is not effectively motivated can be reluctant in taking the cue to action despite knowing the health benefits. This suggests that interventions designed to enhance the perceived benefits of these practices could effectively promote breast cancer knowledge and potentially increase adoption rates. These perceived benefits are consistent with findings by Noor *et al*.,[32] which concluded that the Indonesian female heard about SBE from different sources and accepted that they should palpate the breast to find the breast lumps early. Also, a study was done on Hispanics by Saldaña-Téllez M *et al.*[42] his study provides a comprehensive review of the literature on perceived benefits and barriers to breast cancer screening among Hispanic women. The findings demonstrate that women who perceive greater benefits from breast cancer screening are more likely to undergo self-breast examination, mammograms, and clinical breast exams. In another study done in Malaysia by Noman S *et al.*[43] the findings provide strong evidence that perceived benefits are a significant predictor of breast cancer screening uptake.

Our study revealed limited confidence and knowledge regarding self-breast examination (SBE) among participants. Notably, half the participants lacked confidence in performing SBE, and most didn't know how to do it properly. Furthermore, more than half were unsure of the specific steps involved. This aligns with findings from Mohamed HA *et al.*[44] who reported that there was a high percentage of female university students who had unsatisfactory knowledge, negative attitudes, and poor practice regarding self-breast examination (SBE) and breast cancer, and they recommended that target population awareness and positive attitudes towards Perceived benefits of early breast cancer screening should be increased. While the current study did not explicitly explore cues to action as defined by the health belief model, it highlights the importance of addressing this aspect in future research. Cues to action, such as access to educational materials or training opportunities, could potentially play a significant role in increasing knowledge, and confidence, and ultimately, promoting regular SBE practice. This warrants further investigation to understand how best to utilize these cues to empower individuals and improve preventive health behaviors.

Limitation

This study was conducted only among catholic nuns in Lake Zone, Tanzania. The results from this study must be applied to similar contexts with caution. However, we provide valuable findings that can be used by scholars, researchers, policymakers, and stakeholders in the health arena to design proper breast cancer screening interventions to fit this special group of nuns. Employing convenience sampling, the study acknowledged its potential limitations in participant representativeness. Finally, the questionnaire was self-administered questions, suggesting the possibility of information bias. Therefore, to mitigate this we ensured the study data collection tool was pretested and validated as well as had a reliable reliability score to capture the desired

information. This helped minimize the risk of participants misunderstanding the questions and ensured clarity as well as address information bias associated with self-administered questionnaires.

CONCLUSION

This study identified perceived barriers, perceived benefits, self-efficacy, and occupation as significant factors influencing the low self-breast examination (SBE) practice among Catholic nuns. Consequently, the findings informed the development and implementation of interventions promoting breast cancer knowledge and awareness, ultimately aiming to improve SBE practices. The intervention, including breast health promotion programs, workshops, and support groups, equip nuns with essential information about breast cancer, SBE techniques, and strategies to overcome barriers to breast cancer screening. This approach can also contribute to promoting user-friendly health services, ultimately leading to improved health outcomes within this population. However, these intervention needs to be regularly investigated/evaluated if they influence health behavior change as well as breast health outcomes among this special group of catholic nuns.

Recommendations

This study on breast self-examination (BSE) practices among Catholic nuns in Tanzania revealed a critical knowledge gap and an interesting contrast in the perceived susceptibility and seriousness of breast cancer. Based on these findings, here are recommendations for future research and practice,

emphasizing the importance of tailored interventions and ongoing support for breast health promotion.

1. To explore similar themes of susceptibility and seriousness perceptions among nuns of other faiths and denominations in Tanzania or across a wider geographical area.
2. To utilize both quantitative (surveys) and qualitative methods (interviews, focus groups) to gain a deeper understanding of nuns' beliefs, experiences, and decision-making processes regarding breast health.

To investigate strategies for ensuring the long-term effectiveness of educational interventions within the Catholic nun community. This could involve exploring peer educator training programs for nuns themselves**.**

ETHICAL CONSIDERATIONS

Ethical approval for this study was obtained from the joint Catholic University of Health and Allied Sciences (CUHAS)/Bugando Medical Centre (BMC) Ethics Committee/Institutional Review Board (Number CREC/552/2022). Informed consent of each participant was sought and obtained; each participant being required to sign the consent form on the questionnaire. Participants were assured of the confidentiality of their responses.

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CONFLICT OF INTEREST

The authors declare no conflict of interest.

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DATA AVAILABILITY

All data relevant to the study are included in the article.

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