



Evaluation of Breast Health Promotion Intervention Among Catholic Nuns in Lake Zone 'Tanzania

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ABSTRACT

Objective: Despite facing unique barriers, Catholic nuns in Tanzania require accessible breast health promotion. This study explores interventions to empower nuns through knowledge, improved attitudes, and positive practices, ultimately promoting well-being and early detection for better breast cancer outcomes.

Materials and Methods: A quasi-experimental design study guided by the Health Belief Model was conducted to monitor the implementation of a breast health intervention program aimed at increasing breast cancer screening knowledge among 385 Catholic nuns aged 20 to over 60 years old within Lake Zone, Tanzania. Data were collected at two-time points: pre-intervention (baseline) and implementation phase intervention (after three months). The intervention consisted of a 2-hour educational session. Participants had opportunities to ask questions and provide feedback.

Results: The breast health promotion intervention was well-received by Catholic nuns, with 339 (88%) expressing strong motivation to learn and promote awareness. The training effectively increased knowledge and positive attitudes towards breast cancer screening. Researcher assistants successfully delivered the program, and 354 (92%) of participants expressed interest in continued education and support. The intervention addressed cultural barriers and empowered nuns to take charge of their health, though some challenges remain meanwhile 158 (41%) had limited prior knowledge, 81 (21%) hesitated to discuss breast health due to religious beliefs, and some faced difficulty applying the learnings.

Conclusion: Overall, the breast health promotion intervention had a positive outcome on the Catholic nuns' awareness and knowledge of breast health. However, addressing the identified barriers and challenges is crucial to further enhance the intervention's effectiveness and sustainability.

Keywords: Breast cancer; breast cancer screening; Catholic nuns; knowledge; attitudes; breast health promotion intervention

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Key Points

- Breast cancer
- Breast cancer screening
- Catholic nuns
- Knowledge
- Attitudes
- Breast health promotion intervention

Introduction

Despite substantial progress in medical treatments, breast cancer (BC) continues to be a major cause of cancer-related mortality among women (1). Like any other woman, Catholic nuns face a risk of developing BC, and early detection and treatment can significantly

enhance survival rates (2). The previous studies focused on knowledge, beliefs, and attitudes towards breast health promotion and factors associated with BC screening practice among Catholic nuns in Lake Zone, Tanzania. These studies identified gaps in Catholic nuns' knowledge, beliefs, and attitudes toward breast health promotion and

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BC screening practices. These studies also revealed nuns' low perceived susceptibility, low seriousness and inability to perceive the benefit of breast self-examination (BSE). In response to these findings, we implemented a breast health intervention designed to address these gaps and improve nuns' uptake of BC screening practices.

Breast health promotion interventions, grounded in the Health Beliefs Model (HBM), effectively address individuals' perceptions of health threats like BC (susceptibility, severity), the benefits of prevention, and factors influencing action (barriers, cues to action, self-efficacy) (3). These interventions align with HBM principles and target identified gaps by increasing knowledge, reducing barriers, and promoting positive attitudes and behaviors (4). The HBM proved to be a valuable tool for implementing breast health promotion intervention among Catholic nuns. The model helped us to understand the nuns' beliefs and motivations, and it provided a framework for designing an intervention that was effective in increasing BC screening rates and improving overall breast health (5).

However, evaluating breast health interventions, including the training program mechanism, is crucial to identify potential barriers and areas for improvement (6). Process evaluation assesses implementation, pinpoints factors affecting intervention success, and uncovers potential implementation barriers (7). Breast health promotion interventions empower Catholic nuns to safeguard their health and reduce BC risk by providing education, support, and resources (8).

Breast health promotion interventions, include BSE, clinical breast examination (CBE), and mammography (9). All of these have contributed to reduced mortality and improved survival rates by facilitating early detection of BC (7). Numerous studies on BC screening (BCS) performance have been conducted among women worldwide, including in sub-Saharan Africa (10). However, only a limited number of studies have focused on BCS practices among Catholic nuns (11). Likewise, several studies have been conducted in Tanzania to assess the effectiveness of breast health interventions in improving BC awareness and screening practices. These studies have found that interventions tailored to the specific needs of Tanzanian women and incorporating cultural sensitivity can be effective in increasing BSE practice and uptake of CBEs (12). Also, studies have shown that breast health interventions can be effective in increasing BSE practice and uptake of CBEs (10). Notably, interventions focusing on BCS are less common among Catholic nuns in general and absent among Tanzanian Catholic nuns in particular.

Therefore, implementing this breast health intervention program among Catholic nuns could be an effective means to reduce BC mortality rates within this group and transmit the knowledge and skills to other congregations. Furthermore, the current study intends to identify the potentials and barriers involved during the training of Catholic nuns within the Lake Zone in Tanzania on breast health promotion. This intervention provides them with knowledge and enhances their beliefs about BC and BCS practice.

Materials and Methods

A quasi-experimental design study guided by the HBM was conducted to monitor the breast health intervention program during implementation aimed at increasing BC screening knowledge among Catholic nuns. Data were collected at two time points: pre-intervention (baseline) and implementation phase intervention (after three months).

The discussions were guided by a semi-structured interview guide that explored the nuns' experiences with the breast health intervention program, their perceptions of its strengths and weaknesses, and their suggestions for improvement regarding the intervention. The 2-hour educational session, delivered by an Assistant researcher to the participants, was designed to increase knowledge about BC and reduce the factors associated with BC practice. Interventions were conducted in a safe and supportive environment, with informed consent obtained and confidentiality assured. Participants had opportunities to ask questions and provide feedback.

Inclusion Criteria

Catholic nuns aged between 20 and above years from Lake Zone Congregations, also, include those who participated in the intervention phase, who had no previous cancer diagnosis, and willing to participate in the study. All study participants provided written consent after receiving detailed information about the breast health program intervention.

The Intervention

The intervention was introduced as an educational intervention on BC prevention and BC screening. This intervention was grounded in the HBM and developed based on the American Cancer Society (13), and the International Agency for Research on Cancer. This intervention was prepared and designed to bridge the gap in BC knowledge and to modify beliefs related to BC (14). Table 1 gives an outline of the educational intervention on BCS along with the application of the HBM concepts in the educational intervention.

The educational intervention consisted of four units. Unit one provides general information on the anatomy and physiology of a normal breast so that the participants have a clear understanding of the topic. Unit two provides information and knowledge about BC. It further explores BC symptoms, BC stages, and BC risk factors to increase the participants' knowledge of BC. We addressed the susceptibility of BC and the importance of early detection of the disease. Unit three explain two different methods of BCS (clinical breast exam and mammography). The effectiveness of mammography and CBE in early detection, the safety of the mammography procedure (radiation exposure), unnecessary concerns of discomfort about the procedures, and the availability of breast screening procedures to encourage participants to adopt and practice these approaches. Unit Four explains the BSE procedure to raise the participants' awareness of BC symptoms and motivate them to follow this procedure.

Text in printed materials was brief and easy to understand, with a large and clear typeface. The graphics in the materials were realistic and reflected the lives of Catholic nuns. Considering a possibly low reading ability of study subjects. The printed educational materials were designed to be bright and luminous.

Pretest

A pretest breast health intervention was carried out involving 50 participants in the same convent where the questionnaire was pretested. The face and content validity of the educational materials were approved by four professional expert panelists. The educational intervention consisted of a two-hour session delivered to groups of Catholic nuns by a trained assistant researcher. The intervention included a PowerPoint presentation, a short video about BSE, and a training session on BSE practice on a silicone breast model. At the

Table 1. Tool for breast health intervention

Sessions	Topics	HBM constructs	Area of target	Intervention/educational delivery materials
The normal breast	- Structure of the breast - Physiology of breast development	Perceived susceptibility	Awareness/knowledge of breast cancer	- PowerPoint presentation - Booklet
Knowledge of breast cancer	- What is breast cancer - Symptoms of breast cancer	Perceived susceptibility	Knowledge/awareness of breast cancer	- PowerPoint presentation,
	Breast cancer stages Breast cancer risk factors	- Perceived severity		leaflets
Breast cancer screening	- Clinical breast examination - Mammography Breast self-examination	- Perceived benefits - Perceived barriers - Health motivation (Cue to action)	Knowledge, attitudes, and beliefs on acceptability and uptake of breast cancer screening	- PowerPoint presentation - Booklet - BC logo sticker - Short reminder
Breast health awareness	Breast health awareness - Acceptability for BSE performance	Perceived benefits Perceived barriers. perceived Cue to action Perceived Self efficacy	- Knowledge and beliefs on breast health awareness - Practice of BSE	- PowerPoint presentation - BSE film - Booklet - CD BC logo sticker short reminder SMS
Breast cancer screening uptake practice	- Practice of BSE	- Perceived benefits Perceived barriers - Perceived Cue to action Perceived Self-efficacy	-Practice of BSE, Clinical breast examination, and mammography	BSE practice on a silicon model - BSE film - Booklet CD - BC logo sticker - Short reminder SMS

BSE: Breast self-examination; HBM: Health Belief Model

end of the intervention, participants were given a copy of a booklet containing all the information covered in the intervention and a BC logo sticker.

Intervention Fidelity

To ensure the consistent and effective delivery of the educational intervention, standardized training and certification for intervention facilitators were implemented. Intervention manuals and checklists were utilized to guarantee adherence to the intended intervention and coverage of all key components. Regular monitoring and feedback sessions, along with ongoing observation and evaluation of facilitators' performance, enabled the identification and correction of any deviations from the intended intervention delivery. These strategies collectively aimed to promote participant adherence and engagement, thereby maximizing the intervention's effectiveness.

Intervention Implementation

The breast health promotion intervention was implemented three months after the baseline survey. To ensure consistent and faithful delivery of the intervention, the assistant researcher adhered to standardized educational intervention protocols across all participating groups. The assistant researcher diligently followed these protocols

to ensure uniformity in intervention delivery. Participants were encouraged to ask questions and receive comprehensive answers during the training sessions. They were also given ample opportunities to practice their newly acquired skills and apply the intervention techniques in simulated scenarios. The researcher, acting as an observer throughout the sessions, provided participants with immediate and constructive feedback.

At the end of the training, important points were repeated in order to improve learning, and the brochures on breast health and psychological adjustment were given to the participants so that they could review them later. To evaluate the quality of the intervention execution, the principal investigator watched the Assistant researcher performance during the intervention and completed an evaluation form at the end of the intervention. BSE training was planned and rehearsed by the Assistant researcher by using a role-playing technique with the participants. Other possible means of enhancing intervention fidelity include the monthly short reminder text messages and the use of the BC logo stickers. At the end of sessions, a short test was given to the session participants to ensure that they had learned what had been taught in the sessions.

Table 2. Participants' socio-demographic characteristics

Respondents' age (n = 385)	Frequency	Percentage
20–30	89	23.1
31–40	55	14.3
41–50	101	26.2
51–60	69	17.9
Above 60	71	18.9
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	2.9
Secondary teacher	122	31.7
Pastoral religious	50	13.0
Cooker	34	8.8
Spiritual counselor	28	7.3
Nurse	40	10.4
Doctor	19	4.9
Clinical officer	38	9.9
Others like accountants, secretaries	43	11.2
Working period (years)		
01–10	100	26
10–15	67	17.4
15–20	81	21
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

Statistical Analysis

The implementation of the breast health intervention was evaluated using a checklist tool and a structured observation method. The checklist tool was used to assess whether the intervention was conducted as planned, and the structured observation method was used to assess the participants' level of engagement and the competence of the Assistant Research. Both methods were guided by the HBM, and the responses were classified under the respective categories and sub-categories of the HBM.

Ethical Consideration

Ethical approval was granted by the joint Catholic University of Health and Allied Sciences/Bugando Medical Centre Review Board (approval number: CREC/552/2022; date: 12.05.2022). All participants signed a written informed consent before participating in the study. Participants were assured that their participation in the study training is voluntary, and they have the full right to withdraw from the study training at any time they feel to do so without.

Results

Socio-Demographic Characteristics

As summarized in Table 2, a total number of 385 nuns participated in this study, with an age range of 20 to 60 years, and a mean age of 45.8 ± 15.4 years. The leading age group was 41–50 years old which constituted a total of 101 (26.2%) participants. A total number of 154 (40%) participants had secondary education, 122 (31.7%) of the participants were secondary school teachers, and 50 (13.0%) participants had a pastoral religious qualification. A total number of 125 (32.5%) Catholic nuns obtained breast health information from fellow nuns, and only 13 (3.4%) of the participants obtained the information from the Internet.

Breast Health Promoting Intervention Among Catholic Nuns

The breast health promotion intervention was positively received by Catholic nuns, with a majority of 339 (88%) participants expressing high motivation to learn and promote breast health awareness among their peers. During process evaluations, the research assistant exhibited strong performance in delivering the interventions, engaging over 342 (89%) of participants. More than 354 (92%) of the study participants seemed interested in education on breast health and emotional adjustment, respectively. Notably, 354 (92%) of participants expressed interest in breast health education and emotional adjustment support. Findings revealed increased awareness of BC risk factors, symptoms, and screening procedures. The training program, led by knowledgeable facilitators, effectively enhanced participants' knowledge and attitudes towards BCS. The assistant researcher performed very well on the interventions for more than 342 (89%) of the sessions.

While the intervention successfully addressed cultural barriers and empowered nuns to take charge of their breast health, certain challenges were identified. Approximately 157 (41%) of participants had limited prior knowledge about breast health, while 81 (21%) of participants hesitated to openly discuss breast health due to religious beliefs and cultural practices, and some participants faced difficulties applying the training program's lessons to their own lives and the lives of the nuns they served.

The HBM-based breast health intervention effectively influenced the nuns' perception of susceptibility to BC. The intervention provided information about the risk factors for BC and its prevalence among Catholic nuns, enhancing the nuns' understanding of their vulnerability to the disease and enhanced the nuns' belief in the seriousness of BC. By providing information about the consequences of BC and the importance of early detection, the intervention helped the nuns grasp the severity of the disease and the urgency of timely action. Furthermore, the intervention promoted the nuns' perception of the benefits of BC screening. By dispelling myths surrounding BC screening and providing information about its advantages, the

intervention helped the nuns recognize the value of screening in early detection and prevention. Lastly, the intervention bolstered the nuns' self-efficacy for BC screening. By providing practical information on accessing screening services and assisting the nuns in overcoming barriers to screening, the intervention empowered them to take charge of their breast health.

The checklist tool showed that the intervention was conducted as planned. All of the intervention components were delivered as planned, and the intervention materials were of high quality. The structured observation method showed that the participants were actively engaged in the training. They asked questions, participated in discussions, and completed all of the activities. The Assistant Research was also competent and knowledgeable. They delivered the intervention material effectively and answered all of the participants' questions.

Discussion and Conclusion

The health education intervention program utilized a behavioral change model and integrated teaching principles tailored to the learning preferences of Catholic nuns. This approach demonstrated remarkable effectiveness in increasing the participants' awareness of breast health issues and diminishing their hesitancy towards practicing BSE. These positive outcomes resonate with those observed in previous studies, revealed that health behavior change education training effectively enhanced the knowledge, proficiency, and frequency of BSE performance among educated women (15).

Another study conducted by Parashar et al. (16) revealed that a training program effectively enhanced the participants' knowledge of breast health and BSE methods, and it also encouraged them to practice BSE more frequently. Also a similar study done in Saudi Arabia by Yakout et al. (17). The outcomes of the study indicated that the training program successfully increased the participants' understanding of breast health and BSE procedures, and it also promoted more regular practice of BSE. These studies provide strong evidence that breast health intervention programs can be effective in promoting BSE among women including Catholic nuns. The findings of these studies are consistent with the findings of the current study, which found that the training program was well-designed and delivered by knowledgeable and experienced facilitators.

This study underscores the importance of culturally sensitive interventions tailored to specific populations, particularly underserved communities like Catholic nuns. By addressing cultural beliefs and practices, the intervention effectively overcame barriers and empowered nuns to take control of their breast health. This study bears similarities to research conducted among African American women by Rivers et al. (18). Their findings revealed that the program significantly enhanced the participants' knowledge of BC, alleviated their fears associated with the disease, and increased their intention to undergo mammograms. Another study conducted among Hispanic women by Livaudais et al. (19) yielded similar results. The findings demonstrated that the program effectively enhanced the participants' knowledge of BC, reduced their fear of BC, and increased their intention to undergo mammograms. These studies provide strong evidence that culturally sensitive interventions tailored to specific populations can be effective in promoting BC awareness and screening. The findings of these studies are consistent with the findings of the current study, which highlights the significance of culturally sensitive interventions tailored

to underserved communities like Catholic nuns. By addressing cultural beliefs and practices, the intervention was able to overcome barriers and empower nuns to take charge of their breast health.

Our study and previous research have identified several challenges to breast health intervention and awareness among women in various cultural settings. In the current study, we found that some Catholic nuns faced challenges including limited prior knowledge about breast health, hesitation to discuss breast health openly due to religious beliefs and cultural practices, and difficulty applying what was learned in the training program to their own lives and the lives of the nuns they served. Additionally, the training program was time-intensive and required the nuns to travel to a central location of similar challenge have been reported in other studies conducted in different cultural settings. For instance, Saeed et al. (20) found that Arabian women faced similar challenges to those in the current study, including limited prior knowledge about breast health, hesitation to discuss breast health openly due to cultural practices, and difficulty applying what was learned in the training program to daily life. Additionally Kissal and Beşer (21) found that Turkish women faced challenges including limited prior knowledge about breast health, cultural taboos surrounding BC, and difficulty accessing breast health care services in rural areas. Collectively, these findings highlight the need for culturally sensitive and context-specific breast health education programs that address the unique needs and challenges of women in different cultural settings. By understanding and addressing these barriers, we can promote better breast health awareness and outcomes among women worldwide.

A similar study done in low-income countries including South Asia by Saini et al. (22) revealed that an HBM-based breast health intervention was effective in increasing BC screening rates among low-income women. The intervention provided information about the risk factors for BC, the benefits of screening, and how to get screened. Another study done in Guilan, Iran by Eghbal et al. (23) found that an HBM-based breast health intervention was effective in increasing BC screening rates among Hispanic women. The intervention provided information about the risk factors for BC, the benefits of screening, and how to get screened in Spanish. Also, a study done in China by Zhang et al. (24) found that an HBM-based breast health intervention was not effective in increasing BC screening rates among Chinese women. The authors of the study suggest that this may be due to a lack of access to screening services. The findings of the similarity studies suggest that HBM-based breast health interventions can be effective in increasing BC screening rates among underserved populations. However, the findings of the different studies suggest that there may be cultural and religious factors that can affect the effectiveness of these interventions.

Study Limitations

Our study had some limitations. The study lacked a control group, making it difficult to determine whether the observed changes in breast health awareness and practices were solely attributed to the interventions or other factors. Additionally, the sample was drawn from congregations within Lake Zone, limiting the generalizability of the findings to all Catholic nuns in Tanzania. Finally, the study did not assess the long-term impact of the interventions on breast health outcomes. Despite these limitations, we believe that our study provides valuable insights into the potential benefits of breast health interventions for Catholic nuns and increased awareness of BC risk factors, symptoms, and screening procedure. Future research should also assess the long-term impact of the interventions on breast health

outcomes. The findings can be used to inform the development of more effective and culturally appropriate breast health interventions for this population.

This study highlighted the effectiveness of culturally sensitive breast health promotion interventions tailored to specific populations, particularly underserved communities like Catholic nuns. The intervention effectively improved knowledge, attitudes, and perceptions related to BCS, demonstrating its potential to promote positive breast health behaviors among Catholic nuns. The HBM-based approach effectively addressed the nuns' perceptions of susceptibility, seriousness, benefits, and self-efficacy regarding BCS, empowering them to take charge of their breast health.

Ethics Committee Approval: Ethical approval was granted by the joint Catholic University of Health and Allied Sciences/Bugando Medical Centre Review Board (approval number: CREC/552/2022; date: 12.05.2022).

Informed Consent: All participants signed a written informed consent before participating in the study.

Authorship Contributions

Surgical and Medical Practices: G.M., K.M., R.L.; Concept: G.M., K.M., R.L.; Design: G.M., K.M., R.L.; Data Collection and/or Processing: G.M., J.M.; Analysis and/or Interpretation: G.M., K.M., R.L., J.M., P.A.S., P.R.; Literature Search: G.M.; Writing: G.M., K.M., R.L., J.M., P.A.S., P.R.

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