Determinants of Breast Cancer Screening Among Reverend Sisters in Kampala Archdiocese, Uganda: A Cross-Sectional Study

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ABSTRACT

Background: Breast cancer in Uganda is the second commonest cancer in women coming only next to cancer of the cervix. This is the first cross-sectional study to investigate the determinants of self-breast cancer screening among Reverend Sisters in Kampala, the largest Archdiocese of Roman Catholic Church in Uganda. The prevention strategies in this country are still not optimal and the key to prevention is breast screening.

Methods: A cross-sectional analytical study was conducted from September, 2018 to June, 2019. A sample of 310 respondents were interviewed using a semi-structured, self-administered questionnaire. Data was analyzed using logistic regression model.

Results: A 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. The reasons for performing BSE included: curiosity (61.9%), having a lump (19%) and carrying out screening (9.5%). Significant predictors of breast cancer screening were ordinary level of education (11 years of education), hearing about breast cancer, different screening methods, and symptoms of breast cancer, usefulness of screening for women, a need for sisters to screen, self-breast examination and mammography. Age and other levels of education were not significantly associated with breast cancer screening.

Conclusion: The Reverend Sisters had a low level of knowledge and a small fraction practiced breast cancer screening. This demands a sustainable interventional strategy of breast health awareness campaign, establishment of appropriate health infrastructure related to precision oncology in Uganda and similar settings.

INTRODUCTION

The Reverend Sisters who are a cohort of religious women in the Roman Catholic Church have not been exempted from the epidemic of breast cancer. As early as 1600 in Italy, an increased prevalence of breast cancer was recognized among Roman Catholic nuns.[1] Though breast cancer is ranked the fifth cause of cancer death worldwide, unfortunately breast cancer screening programs are done in only 17% of African countries.[2,3]

The 5-year survival rate is highest in developed countries with 90.2% in the United States of America, 89.5% in Australia, and 96% in Europe,[4,5] compared to 53% in Africa.[6] Previous studies done in Uganda have shown that a 5-year survival rate for patients with breast cancer is 46–56%,[7] compared to East Africa at 37.7%, West Africa at 35.2% and 48.1% in South

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Africa.[8] In Uganda, cancer accounts for 9% of the 33% total deaths due to non-communicable diseases (NCDs). The global burden of cancer study (GLOBOCAN) 2018 project found out that breast cancer is the second commonest cancer after cervical cancer among women in Uganda. The new breast cancer cases as of 2018 were at 2,318 (12.8% of all cancers in women) and deaths stood at 1,076. Breast cancer affects young women with a mean age of 42 years in a country with a life expectancy at birth of 65 years for women.[9] Uganda's age standardized incidence rate of breast cancer is estimated at 4.5% annual increase. [10,11] The uniqueness of Reverend Sisters is that they are at a greater risk of developing breast cancer than the general population.[12] However, breast cancer is preventable[13,14] and can be treated if it is detected in time through regular breast self-examination (BSE) and clinical diagnosis.[11,3,15] Today, there are minimal concerted efforts to raise breast cancer awareness in nearly all regions of Africa and this thwarts prospects of prevention, cure and eradication of breast cancer among women.[16] Consequently, this leads to a high prevalence of breast cancer and associated mortality rates among women.

The Reverend Sisters have been acknowledged as a high-risk population.[12] Existing research shows only a limited number of breast health studies on breast cancer screening, breast cancer incidence, knowledge on breast cancer and breast healthcare seeking behavior. Breast cancer screening has an undisputable role in early detection and timely diagnosis that can promote the comprehensive treatment response and prolonging life expectancy.[3,15,17] Integration of breast cancer screening programs in health care system has proved to reduce morbidity and mortality by 30% which is attributable to breast cancer among women,[18] and will help to realize sustainable development goal (SDG) of 3.4 by 2030.[19]

The aim of this study was to investigate the level and determinants of breast cancer screening among the Reverend Sisters in Kampala Archdiocese, Uganda. As such, it explored the preferences and views of Reverend Sisters, specifically looking at what was significant to them when investigating levels and determinants of breast cancer screening and thus inform the breast cancer screening programs in this population segment or similar settings.

METHODS

This research was a cross-sectional analytical study. The study was conducted between September, 2018 and June, 2019 in Kampala Archdiocese located in central region of Uganda. The Kampala Archdiocese was selected because it is the largest and oldest with 3,592,053 people who constitute 8.6% of the total

population of Uganda.[20] Secondly, it is an area of operation for Kampala (the capital city of Uganda) cancer registry that collects broad data. The Reverend Sisters (18 years and above) both retired and those still in service living in the selected dioceses of Kampala Archdiocese constituted the study population. The population of the Reverend Sisters is privileged and information about them is restricted. Thus, it was never passed on to the research team. Reverend Sisters who were 18 years and above voluntarily gave consent to participate in the study. The Reverend Sisters who had dementia and those with mental illness episodes were excluded from the study; these Reverend Sisters could not give any response to the questions.

Sampling

The sampling pattern covered study respondents and geographical setting. A two stage sampling strategy was used to construct the study sample. Convenient non-random sampling was used to select Kampala Archdiocese out of the 4 Archdioceses of the Roman Catholic Church in Uganda.

At each sampled Covent, the researcher sensitized the Revered Sisters, then wrote numbers on pieces of paper, placed them in a box, shook it and gave respondents an opportunity to pick a paper. Respondents who had picked an even number were requested to participate in the study. This continued on until the total number of respondents for the study was achieved. In this sampling, there was no division into sub-populations or taking any other additional steps before selecting respondents. The method was a fair way to select the respondents since every member of the population had an equal chance of getting selected.

Sample size

The sample size was determined using Kish Leslie formula ($N = Z^2pq/d^2$) for prevalence studies.[21] Where N is the desired sample size, Z is the standard normal deviation set at 1.96 which corresponds to 95% confidence level, p is the population of the target, q is the proportion of attrition and d is the acceptable degree of error (in this case 0.5). In this study, the research team employed an assumption of a conservative estimate at 50 % of Reverend Sisters screened for breast cancer, with a 5% margin of error and 95% CI. This was augmented by the assumptions made in a similar study in Uganda by Atuhairwe *et al*., (2018).[13] Thus, the research team arrived at the sample size of 384 respondents.

Questionnaires and data analysis

Four research assistants were recruited to help with the data collection exercise. These were people who had prior experience with data collection. However, efforts were made to familiarize the research assistants

with the current study through training that was done for two days. The training was 5 hours per session and focused on information about assessing BCS, the methods of the study, the questionnaire, and interview skills. The proposed changes were shared until a common agreement was reached and there were no further proposed changes of differing interpretations among members of the research team. The questionnaire was designed in English and validated in a pilot study conducted on 30% of the sample at Buluba convent in Jinja Diocese, Mayuge District before being finally utilized. The interview lasted 15 to 20 minutes for each respondent to fill the questionnaire. The tool was constructed based on a similar study in Uganda.[13] The pilot study was conducted to examine the validity and reliability of the instrument prior to administration of the tool to respondents. Pretesting was carried out during the pilot study to evaluate the reliability and validity of the survey instruments prior to final data collection. The research team looked at the extent to which a questionnaire was understood by respondents to covey the meaning. In the process of conducting a pre-test, the team determined whether the questionnaire measured what it was designed to measure; where there was inconsistency or any other fault, it was addressed before final administration to the respondents. In the questionnaire, there were 5 socio-demographic questions, and 20 questions on the respondents' knowledge and practice of breast cancer screening. The knowledge and practice based questions were semi-structured so as to allow for more in-depth information from respondents. The questionnaires were self-administered. The data collected from respondents included age, education level, prior knowledge of breast cancer, different screening methods and knowledge of symptoms of breast cancer. In addition, respondents provided data on whether screening is helpful for women, whether Reverend Sisters need to screen, and whether they ever heard of self-breast examination and mammography.

Each questionnaire was checked on a daily basis for completeness. In advance of substantive data analysis, data checking algorithms (a number of systematic checks of data quality including inconsistencies, missing values, double data entry and identification of numbers for respondents) were used. As such, the logical checking technique involved compilation of these undertakings to provide summary indicators of data quality. Data entry and statistical analysis were performed using SPSS version 20. Descriptive statistics were used to describe the study frequency, percentage and mean for social demographic factors. Breast cancer awareness was defined as knowledge of the symptoms of breast cancer and was probed first with a close-ended question: "Do you know of any symptoms of breast cancer? The respondent answered the question with a 'yes' or a 'no'. Then if 'YES', the question was, "what are some of the symptoms of breast cancer you know or have heard of?" The respondents answered by filling in their responses.

In order to establish factors that equally predisposed breast cancer screening, a logistic regression model was fitted. The dependent variable was regressed with a set of independent variables including socio-demographic, knowledge and practice-based factors. The dependent variable was dichotomous and grouped as 1 (not screened for breast cancer) and 2 (screened for breast cancer). Bivariate logistic regression analysis was done to assess the determinants of breast cancer screening. To assess the adequacy of the model, factors at bivariate analysis that were assumed to be significant and expressed by Odds rations (OR) were considered for multivariate analysis. Statistical significance was set at $P<0.05$ for all analyses.

RESULTS

Socio-demographic characteristics

Only 310 Reverend Sisters participated in the study out of 384 who received questionnaires, with a response rate of 81%. The mean age of the respondents was 34.1 years. Overall, respondents who knew about the different screening methods were 25.8% [n=80]. The median (IQR) years spent in congregation of nuns were 5 (4-8) years (Table 1). The levels of education are differentiated and elaborated in Table 1. Education refers to academic awards offered ranging from the ordinary level school certificate (11 years) to a degree level.

Table 1. Reverend Sister's Socio-demographic characteristics

Breast cancer screening		
Characteristics	N	%
Age in years (n=310)		
18-27	104	33.5
28-35	110	35.5
36-45	59	19.0
>46	37	12.0
Mean age (34.1 years)		
Education level (n=308)		
Ordinary level (11 years of school)	17	5.5
Certificate	74	24.0
Diploma	124	40.3
Degree	93	30.2
Occupation (n=298)		
Teacher	137	46.0
Accountant	41	13.8
Farmer	29	9.7
Tailor	18	6.0
Business	13	4.4
Nurse	11	3.7
Secretary	11	3.7
Others	38	12.7
Congregation (n=309)		
IHMR – Gogonya	159	51.5
LSOSF	150	48.5
Years spent in Congregation	*5	**4-8

IHMR: Immaculate Heart Mary Reparatix; LSOSF: Little Sisters of St Francis

Knowledge of breast cancer

Table 2 reveals the knowledge-based factors associated with breast cancer screening among Reverend Sisters. The sisters who were more knowledgeable about breast cancer in general and warning signs were 71.9% [n=223], and 63.9 % [n=198], respectively. The study findings indicated that respondents received breast cancer information mainly from the Health Centers (52.3%) and television programs (33.3%).

Practices of reverend sisters for screening their breasts

The breast cancer screening includes clinical breast examination, doing mammography, breast self-examination and best time of breast self-examination. Table 2 shows the practices of Reverend Sisters regarding the screening of their breasts. Overall, a small number of participants said that they performed CBE (21 respondents, 6.7%) with a large proportion indicating that they practiced it out of curiosity (13 respondents, 62%). The others reported that the reasons for performing breast clinical examination were: having lump (19%), interest in screening (9.5%), general checkup and opportunity (4.8%). A total of 292 of respondents (96.4%) indicated that they had not done mammography. About 11 participants (3.6%) replied doing mammography. The rationale for the age grouping was based on country data grouping practices in the periodic National Censuses and Demographic Health Surveys. The age of respondents affected the use of mammography in the study population. The findings of this study indicate that for the age group 36-45 years, there were 35 Reverend Sisters above 40 years. Thus, the participants who were in the age of cancer screening using mammography (40+ years) were 72 (23%). However, out of 72 subjects only 11 used mammography which is still low.

Multivariate regression modelling

The factors found to be significantly associated with breast cancer screening after modelling in a logistic regression included: certificate level of education (P=0.04), having heard about breast cancer (P<0.0001); having heard about different screening methods (P=0.0001), knowing the symptoms of breast cancer (P<0.0001), the useful of screening for women (P=0.0001), a need for Reverend Sisters to screen (P=0.0005), having heard of self-breast examination (P<0.0001), and having heard of mammography (P<0.0001). Others factors such as age and education were not significantly associated with breast cancer screening among Reverend Sisters. Table 3 indicates the results that were found to be significantly associated with breast cancer screening.

Table 2. Knowledge and Practice-based factors associated with breast cancer screening

Variable	Frequency	Percent
Prevalence of breast cancer screening (n=141)		45.5
A. Knowledge-based factors		
Why REV sisters should screen (n=249)		
Avoid death	2	0.8
For awareness	75	30.1
Protection	20	8.0
Perceived susceptibility	152	61.1
Why clinical examination (n=21)		
General checkup	2	9.5
Had lump	4	19.0
Opportunity	2	9.5
Curiosity	13	62.0
B. Practice-based factors		
Perform self-breast examination (n=307)		
Yes	141	45.9
No	166	54.1
Best time for self-breast examination (n=149)		
After menstrual period	50	33.6
Afternoon	2	1.3
Bedtime	51	34.2
Morning	46	30.9
Where self-breast information is obtained (n=174)		
At workplace	5	2.9
Church	1	0.6
Health Centre	91	52.3
Newspapers	2	1.1
Nursing school	3	1.7
Radio	10	5.8
Television program	58	33.3
Training School	4	2.3
Done a screening mammography (n=303)		
Yes	11	3.6
No	292	96.4

REV= Reverend.

DISCUSSION

There is paucity of national data regarding breast cancer screening. This presents difficulty in comparing the statistics from this study against the general population of Uganda. Our findings showed that breast self-examination, clinical breast examination and mammography are prevalent among Ugandan Reverend Sisters.

Uganda, like many other developing countries, grapples with limited resources to set up routine screening programs. There is no national mammography screening program and many women cannot access the service due to its limited availability and costs despite its significance in breast cancer management.[22] In this study, low knowledge is regarded as a breast cancer risk factor among the study population, affecting cancer prevention and early detection efforts. The uptake of breast screening methods (clinical and mammography) are dependent on the established healthcare infrastructure (facilities, personnel and capacity to diagnose). For example, the country has only two mammography units.[23]

The rate of carrying out mammography as a main component of breast cancer screening was considered based on the Uganda Breast Cancer guidelines. In Uganda, mammography is recommended for the symptomatic women who are 40+ years old or are younger than 40 but over 25 years with risk factors for breast cancer.[23,24]

The percentage of Reverend Sisters in this study who performed BSE (45.9%) and mammography (3.6%) was higher than that in the previous Ugandan study done among women. Atuhairwe *et al.* (2018) reported that 35.2% and 2.4% of women in Kyadondo County performed BSE and mammography, respectively.[13] However, this is lower than what is reported in previous studies among women in West Africa at 58.87% (95% CI: 48.06, 69.27) and higher than East Africa at 32.18% (95% CI: 23.74,41.24).[13,19] The finding was lower than results from studies conducted in Kenya among women with higher percentages of the population practicing BSE (54.4%) and Nigerian women at 54.8 %.[25-26] This inconsistency can be attributed to the age difference of the study population. Curiosity was due to the belief that breast cancer screening is a good idea and early detection decreases mortality and saves lives. However, early detection and diagnosis only improve outcomes if they are linked to treatment. Though no previous study is in agreement with our findings that curiosity is the main reason for the clinical examination of the breast, several studies indicate that women with potential breast cancer symptoms usually self-present to health facilities for diagnosis. Hence, curiosity increases the quest for diagnosis through screening efforts.[27,28,29]

Prior to this study, the anecdotal evidence in Uganda showed that BSE is preferred at bed time given that the Ugandan economy is mainly dawn-to-dusk. In our study, the research team considered adherence to BSE practice. Indeed, the finding in this study shows that the best time for self-breast examination was bedtime (34.2%), after the menstrual period (33.6%) followed by morning time (30.9%), with the least favored being the afternoon (1.3%). This timing may be due to its coincidence with personal hygienic needs and break-offs from official working hours. In this study, the majority of the respondents (84%) expressed willingness to be screened for breast cancer because they perceived themselves to be at a higher risk (61.1%). However, only half of them (50.2%) had conducted breast screening. Evidence elsewhere shows mixed reactions to usefulness of BSE. The American Cancer Society points out that there is no evidence showing a decrease in death among women who do breast self-examinations.[30] However, breast self-examination could be useful in combination with other screening methods so as to increase the odds of early breast cancer detection. BSE is useful especially when used in combination with regular physical examinations by a doctor, mammography, and in some cases ultrasound and/or MRI. Breast self-examination is a convenient, no-cost tool that can be used on a regular basis and can be done at any age. Women routinely perform breast self-examinations as part of their overall breast cancer screening strategy especially in a limited resource setting.[31] The salient factor in Reverend Sisters' low frequency of breast screening performance may be related to the high level of breast screening barriers. Earlier studies of the factors that affect breast screening behavior have acknowledged these barriers: lack of information and awareness, fear of breast cancer diagnosis, lack of time and high costs incurred.[25,27-32] The overall rates of breast cancer screening were low. For example, respondents who did mammography had in 3.6% of cases and those who did clinical breast exams had cancer in 6.7% of cases compared to a recent study where the rates ranged from 20-38% and 100%, respectively.[29] There were diverse factors that played a notable role in influencing the general health conditions of Reverend Sisters diagnosed with breast cancer. In this study, after modelling for other potential confounders, the odds of education status at 0.2 (OR, 2.35, 0.63-8.81) and age at 0.1 (OR, 1.64, 0.9-2.96) were not significant predictors of breast screening performance. The findings were consistent with other studies carried out in Nigeria[33], Zimbabwe[34] and Germany.[35]

Table 3. Multivariate regression model of factors associated with Breast Cancer

Variable	No (%)	Yes (%)	OR (CI 95%)	P-value
Age in years				
18-27	62 (36.7)	42(29.7)	Ref	
28-35	50 (29.6)	60 (42.6)	1.77(1.02-3.04)	0.038
36-45	29 (17.2)	30 (21.3)	1.52 (0.80-2.90)	0.197
>45	28 (16.5)	9 (6.4)	0.47(0.20-1.10)	0.084
Education				
Ordinary level	7	10	Ref	
Certificate	50	24	0.33(0.11-0.99)	0.04
Diploma	80	44	0.38(0.36-1.08)	0.07
Degree	30	63	1.47(0.5-4.2)	0.47
Congregation				
IHMR Gogonya	78 (46.4)	81 (57.5)	Ref	
LSOSF	90 (53.6)	60 (42.5)	0.64(0.4-1.00)	0.054
Heard about breast cancer				
No	61 (36.8)	19 (13.5)	Ref	
Yes	105 (63.2)	122 (86.5)	3.73(2.09-6.64)	<0.0001*
Heard about different screening methods No	141 (88.7)	74 (53.6)	Ref	
Yes	18 (11.3)	64 (46.4)	6.77(3.74-12.26)	<0.0001*
Know symptoms of breast cancer				
No	84 (50.6)	27 (19.1)	Ref	
Yes	82 (49.4)	114 (80.9)	4.32 (2.57-7.26)	<0.0001*
Screening is helpful for women				
No	33 (20.7)	2 (1.4)	Ref	
Yes	126 (79.3)	138 (98.6)	18.07(4.24-76.85)	=0.0001*
Think Rev Sisters need to screen				
No	37 (22.3)	10 (7.1)	Ref	
Yes	129 (77.7)	130 (92.9)	3.72 (1.77-7.81)	=0.0005*
Heard of self-breast examination				
No	125 (76.2)	5 (3.6)	Ref	
Yes	39 (23.8)	136 (96.5)	87.17 (33.3-28.18)	<0.0001*
Heard of mammography				
No	159 (95.2)	89 (65.9)	Ref	
Yes	8 (4.8)	46 (34.1)	10.27(4.64-22.73)	<0.0001*

*Statistically significant at P≤0.05.
OR: Odds Ratio; Ref: Reference category; CI: Confidence Interval

But, they were not in agreement with the results of other studies that emphasized the relationship between the women's age, educational level and breast cancer screening.[36,37] Also, having heard about breast cancer was not a significant factor. However, the odds of belonging to LSOF congregation at 0.02 (OR 0.76 CI: 0.60-0.96) was a significant predictor of breast cancer screening. Other significant predictors of breast cancer screening were knowledge and practice-based factors such as having heard about different screening methods at 0.001(OR 1.53 CI: 1.18-1.98), the usefulness of screening for women 0.022 at (OR 9.83 CI: 1.39-69.60) and having heard of mammography at 0.001(OR 1.5 CI 1.18-1.91). These findings were in agreement with the results of previous studies of breast cancer screening done in Zimbabwe and Ethiopia.[38,39] The authors acknowledge that it would be useful to mention the percentage of participants who experienced at least one of screening tests. However, this information was not obtained during the design of the study.

Limitations

Several studies have revealed that increased breast cancer awareness may have contributed to the decrease in breast cancer mortality rates in a number of countries. [15,18,40] Consequently, participation of respondents in breast health awareness campaigns could have an impact on the level of knowledge on breast cancer screening. The authors acknowledge that the data collection was based on self-reporting of health behavior, so data might have been subjected to recall bias. However, this risk should be minimal given that the questions referred to health behavior within 12 months which defines a short time period. Also, the method used might be biased because the sample was based on a group of respondents that were similar in a particular way.

The increased margin of error is due to a small number of respondents who answered "Screening is helpful for women'', which is also a limitation to the study. Given that the study was a field-based survey, the findings depended entirely on the information given by the respondents. As such, the study did not have a confirmatory basis to validate the truth of their responses. Lastly, participation was voluntary, and it is assumed that Reverend Sisters who were more interested in breast cancer screening were the ones enrolled in the study. In essence, this might subject the study to bias.

Strength and weaknesses of the study

In regard to strengths, this study presents the first report for Breast Cancer Screening in Uganda among Reverend Sisters, and provides a scientific foundation for implementing more targeted campaigns of prevention and early detection of breast cancer in the Ugandan population and similar settings elsewhere. As for weaknesses, we did not focus on the timing of mammography among those with a history of using this service, family history of breast cancer, or whether the participants did any checkup or not. Hence, the timing of mammography and family history as determinants of the screening method could be potential research areas in upcoming studies.

CONCLUSION

The significant predictors of breast cancer screening were ordinary level of education (11 years of education), having heard about breast cancer, different screening methods, symptoms of breast cancer, the usefulness of screening for women, a need for sisters to screen, self-breast examination and mammography. Age and other levels of education were not significantly associated with breast cancer screening. In this study, the Reverend Sisters had low level of knowledge and a small fraction practiced breast cancer screening. Consequently, this demands a sustainable interventional strategy by the government of Uganda and her partners so as to provide breast health awareness campaigns and establishment of heath infrastructure related to precision oncology. This could possibly reduce the increased prevalence and improve early screening, diagnosis and effective treatment in Uganda and other similar settings. Driven by the contentious challenge of breast cancer screening across countries and special sub-populations, more studies to recognize the perceived barrier to breast cancer screening among Reverend Sisters or related population could be an objective for further research.

ETHICAL CONSIDERATIONS

This study was conducted in accordance with Declaration of Helsinki Ethical principles for medical research involving human subjects (as amended). Ethical approval was obtained from the Ethics Review Committee, Uganda Christian University Mukono, approval Number 20-02-600-00097. Further approval was obtained from the Superior General of the congregations in Kampala Archdiocese and Jinja Diocese of Tororo Archdiocese. Written informed consent was obtained from all respondents after thorough explanation about the study.

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