Breast cancer awareness and downstaging practices among adult women in the Gulu City Main Market, Northern Uganda: A cross-sectional study

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Research Article

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Abstract

Background: Breast cancer (BC) is one of the most common cancers that occur worldwide among women. There were more disability-adjusted life years (DALYs) lost to breast cancer among women worldwide than any other cancers, and DALYs occurred in women globally after puberty, with increasing rates later in life. Improvements in breast cancer survival began in the 1980s in countries where early detection programs combined with different modes of treatment to eradicate the invasive form of the disease were practiced. Recent data showed that there was a higher prevalence of breast cancer among women in Northern Uganda than among women in the rest of Uganda.

The objective of this study was to determine factors associated with breast cancer awareness, breast self-examination (BSE), clinical breast examination (CBE), and other modalities for screening and early breast cancer detection among adult women in the Gulu main market.

Methods: A cross-sectional study was conducted in the Gulu main market in 2020. A total of 98 adult women were recruited for the study by a random sampling method. The questionnaire had an internal validity of Cronbach's α=0.72. The study was approved by a local IRB. SPSS version 26.0 was used for data analysis, and a p-value less than 0.05 was considered significant.

Results: Most participants were 20-29 years 41(41.8%), married 44(44.9%), monthly incomes of >UGX1 million shillings 51(52.2%), Acholi 81(82.7%), Catholics 46(46.9%), vendors 75(76.5%), duration of work in the market (1-10 years) 64(65.4%), primary level of education 39(39.8%), and had 1-2 pregnancies 37(37.8%). The independent factors associated with breast cancer awareness, breast self-examination, and clinical breast examination were vendor (primary occupation) (β=-0.130, t=-2.979, p<0.004), duration of work in the market (1-10 years) (β=-0.186, t=-2.452, p<0.016), and higher level of education (β=-0.091, t=-2.506, p<0.014).

Conclusions: Breast cancer awareness and downstaging practices in adult women in the Gulu main market were thought-provoking. Women with better socioeconomic status (higher education, moderate work duration in the market and primarily vendors) in the Gulu main market were more likely aware and practiced breast cancer downstaging activities. There is a need to strengthen publicity on breast cancer-related knowledge for lower-income occupational groups and those with lower education levels to better understand the importance of conducting BSE, CBE, and mammography for early breast cancer detection.

Background

Breast cancer (BC) is one of the most common cancers that occur globally among women [1]. In 2020, 2.3 million women were diagnosed with breast cancer and 685 000 deaths worldwide [2]. As of 2020, there were 7.8 million female survivors of breast cancer in the last 5 years, making it the world's most prevalent cancer [2]. There are more disability-adjusted life years (DALYs) lost to breast cancer among women universally than any other cancer, and DALYs occur in women worldwide after puberty, with increasing rates later in life [2]. Statistics show that mortality rates to breast cancer have changed very

little from the 1930s to the 1970s [2]. Improvements in breast cancer survival began in the 1980s in countries where early detection programs combined with different modes of treatment to eradicate the invasive form of the disease were practiced [2].

According to a 2012 breast cancer statistic, 60% of breast cancer deaths occur in developing countries, representing 50% of cancer cases and 62% of all cancer deaths [2]. On the other hand, an estimated 249,260 new cases of breast cancer are diagnosed annually in the United States, but mortality from the disease is decreasing in developed countries, in contrast to statistics from developing countries [2].

According to the American Cancer Society (ACS) of 2012, breast cancer constituted 25% of all new cancer diagnoses in women globally, and nearly 1.7 million new cases were diagnosed worldwide [3]. Regrettably, most new breast cancer diagnoses and deaths occur in developing countries [3].

Additionally, the CDC report of 2018 showed that breast cancer was the most common cancer in women in the United States regardless of race or ethnicity, was the most common cause of cancer deaths among Hispanic women and was the second most common cause of cancer deaths among white, black, Asian/Pacific islanders and American Indians [2].

In Africa, breast cancer is responsible for 28% of all cancers and 20% of all cancer deaths in women [4]. A publication on barriers to early presentation and diagnosis of breast cancer among African women living in sub-Saharan Africa showed that it was the leading cause of cancer deaths among women [4]. In addition, delayed appearances and late diagnosis at health facilities were contributing factors to delayed breast cancer presentation and diagnosis among women in sub-Saharan Africa [4].

In Uganda, data from the Kampala Cancer Registry of 2014 showed that the incidence of breast cancer among women was 3.7% [5]. This implied that 4 in every 100 women were diagnosed with breast cancer every year in Uganda [5]. The fear of underreporting was confirmed in a New Vision newspaper publication of 2017 where an oncology specialist at Uganda Cancer Institute-Mulago Hospital suggested that the incidence of breast cancer could be much higher because only 20% of people with breast cancer seek treatment, and the remaining 80% do not seek medical help because they lack funds to undertake early screening and treatment even after feeling a lump in their breasts and very often resort to herbal treatment as remedies for their ailments [6].

Authors and scholars have suggested that the most practical solution to early breast cancer detection and prevention lies in increasing the awareness of women on the disease (breast cancer education) so that women can judge their risks and take relevant measures [7]. The three-pronged approach to early breast cancer detection suggested the following: a monthly breast self-examination (BSE), which should begin at the age of 18 years; clinical breast examination (CBE), which should be done annually beginning at 18 years; and breast ultrasound and mammography, which should be done routinely beginning at the age of 40 years [7, 8]. The World Health Organization (WHO) similarly recommends these approaches for breast cancer screening and early detection [2].

In Uganda, the Uganda Cancer Institute (UCI) is an institution dealing with cancers but overwhelmed with the treatment and palliative care of advanced cancer cases [7, 8, 9]. The institution has a very limited budget allocation from the government but primarily depends on donations for its operations [7, 8, 9]. To make matters worse, the routine health talks in health centers and hospitals in Uganda were more focused on infectious diseases such as HIV, TB, and malaria, neglecting cancers and other noninfectious diseases [7, 8, 9].

Although the month of October is dedicated to the breast cancer campaign whereby intensive efforts to disseminate information on breast cancer awareness, prevention, and early detection are promoted, not much is achieved by these interventions [6–9]. Reports show that these activities were limited only to urban centers, especially Kampala (the capital city of Uganda) [6–9]. The media of communication used (television, radio, and leaflets) for relaying health messages on breast cancer was not ideal for many Ugandan women due to low literacy levels and poverty issues. These programs do not reach most women who are in rural communities of Uganda and run for very short duration in October; thereafter, efforts on early breast cancer detection and prevention programs are completed for the year and only reappear a year later [6–9].

Authors have suggested that screening and early diagnosis of breast cancer are critical because survival after diagnosis and treatment are related to the stage of the cancer at diagnosis and treatment [9, 10]. They argued that the earlier the diagnosis of breast cancer, the better the possibility of survival and better the quality of life thereafter [9, 10]. In this approach, there is considerable potential to reduce mortality from breast cancer in Uganda through screening and early detection of breast cancer, increased awareness, improved detection practices and increased routine screening for the cancer [9, 10].

The current problem in Gulu City is the high prevalence of breast cancer in Northern Uganda; 41 cases were diagnosed in 2013-2014, representing 12.6% of all female cancers, which was higher than the national prevalence (2014) of breast cancer (3.7%) [10]. The level of awareness and risk factors for breast cancer in northern Uganda, similar to other parts of Uganda, was low, as shown by the low awareness level of 9% in a study carried out among nurses and midwives working in Mulago Hospital in 2009 [11].

Justification of this study: In Uganda, most cases of breast cancers are diagnosed in advanced stages, translating into high mortality rates (over 80%) and low survival rates (20% is the 5-year survival rate in Uganda). This was mainly due to a lack of awareness of the disease, which was highly preventable [12]. Therefore, increasing knowledge and awareness of the disease is the recommended primary prevention strategy [12]. Sadly, in routine health care service delivery, in both private and public institutions, health talks and health education on breast cancer are limited and not routinely conducted [12]. Increasing the level of awareness through routine health talks and the use of cheap public communication systems such as radios, televisions and brochures in different local languages could increase levels of awareness of the disease [12].

Authors have suggested that awareness of breast cancer could be focused on basic knowledge on early signs and symptoms of the disease, such as breast lumps and abnormal discharge from the breast [12].

At the primary health care level, the role of breast self-examination and basic knowledge on how to conduct a routine breast self-examination for women 18 years and above could have been the first emphasis [12]. Furthermore, women 18 years and above should have been given information on the role of breast self-examination, clinical breast examination, breast ultrasound and mammography, and their appropriate timing for early breast cancer detection [12].

In the current study, we found that most women with basic knowledge on early breast cancer detection and the extent to which early detection methods have been utilized in terms of timeliness were grossly lacking.

The objectives of this study were.

To assess the relationship between sociodemographic characteristics and awareness of breast cancer, breast self-examination, clinical breast examination and other modalities for screening and detecting breast cancer were performed among the study population.

To assess practices on early breast cancer detection modalities (breast self-examination, clinical breast examination and mammography) among the study population.

To determine the factors associated with breast cancer awareness, breast self-examination, clinical breast examination and other modalities for screening and detecting breast cancer among the study population.

Methods

Study design: This was a cross-sectional study conducted among adult women in the Gulu main market in 2020.

Study Site: This study was conducted at Gulu main market, located at the center of Gulu City in Northern Uganda. Gulu City, described as the economic capital of northern Uganda, is approximately 343 kilometers north of Kampala, the capital city of Uganda, with a population of 152,276, as of the 2014 national population census. The city is divided into four administrative divisions (Laroo, Bardege, Layibi, and Pece). The Gulu main market is located in the Laroo division and has a population of approximately 4,000 registered and nonregistered vendors. Approximately three-quarters of the vendors in the main market of Gulu City were women.

Study population: The study population was women aged 18 years and above conducting businesses in the Gulu main market and met the inclusion criteria for this study.

Selection criteria

Inclusion criteria: (i) Women aged 18 years and above, (ii) residents of Gulu City for at least 6 months prior to this study, (iii) informed consent to participate, and (iv) registered in the main Gulu market

Exclusion criteria: (i) Vendors with speech and hearing disabilities and (ii) lack of informed consent

Sample size determination: We determined the sample size for this study using Kish Leslie (1965)

$N=Z^2pq/d^2$

Where,

N= Sample size

Z= Confidence level at 95% (1.96)

p= prevalence of breast cancer awareness in Uganda (5.7%)

q= 1-p

d= degree of freedom

Using the prevalence of breast cancer in Uganda at 5.7% (Tove Ekdahl Hjelm *et al.*, 2019)

$N=z^2pq/d^2$

$N=1.96^2*0.057*0.943/0.05^2$

N=82.595

Accounting for 10% nonresponse, we added 8.2596 to the estimated sample size; therefore, the total sample size (N) = 91 participants

Sampling procedure: In this study, a simple random sampling method was used to recruit participants. The main market of Gulu City was compartmentalized into five sections based on the architectural structure of the building. In each section, 20 participants were randomly and consecutively selected until a total sample population of 98 participants was obtained from the market. A simple random sampling technique was used because it provided equal probability for choosing each participant. The intention for simple random sampling was to ensure that an unbiased sampled population was obtained to represent the total population. This unbiased sampled population was important for drawing logical conclusions on the research questions.

Data collection: Data for this study were collected using a pretested questionnaire designed by the research team to obtain information on breast cancer awareness, the use of breast self-examination (BSE), BSE practices, clinical breast examination (CBE), CBE practices and mammography for breast cancer screening and early detection among adult women in the main market of Gulu city in northern Uganda. A face-to-face questionnaire interview was conducted with participants (adult women) in the market.

The study instrument: We collected data for this study using a questionnaire (Supplementary file A1). The questionnaire was designed by the research team and had structured questions (SQs) and unstructured questions (UQs). There were questions on socio-demographic and personal characteristics of participants for example age, address, occupation, tribe, religion, marital status, number of pregnancies, monthly incomes, number of years worked in the market and highest level of education attained; awareness on breast cancer, knowledge, awareness on, and practices on Breast Self-Examination (BSE), Clinical Breast Examination (CBE) and use of mammography for screening and early breast cancer detection among participants in Gulu main market. The UQs provided the opportunity for participants to express their views on BSE, CBE, breast cancer and other modalities for screening, such as mammography.

Pretesting the questionnaire: The questionnaire was pretested among adult women in a smaller market in the Pece Division in Gulu City. The internal validity of the questionnaire was Cronbach's $\alpha = 0.72$.

After the pretest, the questionnaire was improved to help participants recall BSE, CBE, breast cancer awareness and utilization of mammography services. Spaces were added to consider other relevant information on services provided and those that were used by participants. To avoid any unnecessary semantics and misunderstandings, the questionnaire was written in simple English and translated to Acholi, the main regional language. The translation from English to Acholi was conducted by the research team in conjunction with trained interviewers and interpreters from the Department of Language at Gulu University. As part of the interviews, participants were asked open-ended questions to describe their knowledge, awareness, and practices on BSE, CBE, and utilization of a mammography for screening and early detection of breast cancer. In addition, participants were required to paraphrase the information to interviewers before entry into the questionnaire. Extra spaces were added to the questionnaire and used to record qualifying remarks from participants. This assisted interviewers considerably in providing additional information that was used in accurately filling and completing questionnaires.

Data collection procedures: Upon obtaining informed consent, face-to-face questionnaire interviews were conducted with participants within the Gulu main market (Supplementary file A1). The three researchers (coauthors) were trained on how to select, interview, and accurately record the responses of participants. This process was supervised by the corresponding author, who was the academic supervisor of the research team. Researchers (2 males and 1 female) were medical students of Gulu University in the final year and had gathered enough experience on breast cancer, BSE, CBE, and mammography during their bachelors' medical degree training. The research team visited the market, the site for data collection between 8:30 am and 5:30 pm on weekdays and between 9:00 pm and 2:00 pm on Saturdays. These hours were chosen because they were the most convenient time for participants to be interviewed. The average length for each interview was estimated to be between 50-60 minutes. Ultimately, most interviews were conducted in English, as most respondents could speak and understand English language well.

As guided by previous research experience and the additional workload of the research team, no more than three participants were interviewed per day. This process continued every weekday and Saturdays

until the total sample population was realized.

Variables: Variables assessed for this study were sociodemographic characteristics of participants (age, address, occupation, tribe, religion, marital status, number of pregnancies, monthly incomes, primary occupation, work duration in the Gulu market, and highest level of education attained), awareness of breast cancer, knowledge and awareness of breast self-examination (BSE), clinical breast examination (CBE) and use of mammography for breast cancer screening and early detection among participants in the Gulu market.

Data quality control and assurance: To obtain quality data, all researchers were trained on data collection and how to select and conduct face-to-face questionnaire interviews with research participants. Additionally, the questionnaire was pretested among adult women conducting vending businesses in a nearby market in the Pece Division in Gulu City. However, the results of the pretest were excluded from the main finding of this study. Nevertheless, adjustments were made after the pretest to modify questions in the questionnaire, ensuring that the required chronology and spaces for answers of participants were made. Finally, questions in the questionnaire were determined to have an internal validity of Cronbach's $\alpha = 0.72$.

Data analysis: Data were analyzed using the computer software program Statistical Package for Social Sciences (SPSS) version 26.0. Descriptive statistics are presented as frequencies, percentages, and tables. In this study, the primary unit of analysis was the participants' sociodemographic characteristics, knowledge, awareness, and practices on breast cancer, breast self-examination (BSE), clinical breast examination (CBE) and use of mammography for breast cancer screening and early detection among adult women in the Gulu main market.

Furthermore, bivariate analysis of variance (ANOVA) was conducted to determine relationships between independent and dependent variables. For bivariate analysis, the chi square test (χ^2) was used to determine associations between independent and dependent variables at 95% confidence intervals (95% CI), where a p-value less than 0.05 was considered statistically significant.

All variables at bivariate analysis with p-values less than or equal to 0.2 were entered into the ANOVA models to determine the independent factors associated with the dependent variable (awareness, knowledge and practices on BSE, CBE, mammography, and cancer of the breast) among participants. Confounding was checked by observing whether the addition of covariate(s) in the ANOVA models caused changes in adjusted R square and the standardized coefficient Beta (β) of the main exposure variables. Subsequently, sensitivity tests on ANOVA models were conducted by adding covariates and conducting backward and forward adjustments on the model until the adjusted R square and the standardized coefficient Beta remained stable. After this, values of the standardized coefficient beta (β), t-values and p-values (at 95% confidence interval) in the final model were considered the independent factors associated with awareness, knowledge and practices on BSE, CBE, mammography, and cancer of

the breast among adult women conducting businesses in the Gulu main market. A p-value less than 0.05 was considered statistically significant.

Ethical considerations: Ethical approval for the study was obtained from Gulu University, Faculty of Medicine Research and Ethics Committee (Gulu REC). Informed consent was obtained from each research participant. Additionally, confidentiality, respect, privacy, and high moral principles were observed with participants and their information during and after the study.

Results

The study achieved a questionnaire response rate of 98/91 (107.7%). Most participants were 20-29 years 41(41.8%), married 44(44.9%), monthly incomes of more than UGX1 million shillings 51(52.2%), Acholi 81(82.7%), Catholics 46(46.9%), vendors 75(76.5%), work duration in the market (1-10 years) 64(65.4%), primary level of education 39(39.8%) and had 1-2 pregnancies 37(37.8%) (Table 1).

In the descriptive statistics on downstaging practices on breast cancer among participants, 36 (36.7%) and 29 (29.6%) were aware of BSE and practiced BSE, respectively; 38 (38.8%) participated in clinical breast examination, and only 14 (14.3%) and 13 (13.3%) knew about mammography and the clinical importance of mammography in early breast cancer detection, respectively. Most participants had heard about breast cancer (90, 91.8%). The most common sources of breast cancer information were media (TVs, internet, social media) 110 (42.6%), friends and relatives 104 (40.3%), hospitals 37 (14.3%), books 1 (0.4%), lectures 2 (0.8%) and others 4 (1.6%) (Table 2).

In the bivariate analysis, the following factors were associated with knowledge on breast self-examination (BSE): highest level of education attained (χ^2 = 21.461, p=0.010); work duration at Gulu main market (χ^2 = 20.079, p=0.0000), vendor (primary occupation) (χ^2 = 20.330, p=0.002), monthly incomes >UGX1 million (χ^2 = 8.140, p=0.02), and married (marital status) (χ^2 = 11.643, p=0.020).

Regarding awareness of breast self-examination, the following were significantly associated: work duration in the Gulu main market (1-10 years) (χ^2 = 15.166, p=0.002), highest level of education attained (university graduates) (χ^2 = 26.262, p=0.0000), and vendor (as the primary occupation) (χ^2 = 17.577, p=0.007) (Table 3).

Table 4 shows the ANOVA tests on the importance of BSE on early breast cancer detection among participants. The independent determinants of BSE were vendor (as primary occupation) (β=-0.130, t=-2.979, p<0.004), work duration in the Gulu main market (1-10 years) (β=-0.186, t=-2.452, p<0.016), and highest level of education attained (university graduates) (β=-0.091, t=-2.506, p<0.014).

Table 5 shows the ANOVA tests on the BSE practices among participants. The independent determinants of BSE practices were vendor (as primary occupation) (β=-0.049, t=-1.989, p<0.050), work duration in the Gulu main market (1-10 years) (β=-0.223, t=-3.149, p<0.002), and highest level of education attained (university graduates) (β = 0.089, t=2.638, p<0.010).

Table 6 shows the ANOVA tests on awareness of participants on CBE. The test showed that the independent predictors of CBE awareness among participants were work duration in the Gulu main market (1-10 years) (β=-0.171, t=-2.166, p<0.033) and the highest level of education attained (university graduates) (β = 0.070, t=1.835, p<0.007).

Table 7 describes the ANOVA test on practices of participants on Clinical Breast Examination (CBE). The independent determinants of CBE practices were primary occupation (vendor) (β=-0.122, t=-2.747, p<0.007), work duration in the Gulu main market (1-10 years) (β=-0.180, t=-2.347, p<0.021), and highest level of education attained (university graduates) (β=-0.087, t=-2.347, p<0.021).

Table 8 shows the ANOVA tests on the usefulness of CBE in early breast cancer detection among participants. The independent determinants of CBE usefulness were primary occupation (vendor) (β=-0.122, t=-2.747, p<0.007), work duration in the Gulu main market (1-10 years) (β=-0.180, t=-2.347, p<0.021), and highest level of education attained (university graduates) (β=-0.087, t=-2.347, p<0.021).

There were no factors associated significantly with knowledge and awareness of the usefulness of mammography in early cancer detection among participants.

Table 1: Socio-demographic Characteristics of participants in the Gulu main market

Variables	Frequency	Percent (%)	Cumulative %
Ages (years)			
<20	6	6.1	6.1
20-29	41	41.8	47.9
30-39	29	29.6	77.5
40-49	9	9.2	86.7
≥ 50	13	13.3	100.0
Sub total	**98**	100.0	
Marital status			
Co-habiting	2	2.0	2.0
Married	44	44.9	46.9
Divorced/separated	12	12.2	59.1
Single/never married	23	23.5	82.6
Widowed	17	17.3	100.0
Subtotal	**98**	**100.0**	
Monthly incomes (UGX)			
<200,000/=	33	33.7	33.7
200,000-500,000/=	2	2.0	35.7
500,001-1,000,000/=	12	12.2	48.0
>1,000,000/=	51	52.0	100.0
Subtotal	**98**	**100.0**	
Tribes			
Acholi	81	82.7	82.7
Alur	3	3.1	85.8
Baganda	1	1.0	86.8
Banyankole	2	2.0	88.8
Banyoro	2	2.0	90.9
Lugbara	4	4.1	94.9

Table 1: Socio-demographic Characteristics of participants in the Gulu main market			
Bagishu	4	4.1	99.0
Sabini	1	1.0	100.0
Subtotal	98	100.0	
Religion			
Protestant	26	26.5	26.5
Catholic	46	46.9	73.4
Muslims	2	2.0	75.5
Pentecostals	24	24.5	100.0
Subtotal	98	100.0	
Primary Occupation			
Business	3	3.1	3.1
Students	4	4.1	7.2
Tailors	4	4.1	11.3
Teachers	4	4.1	15.3
Vendors	75	76.5	91.9
Others	8	8.2	100.0
Subtotal	98	100.0	
Work duration in Gulu main market (years)			
<1 year	15	15.3	15.3
1-10 years	64	65.3	80.6
11-20 years	11	11.2	91.8
21-40 years	8	8.2	100.0
Subtotal	98	100.0	
Highest level of education attained			
No formal education	3	3.1	3.1
Primary	39	39.8	42.9
Ordinary level	27	27.6	70.4
Advanced level	7	7.1	77.6

Table 1: Socio-demographic Characteristics of participants in the Gulu main market			
Other tertiary institutions	14	14.3	91.9
University	8	8.2	100.0
Subtotal	**98**	100.0	
Number of pregnancies			
0	18	18.4	18.4
1 to 2	37	37.8	56.2
3 to 4	20	20.4	76.6
5 to 6	15	15.3	91.9
≥ 7	8	8.2	100.0
Subtotal	**98**	100.0	

In Table 1, most participants were in the age group of 20-29 years 41(41.8%), married 44(44.9%), with monthly income >UGX 1million shillings 51(52.0%), Acholi 81(82.7%), Catholics 46(46.9%), vendors 75(76.5%), work duration in Gulu main market (1-10 years) 64(65.3%), primary level of education 39(39.8%), and had 1-2 pregnancies 37(37.8%).

Table 2
Downgrading activities on Breast Cancer (BSE, CBE, and Mammography) among participants

Variables	Yes (%)	No (%)
Knowledge on Breast Self-Examinations (BSE)		
Have you heard about Breast Self-Examination (BSE)?	36(36.7)	62(63.3)
Do you know that BSE is useful for early detection of cancer of the breast?	36(36.7)	62(63.3)
Have you been taught on how BSE is conducted?	22(22.4)	76(77.6)
Who taught you the BSE?		
Teachers	7(7.1)	
Health workers	10(10.1)	
Friends	2(2.0)	
Others	22(22.4)	
At what age should BSE Should be started?		
≥20 years	3(3.1)	
≥30 years	1(1.0)	
From Puberty	16(16.3)	
No idea	78(79.6)	
How often should BSE be conducted?		
Daily	4(4.1)	
Weekly	6(6.1)	
Monthly	9(9.2)	
No idea	79(80.6)	
When is the best period for conducting BSE?		
A week after menstrual period	3(3.1)	
During breast feeding	2(2.1)	
During menstrual flow	1(1.0)	
During pregnancy	2(2.1)	
No idea	90(91.7)	
Who should conduct for you BSE?		
Health worker	11(11.2)	

Variables	Yes (%)	No (%)
The individual	20(20.4)	
No idea	67(68.4)	
Do you practice Breast Self-Examination (BSE)?	**29(29.6)**	**69(70.4)**
How often do you practice BSE?		
Weekly	11(11.2)	
Monthly	4(4.1)	
Occasionally	7(7.1)	
Rarely	7(7.1)	
If you do not practice BSE, why not?		
I do not know how to perform it	29(29.6)	
I am too busy to perform it	39(39.8)	
I think it is unnecessary	30(30.6)	
When you did BSE, did you find any abnormality in your breasts?	69(70.4)	29(29.6)
Do you think BSE is a good practice?	31(31.6)	67(68.4)
Knowledge of Clinical Breast Examinations (CBE)		
Have you heard about Clinical Breast Examinations (CBE)?	**38(38.8)**	**60(61.2)**
Do you know that CBE is a useful tool for early detection of cancer of the breast?	38(38.8)	60(61.2)
Who do you think should conduct CBE?		
Health Practitioner	36(36.7)	
The Individual	1(1.0)	
Others	1(1.0)	
What tool should we use for conducting CBE?		
Ultrasound machine (USS)	59(60.2)	
Mammography	21(21.4)	
The hand	2(2.0)	
Others	16(16.3)	
How often should CBE be conducted?		

Variables	Yes (%)	No (%)
Daily	60(61.2)	
Weekly	6(6.1)	
Monthly	9(9.2)	
Yearly	2(2.0)	
When any abnormality is detected on BSE	12(12.2)	
I have no idea	9(9.2)	
Knowledge on the use of Mammography		
Have you ever heard about mammography?	14(14.3)	84(85.7)
Is mammography a useful tool in early breast cancer detection?	13(13.3)	85(86.8)
At what age should mammography be started on a person?		
After menopause	1(1.0)	
From 20 years	2(2.0)	
From 40 years	1(1.0)	
From Puberty	2(2.0)	
No idea	92(93.9)	
How often should mammography be conducted?		
Weekly	1(1.0)	
Monthly	2(2.0)	
Yearly	90(91.8)	
Every three years	3(3.1)	
When a lump is found on BSE	2(2.0)	
Have you ever conducted a mammography on your breasts?	0(0.0)	98(100.0)
What are the reasons why you have not done mammography?		
I am not old enough	82(83.7)	
Because of financial constraints	6(6.1)	
The mammography machines are not available	2(2.0)	
Others	8(8.2)	
Knowledge on breast cancer		

Variables	Yes (%)	No (%)
Have you ever heard about breast cancer?	90(91.8)	8(8.2)
Has any member of your family suffered from breast cancer?	15(15.3)	83(84.7)
Has any of your relative suffered from the breast cancer?		
Mother	3(3.1)	
Aunt	3(3.1)	
Sister	3(3.1)	
Cousin	2(2.0)	
Others	4(4.1)	
What is your source of information on breast cancer?		
Media (TV, internet, and social media)	110(42.6)	
Friends and Relatives	104(40.3)	
Hospitals	37(14.3)	
Books	1(0.4)	
Lectures	2(0.8)	
Others	4(1.6)	

Table 3
Socio-demographic characteristics with dependent variables (BSE, CBE, mammography, and breast cancer)

Variables	Chi Square	df	p-value
Knowledge on Breast Self-Examinations (BSE)			
Highest level of education attained	21.461	5	0.010
Work duration at Gulu main market (years)	20.079	3	0.000
Religion	1.106	3	0.776
Primary occupation (Vendor)	20.330	6	0.002
Monthly incomes	8.140	3	0.020
Marital status	11.643	4	0.020
Age-groups (years)	5.258	4	0.262
Awareness on BSE			
Monthly incomes	1.922	3	0.589
Duration of work in the main market (years)	15.166	3	0.002
Highest level of education attained	26.262	5	0.000
Primary occupation	17.577	6	0.007
Knowledge on CBE			
Primary occupation	14.912	6	0.021
Work duration at Gulu main market (years)	6.903	3	0.075
Number of pregnancies	1.610	4	0.807
Highest level of education attained	8.238	5	0.144
Awareness on CBE			
Work duration at Gulu main market (years)	6.903	3	0.075
Monthly incomes	4.564	3	0.207
Knowledge on usefulness of mammography			
Age-groups (years)	2.941	4	0.568
Marital status	5.790	4	0.215
Monthly incomes	5.790	4	0.215
Primary occupation	3.959	6	0.682

Variables	Chi Square	df	p-value
Work duration at Gulu main market (years)	3.091	4	0.543
Highest level of education attained	4.974	5	0.419
Knowledge on breast cancer			
Primary occupation	11.030	6	0.087
Highest level of education attained	5.578	5	0.349

Table 3 is a bivariate analysis that shows variables associated with breast cancer downstaging activities (on knowledge on BSE), highest level of education attained (university graduates) χ^2 = 21.461, p=0.010, work duration at Gulu main market (1-10 years) χ^2 = 20.079, p=0.0000, primary occupation(vendor) χ^2 = 20.330, p=0.002; monthly incomes >UGX1 million shillings χ^2 = 8.140; 0.020, and marital status (married) χ^2 = 11.643; p=0.020.

Awareness of BSE was significantly associated with the highest level of education (university graduates) (χ^2 = 26.262, p=0.0000), primary occupation (vendor) (χ^2 = 17.577, p=0.007) and work duration in the Gulu main market (1-10 years) (χ^2 = 15.166, p=0.002).

Knowledge of CBE was statistically and significantly associated with primary occupation (vendor) (χ^2 = 14.192, p=0.021). Regarding awareness of CBE, knowledge of the usefulness of mammography and knowledge of breast cancer, no factors were significantly associated with any sociodemographic characteristics.

Table 4
The ANOVA tests on the usefulness of BSE for early breast cancer detection

Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	
1	.440[a]	0.193	0.131	0.457	
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	4.497	7	0.642	3.081	0.006
Residual	18.768	90	0.209		
Total	23.265	97			
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
Model 1	B	Std. Error	Beta		
(Constant)	2.739	0.327		8.370	0.000
Age-group (years)	0.004	0.075	0.009	0.052	0.959
Monthly income	-0.013	0.026	-0.047	-0.478	0.634
Religion	-0.003	0.045	-0.006	-0.063	0.950
Primary occupation (vendor)	-0.130	0.044	-0.300	-2.979	**0.004**
Work duration in Gulu main market (1-10 years)	-0.186	0.076	-0.299	-2.452	**0.016**
How many pregnancies have you had?	0.059	0.065	0.145	0.914	0.363
Highest level of education (university graduates)	-0.091	0.036	-0.246	-2.506	**0.014**

Table 4 shows the independent determinants of the usefulness of BSE for early breast cancer detection: primary occupation (vendor) (β=-0.130, t=-2.979, p<0.004), work duration in the Gulu main market (1-10 years) (β=-0.186, t=-2.452, p<0.016), and highest level of education attained (university graduates) (β=-0.091, t=-2.506, p<0.014).

Table 5: The ANOVA tests on BSE practices among participants					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	
1	.479[a]	0.23	0.17	0.426	
Model 1	Sum of Squares	df	Mean Square	F	Sig.
Regression	4.872	7	0.696	3.838	0.001
Residual	16.322	90	0.181		
Total	21.194	97			
Model 1	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.564	0.305		5.126	0.000
Age-group (years)	0.085	0.07	0.204	1.212	0.229
Monthly income	-0.049	0.024	-0.191	-1.989	**0.050**
Religion	-0.015	0.042	-0.037	-0.367	0.714
Primary occupation	0.008	0.041	0.019	0.195	0.846
Work duration in Gulu main market (years)	-0.223	0.071	-0.375	-3.149	**0.002**
How many pregnancies have you had?	-0.071	0.061	-0.182	-1.178	0.242
Highest level of Education (university graduates)	0.089	0.034	0.253	2.638	**0.010**

Table 5 shows the independent determinants of BSE practices; primary occupation (vendor) (β=-0.049, t=-1.989, p<0.050), work duration in Gulu main market (1-10 years) (β=-0.223, t=-3.149, p<0.002), and highest level of education attained (university graduates) (β = 0.089, t=2.638, p<0.010) were statistically significant.

Table 6
The ANOVA tests on awareness of participants on CBE in early breast cancer detection

Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	
1	.367[a]	0.134	0.046	0.473	
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	3.061	9	0.34	1.518	.154[b]
Residual	19.714	88	0.224		
Total	22.776	97			
Coefficients					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	1.665	0.364		4.579	0.000
Age-group (years)	0.074	0.087	0.172	0.854	0.395
Marital status	0.002	0.047	0.005	0.047	0.963
Monthly income	-0.037	0.028	-0.141	-1.348	0.181
Tribe	-0.01	0.025	-0.042	-0.41	0.683
Religion	-0.008	0.047	-0.019	-0.176	0.860
Primary occupation (vendor)	-0.017	0.046	-0.039	-0.364	0.717
Work duration in Gulu main market (1-10 years)	-0.171	0.079	-0.278	-2.166	**0.033**
How many pregnancies have you had?	-0.057	0.073	-0.141	-0.789	0.432
Highest level of education (university graduates)	0.070	0.038	0.191	1.835	**0.007**

Table 6 shows the independent determinants of CBE awareness as work duration in the Gulu main market (**β**=-0.171, t=-2.166, p<0.033) and the highest level of education attained (university graduates) (**β** = 0.070, t=1.835, p<0.007).

Table 7
ANOVA test on practices of participants on Clinical Breast Examination (CBE)

Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	
1	.451[a]	0.204	0.122	0.459	
		ANOVA			
Model 1	Sum of Squares	df	Mean Square	F	Sig.
Regression	4.738	9	0.526	2.5	.014[b]
Residual	18.528	88	0.211		
Total	23.265	97			
	Unstandardized Coefficients		**Standardized Coefficients**	**t**	**Sig.**
	B	**Std. Error**	**Beta**		
(Constant)	2.676	0.353		7.59	0.000
Age-group (years)	-0.026	0.084	-0.059	-0.304	0.762
Marital status	0.021	0.046	0.052	0.459	0.647
Monthly income	-0.014	0.027	-0.051	-0.51	0.611
Tribe	-0.022	0.025	-0.09	-0.903	0.369
Religion	-0.003	0.046	-0.007	-0.071	0.943
Primary occupation (vendor)	-0.122	0.044	-0.282	-2.747	**0.007**
Work duration at Gulu main market (1-10 years)	-0.180	0.077	-0.288	-2.347	**0.021**
How many pregnancies have you had?	0.079	0.070	0.193	1.125	0.264
Highest level of Education attained (university graduates)	-0.087	0.037	-0.234	-2.347	**0.021**

Table 7 shows that the independent determinants of CBE practices were primary occupation (vendor) (β=-0.122, t=-2.747, p<0.007), work duration in the Gulu main market (β=-0.180, t=-2.347, p<0.021), and highest level of education attained (university graduates) (β=-0.087, t=-2.347, p<0.021).

Table 8
ANOVA on usefulness of CBE in early detection of Breast cancer

Model	**R**	**R Square**	**Adjusted R Square**	**Std. Error of the Estimate**	
1	.451[a]	0.204	0.122	0.459	
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	4.738	9	0.526	2.5	.014[b]
Residual	18.528	88	0.211		
Total	23.265	97			
Coefficients					
	Unstandardized Coefficients		Standardized Coefficients	t	Sig.
	B	Std. Error	Beta		
(Constant)	2.676	0.353		7.590	0.000
Age-groups (years)	-0.026	0.084	-0.059	-0.304	0.762
Marital status	0.021	0.046	0.052	0.459	0.647
Monthly income	-0.014	0.027	-0.051	-0.510	0.611
Tribe	-0.022	0.025	-0.090	-0.903	0.369
Religion	-0.003	0.046	-0.007	-0.071	0.943
Primary occupation (vendor)	-0.122	0.044	-0.282	-2.747	**0.007**
Work duration in Gulu main market (1-10 years)	-0.180	0.077	-0.288	-2.347	**0.021**
How many pregnancies have you had?	0.079	0.070	0.193	1.125	0.264
Highest level of Education attained (university graduates)	-0.087	0.037	-0.234	-2.347	**0.021**

Table 8 shows the independent determinants of CBE usefulness in early cancer detection: vendor (primary occupation) (β=-0.122, t=-2.747, p<0.007), work duration in the Gulu main market (1-10 years) (β=-0.180, t=-2.347, p<0.021), and highest level of education attained (university graduates) (β=-0.087, t=-2.347, p<0.021).

Discussions

The most significant findings from this study were that the independent factors associated with breast cancer awareness and downstaging practices among participants in the Gulu main market were the highest level of education attained (university graduates), work duration in the Gulu main market (1-10 years), and primary occupation (vendor) (Table 1, Table 2, Table 3). Participants with higher educational qualifications had worked in the Gulu main market for 1-10 years, where vendors were primarily more likely aware and practiced Breast Self-Examination (BSE) and Clinical Breast Examination (CBE) for screening and early breast cancer detection (Table 4, Table 5, Table 6, Table 7, Table 8).

Many studies have shown that breast cancer is a growing problem in sub-Saharan Africa and has the potential to overwhelm limited health care resources [13, 14, 15, 16, 17]. In Uganda in particular, breast cancer treatment was conducted at Ugandan Cancer Institute (UCI) gratis, but these efforts were frustrated by the late presentation of cases, as 75–90% of women received a diagnosis of locally advanced (stage III) or metastatic (stage IV) disease [18, 19]. For many reasons, the World Health Organization (WHO) has been leading efforts to reduce this avoidable late disease burden by 2025 in many African countries [20]. Because of these realities experienced in Uganda, authors have recommended efforts that focused on detecting breast cancer at an early stage (downstaging) by encouraging BSE, CBE, and mammography for screening and early breast cancer detection [21, 22, 23].

To address these challenges in northern Uganda, a survey among adult women in the Gulu main market was conducted to assess baseline downstaging practices and determine variations in sociodemographic characteristics with respect to breast self-examination (BSE), clinical breast examination (CBE), use of mammography for breast cancer screening and early cancer detection. The Gulu main market was chosen as the study site because it was a single unit where adult women congregated in sizeable numbers (over 4,000 vendors), organized, and registered with women movements in Northern Uganda. Organized women groups in Uganda most often support their members with appropriate health messages and train them on health matters, including breast cancer screening and early detection.

Disappointingly, we were stunned by the low level of awareness of BSE and CBE and the use of mammography as screening tools for early breast cancer detection among participants. Authors have questioned whether these participants were trained or were too busy to participate in trainings or participated in trainings organized by women movements in Northern Uganda but deliberately chose to ignore the advice on downstaging practices. In the case they ignored these trainings which were regularly organized by women movements in Northern Uganda, this would be a point of concern that should be addressed by the health authorities concerned because resistance to health information will likely have dire consequences on breast cancer situation among women in Northern Uganda in the years to come.

Sociodemographic characteristics and awareness of breast cancer downstaging practices

The authors found that although there was a high prevalence of breast cancer in Northern Uganda compared to the rest of the country [24, 25], the level of awareness and practices regarding downstaging

activities were low/limited. Most participants with the highest qualification (university degrees) had worked in the Gulu main market for 1-10 years, and vendors had statistically significant associations with downstaging awareness and practices (Table 1, Table 2, Table 3, Table 4, Table 5, Table 6, Table 7, Table 8). The current finding was supported by another study on breast cancer screening awareness, knowledge, and practices among women in the United Arab Emirates, where there was a lack of knowledge on breast cancer screening, 44.8% of participants had never done CBE, and 44.1% never had mammography and expressed a lack of knowledge on the existence of breast cancer screening techniques [26].

On mammography screening for early breast cancer detection, the current study found that 100% of participants had never undergone mammography despite some being in the age group for breast cancer screening using mammography (Table 3). Reasons cited for not undertaking mammography indicate lack of knowledge on its importance on breast cancer screening and early detection. In addition, unavailability of mammography machines and feeling that they were not old enough to undertake this investigation were cited among participants (Table 3).

Responses from participants and findings from the current study were not new in many African communities where a higher prevalence of breast cancer has been reported. This was similarly supported by the ABC-DO (Cohort African breast cancer disparities in outcomes) study in Zambia and Namibia, which found that approximately 15% of participants had not previously heard of breast cancer and 25-40% did not know it was curable [27], similar to another study in Uganda [28].

The success of early screening for breast cancer in Ugandan communities has been noted, particularly where awareness was lowest; for example, 1 in 4 women had no breast cancer awareness, and 2 in 3 had no knowledge of its cure potential [29]. This was equally observed in the current study, where only one-third of participants knew breast cancer downstaging practices (Table 2). This finding has consequences on how the Ugandan Ministry of Health could use this information to scale-up breast cancer awareness by engaging, sensitizing, and mobilizing women in different age groups on screening for early breast cancer detection.

Educational level and awareness of breast cancer downstaging practices

Our current study found that participants in the Gulu main market with a higher educational level practiced more breast cancer screening activities than those with lower educational levels. This was similarly observed in other studies [30, 31]. Many studies have shown that higher educational levels positively influence practices on breast self-examination (BSE) in women [30, 31, 32]. This encouraged authors to suggest that BSE ought to be taught to all women, regardless of their educational levels. In addition, the authors proposed that when teaching women on breast cancer (BC) and BSE, hospitals, physicians, and primary health care clinics should impart this information bearing in mind their educational levels [32]. In addition, they proposed a special consideration for participants when teaching women of lower educational standards in that more time and patience accorded to them so that they could learn and appreciate the importance of breast cancer downstaging practices [32]. On the other

hand, authors have encouraged university graduate women to allocate more time for breast health despite their exhaustive workloads [32].

Many studies have shown substantial evidence demonstrating that the socioeconomic status (SES) of patients with breast cancer significantly wedged prognosis because of the associated influence on cancer stage at diagnosis [33, 34, 35]. Previous findings suggested that people with lower incomes presented with late cancer stage at the point of diagnosis and had worse prognosis overall [33, 34, 35]. Socioeconomic status was equally and significantly associated with educational level and occupation, both of which greatly influenced patients' perception of breast cancer, thereby affecting the level of early detection, diagnosis, and treatment of the cancer [36, 37].

The authors found that many studies showed that the occurrence and development of breast cancer were closely related to the level of economic income [33, 34, 35, 38]. Higher income groups had a higher incidence of early breast cancer diagnosis and better prognosis [38]. In addition, income levels were closely related to occupation and education level [33, 38], and these were similarly observed in the current study.

These findings suggest that African governments could focus on characteristics of lower income, occupation, and lower educational achievement groups to develop more accurate and effective prevention and treatment strategies for breast cancer [39]. In an ABC-DO (Cohort Africa breast cancer disparities in outcomes) study, lower educational level, unskilled employment, low socioeconomic position, rural residence, being unmarried and, in some settings, HIV positivity were associated with lower breast cancer awareness [27]. These were similarly observed in the current study (Table 4, Table 5, Table 6, Table 7, and Table 8).

Furthermore, studies showed that unskilled employment was associated with not having heard of breast cancer (OR=3.37; 2.17-5.23), believing that it was incurable (OR=2.43; 1.81-3.26) and not recognizing a breast lump symptom (OR=1.85; 1.41-2.43). These findings provided evidence on the level and differences in breast cancer awareness and beliefs across different settings, highlighting the urgent need for context-specific educational programs in the sub-Saharan African region for women [29].

On the source of information and how breast cancer messages were delivered to participants in the current study, this was similar to a study on the effect of knowledge on uptake of breast cancer prevention modalities among women in Kyadondo county-Uganda, an empirical relationship between uptake of breast cancer prevention modalities and source of information, television, awareness on breast cancer, what reduced breast cancer acquisition, how to check for signs of breast cancer especially through breast self- examination and other methods of breast cancer diagnosis in health care set up were found wanting [40]. On this evident widespread lack and low level of awareness of breast cancer and downstaging practices in communities in Northern Uganda, the authors suggested a need for a boost in breast cancer information dissemination through community health education [40].

In summary, this study showed that occupation, work duration in the Gulu main market and higher educational level of participants significantly impacted breast cancer downstaging practices. Authors have suggested that many issues could be addressed by increasing regular breast cancer screening programs among individuals with lower-income occupations or lower educational levels by improving the coverage and penetration of screening for early detection rates among rural women. Second, there was a need to strengthen publicity on breast cancer-related knowledge for lower-income occupational groups or those with lower educational levels to make them better understand the importance of conducting BSE, CBE, and mammography.

The results from this study also suggested that changes regarding funding policy would be necessary to waive off or reimburse women in lower-income occupations or lower educational levels to ensure they would not encounter financial barriers that stop them from participating in early screening and detection of breast cancer in their communities.

Strength And Limitations Of This Study

This study was a cross-sectional study conducted among women in the Gulu main market. It has limitations based on the cross-sectional nature of the study design. A prospective cohort study would have produced much more powered results for the observations and outcomes we reported.

Second, monthly incomes recorded by participants were reported as average incomes and were not verified or confirmed by bank statements. These reported monthly incomes may not necessarily reflect the actual financial status of each vendor in the Gulu market but were used in calculations to determine their effects on the dependent variable (breast cancer downstaging activities). We mitigated income uncertainties by obtaining corroborative information from leaders of sectors in the market who knew what each registered member earned daily. We found that the information presented by vendors was consistent, comparable, and reliable.

Generalizability Of This Results

The information presented can be generalized to women in cosmopolitan urban centers and rural communities in Uganda. There is inadequate information on breast cancer downstaging practices among participants in this study population.

Conclusions

The most significant findings from this study were that downstaging activities among women in the Gulu market were statistically associated with higher educational level (university graduates), work duration in the Gulu main market (1-10 years) and vending as a primary occupation. Participants with higher educational qualifications had worked in the main market for 1-10 years and where primarily vendors by

occupation were more likely to be aware and practiced breast self-examination (BSE) and clinical breast examination (CBE) for screening and early detection of breast cancer than others.

Authors suggest a need for BSE to be taught to all women, regardless of their educational and income levels. In addition, when teaching women on breast cancer, CBE and BSE, hospitals, physicians, and primary health care clinics should impart this information bearing in mind the educational levels of the women they are dealing with. In addition, attention should be given to teaching and encouraging university graduate women to allocate more time for breast health activities despite their intensive workloads. Additionally, the health education for women without university education should focus on inculcating the correct perception on breast cancer risks in their communities.

Abbreviations

BSE
Breast Self-Examination
CBE
Clinical Breast Examination
BC
Breast Cancer
WHO
World Health Organization
ABC-DO
African breast cancer disparities in outcomes
ANOVA
Analysis of variance

Declarations

Ethical approval and consent to participate: This study was approved by Gulu University Review and Ethics Committee (GU REC). Informed consent was obtained from each participant for this study.

Consent for publication: All participants consented to the publication of this information.

Availability of data and materials: The minimal data that support this manuscript are available in the manuscript, and others can be accessed upon reasonable request to the corresponding author.

Competing Interests: All authors declare no conflicts of interest.

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Authors' contributions: JA, GN, SL and DLK participated in designing the study, DLK was responsible for field work supervision, and JA, GN, DLK and SL were responsible for data analysis, interpretation, writing and revision of the manuscript.

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