

Original Research Article

Demographic Profile of Suspected Female Breast Cancer Patients Seeking Ultrasound Services in Selected Public Hospitals in Lusaka District, Zambia

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Abstract: Background: Globally, breast cancer among females is the number one cause of morbidity at 11.6% and is the leading cause of mortality at 6.6%. In Zambia, it is the most common malignancy among women. However, the demographic characteristics of suspected breast cancer female patients accessing ultrasound breast cancer services in Zambia are still unclear. **Objective:** This study aimed to determine the demographic characteristics of suspected female breast cancer patients. The demographic characteristics may then be used by responsible authorities such as the Ministry of Health (MoH) in Zambia and aligned Non-governmental organisations (NGOs) such as the Zambia cancer association in concentrating their efforts to curtail the scourge. **Methods:** Systematic random sampling was used for the selection of participants in this study. The selected participant's demographic information was obtained from their medical records such as the medical files, Cancer Diseases Hospital (CDH) ultrasound register and University Teaching Hospital (UTH) histology registers. Further, the researcher personally interviewed the selected participants to obtain the demographic information required for the study. **Results:** The median age for the study participants was 43, with the interquartile range (IQR)=36-50. The median parity status was 3, with IQR=1-5. The majority of breast cancer patients were married (57) (55.9%) and employed (80) (78.4%). There was no significant difference in education level and classification of residence for study participants between participants with a histology-positive and histology-negative result, P greater than 0.05. **Conclusion:** This study has found evidence that the reproductive age group, low to no parity status, married marital status and employed employment status are associated with breast cancer. Education level and classification of residence did not show any association with breast cancer in this study.

Key words: Breast cancer patients, breast ultrasound, Ultrasound, Median, participants, breast.

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BACKGROUND

Mammography is the medical imaging gold standard investigation for breast cancer. In Zambia, mammography is not readily available due to a shortage of mammographic units, prolonged breakdowns of the few units in the country and a shortage of radiologists and mammographers (Bwanga *et al.*, 2020). This makes breast ultrasound the first medical imaging examination of choice in patients with suspected breast cancer. This is because ultrasound is readily available in most medical facilities, is less costly, and does not use ionising radiation (Bwalya *et al.*, 2021). Nevertheless, it

is user dependent. Lange (2012) defines breast ultrasound as the use of high-frequency ultrasound to examine breast tissue. The common reasons for referrals in the Zambian healthcare system include the identification and characterisation of clinical and mammographic findings, identification and characterisation of palpable abnormalities, guidance for procedures, and follow-up of a finding from a breast magnetic resonance imaging (MRI). Breast ultrasound is also especially useful in patients with dense breasts and patients in the reproductive age group where mammography is limited.

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The Zambian healthcare system is delivered at five levels: health posts, health centers, level 1 hospitals, level 2 hospitals, and level 3 hospitals. A consultative meeting on breast cancer control was held in 2017, by bringing together the country's main breast cancer stakeholders to identify opportunities and improve breast cancer control. This meeting culminated in the formulation of MoH national guidelines for early diagnosis of breast cancer in Zambia (2019) to focus on breast healthcare delivery by providing services toward the attainment of early breast cancer diagnosis through radiological services including ultrasound and mammography among others, to each healthcare level facility (Ministry of Health, 2019). Breast ultrasound being a specialised area is mostly offered at higher levels of the healthcare delivery system such as provincial and university teaching hospitals where radiologists and sonographers are available.

It should be mentioned that sonographers, radiologists and radiographers trained in breast ultrasound are scarce in Zambia, especially in lower-level health (Chibwasha, 2017). This may be attributed to the lack of adequate training institutions offering ultrasound in the country. A few sonographers competent in breast ultrasound were trained from outside the country. To overcome this problem, the Radiological Society of Zambia (RSZ) working in conjunction with MoH and Schools of Radiography pushed for the establishment of local ultrasound training courses. Three Higher Education Institutions (HEI) are offering ultrasound courses. At the time of writing this article, only Evelyn Hone College (EHC) had graduated sonographers since 2012. However, the level of competency in this diploma in ultrasound in performing breast ultrasound scans is limited. Last year, the University of Zambia (UNZA) and Lusaka Apex Medical University (LAMU) started running the first-ever sonography programmes for Master of Science (MSc) and Bachelor of Science (BSc) respectively, though yet to produce a graduate. The curricula for both training programmes include advanced breast ultrasound imaging at a specialized level. It is anticipated that these training programmes will produce more sonographers to perform breast ultrasound scans and achieve the MoH policy of bringing health services as close to the health posts and health centers.

The demographic characteristics of breast cancer female patients accessing ultrasound breast cancer services in Zambia are unclear. The exception is the age demographic (Songiso *et al.*, 2020). Even then, the demographic finding in the preceding study was only restricted to a single study site, that is, Matero General Hospital, which is not a national referral center. This may be explained by among other reasons the limited use of ultrasound in breast cancer diagnosis, inadequate studies on the topic and inadequate documented information, which includes published data. Further, the demographic characteristics of breast

cancer patients in the female population vary world-over. For instance, Olaogun *et al.*, (2017), Bekkali and Basu (2021), and Makanga *et al.*, (2013) found varying mean ages of 47.5, 49, and 50 years respectively for breast cancer patients in their studies. Similarly, regarding the demographic characteristic of Marital status, Martínez *et al.*, (2017) found married females to be the majority of breast cancer patients at 55% while Olaogun *et al.*, (2017) found married female patients to be the majority with an incidence of 78%. Though the findings show married females to be the majority in the preceding studies, a difference in the proportions is noted. If the demographics for suspected breast cancer patients were not identified in Zambia, resources meant for breast cancer programmes under the MoH and other stakeholders would be misapplied, and efforts meant to curb this scourge may yield little results.

This study identified the demographic characteristics of suspected female breast cancer patients which may then be used by responsible authorities such as MoH in Zambia and NGOs such as the Zambia Cancer Association (ZCA) in concentrating their efforts to curtail the scourge of the disease. To our knowledge, this is the first study to determine a comprehensive demographic profile of suspected female breast cancer patients in Zambia. The findings may also be used to contribute baseline evidence to aid policy formulation regarding breast cancer demographics in Zambia.

METHODS

Study Design

The study was quantitative, cross-sectional and prospective. A quantitative research design was suitable for this study to identify and qualify the demographic characteristics of suspected female breast cancer patients and produce objective data that can be clearly communicated through statistics (Hayre & Zheng, 2022). It was part of a larger research project titled "Utilising predominant breast ultrasound features of Zambian females in establishing a predictive model for improved diagnosis of breast cancer in Zambia".

Study Setting

The study was carried out in the Lusaka District of Zambia. It is situated in the south-central part of Zambia, is the most urban area and is Zambia's most populated province with an approximate population of 3,042,000 in 2022 (United Nations World Populations, 2022). However, it is the smallest province in the country. The specific study settings were the surgical breast clinics and ultrasound departments of CDH and Matero General Hospital of Lusaka. CDH is a level 3 health facility with a bed capacity of 252 and was chosen as a study site because it is the only dedicated cancer hospital in the country. Matero General Hospital is a level 1 health facility with a bed capacity of 135 and was chosen because it runs a well-established breast clinic. At the time of the study, CDH offered MRI, CT

and mammography services while Matero General Hospital only offered Conventional X-ray and ultrasound services. CDH had 16 radiology members of staff out of which, the facility did not have either a radiologist or a sonographer. Similarly, at Matero General Hospital, out of 11 radiology members of staff, the facility did not have any radiologist or sonographer.

Population and Sampling

Population

The total population stood at 972 patients (International Agency for Research on Cancer, 2020), while the total calculated sample size was 200. The Cochran formula (1977) was used to determine the sample size at a 5% level of significance.

Sampling

In order to select participants for inclusion in this study, systematic random sampling was used. The sampling interval was calculated by dividing the total patient population size by the calculated sample size. This resulted in a sampling interval of 4.86, rounded off to 5. The first participant was randomly chosen from between the first patient and the patient falling on the sampling interval of 5 in the patient queue. After choosing the first participant, the rest of the participants were chosen using a count interval of 5 until the sample size was met. These were patients that were prescribed histology and breast ultrasound examinations for suspected breast cancer. This sampling technique was applied to both study sites.

Data collection tools and procedures

Data collection tools

The researcher used the standard tools which were modified in line with the aim and objectives of the study to collect data. The checklists decrease the chances of error and objectively evaluates the characteristics of observations. The checklists used included the American College of Radiologists (ACR) BI-RADS Atlas fifth edition checklist (ACR, 2016). They were a hybrid of the optional type, the alternative type and the multiple choice type of checklists. The participant's demographic characteristics were collected from their medical records such as medical files, ultrasound and histology registers. The CDH ultrasound and UTH histology registers were particularly used. The demographic information was then recorded in the data collection tools. The information included age, parity status, marital status, education status, classification of residence and employment status of research participants.

Data collection procedures

Ultrasound departments were used to scan patients while surgical breast clinics were used to recruit patients into the study and access histology results. The ultrasound examination procedure was clearly explained to the patients and they were assured of confidentiality. Firstly, the researcher and his

assistants performed a breast ultrasound scan on the suspected breast cancer patients in the ultrasound department to obtain the ultrasound features. The histology results for the same patients were then obtained from the UTH histology laboratory or the histology report filed in the patient's medical file after they had done the histology examination. Further, the researcher personally interviewed the selected participants to obtain the demographic information required for the study. Data were collected from July 2021 to June 2022.

Data management and analysis

Data was transferred from the hardcopy collection tools, cleaned and stored in an excel sheet upon completion of data collection. It was backed up and protected with a password.

Statistical analyses were performed using Stata SE version 16. The Shapiro-Wilk test for normality of data was performed for continuous data. In this study, continuous data were not normally distributed and as such were presented as medians and IQR, while categorical data were presented as a percentage frequency distribution.

To assess if there was any significant difference between ultrasound features found in histology-confirmed breast cancer lesions and histology-confirmed non-breast cancer lesions, a multivariate analysis using Pearson's chi-square test, $p < 0.05$ was done. Tables were prepared using the Microsoft excel work package. A statistician was engaged to analyse the data.

Ethical Considerations

Approval to conduct the study was sought from Excellence in Research Ethics and Science (ERES) Converge [Ref. No. 2021-Jan-004], and National Health Research Authority (NHRA) [Ref No. NHRA0000I7 129 /0612021]. Authority was further obtained from the respective study sites. In addition to the above, the 4 fundamental principles of ethics were adhered to in this study. These included:

- a. Beneficence. The researcher and his assistants ensured the examinations conducted on the patients were also for the patients' benefit despite being used for research purposes.
- b. Non-maleficence. The researcher and his assistants ensured that no harm to the patient occurred during the breast ultrasound examinations.
- c. Autonomy. The researcher and his assistants ensured that the patients exercised their right of choice, either accepting to participate in the study or not.
- d. Informed Consent. The researcher ensured that the patients understood the procedure for participating in the study and voluntarily consented to take part.

RESULTS

Demographic characteristics of study participants

The demographic characteristics of study participants in the current study included participants'

age, parity status (number of children), marital status, education level, classification of residence and occupation. They are shown in the table below.

Demographic characteristics of study participants

Characteristic	Median	IQR
Age	37	28-46
Parity	2	1-4
	Category	Proportion (%)
Marital status	Married	86 (46.5)
	Single	99 (53.5)
	Total	185 (100)
Education level	Tertiary	51 (27.6)
	Secondary	92 (49.7)
	Primary/No formal education	42 (22.7)
	Total	185 (100)
Classification of residence	High	117 (63.2)
	Medium	40 (21.7)
	Low	28 (15.1)
	Total	185 (100)
Employment status	Employed	119 (64.3)
	Unemployed	66 (35.7)
	Total	185 (100)

The median age for the participants in this study was 37 with an IQR of 28 to 46. The median parity status was 2 with an IQR of 1 to 4. With regards to the marital status of the study participants, the majority were single (53.5%), while with regards to education level, the majority had attained secondary education (49.7%). The majority of the study participants resided in high residential areas (63.2%)

and were employed, either formally or informally (64.3%).

Demographic characteristics of histology-confirmed breast cancer lesions and histology-confirmed non-breast cancer lesions

The table below shows a comparison of demographic characteristics between histology-confirmed breast cancer and non-breast cancer participants.

Demographic characteristics of histology-confirmed breast cancer lesions and histology-confirmed non-breast cancer lesions

Characteristics		Confirmed-breast cancer patients	Confirmed-none breast cancer patients	P-Value
Age (in years), Median/IQR		43(36-50)	27(20-37)	<0.0001
Parity status		3(1-5)	1(0-2)	<0.0001
Marital status	Category	Proportion (%)	Proportion (%)	
	Married	57(55.9)	29(34.9)	0.005
	Single	45(44.1)	54(65.1)	
	Total	102(100)	83(100)	
Education level	Primary	28(27.5)	14(16.87)	0.23
	Secondary	48(47)	44(53.01)	
	Tertiary	26(25.5)	25(30.12)	
	Total	102(100)	83(100)	
Classification of Residence	Low	18(17.65)	10(12.05)	0.387
	Medium	19(18.63)	21(25.30)	
	High	65(63.72)	52(62.65)	
	Total	102	83(100)	
Employment status	Employed	80(78.4)	39(47)	<0.0001
	Unemployed	22(21.6)	44(53)	
	Total	102(100)	82(100)	

There was a significant difference in age between participants with a histology-positive and histology-negative breast cancer result, Median age/IQR=43years (36-50 years), and Median age/IQR=27years (20-37 years), $P<0.0001$. Most participants with histology-positive breast cancer results were older than those with histology-negative breast cancer results.

There was also a significant difference in parity status between participants with a histology-positive and histology-negative breast cancer result, Median parity status/IQR=3 children (1-5 children), and Median parity status/IQR=1 child (0-2 children), $P<0.0001$.

A significant difference was found in the marital status between participants with a histology-positive and histology-negative breast cancer result, $P=0.005$. The married participants with histology-confirmed breast cancer were more (55.9%) compared to the married histology-negative breast cancer participants (34.9%). The participants with single marital status and whose results were negative for breast cancer were the majority (65.1%) compared to participants with a single marital status whose results were positive for breast cancer (44.1%).

No significant differences in education levels of the study participants were found between participants with a histology positive and histology negative breast cancer result, $P>0.005$.

No significant difference in the residential status of study participants between participants with histology-positive and histology-negative breast cancer results, $P>0.005$. However, the histology-positive breast cancer participants were the majority.

A significant difference was found in the employment status between participants with a histology-positive and histology-negative breast cancer result, $P<0.0001$. The employed participants (formal or informal) with histology-confirmed breast cancer were more (78.4%) compared to the employed participants with histology-negative breast cancer results (47%).

DISCUSSION

Though breast cancer incidence is on the increase in Zambia, the demographics of female breast cancer patients accessing breast ultrasound services are still unclear. The current study identified demographics for female breast cancer patients where breast prevention and management programmes such as breast cancer sensitization should be more concentrated. Further, a policy may be formulated in respect of the identified demographics to avert the scourge of this disease.

Age of Female breast cancer patients

In this study, the median age for all participants with suspected breast cancer lesions was 37, IQR=28-46. There was a significant difference in median age between histology-confirmed breast cancer patients (Median age=43, IQR=36-50) and histology-confirmed non-breast cancer patients (Median age=27, IQR=20-37). The median age of the participants in this study is comparable to the median age of 47.5 years found in a study in Nigeria (Oluogun *et al.*, 2017). Again the median age of breast cancer found in this study was comparable to the median age of 50 years (Makanga *et al.*, 2013), 49 years (Bekkali and Basu, 2021) and 45.4 years (Hesahm *et al.*, 2010) for breast cancer patients found in studies in Kenya, Morocco and Multiple Arab Countries respectively. The findings in this study and the preceding studies from low-resource countries show median ages of breast cancer patients are much younger (below the age of 50 years) in contrast to the findings from high-resource countries such as the USA and Canada where the median ages for breast cancer are above 60 years (Coughlin *et al.*, 2015). This disparity could be attributed to differences in social environments (Coughlin *et al.*, 2015).

Parity Status

The median parity status for participants with suspected breast cancer lesions in this study was 2, IQR=1-4. There was a significant difference in median parity status between histology-confirmed breast cancer patients (Median parity status=3, IQR=1-5) and histology-confirmed non-breast cancer patients (Median parity status=1, IQR=0-2). The median parity status in this study for histology-confirmed breast cancer participants was comparable to the median parity status of 2 for breast cancer patients found in a study at Oulu University Hospital in Finland (Anniina *et al.*, 2020). The difference found in the median parity status between the current study and the preceding study was too small and thus negligible. A study in a Kenyan Urban Private Hospital found the highest proportion of breast cancer cases among participants with a parity status of 3 (Makanga *et al.*, 2013). Generally, the median parity status of the current study and the preceding studies showed fewer to no parity status to be the most commonly found marital status in female breast cancer patients.

Marital status

In the current study, the non-married participants were the majority (99) (53.5%) compared to the married participants (86) (46.5%). The non-married participants were a representation of participants who had never been married or were divorced or widowed. There was a significant difference in marital statuses between histology-confirmed breast cancer patients and histology-confirmed non-breast cancer patients. In this study, the majority of breast cancer patients were married (57) (55.9%). The finding of the married marital status as the

predominant marital status among breast cancer patients in this study was comparable to the married marital statuses of breast cancer patients of 55% (Martínez *et al.*, 2017), 59% (Zhai *et al.*, 2019) and 78% (Olaogun *et al.*, 2017) respectively. Li *et al.*, (2017) attributed the high frequency of married breast cancer patients to their likelihood of having a higher socioeconomic status, which may translate into better healthcare access and promote healthier lifestyle behaviours.

Education Status

The majority of participants in this study had attained secondary education level of 92 (49.7%). However, no significant difference was found in education status between participants with breast cancer histology-positive and histology-negative results. Though the findings of the current study did not show a significant difference between participants with breast cancer histology-positive and histology-negative results, some studies have associated education level with the presence or absence of breast cancer. For example, Liu *et al.*, (2017) in a study based on the SEER database found the majority of breast cancer patients had attained secondary education level (24.9%). Abdurrahman *et al.*, (2016) in a study in Nigeria found that tertiary education status was the most frequent in breast cancer female patients. Differences are seen in the findings of the current study and the preceding studies regarding participants' education level's association with breast cancer. The preceding studies however found adequate education as a facilitator to easy access to information about breast cancer and breast self-examination.

Classification of Residence

In the current study, the majority of participants resided in high-density areas (117) (63.2%). No significant difference was found in the classification of residence between participants with breast cancer histology-positive and histology-negative results. However, more participants with histology-positive breast cancer results resided in areas classified as high-density compared to areas classified as low or medium-density. High-density areas in Zambia have been defined as areas with more than 1500 residents per square kilometer whereas medium-density areas have been defined as areas located 2 kilometers or more from a high-density area and low-density areas as areas which are neither high-density nor medium-density areas (Sikanyiti, 2019).

Literature regarding the classification of residence for breast cancer patients is inadequate. However, studies appraised regarding the classification of the residence for breast cancer patients were comparable to the findings of this study. The high residential area status of most breast cancer patients in the current study was comparable to the underclass area status of most breast cancer patients found in a study in the USA by Janis Barry *et al.*, (2001). The underclass

area status is synonymous with the high residential area status. Another study in the United States of America (USA) found breast cancer to be more common in the lower socioeconomic status (Kenzik *et al.*, 2020) which is associated with higher-density populations. The findings of this study and preceding studies regarding the classification of residence of breast cancer patients attribute the high incidences of breast cancer in higher residential populations to a late-stage diagnosis of the disease, explained by inadequate access to health care by these populations.

Employment Status

The employed participants were the majority in this study (119) (64.3%). There was a significant difference in employment status between histology-confirmed breast cancer patients and histology-confirmed non-breast cancer patients. The majority of the histology-confirmed breast cancer participants in this study were employed (80) (78.4%).

The finding of the employed employment status being associated with breast cancer in the current study was comparable to the employed employment status found in other related studies. A study by Namushi (2019) at CDH, Lusaka, Zambia found 60 employed breast cancer patients compared to 50 unemployed breast cancer patients as the employment status. The current study's findings strengthen the preceding findings by Namushi since it is a multicenter study. On the global scene, a study in China found that 82% of breast cancer patients were employed (Liu *et al.*, 2017) while a study in Nigeria found 83% of breast cancer patients to be employed (Oluogun *et al.*, 2017). These preceding findings and findings of the current study regarding employed breast cancer patients being the majority of breast cancer patients may be attributed to easier access to healthcare facilities since employment status is closely related to income (Ehsan *et al.*, 2018).

CONCLUSION

This study found evidence that the reproductive age group, low to no parity status, married marital status and employed employment status are associated with breast cancer. Education level and classification of residence did not show any association with breast cancer in this study. The demographic characteristics information of female breast cancer patients accessing ultrasound breast cancer services in Zambia was still unclear. This study has therefore shown the demographic characteristics of suspected female breast cancer patients which may then be used by responsible authorities such as MoH in Zambia and aligned NGOs such as the Zambia cancer association in concentrating their efforts to curtail the scourge.

What is already known on this topic:

- Breast cancer is the most common malignancy among women in Zambia.
- The demographic information of breast cancer female patients accessing ultrasound breast cancer services in Zambia was unclear.
- The demographic characteristics of breast cancer patients in the female population vary world-over.

What this study adds:

- This study has shown the demographic characteristics of suspected female breast cancer patients which may be used by responsible authorities in Zambia such as MoH and aligned NGOs such as the Zambia cancer association in concentrating their efforts to curtail the scourge.
- MoH in Zambia and other relevant authorities may utilise the findings of this study to aid policy formulation regarding breast cancer demographics in Zambia.
- It adds information to the body of knowledge on demographic characteristics of female breast cancer patients.

Competing Interests: The authors declare that they have no competing interests.

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