NSC ursing

2025, Volume 1, Nr. 3 pp 44-63

Knowledge, perceptions and practices associated with timing for breast cancer screening among female students at the University of Zimbabwe: A cross-sectional study

Peter Chikuvadze[1], Grace Nkhoma[2], Maxwell Mhlanga[3*], Augustine Ndaimani[4]

[1,2] Department of Nursing Science, University of Zimbabwe, Harare, Zimbabwe

[3] Centre of Gender Equity, University of Global Health, Kigali, Rwanda

[4] Centre for Nursing and Midwifery, University of Global Health, Kigali, Rwanda

*_Corresponding Author_: Maxwell Mhlanga, Centre of Gender Equity, University of Global Health Equity, Kigali, Rwanda. E-mail: mmhlanga@ughe.org

Original article

DOI: 10.32549/OPI-NSC-116

Submitted: 14 November 2024

Revised: 23 January 2025

Accepted: 03 February 2025

Published online: 06 February 2025

ABSTRACT

Background: Breast cancer remains one of the leading causes of cancer-related mortality among women globally. Early detection through screening is crucial for improving outcomes. However, knowledge gaps, misconceptions, and poor practices around screening timing persist among young women. This study explores the knowledge, perceptions, and practices related to breast cancer screening among female students at the University of Zimbabwe. It aims to inform nursing practice by highlighting the critical role nurses play in addressing these gaps through education, awareness, and guidance on screening timing**.**

Methods: This analytical cross-sectional study employed random sampling to recruit participants at the University of Zimbabwe from March 4 to April 8. A structured questionnaire with three sections, consisting of closed-ended questions, was used to assess demographic characteristics, as well as knowledge, perceptions, and practices related to breast cancer screening. Data were analyzed using STATA 15, with descriptive statistics presented in tables and figures. Associations between variables were tested using Chi-square, Fisher's exact tests, and binary logistic regression.

Results: Of the 139 participants, 85% were aged 20-25, single, and undergraduates. Among all age groups, 54% did not perform breast self-examinations. Participants aged 36-40 had significantly higher odds of late screening (OR=17.8, p=0.014) and married participants also had higher odds of later screening (OR=4.42, p=0.009) compared to single participants. Participants who perceived that a healthy diet reduces breast cancer risk had lower odds of late screening (OR=0.32, p=0.021). Participants who knew the recommended age of Breast Self-Examination had higher odds of late screening (OR=2.5, p=0.027). Participants with religious and cultural beliefs influencing their decision-making were significantly more likely to present late (OR = 3.21, p = 0.030).

Conclusion: Socio-demographic factors and health-seeking behaviors significantly influenced breast cancer screening timing. Nurses are pivotal in promoting early screening through tailored

health promotion strategies, including raising awareness, addressing misconceptions, and encouraging self-examination practices.

Keywords: Breast cancer, screening, Breast self-examination, Knowledge, Perceptions, Nursing.

INTRODUCTION

Globally, breast cancer remains a significant public health concern as the most prevalent cancer and a leading cause of cancer-related deaths [1]. While incidence rates are higher in developed countries, mortality rates are disproportionately higher in developing countries due to delayed diagnosis and limited access to healthcare services [1, 2]. Early detection through regular screening significantly improves survival rates, making it a critical component of cancer control strategies [3]. Sub-Saharan Africa is experiencing a growing burden of non-communicable diseases, including cancer.

In Zimbabwe, breast cancer ranks among the most common cancers, second only to cervical cancer in mortality rates [4]. Late-stage presentation is prevalent, with over one in four cancers diagnosed among Zimbabwean women being breast cancer [5]. Contributing factors include limited access to diagnostic equipment, low awareness levels, and sociocultural barriers [6]. Additionally, most patients rely on underfunded public health services, which are often inaccessible and expensive, further exacerbating late detection [7].

The onset of breast cancer in Zimbabwe occurs as early as 18 years of age, with incidence increasing significantly among women aged 40 years and older [8]. Despite recommendations for routine screening, including mammography and clinical breast examinations, many women only seek care at advanced stages of the disease [5]. Breast self-examination (BSE) is often the most accessible screening method in low-resource settings, where diagnostic services like mammography are scarce [9]. However, adherence to regular BSE practices is low due to limited knowledge, misconceptions, and cultural influences [10]. Nurses play a unique role in alerting the community to early breast cancer diagnosis, as they typically have the closest contact with female patients [11]. Nurses can use their knowledge of health services to educate women about breast cancer risk factors and available breast cancer screening services and practices [12].

University students represent a unique population within the broader breast cancer risk group, as

they often encounter specific challenges such as lack of awareness, limited healthcare access, and sociocultural factors that may delay early screening [13]. Understanding the knowledge, perceptions, and practices of young women in higher education settings regarding breast cancer screening is crucial for designing targeted interventions.

This study measured the individual knowledge, perceptions, and practices related to breast cancer screening timing among female students at the University of Zimbabwe.

MATERIALS and METHODS

Study Design

This was an analytical cross-sectional study conducted between March 4 and April 8, 2024, in Harare, Zimbabwe.

Study Setting

The study was conducted at the University of Zimbabwe, located in the capital city, Harare, within Harare Metropolitan Province. Harare is Zimbabwe's economic, political, and cultural hub, with a population exceeding two million people. The University, the oldest and largest institution of higher learning in the country, serves a diverse student population from various socio-economic backgrounds. Female students constitute a significant portion of the student body, offering a valuable demographic for studying breast cancer screening knowledge, perceptions, and practices.

Study Population

All female students enrolled at the University of Zimbabwe aged between 20 and 45 years, with good knowledge of the English language and who agreed to participate in the study were included in the study. All students who had completed their education, were <20 years or >45 years old or did not speak English were excluded. Before the start of the study, the students who agreed to

participate were explained the purpose of the study and were asked to sign the informed consent.

Sample Size Determination

A minimum sample size of 126 participants was calculated using Cochran's formula for cross-sectional studies:

$$n = Z_{\alpha}^{2} \frac{\pi(1-\pi)}{e^{2}} = (1.96)^{2} \frac{0.09(1-0.09)}{0.05^{2}} = 125.9 \cong 126$$

where:

- Z is the Z-value for a 95% confidence level (1.96),
- π is the estimated proportion of unawareness of breast self-examination (9%, or 0.09, as reported by Kinteh et al. in 2023 [14]),
- e is the margin of error (5%, or 0.05).

Recruitment Process

Participants were recruited through simple random sampling. Eligible students randomly selected either a "Yes" or "No" card from a container. Those who picked "Yes" cards were enrolled in the study until the required sample size was reached.

Measurement

A single structured questionnaire was used to collect data on factors associated with late presentation for breast cancer screening. The questionnaire comprised three sections. The first section captured participant characteristics, including age, religion, place of residence, and socio-economic background. The section on knowledge and practices assessed participants' knowledge of breast cancer signs and symptoms, the recommended age for breast self-examination (BSE), and proper BSE techniques. It included eight items scored using a Likert scale. The last section

examined factors affecting screening behaviors, such as cultural beliefs, financial constraints, healthcare access, and personal perceptions. The section comprised seven items with responses on a Likert scale.

This tool was closed-ended structured questionnaire that was adapted from three previous studies [15-17]. To ensure clarity, relevance, and validity, the instrument was pre-tested with 16 female students at the University of Zimbabwe who shared characteristics with the target population. Feedback from the pilot study informed minor revisions to improve clarity.

The internal consistency of the tool was evaluated using Cronbach's alpha, which yielded a reliability coefficient of 0.74, indicating acceptable reliability [18].

Data Collection

Data were collected over 28 weekdays during the study period. Participants completed a self-administered online structured questionnaire. Trained research assistants were available to address any technical difficulties or questions related to the survey.

Ethical Considerations

The study received ethical approval from the Joint Research Ethics Committee of Parirenyatwa Group of Hospitals and the University of Zimbabwe Faculty of Medicine and Health Sciences (JREC Ref 247/2024). Written informed consent was obtained from all participants before enrollment. Confidentiality was maintained by anonymizing participant data, and access was restricted to authorized researchers.

Data Analysis

Data were entered into STATA version 15 for analysis. Descriptive statistics summarized the characteristics of the study population, presented in tables. The chi-square test or Fisher's exact test,

where appropriate, was used to determine associations between categorical variables. Bivariate logistic regression identified predictors of late breast cancer screening, reporting odds ratios (OR), 95% confidence intervals (CI), and p-values. All tests were two-sided, and considered significant if p-value (*p*) was less than 0.05.

RESULTS

Socio-demographic characteristics of participants and timing for breast cancer screening

Among the 139 participants, the majority (85%) were aged 20–25 years, 4% were aged 26–30 years, 5% were aged 31–35 years, 3% were aged 36–40 years, and 4% were aged 41–45 years. Late presentation for screening was more prevalent among participants aged 36–40 years and age was significantly associated with late presentation timing (p = 0.001) (Table 1).

Most participants were single (84%), followed by married participants (12%), divorced (3%), and widowed (1%). Single participants had the highest proportion of early screenings, whereas 41.2% of married individuals presented late for screening. Marital status was significantly associated with screening timing (p = 0.006) (Table 1).

Pentecostal participants formed the largest religious group (53%), followed by Apostolics and those with no religion (13% each), Protestants (12%), adherents of traditional religion (7%), and finally, Muslims (1%). Late presentation was most pronounced among participants practicing traditional religion and Protestantism, although there was no significant association between religion and late screening (Table 1).

The majority of participants were undergraduates (93%), followed by master's students (7%). Late screening was more prevalent among master's students. However, no significant association was found between the level of study and the timing of screening. The majority of participants resided off-campus (81%), and 17.7% of this group presented late, compared to 19.2% of those residing on campus. However, there was no significant association between place of residence and timing for

screening (Table 1).

Variable	Category	"Presented late" (No)	"Presented late" (Yes)	Total n (%)	p-value (test)
Age	20-25	101	17	118 (84.9%)	0.001* (F)
	26-30	3	2	5 (3.6%)	
	31-35	6	1	7 (5.0%)	
	36-40	1	3	4 (2.9%)	
	41- 45	3	2	5 (3.6%)	
Marital status	Married	10	7	17 (12.2%)	0.006* (F)
	Single	101	16	117 (84.2%)	
	Widowed	0	1	1 (0.7%)	
	Divorced	3	1	4 (2.9%)	
Religion	Pentecostal	63	10	73 (52.5%)	0.48 (F)
	Protestant	12	5	17 (12.2%)	
	Islam	2	0	2 (1.4%)	
	Traditional	6	3	9 (6.5%)	
	Apostolic	15	4	19 (13.4%)	
	None	16	3	19 (13.4%)	
Level of study	Undergraduate	108	21	129 (92.8%)	0.08 (F)
	Masters	6	4	10 (7.2%)	
Resident on campus	No	93	20	113 (81.2%)	0.78 (F)
	Yes	21	5	26 (18.8%)	
*=Significant, F= Fisher's exact test					

Table 1. *Socio-demographic characteristics of the study participants (n=139)*

Knowledge of breast cancer and timing late for breast cancer screening

Only knowledge on the recommended age to start BSE (p = 0.027), was associated with timing for breast cancer screening (Table 2).

Variable	Category	"Presented late" (No)	"Presented late" (Yes)	Total n (%)	p-value (test)
Perceived knowledge on breast cancer	Poor	21	3	24(17.3%)	0.76 (F)
	Fair	72	14	86(61.9%)	
	Good	18	7	25(18.0%)	
	Excellent	3	1	4(2.9%)	
	Total	114	25	139(100.0%)	
Educated on breast cancer	No	42	6	48(34.5%)	0.32 (C)
	Yes	72	19	91(65.5%)	
	Total	114	25	139(100.0%	
Knowledge of	Low	27	5	32(23.0%)	0.89 (C)

signs and symptoms					
	High	87	20	107(77.0%)	
	Total	114	25	139(100.0%)	
BSE	Regularly	13	4	17(12.2%)	0.76 (F)
	Occasionally	31	14	45(32.4%)	
	No	70	7	77(55.4%)	
	T**otal**	114	25	139(100.0%)	
Knowledge of recommended age to start BSE	No	87	13	100(71.9%)	0.027* (C)
	Yes	27	12	39(28.1%)	
	Total	114	25	139(100.0%)	
Knowledge on how to perform BSE	No	89	15	104(74.8%)	0.10 (C)
	Yes	25	10	35(25.2%)	
	Total	114	25	139(100.0%)	
*=Significant, C= Chi square test F= Fisher's exact test					

Table 2. *Knowledge of breast cancer and timing for breast cancer screening*

Perceptions, other risk factors and late screening breast cancer

Significant associations were found between late screening and the perception that a healthy diet reduces breast cancer risk (p = 0.011), with those who believed this being less likely to present late. Similarly, those who did not perceive Breast Self-Exams (BSE) as uncomfortable were also less likely to present late (p = 0.019). Religious and cultural beliefs were significantly associated with late presentation (p = 0.014). Overall, perceptions and beliefs played a crucial role in the timing of screening (Table 3).

Variable	Category	"Presented late" (No)	"Presented late" (Yes)	Total n (%)	p-value (test)
Perception that health diet reduces risk of Breast cancer	No	26	12	38(27.3%)	0.011* (C)
	Yes	88	13	101(72.7%)	
	Total	114	25	139(100.0%)	
Perception that BSE is uncomfortable	No	61	5	66(88.0%)	0.019* (F)
	Yes	6	3	9(12.0%)	
	Total	67	8	75(100.0%)	
Family history of breast cancer	No	96	17	113(81.3%)	0.06 (C)

	Yes	18	8	26(18.7%)	
	Total	114	25	139(100.0%)	
Religious and cultural beliefs	No	97	16	113(81.3%)	0.014* (C)
	Yes	17	9	26(18.7%)	
	Total	114	25	139(100.0%)	
Fear of stigma	No	108	21	129(92.8%)	0.06 (C)
	Yes	6	4	10(7.2%)	
	Total	114	25	139(100.0%)	
*=Significant, C= Chi square test F= Fisher's exact test					

Table 3. *Perceptions, other risk factors and timing for breast cancer screening*

Factors associated with late presentation of breast with breast cancer

Women aged 36–40 years had significantly higher odds of late breast cancer screening compared to those aged 20–25 years (OR=17.82, 95% CI: [1.75–181.61], p=0.014). Married individuals were significantly more likely to present late for screening (OR = 4.42, 95% CI: [1.46–13.40], p = 0.009*). Participants who knew the recommended age for BSE had significantly higher odds of late screening (Crude OR = 2.15, 95% CI: [1.11–4.14], p = 0.027), suggesting that knowledge alone may not translate into timely screening behavior (Table 4).

Those perceiving a healthy diet as reducing breast cancer risk had significantly lower odds of late screening (OR = 0.32, 95% CI: [0.13–0.79], p = 0.021), highlighting a protective association. Participants who found BSE uncomfortable had higher odds of presenting late for screening (OR = 6.10, 95% CI: [1.16–32.05], p = 0.076), though the association was not statistically significant. Participants with religious and cultural beliefs influencing their decision-making were significantly more likely to present late (OR = 3.21, 95% CI: [1.22–8.43], p = 0.030).

In summary, significant factors for late breast cancer screening include age, marital status, perceptions about health and BSE, and religious or cultural beliefs, highlighting the complex interplay of demographic and psychosocial factors in screening behavior.

Variable	Presented Late (Yes)	Presented Late (No)	Crude Odds Ratio	95% Confidence Interval	P-value (test)
Age					
20-25	17	101	1.00 (ref)	-	-
26-30	2	3	3.96	[0.62 - 25.10]	0.14
31-35	1	6	0.99	[0.11- 8.961]	0.99
36-40	3	1	17.82	[1.75-181.61]	0.014*
41-45	2	3	3.96	[0.62 - 25.10]	0.14
Marital status					
Single	16	101	1.00 (ref)	-	-
Married	7	10	4.42	[1.46 - 13.40]	0.009*
Widowed	1	0	-	-	-
Divorced	1	3	2.11	[0.20 - 21.98]	0.53
Knowledge of recommended age for BSE					
No	13	87	1.00 (ref)	-	-
Yes	12	27	2.15	[1.11- 4.14]	0.027*
Perception that healthy diet reduces Breast cancer					
No	26	12	1.00 (ref)	-	-
Yes	18	13	0.32	[0.13 - 0.79]	0.021*
Perception that BSE is uncomfortable					
No	61	5	1.00 (ref)	-	-
Yes	6	3	6.10	[1.16 - 32.05]	0.08
Religious and cultural belief					
No	16	97	1.00 (ref)	-	-
Yes	9	17	3.21	[1.22 – 8.43]	0.030*

Table 4. *Factors associated with late screening for breast cancer (n=139)*

DISCUSSION

This study investigated factors associated with late presentation for breast cancer screening among female students at the University of Zimbabwe.

Age was significantly associated with delayed screening, with women aged 36–40 years showing higher odds of late presentation compared to those aged 20–25 years. Similar trends have been observed in Ghana, where younger women were more likely to attend routine screenings due to targeted health promotion campaigns [19]. In contrast, older women in South Africa exhibited misconceptions about breast cancer, perceiving it as a disease primarily affecting younger populations [19]. However, studies by Moodley et al. indicate that younger women may also delay screening due to fear of diagnosis and limited awareness [20, 21]. These variations suggest that access to health information and sociocultural norms play a pivotal role in shaping health-seeking

behavior across age groups.

Married women were more likely to delay screening, consistent with findings in Nigeria, where familial responsibilities and reliance on spouses for financial decisions contributed to delays [22]. Conversely, single women in Kenya demonstrated higher screening uptake, likely due to greater autonomy in decision-making [23]. Cultural expectations and economic dependence within marriage may similarly hinder timely health-seeking behaviors among married women in Zimbabwe.

Surprisingly, knowledge of the recommended age for breast self-examination (BSE) was associated with late screening in this study. This finding diverges from evidence in Tanzania, where knowledge of BSE facilitated earlier screening [24]. In Ethiopia, however, limited awareness led to symptom misinterpretation and delayed care [25]. These discrepancies highlight the complexity of translating knowledge into action, suggesting that barriers such as stigma, fear, or healthcare access may undermine the benefits of awareness.

Perceptions about diet and cancer prevention were linked to lower odds of late screening, aligning with findings from Egypt, where women with dietary knowledge were more proactive in seeking screening [26]. These results underscore the importance of lifestyle education in encouraging early detection behaviors [27].

Cultural and religious beliefs were also significant barriers to timely screening. In Uganda, reliance on spiritual healing delayed early detection [28]. Similarly, some religious practices in Zimbabwe emphasize prayer over medical interventions [29]. Such beliefs strongly influence healthcare decisions, as observed in other studies [30, 31]. Addressing these barriers through community engagement and collaboration with faith leaders could improve screening uptake.

Overall, this study highlights the multifaceted factors influencing late presentation for breast cancer screening among female students in Zimbabwe. Targeted interventions addressing sociocultural, informational, and lifestyle barriers are critical for promoting early detection practices.

Implications

The finding that 18% of participants presented late for breast cancer screening, with only 54% performing BSE, is concerning. There is a need to intensify nursing-led social behavior change approaches that use differentiated methods to promote sexual and reproductive health services in tertiary institutions. Early screening initiatives for reproductive cancers should be prioritized.

Targeted screening and awareness campaigns for female students aged 36-40 years should be implemented, alongside promotion of regular BSE as key nursing interventions. Tailored educational materials and support groups for single students can raise awareness about the importance of early detection. This is where community nursing and nursing outreach programs play a vital role in health promotion and social behaviour change communication. Nursing outreach programs targeting tertiary institutions in Zimbabwe should integrate comprehensive education on BSE techniques, the importance of regular screenings, and the benefits of early detection. Collaboration with cultural and religious organizations to disseminate accurate health information and support students influenced by negative beliefs could be helpful.

Limitations of the Study

Reliance on self-reported data regarding student behaviors may lead to overestimation of actual practices due to social desirability bias.

The university-based survey methodology excluded students who were not attending classes or were absent during the survey period; their BSE practices might differ from those who participated. Additionally, the limited sample size and focus on a single university (monocentricity) may affect the generalizability of the findings.

CONCLUSION

This study identified socio-demographic factors, health-seeking behaviors, practices, and

perceptions significantly associated with late presentation for breast cancer screening among female students at the University of Zimbabwe. Future nursing health promotion and education programs should adopt differentiated, targeted approaches to increase the success of interventions, improve early detection rates, and encourage simple practices like BSE for effective early breast cancer screening.

Ethics considerations.

Ethics issues have been completely observed by authors.

Funding

The study was not externally funded.

Conflict of Interest

The authors declare that there is no conflict of interest.

Acknowledgements

We extent our gratitude to the University of Zimbabwe for all the support.

Authors' Contributions

Conceptualization: P.C. and G.N; methodology: P.C. and M.M.; software: P.C. and M.M; validation: P.C, G.N, M.M. and A.N.; statistical analysis: M.M., and A.N.; investigation: P.C.; resources: P.C. and G.N.; data curation: P.C. and M.M.; writing- original draft preparation: P.C.; writing-review and editing: G.N.; M.M and A.N; visualisation: M.M.; supervision: G.N.; projection administration: P.C.; funding acquisition: N/A. All authors have read and agreed to the published version of the manuscript.

REFERENCES

1. Sha, R., Kong, Xm., Li, Xy. *et al.* (2024). Global burden of breast cancer and attributable risk factors in 204 countries and territories, from 1990 to 2021: results from the Global Burden of Disease Study 2021. *Biomark Res* **12**, 87. doi: https://doi.org/10.1186/s40364-024-00631-8
2. American Cancer Society. Breast Cancer (2023). Breast self-examination guidelines. Available at: https://www.cancer.org/cancer/types/breast-cancer/screening-tests-and-early-detection/american-cancer-society-recommendations-for-the-early-detection-of-breast-cancer.html. Last access: 16 October 2024.
3. World Health Organization. IARC, GLOBACAN (2021). Available at: http://globocan.iarc.fr/factsheets/cancers/breast.asp. Last accessed November 2024.
4. Obikunle, A.F., Ade-Oshifogun, B. (2022). Perspectives of African American women about barriers to breast cancer prevention and screening practices: A qualitative study. Afr J Reprod Health. 2022 Jul;26(7):22-28. doi: 10.29063/ajrh2022/v26i7.3.
5. Abo Al-Shiekh, S.S., Alajerami, Y.S., Abushab, K.M., Najim, A.A., AlWaheidi, S., Davies, E.A. (2022). Factors affecting delay in the presentation of breast cancer symptoms among women in Gaza, occupied Palestinian territory: a cross-sectional survey. BMJ Open. 12(10):e061847. doi: 10.1136/bmjopen-2022-061847.
6. Alsaraireh, A., Darawad, M.W. (2018). Breast cancer awareness, attitude and practices among female university students: A descriptive study from Jordan. Health Care Women Int.;39(5):571-583. doi: 10.1080/07399332.2017.1368516.
7. Sung, H., Ferlay, J., Siegel, R.L., Laversanne, M., Soerjomataram, I., Jemal, A., Bray, F. (2021). Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA Cancer J Clin.1(3):209-249. doi: 10.3322/caac.21660.

8. Siegel, R.L., Miller, K.D., Wagle, N.S., Jemal, A. Cancer statistics, 2023. CA Cancer J Clin. 2023. 73(1):17-48. doi: 10.3322/caac.21763.
9. Ramathuba, D.U., Ratshirumbi, C.T.., Mashamba, T.M. (2015). Knowledge, attitudes and practices toward breast cancer screening in a rural South African community. Curationis.;38(1):1172. doi: 10.4102/curationis.v38i1.1172.
10. Cancer in Zimbabwe. Zimbabwe National Cancer Registry 2022 Annual Report. Available at: https://www.afro.who.int/sites/default/files/202308/WHO%20Zimbabwe%20Annual%20Report%202022%20.pdf. Accessed July 2024.
11. Abu Awwad, D., Hossain, S. Z., Mackey, M., Brennan, P., & Adam, S. (2021). Optimising awareness and knowledge of breast cancer screening for nurses through train-the-trainer workshops. Journal of Cancer Education, 1-11.
12. McCready, T., Littlewood, D., & Jenkinson, J. (2005). Breast self-examination and breast awareness: a literature review. Journal of clinical nursing, 14(5), 570-578.
13. Magara, M.S., Mungazi, S.G., Gonde, P., Nare, H., Mwembe, D., Madzikova, A., Chagla, L.S., Pereira, J., McKirdy, M.J., Narayanan, S., Grimsey, L., Hicks, J., James, R., Rainsbury, R.M. (2023). Factors leading to the late diagnosis and poor outcomes of breast cancer in Matabeleland South and the Bulawayo Metropolitan Provinces in Zimbabwe. PLoS One. 18(11):e0292169. doi: 10.1371/journal.pone.0292169.
14. Kinteh, B., Kinteh, S.L.S, Jammeh, A., Touray, E., Barrow, A. (2023). Breast Cancer Screening: Knowledge, Attitudes, and Practices among Female University Students in The Gambia. Biomed Res Int. 2023 Nov 30;2023:9239431. doi: 10.1155/2023/9239431.
15. Ayoub N. M., Al-Taani G. M., Almomani B. A., et al. (2021). Knowledge and practice of breast cancer screening methods among female community pharmacists in Jordan: a cross-sectional study. International Journal of Breast Cancer . 2021:13. doi: 10.1155/2021/9292768.9292768

16. Abo Al-Shiekh S. S., Ibrahim M. A., Alajerami Y. S. Breast cancer knowledge and practice of breast self-examination among female university students, Gaza. The Scientific World Journal . 2021;2021:7. doi: 10.1155/2021/6640324.6640324
17. Ramya Ahmad S., Asmaa Ahmad A., Nesreen Abdullah A., et al. Awareness Level, Knowledge and Attitude towards Breast Cancer between Medical and Non-Medical University Students in Makkah Region: A Cross Sectional Study. International Journal of Cancer and Clinical Research . 2019;6(1) doi: 10.23937/2378-3419/1410106.
18. Seyedkanani, E., Hosseinzadeh, M., Mirghafourvand, M., Sheikhnezhad, L. (2024). Breast cancer screening patterns and associated factors in Iranian women over 40 years. Sci Rep. 2024 Jul 3;14(1):15274. doi: 10.1038/s41598-024-66342-0.
19. Opoku, S.Y., Benwell, M., Yarney, J. (2012). Knowledge, attitudes, beliefs, behaviour and breast cancer screening practices in Ghana, West Africa. Pan Afr Med J. 2012;11:28. Epub 2012 Feb 17. PMID: 22514762; PMCID: PMC3325066.
20. Faryabi, R., Daneshi, S., Davarani, E.R., Yusefi, A.R., Arabpour, M., Ezoji, K., Movahed, E., Daneshi-Maskooni, M., Hussaini, S.M. (2023). The assessment of risk factors and risk perception status of breast cancer in Northern Iran. BMC Womens Health. 2023 May 16;23(1):268. doi: 10.1186/s12905-023-02422-z.
21. Hassen, A.M., Hussien, F.M., Asfaw, Z.A., Assen, H.E. (2021). Factors Associated with Delay in Breast Cancer Presentation at the Only Oncology Center in North East Ethiopia: A Cross-Sectional Study. J Multidiscip Healthc. 2021 Mar 19;14:681-694. doi: 10.2147/JMDH.S301337.
22. Okobia, M.N., Bunker, C.H., Okonofua, F.E., Osime, U. (2006). Knowledge, attitude and practice of Nigerian women towards breast cancer: a cross-sectional study. World J Surg Oncol. 2006 Feb 21;4:11. doi: 10.1186/1477-7819-4-11.

23. Antabe, R., Kansanga, M., Sano, Y. *et al.* (2020). Utilization of breast cancer screening in Kenya: what are the determinants?. *BMC Health Serv Res* **20**, 228 (2020). https://doi.org/10.1186/s12913-020-5073-2

24. Zewdie, A., Kassie, T.D., Anagaw, T.F. *et al.* (2024). Advanced-stage breast cancer diagnosis and its determinants in Ethiopia: a systematic review and meta-analysis. *BMC Women's Health* **24**, 284. https://doi.org/10.1186/s12905-024-03133-9

25. Gebremariam, A., Dereje, N., Addissie, A., Worku, A., Assefa, M., Abreha, A., Tigeneh, W., Pace, L.E., Kantelhardt, E.J., Jemal, A. (2021). Factors associated with late-stage diagnosis of breast cancer among women in Addis Ababa, Ethiopia. Breast Cancer Res Treat. 2021 Jan;185(1):117-124. doi: 10.1007/s10549-020-05919-5.

26. Akpinar,Y.Y., Baykan, Z., Naçar, M., Gün, I, Çetinkaya, F. (2011). Knowledge, attitude about breast cancer and practice of breast cancer screening among female health care professionals: a study from Turkey. Asian Pac J Cancer Prev. 2011;12(11):3063-8. PMID: 22393990.

27. Kinteh, B., Kinteh, S.L.S., Jammeh, A., Touray, E., Barrow, A. (2023). Breast Cancer Screening: Knowledge, Attitudes, and Practices among Female University Students in The Gambia. Biomed Res Int. 2023 Nov 30;2023:9239431. doi: 10.1155/2023/9239431

28. Galukande, M., Wabinga, H., Mirembe, F., Karamagi, C., Asea, A. (2016). Breast Cancer Risk Factors among Ugandan Women at a Tertiary Hospital: A Case-Control Study. Oncology. 90(6):356-62. doi: 10.1159/000445379.

29. Elmore, S.N.C., Mushonga, M., Iyer, H.S., Kanda, C., Chibonda, S., Chipidza, F., Makunike Mutasa, R., Muchuweti, D., Muguti, E.G., Maunganidze, A., Ndlovu, N., Bellon, J.R., Nyakabau, A.M. (2021). Breast cancer in Zimbabwe: patterns of care and correlates of adherence in a national referral hospital radiotherapy center cohort from 2014 to 2018. Cancer Med. 2021 Jun;10(11):3489-3498. doi: 10.1002/cam4.3764.

30. Sambanje, M.N., Mafuvadze, B. (2012). Breast cancer knowledge and awareness among university students in Angola. Pan Afr Med J.11:70. Epub 2012 Apr 16. PMID: 22655104; PMCID: PMC3361208.
31. Al-Biatty, S., Salih, E., Alamin, S., Altoom, N., Babeker, R., Gnawi, O. (2020). Knowledge, attitude and practice of breast self-examination in Khartoum State, Sudan. Clin Med (Lond). 20(Suppl 2):s2-s3. doi: 10.7861/clinmed.20-2-s2.