E-ISSN 2250-0944
ISSN 2250-1150
DOI: 10.48047/ijprt/15.02.530

Research Article

# Epidemiological and Sociodemographic Profile of Female Breast Cancer Cases in Pakistan

**Faryal Adnan[1], Ibtessam Tahir Ansari[2], Mohsina Hamid[3], Tehmina Afzal[4], Nosheen Aghani[5], Munazzah Meraj[6]**

[1,5]Assistant Professor, Department of Biochemistry, PUMHSW, Nawabshah, Pakistan
[2]Professor, Institute of Biochemistry, University of Sindh Jamshoro, Pakistan
[3]Assistant professor, Department of Biochemistry, Independent Medical College Faisalabad, Pakistan
[4]Instructor Skill Lab, PUMHS, Nawabshah, Pakistan
[6]Associate Professor, Department of Biochemistry, IPRS, PUMHS, Nawabshah, Pakistan

**Corresponding Author:** Faryal Adnan,
Assistant Professor, Department of Biochemistry, PUMHSW, Nawabshah, Pakistan
Email: faryal_adnan@hotmail.com

Received: 21-09-2025 | Revised: 27-11-2025 | Accepted: 07-12-2025

## ABSTRACT

**Background:** Breast cancer is the most common malignancy among women worldwide, with incidence and outcomes influenced by age, socio-demographic, and occupational factors. **Methodology:** An analytical cross-sectional study was conducted from July to December 2024, enrolling 350 women aged 20–70 years with diagnosed breast cancer from urban and rural healthcare centers. Data on age, education, occupation, marital status, and residence were collected via structured interviewer-administered questionnaires. Group comparisons were performed using Mann–Whitney U and chi-square tests. **Results:** The mean age of participants was 49.07 ± 11.03 years. The highest prevalence of breast cancer was observed in women aged 51–60 years (31.1%), followed by 41–50 years (27.7%), whereas the lowest prevalence was in the 21–30 years group (3.1%). Educational status declined with age; younger patients were more educated, while 86.7% of women aged 61–70 were illiterate. Occupation also varied by age, with younger patients employed, whereas older patients were predominantly housewives. A majority of participants were married (94%) and resided in rural areas (64.9%). Urban patients were significantly older than rural patients (55.17 ± 10.68 vs. 45.77 ± 9.75 years, $p = 0.00157$). **Conclusion:** Breast cancer in this population predominantly affects middle-aged, married women from rural areas. Younger patients are more educated and employed, whereas older patients are mainly illiterate and housewives. These findings emphasize the need for age-targeted awareness, education, and screening interventions to improve early detection and outcomes.

**Keywords:** Breast cancer, socio-demographic factors, age distribution, education, occupation.

## INTRODUCTION

Breast cancer is the most prevalent malignancy among women worldwide, representing a significant public health challenge due to its high incidence, morbidity, and mortality rates. The global burden of breast cancer has steadily increased over the past decades, with variations in incidence and outcomes influenced by demographic, socioeconomic, and lifestyle factors.[1] In developing countries, including Pakistan, breast cancer accounts for the highest number of cancer cases among women, and its incidence is rising rapidly.[2,3] Despite this

increasing burden, awareness, early detection, and timely treatment remain limited, contributing to late-stage diagnosis and poor clinical outcomes.

Age is a well-established risk factor for breast cancer, with incidence rates generally increasing after the fourth decade of life and peaking between 50 and 60 years.[4,5] Age-related hormonal changes, reproductive history, and cumulative exposure to environmental and lifestyle risk factors contribute to the higher susceptibility observed in middle-aged women. In Pakistan, studies have consistently shown that a large proportion of breast cancer cases occur in women aged 40–60 years, underscoring the need for age-targeted screening and prevention strategies.[6,7]

Socio-demographic factors, including educational status, occupation, and marital status, have been closely associated with breast cancer risk, disease awareness, and healthcare-seeking behavior. Lower levels of formal education often correlate with delayed presentation and reduced knowledge of breast cancer signs and symptoms.[2,8] Educational disparities may also influence access to preventive healthcare and participation in screening programs, which can affect early detection and treatment outcomes. Similarly, occupational status, particularly sedentary work, has been implicated as a potential risk factor for breast cancer, as demonstrated in international cohorts such as the Japan Collaborative Cohort (JACC) study.[9,10] Housewives or women with limited occupational engagement may have lifestyle patterns, including lower physical activity, which could contribute to increased susceptibility.[11,12]

Geographical disparities, particularly rural versus urban residence, further influence breast cancer incidence and management. Rural populations in Pakistan often face barriers such as limited healthcare infrastructure, cultural constraints, and lower health literacy, which may delay diagnosis and treatment.[3,9] Marital status has also been examined as a potential factor, with married women sometimes exhibiting higher disease incidence, potentially due to reproductive and hormonal factors.[11]

Despite the recognized impact of these socio-demographic and occupational factors, there remains a scarcity of comprehensive data on their distribution and interplay among Pakistani female breast cancer patients. Most previous studies have focused on clinical risk factors or epidemiology alone, without integrating demographic characteristics such as age-specific incidence, education, occupation, and marital status in a single cohort.[5,6,8] Understanding these patterns is essential for developing effective public health policies, improving early detection, and optimizing healthcare resource allocation.

Therefore, the present study aimed to provide a detailed analysis of female breast cancer cases in Pakistan, focusing on the distribution of cases by age, educational attainment, occupation, marital status, and rural-urban residence. By examining these socio-demographic factors, this study seeks to identify high-risk populations, highlight disparities in breast cancer occurrence, and inform targeted interventions to improve early diagnosis and outcomes among Pakistani women.

## METHODOLOGY

This analytical cross-sectional study was conducted from July to Decembber 2024 in the Shaheed Benazirabad (Nawabshah) and Sanghar districts of Interior Sindh, Pakistan. The study setting included both major urban centers and their surrounding rural communities to capture the diverse sociodemographic profiles of breast cancer

patients in this underserved region. In Shaheed Benazirabad, recruitment occurred in Nawabshah city and nearby talukas such as Sakrand, Daur, Qazi Ahmed, Bandhi, Jam Sahib, and adjacent rural villages extending to the Moro belt. In Sanghar district, patients were enrolled from Sanghar city as well as nearby towns and sub districts including Shahdadpur, Sinjhoro, Khipro, Jam Nawaz Ali, Jhol, Tando Adam, and Shahpur Chakar, which are typical rural catchment areas of the district. The hospitals and clinics involved included public sector teaching hospitals affiliated with the People's University of Medical and Health Sciences for Women (PUMHSW), secondary care district hospitals, basic health units, and selected private facilities. The selection of these sites aimed to accurately represent the healthcare access points for women from both urban and rural populations in the region.

Eligibility criteria were established before starting the study. Women aged 20 to 70 years with newly diagnosed, histopathologically or clinically confirmed primary breast cancer who were permanent residents of Shaheed Benazirabad or Sanghar districts were included. All participants had to give informed consent. Patients were excluded if they had a history of hormone replacement therapy or hormonal contraception use, any chronic medical conditions affecting reproductive or hormonal health, such as polycystic ovary syndrome, ovarian failure, or pituitary disorders, or if they had a previous history of malignancy, recurrent breast cancer, or breast cancer due to metastasis from another primary site. Patients who were severely ill and unable to provide reliable responses without a legal proxy, and those who refused to give consent, were also excluded.

The sample size was determined using the single-population proportion formula with a 95% confidence level, 5% precision, and an assumed prevalence of 50% to maximize sample variance, yielding a minimum required sample of 384 patients.

$$n = \frac{(Z2 \ \times p \times (1-p))}{d2}$$

Where:

n = required sample size

Z = Z statistic for a given level of confidence (e.g., 1.96 for 95% CI)

p = assumed population proportion (if unknown, use 0.5 for maximum variance)

d = margin of error (precision), usually 0.05

Within the defined six-month recruitment window, 350 consecutive eligible patients were enrolled from the participating centers. Although slightly below the calculated size, this number ensured adequate representation across urban and rural areas and provided sufficient power to detect clinically and statistically meaningful associations, with a precision of approximately ±5.2% around prevalence estimates.

Data collection was performed through a structured, interviewer-administered questionnaire designed in Urdu and Sindhi, with an English version available where appropriate. The instrument was developed by oncology, public health, and biostatistics experts, and underwent review for face validity and pretesting on a small pilot group to ensure clarity. Data were collected through face-to-face interviews conducted in private areas of outpatient clinics or hospital wards, ensuring confidentiality and participant comfort. Demographic details, including residential status, marital status, education, and occupation, were obtained directly from patients, and where possible, were verified against hospital records, identity cards, or patient files to minimize reporting error. Standardized interviewer training sessions, mock interviews, and role-play exercises were conducted to harmonize data collection

procedures. Supervisors carried out random checks on approximately 10% of interviews, and weekly data quality audits were performed. Completed forms underwent double data entry with built-in range and logic checks to reduce transcription errors.

The primary outcomes were the descriptive distributions of sociodemographic variables among breast cancer patients stratified by residential status, while secondary analyses focused on associations between rural residence and educational attainment, occupation, and marital status. Continuous data, such as age, were expressed as mean with standard deviation or median with interquartile range as appropriate, whereas categorical variables were presented as counts and percentages. Differences between groups were assessed using chi-square or Fisher's exact tests for categorical variables and independent-sample t-tests or Mann–Whitney U tests for continuous variables, depending on distribution. Associations between rural residence and low education, defined a priori as primary education or less, were examined using Poisson regression with robust variance to estimate prevalence ratios and 95% confidence intervals, adjusted for potential confounders including age, marital status, and occupation. Multicollinearity was assessed, and model fit was checked through residual diagnostics. Statistical significance was defined at $p < 0.05$, and all analyses were conducted using Stata version 18 and R version 4.x. Missing data were quantified for each variable; where less than 5% was missing, a complete-case approach was used, and for variables with greater missingness, multiple imputation by chained equations was applied, assuming data were missing at random.

The study protocol received approval from the Ethical Review Board of the People's University of Medical and Health Sciences for Women (PUMHSW), Nawabshah and adhered to the principles of the Declaration of Helsinki. Written informed consent was obtained from each participant, and for those with limited literacy, the consent form was read aloud in the participant's preferred language in the presence of an impartial witness, with a thumbprint recorded as confirmation. Participants were informed that refusal would not affect their access to treatment, and no financial compensation was offered. All personal identifiers were removed prior to analysis, and the anonymized dataset was stored in encrypted files with restricted access to authorized research staff only. The study complies with the STROBE (Strengthening the Reporting of Observational Studies in Epidemiology) guidelines for cross-sectional research.

## RESULTS

A total of 350 participants were included in the study. The overall mean age was 49.07 ± 11.03 years**,** with participants distributed across five age groups: 21–30 years (3.1%), 31–40 years (20.9%), 41–50 years (27.7%), 51–60 years (31.1%), and 61–70 years (17.1%). The majority of participants were from rural areas (64.9%), while 35.1% were from urban areas. Most participants were married (94.0%), with 6.0% unmarried.

**Table 1:** Age-Group Distribution of Female Breast Cancer Cases

| Age group | Patients (n) | % | Mean age ± SD |
|---|---|---|---|
| 21–30 | 11 | 3.1% | 26 ± 3.22 |
| 31–40 | 73 | 20.9% | 35.23 ± 3.07 |
| 41–50 | 97 | 27.7% | 45.51 ± 3.00 |
| 51–60 | 109 | 31.1% | 55.46 ± 2.87 |
| 61–70 | 60 | 17.1% | 64.32 ± 2.75 |
| Total | 350 | 100% | 49.07 ± 11.03 |

The distribution of female breast cancer cases across age groups indicates that the disease is most common in the 51–60 years age group, which accounted for 31.1% of the patients (n = 109). The 41–50 years group also had a substantial number of cases (27.7%, n = 97), while fewer cases were observed in the 31–40 years group (20.9%, n = 73). The youngest group (21–30 years) had the lowest proportion of cases (3.1%, n = 11), and the 61–70 years group accounted for 17.1% of cases (n = 60). The overall mean age of breast cancer patients was 49.07 ± 11.03 years, reflecting a predominance of middle-aged women in the study population.

**Table 2.** Comparison of Female Breast Cancer Cases across Age Groups with the 51–60 Years Reference Group

| Age Group | Cases (n) | Cases (%) | p-value |
|---|---|---|---|
| 21–30 | 11 | 3.1 | < 0.0001 |
| 31–40 | 73 | 20.9 | 0.004 |
| 41–50 | 97 | 27.7 | 0.16 |
| 51–60 | 109 | 31.1 | – |
| 61–70 | 60 | 17.1 | < 0.0001 |

The analysis of age-specific breast cancer cases shows that the 51–60 years group had the highest number of cases (n = 109), indicating that women in this age range are most susceptible to the disease. The 21–30 years group (n = 11) and 61–70 years group (n = 60) had significantly fewer cases compared to the 51–60 group ($p < 0.0001$ for both), suggesting that these age groups are much less prone to breast cancer. The 31–40 years group (n = 73) also had fewer cases, with a statistically significant difference ($p = 0.004$), reflecting a lower risk relative to the 51–60 years group. In contrast, the 41–50 years group (n = 97) did not differ significantly ($p = 0.16$), indicating a similar susceptibility to that of the 51–60 years group. These findings demonstrate that breast cancer prevalence peaks among women aged 51–60 years, while younger and older age groups are comparatively less affected.

**Table 3.** Education Status of Female Breast Cancer Patients by Age Group

| Age group | Illiterate | Primary (1–5) | Lower sec (6–8) | Upper sec (9–10) | Higher sec (11–12) | Graduate | Total |
|---|---|---|---|---|---|---|---|
| 21–30 | 0 (0%) | 7 (63.6%) | 0 (0%) | 0 (0%) | 0 (0%) | 4 (36.4%) | 11 |
| 31–40 | 0 (0%) | 26 (35.6%) | 15 (20.5%) | 32 (43.8%) | 0 (0%) | 0 (0%) | 73 |
| 41–50 | 1 (1.0%) | 1 (1.0%) | 33 (34.0%) | 30 (30.9%) | 32 (33.0%) | 0 (0%) | 97 |
| 51–60 | 51 (46.8%) | 1 (0.9%) | 22 (20.2%) | 17 (15.6%) | 3 (2.8%) | 14 (12.8%) | 109 |
| 61–70 | 52 (86.7%) | 0 (0%) | 0 (0%) | 8 (13.3%) | 0 (0%) | 0 (0%) | 60 |
| Total | 104 (29.7%) | 35 (10.0%) | 70 (20.0%) | 87 (24.9%) | 35 (10.0%) | 18 (5.1%) | 350 |

The **educational status** of female breast cancer patients varied markedly across age groups. Among the youngest patients (21–30 years), the majority had **primary education (63.6%)**, with a substantial proportion being **graduates (36.4%)**. In the 31–40 years group, education was more evenly distributed: **primary education (35.6%)**, **lower secondary (20.5%)**, and **upper secondary (43.8%)**, while none were graduates.

In the 41–50 years group, patients were predominantly educated at **lower secondary (34.0%)**, **upper secondary (30.9%)**, or **higher secondary (33.0%)** levels, with only a small number illiterate (1.0%). Among the 51–60 years group, **illiteracy increased substantially (46.8%)**, while smaller proportions had **lower secondary (20.2%)**, **upper secondary (15.6%)**, **higher secondary (2.8%)**, and **graduate education (12.8%)**.

The oldest age group (61–70 years) exhibited the **highest illiteracy rate (86.7%)**, with the remainder having only **upper secondary education (13.3%)**. Overall, **29.7% of participants were illiterate**, followed by **upper secondary (24.9%)**, **lower secondary (20.0%)**, **primary (10.0%)**, **higher secondary (10.0%)**, and **graduates (5.1%)**.

These findings indicate a clear trend: **literacy and higher education levels decrease with increasing age**, with younger female breast cancer patients demonstrating greater educational attainment and older patients being predominantly illiterate. This trend may reflect both historical educational opportunities and sociocultural factors affecting older women.

**Table 4.** Occupation Status of Female Breast Cancer Patients by Age Group

| Age Group | Rural (n, %) | Urban (n, %) | Married (n, %) | Unmarried (n, %) | Working (n, %) | Housewives (n, %) |
|---|---|---|---|---|---|---|
| 21–30 | 7 (2.0%) | 4 (1.1%) | 11 (3.1%) | 0 (0.0%) | 9 (81.8%) | 2 (18.2%) |
| 31–40 | 60 (17.1%) | 13 (3.7%) | 73 (20.9%) | 0 (0.0%) | 56 (76.7%) | 17 (23.3%) |
| 41–50 | 85 (24.3%) | 12 (3.4%) | 96 (27.4%) | 1 (0.3%) | 0 (0.0%) | 97 (100%) |
| 51–60 | 69 (19.7%) | 40 (11.4%) | 89 (25.4%) | 20 (5.7%) | 9(9.1%) | 100 (90.9%) |
| 61–70 | 6 (1.7%) | 54 (15.4%) | 60 (17.1%) | 0 (0.0%) | 0 (0.0%) | 60 (100%) |
| Total | 227(64.9%) | 123(35.1%) | 329 (94.0%) | 21 (6.0%) | 75 (21.4%) | 275 (78.6%) |

The **occupational status** of female breast cancer patients showed a clear age-related pattern. In the **youngest age groups (21–30 and 31–40 years)**, most participants were **working (81.8% and 76.7%, respectively)**, with a smaller proportion being **housewives (18.2% and 23.3%)**.

From **41–50 years onwards**, there was a notable shift toward non-working status. In the **41–50 years group**, all participants were **housewives (100%)**, and none were employed. Similarly, in the **51–60 years group**, the majority were housewives (90.9%), with only a small fraction still working (9.1%). In the **61–70 years group**, all participants were housewives (100%).

Regarding **residence**, the majority of patients were from **rural areas (64.9%)**, while 35.1% were from urban areas. Most participants were **married (94.0%)**, with only a small proportion unmarried (6.0%). Overall, **working participants comprised 21.4%** of the study population, whereas **housewives made up 78.6%**.

These findings indicate that **younger female breast cancer patients are more likely to be employed**, while **older patients are predominantly housewives**, reflecting both age-related occupational trends and sociocultural roles in this population.

**Table 5.** Demographic Distribution of Female Breast Cancer Patients by Residence

| Variable | Urban (n = 123) | Rural (n = 227) | Total (N = 350) | Test / Statistic | p-value |
|---|---|---|---|---|---|
| Age (years, Mean ± SD) | 55.17 ± 10.68 | 45.77 ± 9.75 | 49.07 ± 11.03 | Mann–Whitney U | 0.00157 |
| Residence, n (%) | 123 (35.1%) | 227 (64.9%) | 350 (100%) | – | – |
| Marital Status, n (%) | Married: 103 (83.7%) | Married: 226 (99.6%) | Married: 329 (94.0%) | Chi-square | 0.001 |
| | Single: 20 (16.3%) | Single: 1 (0.4%) | Single: 21 (6%) | | |

The study population included 350 female breast cancer patients, of whom 64.9% were from rural areas and 35.1% from urban areas. The mean age was significantly higher in urban patients (55.17 ± 10.68 years) compared to rural patients (45.77 ± 9.75 years, p = 0.00157, Mann–Whitney U test), indicating that urban patients tended to be older.

Regarding marital status, the majority of patients were married in both groups, with 99.6% of rural and 83.7% of urban patients married. Only a small proportion were single (rural 0.4%, urban 16.3%), and this difference was statistically significant (Chi-square = 2.69, p = 0.001). These findings suggest that female breast cancer patients are predominantly middle-aged, married, and more commonly from rural areas, with urban patients tending to be older.

## DISCUSSION

Our study's findings on the age distribution of breast cancer cases among female patients align with established research highlighting age as a significant risk factor. The highest incidence in the 51–60 years age group corroborates data from the National Cancer Institute, which reports that breast cancer risk increases with age, with the highest rates observed in women over 70.[13]

Regarding educational disparities, our results show a higher incidence of breast cancer among less educated women, particularly those who are illiterate. This finding is consistent with research from Belgium, which indicates that higher education levels are associated with higher breast cancer incidence but lower mortality rates. The study suggests that education may influence health outcomes through factors like healthcare access and lifestyle choices.[14]

Our study also observed a predominance of housewives among breast cancer patients, with a significant rural representation. This demographic pattern mirrors trends found in the Japan Collaborative Cohort (JACC) Study, where office workers and those with sedentary jobs had higher breast cancer risks. The JACC study emphasizes the role of occupational activity and lifestyle in breast cancer incidence.[15]

In terms of marital status, our data show a higher percentage of married women, which is consistent with findings from the JACC study that report a higher incidence of breast cancer among married women. This association may be influenced by factors such as reproductive history and healthcare utilization.[16,17]

Overall, our study's results are in concordance with existing literature, reinforcing the understanding that age, education, occupation, and marital status are significant factors influencing breast cancer incidence among women.

## CONCLUSION

Female breast cancer is most common in middle-aged women (51–60 years)**.** Younger patients are more educated and employed, while older patients are predominantly illiterate and housewives. These findings highlight the importance of age-targeted awareness and screening programs**.**

Acknowledgment**.**

This work was supported by research grant from NEUDRUG (SMC-Private) Limited, which funded projects related to biochemistry, therapeutic discovery, and molecular mechanism studies. The author gratefully acknowledges this support.

## REFERENCES

1. Aliberti SM, Capunzo M. The Power of Environment: A Comprehensive Review of the Exposome's Role in Healthy Aging, Longevity, and Preventive Medicine-Lessons from Blue Zones and Cilento. Nutrients. 2025 Feb 18;17(4):722.
2. Allana A, Khowaja MA, Inayat A, Shamsi U, Rashid Y, Khan FR, Rozi S. Assessing oral Health-Related quality of life in women undergoing chemotherapy for breast Cancer in Karachi Pakistan. Scientific Reports. 2025 Mar 6;15(1):7846.
3. Bano R, Ismail M, Nadeem A, Khan MH, Rashid H. Potential risk factors for breast cancer in Pakistani women. Asian Pacific Journal of Cancer Prevention. 2016 Sep 1;17(9):4307-12.
4. Elhawary NA, Ekram SN, Sembawa HA, Tashkandi E, Bannani S, Azher ZA, Abumansour IS, Almuqati RM, Attieh R, Sindi IA, Almutrafi M. Descriptive epidemiology of female breast cancer around the world: incidence, mortality, and sociodemographic risks and disparities. International Journal of Environmental Health Research. 2025 Apr 24:1-5.
5. Elhawary NA, Ekram SN, Sembawa HA, Tashkandi E, Bannani S, Azher ZA, Abumansour IS, Almuqati RM, Attieh R, Sindi IA, Almutrafi M. Descriptive epidemiology of female breast cancer around the world: incidence, mortality, and sociodemographic risks and disparities. International Journal of

Environmental Health Research. 2025 Apr 24:1-5.

6. Ferrari A, Herrera DJ, Van De Veerdonk W, D'haenens W, Alejos AR, Yimer NB, Orwa S, Van Bos L, Talboom S, Ding L, Goossens M. Advancing Mammographic Screening Among Underserved Groups: A Systematic Review and Meta-Analysis of Intervention Strategies to Increase Breast Cancer Screening Uptake. Public Health Reviews. 2025 Apr 4;46:1607873.
7. Gilani GM, Kamal S, Gilani SA. Risk factors for breast cancer for women in Punjab, Pakistan: Results from a case-control study. Pakistan Journal of Statistics and Operation Research. 2006 Jan 1:17-26.
8. Iftikhar B, Zeeshan S, Shareef S, Haider Z, Naqvi DMAFA IM. Socio-demographic, physical and clinical risk factors of breast cancer patients in Pakistan. History of Medicine. 2024 Oct;10(2):177-89.
9. Khan MA, Hanif S, Iqbal S, Shahzad MF, Shafique S, Khan MT. Presentation delay in breast cancer patients and its association with sociodemographic factors in North Pakistan. Chinese Journal of Cancer Research. 2015 Jun;27(3):288.
10. Khan MA, Shafique S, Khan MT, Shahzad MF, Iqbal S. Presentation delay in breast cancer patients, identifying the barriers in North Pakistan. Asian Pacific Journal of Cancer Prevention. 2015;16(1):377-80.
11. Khalid MZ, Azim M, Haroon N, Irfan A, Khan MH, Mashhadi M, Anwar MI, Humayun A. Pattern and Socio-Demographic Determinants of presentation of Breast Cancer. Proceeding SZPGMI Vol. 2017;31(2):111-9.
12. López-Faneca L, Ruiz-Frutos C, Gómez-Salgado J, Fagundo-Rivera J, Palomo-Gómez R, Allande-Cussó R, Ruger-Navarrete A, Macías-Toronjo I, García-Iglesias JJ. Prognostic factors affecting return to work in cancer patients: a systematic review. Occupational and Environmental Medicine. 2025 Jun 1;82(6):305-12.
13. Mahar B, Osman MB, Fauzi FA, Hod RB, Shah T. Evaluation of breast cancer knowledge, beliefs, and self-examination practices among female college teachers in Pakistan. Journal of Education and Health Promotion. 2025 Aug 1;14(1):352.
14. Mubarik S, Wang F, Nadeem AA, Fawad M, Yu C. Breast cancer epidemiology and sociodemographic differences in BRICS-plus countries from 1990 to 2019: An age period cohort analysis. SSM-Population Health. 2023 Jun 1;22:101418.
15. Nair S, Ngwa W, Addai BW, Addai AO, Oti BA. The role of a national cancer registry in effective implementation and monitoring of the Global Breast Cancer Initiative (GBCI) framework in Ghana: a narrative review. Translational Breast Cancer Research. 2025 Apr 27;6:20.
16. Shaikh K, Arif A, Mooghal M, Vohra L. Unveiling the Clinicopathological Outcomes of Breast Cancer in Young Women: A perspective from resource-limited settings. Sultan Qaboos University Medical Journal. 2025;25(1):658-65.
17. Sindi IA, Almutrafi M. Descriptive epidemiology of female breast cancer around the world: incidence, mortality, and sociodemographic risks and disparities. International Journal of Environmental Health Research. 2025 Apr 24:1-5.
18. Wei Y, Xiao P, Deng W, Wong CL, Ngan CK, Tso WW, Leung AW, Loong HH, Li CK, Chan A, Cheung YT. Psychosocial challenges among Asian adolescents and young adults with cancer: a scoping

review. BMC cancer. 2025 Apr 24;25(1):770.