**Impact of Family Support on Knowledge and Health-Seeking Behaviour Practices Among Breast Cancer Patients in Bangladesh**

**Introduction:**

Breast cancer is the most prevalent type of cancer that affects women globally and one of the main causes of cancer that can be fatal [1]. Two million cases of breast cancer were reported in 2020, making it the most common malignancy among women. With 11.7% of all cancer cases worldwide, it had the highest incidence [2]. Although breast cancer is more common in developed nations, developing nations have a higher death rate from the disease than do developed nations [3]. In 2012, nearly 62% of breast cancer-related deaths occurred in developing countries. South Asia alone saw an estimated 200,000 new cases that year, with approximately 97,500 breast cancer deaths [4]. In Bangladesh, the prevalence of breast cancer has remained at 32.8% over the past five years, and it is responsible for approximately 69% of women’s deaths [5]. A recent study found that the overall incidence of breast cancer was 22.5 cases per 100,000 women. [6]. In 2018, 12,764 new cases of breast cancer were detected [7]. A study found that 50% of breast cancer patients died due to late diagnosis at advanced stages [8].

Early diagnosis of breast cancer improves outcomes, but delays often result in detection at advanced stages, leading to poorer prognosis and higher mortality rates, even in areas with lower incidence [9]. Delays in seeking care and early diagnosis are due to lack of awareness, poor healthcare-seeking behaviour among low-income women, and limited access to effective healthcare services [10]. Good health literacy on breast cancer, which encourages ‘breast awareness’—a woman becoming familiar with her breasts and how they change throughout her life—helps women seek early medical care when noticing changes [11]. Similarly, knowledge about breast cancer positively impacts women’s screening behavior and encourages them to seek medical help when they notice early signs and symptoms [12]. Evidence suggests that limited knowledge and various sociodemographic factors contribute to delayed medical help-seeking when the initial signs and symptoms of breast cancer are overlooked [13]. Therefore, it is crucial to assess women’s knowledge of breast cancer and identify factors that may prevent them from seeking early medical attention when noticing suspicious symptoms.

Information on the epidemiology, biology, and various environmental factors of breast cancer is limited in South Asia [14]. In Bangladesh, the higher breast cancer mortality rates are due to lack of knowledge, limited access to treatment, and community negligence. Increased awareness of signs, symptoms, and early detection methods like BSE, CBE, and mammograms is crucial to reducing morbidity and mortality. However, the disease remains under-discussed, leading to widespread misinformation about its causes and risk factors [15]. In Bangladesh, communities lack awareness of self-diagnosis and available treatments for breast cancer, causing delays in seeking care. Additionally, societal stigma makes it difficult for women to discuss symptoms, leading to common delays in presentation at advanced stages [5].

Breast cancer has a profound psychological impact, with fears of death and mastectomy causing anxiety. Patients go through emotional stages as they cope with the diagnosis, feeling overwhelmed as their world changes. In such moments, they deeply need support, but their emotions are often hard for others to understand [16]. In a qualitative study, Hamilton et al. used grounded theory to explore men’s attitudes as husbands, fathers, and caregivers toward their partners' breast cancer and chemotherapy. Through semi-structured interviews, they identified two key themes: focusing on the partner's illness and caregiving, while also maintaining family balance [17]. To provide proper support to breast cancer patients and their families, it is crucial to understand their experiences, as successful management relies on a comprehensive understanding of their needs [18]. The perception of spouses and friends as both supporters and individuals in distress highlights the support needs of patients. Spousal support helps reduce depression and anxiety, benefiting both patients and partners. For patients, family support is crucial in preventing psychological distress, while for male partners, support from friends is most important [19].

Assessing patients' knowledge and practices related to breast cancer and its screening is crucial for designing effective health promotion strategies to reduce mortality from improper health-seeking behavior and inadequate screening services. The aim of this study was to evaluate breast cancer patients' knowledge and practices regarding screening and to examine the role of social support, particularly from family and friends, in their self-management.

**Methods:**

We followed the STROBE guideline for better observational cross-sectional study reporting in epidemiology.

**Study sites and study design:**

A multi-center retrospective cross-sectional study was conducted in two primary cancer care facilities located in Dhaka the capital of Bangladesh.

**Data collection:**

Due to the lack of patient registries, a convenience sampling methodology was used. Patients visiting these facilities were potential participants in the study. If they meet study inclusion-exclusion criteria, they are requested to participate in the study. Verbal informed consent was taken before collecting data as per study protocol.

**Eligibility criteria**

In this study, we surveyed women aged ≥18 years with suspected breast cancer and patients diagnosed with breast cancer referred to our participating centers. These patients will only be included in the study if their initial stage is documented in the medical records or if their initial stage is unavailable but the initial diagnosis is made no more than 6 months before staging at our facilities. Face-to-face interviews with a structured questionnaire were conducted by previously trained interviewers who were not involved in the clinical management of the patients.

**Outcome variables:**

The study assessed the knowledge and practice of participants towards risk factors and health-seeking behaviour of breast cancer. Patients' knowledge and practice regarding risk factors were calculated out of the total knowledge-specific and practice-specific questions. Each accurate response gets one point and zeroes for the incorrect one based on the respondent's response. Finally, the respondents who scored greater than or equal to the mean score were considered to have 'good knowledge', and respondents who scored less than the mean score were considered to have 'low knowledge' [20]. There were 7 knowledge and practice assessment questions with a reliability coefficient above 70% respectively which was calculated using Cronbach’s alpha [21].

**Possible factors**

To find out potential risk factors associated with knowledge and practice, we examined a range of socioeconomic factors, medical history, and family support of the patients as independent variables. These included the patient's age, geographic location (division), residency (urban or rural), current marital status, educational attainment (illiterate, primary, and secondary) of both the patient and their spouse, household monthly income, first health facility visits after symptoms, alternative memedy, any diagnosis delay, access to portable electronic devices, exposure to mass media (social media, television, and newspaper), any mass media access, medical history of the patients, like lump, breast pain, nipple discharge, skin changes, bone pain, other symptoms, any symptoms, cancer stage, discomfort experience, like arm pain, breast pain, itching, lump, nipple discharge, shape changes, skin changes, ulcer or sore skin, family support like the person you talked to first about your health problem, recommended you to consult with a doctor, fear or uncomfortable to talk about the problem to your spouse, receive support from spouse after diagnosis, receive support from social circle. Diagnosis delay encompasses the period from the patient's first symptom recognition to the commencement of definitive treatment, incorporating both patient and provider delay [22]. In this study, a diagnostic delay is typically regarded as exceeding sixteen (16) weeks.

**Statistical analysis**

We conducted descriptive statistics by crosstabs, presenting counts and percentages to summarise categorical variables. Chi-square tests and Fisher's exact test were employed to investigate factors associated with knowledge and practices. Binary and multivariable logistic regression was utilised to identify associated risk factors. Initially, bivariable analysis assessed the relationship between knowledge and practices with other factors. Univariable (unadjusted) and multivariable (adjusted) logistic regression analyses were then conducted to compare associated risk factors. In the univariable analysis, variables were individually added to the logistic regression model, while in the adjusted model, all possible variables were included simultaneously. Results were reported as unadjusted/crude odds ratios (COR) and adjusted odds ratios (AOR) with their respective 95% confidence intervals and 5% level of significance. All analyses were performed using R software.

**Variable selection**

Variables were chosen through a two-stage process. Initially, bivariable analysis (chi-square test) was performed individually for each independent variable. A significance threshold of p-value ≤ 0.20 was applied arbitrarily to determine the inclusion of covariates in the multivariable models [23]. In the second stage, a comprehensive multivariable model was constructed using the selected predictor variables. Additionally, we assessed multicollinearity in the final model using a cut-off value of 4.00 for the variance inflation factor (VIF) analysis [24]. At this stage, all variables were incorporated into the model since the VIF values for each variable were below 4.00.

**Model performance**

We utilized the Area under the Receiver Operating Characteristic (AUROC) curve, sensitivity, specificity, and the Hosmer–Lemeshow goodness-of-fit test to assess the accuracy of the best model. Higher AUROC values indicated superior model performance. In the ROC curve, a lower p-value suggests that the model effectively discriminates between two categories, with an area under the curve exceeding 0.50 [25]. The Hosmer–Lemeshow goodness-of-fit test evaluates the similarity between model-estimated probabilities and observed outcomes, typically through a goodness-of-fit test. A Hosmer–Lemeshow goodness-of-fit test with a p-value greater than 0.05 indicates the model's ability to accurately classify observations into outcome categories [26].

**Results**

**Study population**

In a study involving 355 participants, it was found that patients had slightly higher level of knowledge and practices regarding breast cancer. The results show that a majority of respondents (64.67%) do not know the symptoms of breast cancer, with only 35.33% being aware. Similarly, very few respondents (11.11%) regularly perform breast self-examinations, and only 11.21% seek medical help immediately after noticing symptoms. Additionally, the majority (95.21%) have never had a breast exam conducted by a healthcare professional before experiencing any breast issues. Awareness of mammography is also low, with only 6.01% of participants having heard of it. Regarding personal or family history, 27.92% know someone close to them who has had cancer, but only 9.52% are aware of a family history of breast cancer. When considering overall knowledge and practice, 53.52% of participants were categorized as having "Good" knowledge and practice (mean ≥ 1), while 46.48% had "Low" knowledge and practice (mean < 1). These findings highlight significant gaps in both knowledge and practice related to breast cancer prevention and detection, suggesting a need for targeted education and intervention to improve early detection and awareness (Table 1).

In Table 2, the percentage of patients age with good knowledge and practice was 55.26% for those under 40 years, 56.78% for those between 40 and 59 years, and 43.33% for those aged 60 and above. Regarding geographic location, the percentage of patients with good knowledge and practice ranged from 51.92% in Chittagong to 78.57% in Rangpur. For area of residence, 54.18% of rural residents exhibited good knowledge and practice, while 56.38% of urban residents did. A significant difference emerged in the spouse education level category (p = 0.029), patients whose spouses had a secondary or higher education had 59.46% good knowledge and practice, 44.07% in those with spouses with primary education and 59.55% in those with illiterate spouses. In terms of household monthly income, a strong association was found (p = 0.005), patients earning more than 20,000 BDT monthly (71.64%) exhibited highest good knowledge and practice, lowest (44.25%) in those with incomes below 5,000 BDT. Patients with portable electronic devices and mass media access showed better knowledge and practice, with 55.49% (p = 0.027) of those with devices and 59.03% (p = 0.086) of those with mass media access demonstrating good outcomes.

In medical history, 56.88% of individuals with symptoms had good knowledge and practice and only 14.29% of individuals without symptoms had the same outcome (p < 0.001). First health facility visit showed that 61.05% of patients who first visited a private clinic had good knowledge and practice and lowest 46.67% of those who not visited government or private hospitals. Patients who consumed alternative remedies were less likely to have good knowledge and practice, as only 47.71% of those who used alternative remedies exhibited good knowledge and practices, where 60.45% of those who did not, with a significant p-value of 0.028. Patients who experienced delays in diagnosis showed a trend toward poorer knowledge and practice (57.73% good knowledge in delayed diagnosis and 42.86% in no delay, p = 0.017). Among all patients, 29 (24.58%) had good knowledge and practice, while 50 (22.62%) did not who feel any discomfort experience. The p-value of 0.043 indicates that the difference between the groups with and without discomfort is statistically significant (Table 2).

In the category of family and social support, for those who were recommended to consult with a doctor, 70% of individuals who made the recommendation themselves and had good knowledge and practice followed by, 54.68% from husband, 53.57% from neighbor, 58.57% from sons or daughters, and 53.49% from others, respectively. Regarding the fear or discomfort in talking to a spouse about the issue, 59.26% of individuals who felt uncomfortable had good knowledge and practice and 54.98% had same outcomes who are not in fear to share and comfortable (p = 0.046). When considering spousal support after diagnosis, 57.02% of individuals who received support from their spouse had good knowledge and practice on breast cancer, while, a lowest amount (47.83%) of those who did not receive support (p = 0.025). Among all patients, a large amount (62.50%) did not receive support from their social circle and had lower knowledge and practice (Table 2).

The proportions of patients expressing no fear or discomfort in discussing their breast cancer problems with their spouse varied across districts: 68.18% in Barisal, 86.96% in Chittagong, 76.42% in Dhaka, 96.77% in Khulna, 79.31% in Mymensingh, 80.00% in Rajshahi, 100.00% in Rangpur, and 75.00% in Sylhet. Additionally, percentages of patients receiving support from their spouse after diagnosis also varied: 77.27% in Barisal, 93.48% in Chittagong, 80.00% in Dhaka, 83.87% in Khulna, 96.55% in Mymensingh, 80.00% in Rajshahi, 76.92% in Rangpur, and 75.00% in Sylhet. Furthermore, proportions of patients receiving support from their social circle varied across districts: 56.00% in Barisal, 84.62% in Chittagong, 70.21% in Dhaka, 74.29% in Khulna, 58.06% in Mymensingh, 57.89% in Rajshahi, 78.57% in Rangpur, and 100.00% in Sylhet (Figure 1).

In adjusted model (Table 3), regarding **socioeconomic characteristics**, individuals aged under 40 had 1.25 times higher odds, and those aged 40-59 had 1.35 times higher odds of demonstrating good knowledge and practice compared to those aged 60 or older, but neither was statistically significant (p=0.759). Rangpur had over four times higher odds of exhibiting good knowledge and practice compared to Barisal (AOR: 4.05, 95% CI: 0.64–8.25), but this result also was not statistically significant (p=0.147). For **education level**, patients who were illiterate had 66% lower odds of demonstrating good knowledge and practice (AOR: 0.34, 95% CI: 0.12–0.97) compared to those with secondary or higher education, with a p-value of 0.046, indicating a statistically significant association (p=0.046). Additionally, household income played a crucial role: patients with an income of less than 5000 BDT had 13% lower odds of exhibiting good knowledge and practice (AOR: 0.87, 95% CI: 0.46–0.94) compared to those with an income over 20,000 BDT, with this difference being statistically significant (p<0.001). Furthermore, patients who had access to portable electronic devices had 1.11 times higher odds of demonstrating good knowledge and practice (AOR: 1.11, 95% CI: 1.07–4.97), and this result was statistically significant (p=0.022). While patients with mass media access showed slightly higher odds (AOR: 1.90), this result was not statistically significant (p=0.081).

In terms of **medical history**, patients who reported symptoms had over five times higher odds (AOR: 5.55, 95% CI: 1.04–5.33) of demonstrating good knowledge and practice compared to those without symptoms, with a p-value of 0.041. Additionally, patients who used alternative remedies had 48% lower odds of demonstrating good knowledge and practice (AOR: 0.52, 95% CI: 0.26–0.94, p=0.043). Moreover, patients who experienced a diagnosis delay had 58% lower odds of exhibiting good knowledge and practice (AOR: 0.42, 95% CI: 0.22–0.79, p<0.001). On the other hand, those who experienced discomfort had more than twice the odds (AOR: 2.33, 95% CI: 1.01–5.57, p=0.039) of demonstrating good knowledge and practice compared to those who did not experience discomfort (Table 3).

In regards of **family support**, patients who felt uncomfortable discussing their health issues with their spouse had 2.39 times higher odds of demonstrating good knowledge and practice (AOR: 2.39, 95% CI: 1.03–4.79, p = 0.046). Additionally, those who received support from their spouse after diagnosis had 21% higher odds (AOR: 1.21, 95% CI: 1.11–2.91, p=0.036) of exhibiting good knowledge and practice. Patients who received support from their social circle were 46% less likely to demonstrate good knowledge and practice (AOR: 0.54, 95% CI: 0.26–0.89, p=0.009) compared to those who didn’t receive (Table 3).

The adjusted model utilized in this study demonstrated a good fit as it successfully passed the Hosmer and Lemeshow goodness-of-fit test. Furthermore, the classification accuracy was deemed acceptable, with AUC values of 74.46%, as shown in Tables 4 and Figure 2.

**Discussion**

In this study, a large portion of patients lacked awareness of the symptoms of breast cancer and did not engage in regular breast checks or seek immediate medical attention upon noticing symptoms. These results are almost similar to the study done which reported awareness about breast mass as the cardinal symptom of breast cancer was known to half of the respondents [27]. Most patients also reported that they had never had their breasts checked by a healthcare professional before encountering health problems. Knowledge of mammography and its importance was also limited, with many patients unaware of the procedure. In terms of personal connections, only a small number of patients knew someone close to them who had been affected by cancer, and even fewer had prior knowledge of breast cancer or a family history of it. A study conducted among urban women in Ahmedabad city also revealed a small amount of their subjects were aware that family history increases breast cancer risk [28]. A study conducted on university female students in Bangladesh identify that, those who had a family history of breast cancer with close relatives had significantly higher knowledge about BSE procedure [29].

When looking at overall knowledge and practice, a little more than half of the patients demonstrated good knowledge and practice, while the remaining patients exhibited low levels of both. A study showed a similar range of knowledge as of our study; one survey in Saudi Arabia revealed that about 50% of participants had appropriate knowledge [30]. In contrast to our study, some studies showed that most participants had poor knowledge [31,32]. A study conducted before in Bangladesh showed more than half of the participants had no idea about the risk factors of breast cancer and the knowledge [15,33].

This study reveals significant regional differences in the levels of fear or discomfort patients experienced when discussing their breast cancer issues with their spouses. Patients in certain districts reported feeling less fear or discomfort, while others indicated a higher level of discomfort in sharing such personal matters. Similarly, the amount of support received from spouses after diagnosis varied across districts. In some areas, patients reported receiving strong support from their spouses, while in others, the support was notably lower. Additionally, the level of support from patients' social circles also showed regional disparities, with some districts reporting high levels of support from family and friends, while others had lower support. These variations suggest that local cultural, social, and familial factors may play a crucial role in shaping the emotional and social support available to breast cancer patients, influencing their overall experience and well-being during treatment.

In this study, educational status of spouse, household monthly income, using portable electronic devices, symptoms experienced by patients, consume alternative remedy, diagnosis delay, discomfort, fear to share the problem to spouse, received support from spouse and social circles, were significantly associated with patients’ knowledge and practice regarding breast cancer.

Age played a minimal role in knowledge and practice outcomes, with slightly higher percentages of good knowledge and practice observed in those aged under 40 and between 40 and 59 years. However, individuals aged 60 and above had a lower percentage, suggesting that age might not significantly impact breast cancer awareness. Individuals under 40 and those aged 40-59 had higher odds of exhibiting good knowledge and practice compared to those aged 60 or older, but these differences were not statistically significant.

Geographic location, however, had more pronounced effects, with patients in Rangpur (situated in the northern region of the country) exhibiting the highest levels of good knowledge and practice compared to other regions, particularly Chittagong (located in the southeastern part of Bangladesh), where the percentage was lower.Geographic location also played a role, with patients from Rangpur having higher odds of good knowledge and practice compared to Barisal, though this result was also not statistically significant. Similar to our study, a study conducted in India found no significant association found between demographic variables and level of knowledge of breast cancer [34]. But a clear regional variation exists in Breast self-examination awareness which was described in detail in a large study covering 24 low, middle-income and emerging economy countries by Pengpid and Peltzer [35].

Area of residence showed a minor difference, with urban residents having a slightly higher percentage of good knowledge and practice compared to their rural counterparts. Educational levels of both the patients and their spouses were important factors; patients whose spouses had higher education (secondary or beyond) demonstrated the highest levels of good knowledge and practice. Education level was a significant factor, as illiterate patients had lower odds of demonstrating good knowledge and practice, with the odds being 66% lower compared to those with secondary or higher education. Women with postgraduate studies had a significantly higher mean of knowledge which aligned with other studies [31,32]. A study conducted in Bangladesh found that, the number of years that had been studying had a significant association with breast cancer knowledge about symptoms, risk factors and treatment options, indicating that higher the educational level is associated with higher knowledge about breast cancer [29].

A significant association was found between household income and breast cancer awareness, with those earning more than 20,000 BDT monthly showing the best outcomes. In terms of income, patients with household incomes below 5,000 BDT had lower odds of exhibiting good knowledge and practice compared to those with incomes above 20,000 BDT, and this difference was statistically significant.

Access to technology also played a key role. Those with portable electronic devices or mass media access exhibited significantly better knowledge and practice, underscoring the importance of information access in improving awareness. Access to portable electronic devices was another key factor; patients with such access had higher odds of demonstrating good knowledge and practice, with this result being statistically significant.

On the other hand, while patients with mass media access had slightly higher odds of good knowledge and practice, this difference did not reach statistical significance. This ratio aligned with Mansour et al. study results concerning the role of social media in breast cancer awareness in the Gulf Cooperation Council (GCC) area, which revealed that social media raised breast cancer awareness and promoted breast cancer screening programs [36].

Additionally, patients who had symptoms showed much better knowledge and practice compared to those without symptoms, with the gap being statistically significant.

First health facility visits were another critical factor; those who initially visited private clinics were more likely to demonstrate good knowledge and practice.

Conversely, patients who had delayed diagnosis tended to show poorer knowledge and practice, suggesting that early detection is linked to better outcomes. Diagnosis delays were also associated with poorer knowledge and practice, as patients experiencing delays had more than half the odds of demonstrating good outcomes.

Patients who reported symptoms had significantly higher odds of demonstrating good knowledge and practice, with those experiencing symptoms more than five times more likely to show positive outcomes compared to those without symptoms.

Similarly, patients who used alternative remedies were less likely to show good knowledge and practice. Conversely, patients who used alternative remedies were less likely to exhibit good knowledge and practice, with their odds being nearly 50% lower.

Interestingly, patients who experienced discomfort had more than twice the odds of showing good knowledge and practice

Family and social support also had significant influences. Patients who were recommended to consult with a doctor by themselves or their spouses or other close family members had better knowledge and practice outcomes. A significant difference was found between those who felt uncomfortable discussing their health issues with their spouse and those who did not, with those feeling uncomfortable showing poorer knowledge and practice. Patients who felt uncomfortable discussing their health with their spouse had higher odds of demonstrating good knowledge and practice, indicating that discomfort in sharing health problems may lead to greater awareness or action. As breast cancer can be diagnosed early by breast screening programs, it was important to determine the possible barriers to screening. The results indicate that embarrassment was the leading barrier to breast screening programs. From the results, it was also evident that most of the participants were worried, lacked knowledge and were less confident about sharing their problems with healthcare providers and people in society, which is consistent with some previous studies [37,38].

Lastly, receiving spousal support after diagnosis was linked to better knowledge and practice, while a lack of support from a social circle was associated with lower levels of breast cancer awareness.On the other hand, those who received support from their spouse after diagnosis were more likely to exhibit good knowledge and practice, with a 21% increase in the odds of positive outcomes.

However, patients who received support from their social circle were less likely to show good knowledge and practice, highlighting a possible disconnect between social support and actual health behaviors. This could be due to their less interest in sharing personal experiences with other females, as it is not a common social norm in Bangladesh [39]. Pakistan has a similar scenario [40].

According to the American Cancer Society (ACS), BSE is helpful in early diagnosis but can increase stress and anxiety in females and decrease survival [41]. Again, in developing countries, there is a lack of interest in undergoing mammography because of the cost. Moreover, if mammography is available, mammography-based screening is not executed well [42]. Story et al [11] while attempting to recruit participants for a clinical trial relevant to breast cancer in Bangladesh in 2012, found that the consequence of diagnosing with breast cancer might be devastating for the women as they might face rejection, divorce or even a stimulus for suicide. All these clearly outlines the importance of raising awareness and removing stigma surrounding breast cancer in the country [43]. Therefore, it is important to have programs on knowledge and awareness of breast cancer and BSE by targeting high-risk populations. This would help to reduce the frequency of disease and enable early-stage diagnosis and its management using the country's available resources.

This finding may also reflect the situation in society, where there is a gap between the affected females and other people. If others in society received proper counselling, awareness programs, education and knowledge regarding breast cancer, it would mitigate the issue of late diagnosis and facilitate the proper management of patients diagnosed with breast cancer.

The findings from the present study show that a lack of knowledge of performing BSE and socio-cultural factors against breast screening might be the causes of the unsatisfactory level of breast cancer awareness in Bangladesh. More awareness programs and proper knowledge delivery may change this scenario, although breast cancer prevalence is on the rise. Healthcare professionals and the government can come forward together to formulate an executable policy that can diagnose and increase awareness among the females as well as in society.

Study strengths and limitation

This study contributes to an understanding and fills a gap in the current knowledge, relating to diabetes self-management practices, and perceived social support from family and friends and diabetes care for older people in South Africa. However, the study has some limitations. First, as a cross-sectional survey design, our study could not assess cause and effect. Second, the measurements of self-report rather than direct observation of self-care practices are recognised as a limitation. In addition, the use of a convenience sample drawn from a population who attend a diabetes clinic excludes those who did not attend. Third, younger participants age <60 years were not included in this study to enable comparison of outcome measures to older participants. Fourth, our study was limited to one region and may not be representative of all older South Africans with diabetes. Lastly, as an assessment tool, we have used a diabetes-related social support scale which we believe was a more specific tool in identifying diabetes specific social support than a more general social support scale. However, it would have been strengthened by adding an open-ended component following the social support scale, (for example asking the participant to list the top 3 ways that family and friends help in managing diabetes, and the 3 ways they help least in diabetes management). This might have provided better insight into what role family and friends play in the management process and inform more appropriate measures and/or items on social support scales.

Future research should focus on developing and evaluating family/friends focused community-based multi-disciplinary education programmes to improve DSMP among older individuals attending primary care clinics with a view to enhancing the quality of life and to reduce disability.

One of the main limitations of the present study is that it is not representative of the whole Bangladeshi population or the participants are comparatively more health-aware. As the socio-cultural situation is not conducive to covering a wide variety of demographic classes, the study was conducted in a cancer hospital located in the nation's capital. Also, the research was conducted with no external funding. So, we were limited to collecting the sample from other regions of Bangladesh. Further research can be performed on a wider scale, covering more respondents from different demographic classes and geographic locations to picture the total scenario that may lead to the design of intervention programs on breast cancer awareness.

Although our study is one of the fewer attempts to explore knowledge and practice of BSE among university students, it was not without limitations. The major limitation of the study is the target population. We acknowledge that the ideal target group would have been older women with little or no education. However, university students were chosen for convenience and get an initial idea about the status of awareness on BSE among younger educated women. Another limitation was convenience (non-random) sampling method rendering the study findings non-generalizable to the target population. To get around the problem and make it as generalizable as possible, we purposively choose two public and two private universities so that the sample reflects all socioeconomic strata in our sample. In addition, we selected students from different departments of the universities so that none is missed. Still, the study comprised a small sample and covered only four universities. A qualitative assessment of factors determining practice of BSE could not be done, potentially leaving important determinants. But we recommend further large sample mixed method studies to find the current state of knowledge and practice and associated factors among susceptible women.

Conclusions

Consideration needs to be given to developing and evaluating education programmes that focus on the needs of older people with diabetes mellitus and emphases the role of family and friends. However, it is imperative to introduce programmes at a younger age so that diabetes self-management strategies are embedded as a life course perspective to enhance positive outcomes for persons living with diabetes.

**References**

[1] M.O. Abbas, M. Baig, Knowledge and Practice Concerning Breast Cancer Risk Factors and Screening among Females in UAE, Asian Pac J Cancer Prev 24 (2023) 479. https://doi.org/10.31557/APJCP.2023.24.2.479.

[2] H. Sung, J. Ferlay, R.L. Siegel, M. Laversanne, I. Soerjomataram, A. Jemal, F. Bray, Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries, CA Cancer J Clin 71 (2021) 209–249. https://doi.org/10.3322/CAAC.21660.

[3] R.A. da Costa Vieira, G. Biller, G. Uemura, C.A. Ruiz, M.P. Curado, Breast cancer screening in developing countries, Clinics (Sao Paulo) 72 (2017) 244–253. https://doi.org/10.6061/CLINICS/2017(04)09.

[4] E.M. Ferlay J, Soerjomataram I, GLOBOCAN 2012: Estimated Cancer Incidence, Mortality and Prevalence Worldwide in 2012 v1.0, 2013. http://globocan.iarc.fr. (accessed January 25, 2025).

[5] T. Shamsi, Burden of breast cancer in Bangladesh-current and future and financing treatment with link to willingness to pay, International Journal of Community Medicine and Public Health Shamsi T. Int J Community Med Public Health 8 (2021) 5525–5528. https://doi.org/10.18203/2394-6040.ijcmph20214295.

[6] M.N. Amin, M.G. Uddin, M.N. Uddin, M.Z. Rahaman, S.A. Siddiqui, M.S. Hossain, M.R. Islam, M.N. Hasan, S.M.N. Uddin, A hospital based survey to evaluate knowledge, awareness and perceived barriers regarding breast cancer screening among females in Bangladesh, Heliyon 6 (2020). https://doi.org/10.1016/J.HELIYON.2020.E03753.

[7] WHO supports early detection and control of cervical and breast cancer in Bangladesh, (n.d.). https://www.who.int/bangladesh/news/detail/10-11-2020-who-supports-early-detection-and-control-of-cervical-and-breast-cancer-in-bangladesh (accessed January 25, 2025).

[8] H.S. Steiness, M. Villegas-Gold, H. Parveen, T. Ferdousy, O. Ginsburg, Barriers to care for women with breast cancer symptoms in rural Bangladesh, Health Care Women Int 39 (2018) 536–554. https://doi.org/10.1080/07399332.2018.1446958.

[9] L. Caplan, Delay in Breast Cancer: Implications for Stage at Diagnosis and Survival, Front Public Health 2 (2014) 87. https://doi.org/10.3389/FPUBH.2014.00087.

[10] A. Gupta, K. Shridhar, P.K. Dhillon, A review of breast cancer awareness among women in India: Cancer literate or awareness deficit?, Eur J Cancer 51 (2015) 2058–2066. https://doi.org/10.1016/J.EJCA.2015.07.008.

[11] N. Dahiya, S. Basu, M.C. Singh, S. Garg, R. Kumar, C. Kohli, Knowledge and Practices Related to Screening for Breast Cancer among Women in Delhi, India, Asian Pac J Cancer Prev 19 (2018) 155. https://doi.org/10.22034/APJCP.2018.19.1.155.

[12] V.G. Vogel, Breast cancer prevention: A review of current evidence, CA Cancer J Clin 50 (2000) 156–170. https://doi.org/10.3322/CANJCLIN.50.3.156.

[13] S.B. Abdel-Aziz, T.T. Amin, M.B. Al-Gadeeb, A.I. Alhassar, A. Al-Ramadan, M. Al-Helal, M. Bu-Mejdad, L.A. Al-Hamad, E.H. Alkhalaf, Perceived barriers to breast cancer screening among Saudi women at primary care setting, J Prev Med Hyg 59 (2018) E20–E29. https://doi.org/10.15167/2421-4248/JPMH2018.59.1.689.

[14] M.S. Hossain, S. Ferdous, H.E. Karim-Kos, Breast cancer in South Asia: a Bangladeshi perspective, Cancer Epidemiol 38 (2014) 465–470. https://doi.org/10.1016/J.CANEP.2014.08.004.

[15] F. Mehejabin, M.S. Rahman, Knowledge and perception of breast cancer among women of reproductive age in Chattogram, Bangladesh: A cross‐sectional survey, Health Sci Rep 5 (2022) e840. https://doi.org/10.1002/HSR2.840.

[16] Z. Vanaki, Z. Parsa Yekta, A. Kazemnejad, A.R. Heydarnia, Interpretation of Support for Cancer Patients under Chemotherapy: A Qualitative Research, Iranian Journal of Psychiatry and Clinical Psychology 9 (2003) 53–61. http://ijpcp.iums.ac.ir/article-1-206-en.html (accessed January 26, 2025).

[17] B.A. Hilton, J.A. Crawford, M.A. Tarko, Men’s perspectives on individual and family coping with their wives’ breast cancer and chemotherapy, West J Nurs Res 22 (2000) 438–459. https://doi.org/10.1177/019394590002200405.

[18] L.D. Clyburn, M.J. Stones, T. Hadjistavropoulos, H. Tuokko, Predicting caregiver burden and depression in Alzheimer’s disease, J Gerontol B Psychol Sci Soc Sci 55 (2000). https://doi.org/10.1093/GERONB/55.1.S2.

[19] I. Hasson-Ohayon, G. Goldzweig, M. Braun, D. Galinsky, Women with advanced breast cancer and their spouses: diversity of support and psychological distress, Psychooncology 19 (2010) 1195–1204. https://doi.org/10.1002/PON.1678.

[20] G. Mehiret, A. Molla, A. Tesfaw, Knowledge on risk factors and practice of early detection methods of breast cancer among graduating students of Debre Tabor University, Northcentral Ethiopia, BMC Womens Health 22 (2022). https://doi.org/10.1186/S12905-022-01768-0.

[21] M. Tavakol, R. Dennick, Making sense of Cronbach’s alpha, Int J Med Educ 2 (2011) 53. https://doi.org/10.5116/IJME.4DFB.8DFD.

[22] M. Harris, H. Thulesius, A.L. Neves, S. Harker, T. Koskela, D. Petek, R. Hoffman, M. Brekke, K. Buczkowski, N. Buono, E. Costiug, G.J. Dinant, G. Foreva, E. Jakob, M. Marzo-Castillejo, P. Murchie, J. Sawicka-Powierza, A. Schneider, E. Smyrnakis, S. Streit, G. Taylor, P. Vedsted, B. Weltermann, M. Esteva, How European primary care practitioners think the timeliness of cancer diagnosis can be improved: a thematic analysis, BMJ Open 9 (2019) e030169. https://doi.org/10.1136/BMJOPEN-2019-030169.

[23] M.N. Hasan, M. Abdul Baker Chowdhury, J. Jahan, S. Jahan, N.U. Ahmed, M.J. Uddin, Cesarean delivery and early childhood diseases in Bangladesh: An analysis of Demographic and Health Survey (BDHS) and Multiple Indicator Cluster Survey (MICS), PLoS One 15 (2020) e0242864. https://doi.org/10.1371/JOURNAL.PONE.0242864.

[24] M.N. Hasan, M.R. Babu, M.A.B. Chowdhury, M.M. Rahman, N. Hasan, R. Kabir, M.J. Uddin, Early childhood developmental status and its associated factors in Bangladesh: a comparison of two consecutive nationally representative surveys, BMC Public Health 23 (2023) 1–13. https://doi.org/10.1186/S12889-023-15617-8/TABLES/4.

[25] M.N. Hasan, S. Tambuly, K.F. Trisha, M.A. Haque, M.A.B. Chowdhury, M.J. Uddin, Knowledge of HIV/AIDS among married women in Bangladesh: analysis of three consecutive multiple indicator cluster surveys (MICS), AIDS Res Ther 19 (2022) 1–10. https://doi.org/10.1186/S12981-022-00495-8/TABLES/3.

[26] M.A. Islam, M.N. Hasan, T. Ahammed, A. Anjum, A. Majumder, M.N.E.A. Siddiqui, S.K. Mukharjee, K.F. Sultana, S. Sultana, M. Jakariya, P. Bhattacharya, S.A. Sarkodie, K. Dhama, J. Mumin, F. Ahmed, Association of household fuel with acute respiratory infection (ARI) under-five years children in Bangladesh, Front Public Health 10 (2022) 985445. https://doi.org/10.3389/FPUBH.2022.985445/BIBTEX.

[27] S. Puri, C. Mangat, V. Bhatia, M. Kalia, A. Sehgal, A.P. Kaur, Awareness Of Risk Factors And Aspects of Breast Cancer Among North Indian Women, The Internet Journal of Health 8 (2008). https://doi.org/10.5580/A7590.

[28] K. Agarwal, N. Gupta, J. Shah, R. Aggarbattiwala, PERCEPTION OF WOMEN REGARDING BREAST CANCER IN URBAN AND RURAL COMMUNITY OF AHMEDABAD DISTRICT, J Evol Med Dent Sci 3 (2014) 8240–8247. https://doi.org/10.14260/JEMDS/2014/3037.

[29] R. Sarker, M.S. Islam, S. Moonajilin, M. Rahman, H.A. Gesesew, P.R. Ward, Knowledge of breast cancer and breast self-examination practices and its barriers among university female students in Bangladesh: Findings from a cross-sectional study, PLoS One 17 (2022). https://doi.org/10.1371/JOURNAL.PONE.0270417.

[30] A.H. Al-Zalabani, K.D. Alharbi, N.I. Fallatah, R.I. Alqabshawi, A.A. Al-Zalabani, S.M. Alghamdi, Breast Cancer Knowledge and Screening Practice and Barriers Among Women in Madinah, Saudi Arabia, J Cancer Educ 33 (2018) 201–207. https://doi.org/10.1007/S13187-016-1057-7.

[31] Breast Cancer Risk factor awareness and utilization of screening program: A cross-sectional study among women in the Northern Emirates - PubMed, (n.d.). https://pubmed.ncbi.nlm.nih.gov/30145548/ (accessed February 1, 2025).

[32] Y.E. Elobaid, T.C. Aw, M. Grivna, N. Nagelkerke, Breast cancer screening awareness, knowledge, and practice among arab women in the United Arab Emirates: a cross-sectional survey, PLoS One 9 (2014). https://doi.org/10.1371/JOURNAL.PONE.0105783.

[33] M.N. Amin, M.G. Uddin, M.N. Uddin, M.Z. Rahaman, S.A. Siddiqui, M.S. Hossain, M.R. Islam, M.N. Hasan, S.M.N. Uddin, A hospital based survey to evaluate knowledge, awareness and perceived barriers regarding breast cancer screening among females in Bangladesh, Heliyon 6 (2020). https://doi.org/10.1016/J.HELIYON.2020.E03753.

[34] R. Singh, A. Turuk, A study to assess the knowledge regarding breast cancer and practices of breast self-examination among women in urban area, Int J Community Med Public Health 4 (2017) 4341–4347. https://doi.org/10.18203/2394-6040.IJCMPH20174856.

[35] S. Pengpid, K. Peltzer, Knowledge, attitude and practice of breast self-examination among female university students from 24 low, middle income and emerging economy countries, Asian Pac J Cancer Prev 15 (2014) 8637–8640. https://doi.org/10.7314/APJCP.2014.15.20.8637.

[36] D. Mansour, A. Nashwan, H.A. Rasheed, M. Hararah, H. Nassar, R.A. Abbas, M. Alnuaimi, B. Mrayat, Use of Social Media in Breast Cancer Awareness: GCC Countries’ Experience, J Glob Oncol 4 (2018) 30s–30s. https://doi.org/10.1200/JGO.18.66200.

[37] M. Elshami, R. Dabbour, T. Hasan, E. Saleh, H. Shawwa, H.A. Kmeil, M. Abu-Jazar, I. Mahfouz, D. Ashour, A. Aljamal, N. Mohareb, R. Elbalaawi, M. Abdelati, R. Al-Ghazali, B. Bottcher, J. Ghaith, L. Albarqouni, Breast Cancer Awareness and Barriers to Early Presentation in the Gaza-Strip: A Cross-Sectional Study, J Glob Oncol 4 (2018). https://doi.org/10.1200/JGO.18.00095.

[38] S.B. Abdel-Aziz, T.T. Amin, M.B. Al-Gadeeb, A.I. Alhassar, A. Al-Ramadan, M. Al-Helal, M. Bu-Mejdad, L.A. Al-Hamad, E.H. Alkhalaf, Perceived barriers to breast cancer screening among Saudi women at primary care setting, J Prev Med Hyg 59 (2018) E20. https://doi.org/10.15167/2421-4248/JPMH2018.59.1.689.

[39] M.N. Amin, M.G. Uddin, M.N. Uddin, M.Z. Rahaman, S.A. Siddiqui, M.S. Hossain, M.R. Islam, M.N. Hasan, S.M.N. Uddin, A hospital based survey to evaluate knowledge, awareness and perceived barriers regarding breast cancer screening among females in Bangladesh, Heliyon 6 (2020) e03753. https://doi.org/10.1016/j.heliyon.2020.e03753.

[40] A.S. Abdallah, R.M. El-Gharabawy, H.O. AL-Suhaibany, Knowledge, Attitude and Practice about Breast Cancer among Women in Saudi Arabia, Int Arch Med (2015). https://doi.org/10.3823/1847.

[41] J.A. Tice, K. Kerlikowske, Screening and Prevention of Breast Cancer in Primary Care, Primary Care - Clinics in Office Practice 36 (2009) 533–558. https://doi.org/10.1016/j.pop.2009.04.003.

[42] M.N. Okobia, C.H. Bunker, F.E. Okonofua, U. Osime, Knowledge, attitude and practice of Nigerian women towards breast cancer: A cross-sectional study, World J Surg Oncol 4 (2006) 1–9. https://doi.org/10.1186/1477-7819-4-11/TABLES/5.

[43] H.L. Story, R.R. Love, R. Salim, A.J. Roberto, J.L. Krieger, O.M. Ginsburg, Improving outcomes from breast cancer in a low-income country: lessons from bangladesh, Int J Breast Cancer 2012 (2012) 1–9. https://doi.org/10.1155/2012/423562.