**Understanding Delays in Breast Cancer Diagnosis in Bangladesh**

Mohammad Sorowar Hossain1,2\*, Sumaya Khan Trisha1†, Mohammad Nayeem Hasan1†, Waheed Akhter3 and Henrike Karim-Kos4,5

1. Department of Emerging and Neglected Diseases, Biomedical Research Foundation, Dhaka, Bangladesh
2. School of Environment and Life Sciences, Independent University, Bangladesh, Dhaka, Bangladesh
3. National Institute of Cancer Research & Hospital, Dhaka, Bangladesh
4. Princess Máxima Center for Pediatric Oncology, Utrecht, The Netherlands
5. Department of Research and Development, Netherlands Comprehensive Cancer Organisation (IKNL), Utrecht, The Netherlands

† Sumaya Khan Trishaand Mohammad Nayeem Hasan contributed equally to this work

\* Correspondence: Mohammad Sorowar Hossain, PhD; Biomedical Research Foundation, Dhaka, Bangladesh, Email: [sorowar.hossain@brfbd.org](mailto:sorowar.hossain@brfbd.org)

**Abstract**

**Background:** This study investigates factors contributing to delays in breast cancer diagnosis in Bangladesh and their impact on cancer staging. Early detection is crucial for effective treatment, yet many women in low- and middle-income countries (LMICs) are diagnosed at advanced stages, resulting in poorer outcomes.

**Methods:** A cross-sectional study was conducted at two major cancer care facilities in Dhaka. Women aged 18 and older with suspected or confirmed breast cancer were included. Data were collected using a structured questionnaire on sociodemographic and clinical variables. Total delay, defined as the time from symptom recognition to treatment initiation, was categorized into patient delay (symptom recognition to first medical consultation) and provider delay (first consultation to treatment start). Logistic regression analyses identified factors associated with these delays.

**Results:** Among 355 participants, 55.7% experienced total delays of over four months, with the highest delays in stage III cases (51.5%). Key factors contributing to patient delay included low education (Adjusted Odds Ratio [AOR]: 1.96, 95% CI: 1.04–3.74), low monthly income (AOR: 1.45, 95% CI: 1.22–1.90), and absence of breast pain (AOR: 0.55, 95% CI: 0.32–0.94). Provider delays were significantly associated with rural residence (AOR: 3.07, 95% CI: 1.49–6.98), and presence of nipple discharge (AOR: 2.92, 95% CI: 1.04–8.06). Total delays were most prevalent among patients from the Rangpur division (AOR: 6.07, 95% CI: 1.76–8.02), rural areas (AOR: 2.04, 95% CI: 1.17–3.61), and those with lower education. Additionally, nearly 80% of patients delayed seeking medical attention due to the belief that symptoms would resolve spontaneously, while 75% cited negligence and 65.5% reported financial barriers.

**Conclusions**: Significant delays in breast cancer diagnosis in Bangladesh are driven by socio-economic factors and inadequate healthcare access. Increasing public awareness, especially in rural areas, and improving healthcare accessibility are essential to facilitate early detection. Expanding screening programs and training healthcare providers in early cancer detection are critical to improving patient outcomes.

**Keywords:** Breast cancer, Clinical characteristics, Delays in diagnosis, Cancer staging, Bangladesh

**Background**

Breast cancer is a significant public health concern worldwide, with its impact expected to rise. In 2020, approximately 685,000 women died from breast cancer, accounting for around 16% of all cancer-related deaths among females—equivalent to one in every six cancer fatalities [1]. While the incidence of breast cancer is lower in developing countries compared to their developed counterparts, the mortality rates are disproportionately higher in these regions [2].

Although the incidence is rising due to epidemiological transitions in low- and middle-income countries (LMICs), breast cancer mortality is projected to increase by 53.6% between 2020 and 2040 [3]. This alarming trend poses significant challenges for policymakers aiming to reduce breast cancer mortality. A critical factor contributing to the higher mortality rates is delayed diagnosis, often exacerbated by limited access to healthcare [4]. Delayed diagnosis can be more detrimental to patient survival than the disease itself, as early detection and treatment are linked to improved prognoses [5]. Additionally, delays may lead to advanced disease stages and larger tumors.

In LMICs, two specific types of delays are particularly concerning. Patient delay refers to the interval between the onset of symptoms and the decision to seek medical attention. Research indicates that this delay often results from factors such as lack of awareness, educational deficits, cultural barriers, and fear of diagnosis [6–9]. Conversely, treatment/provider delay is the period between diagnosis and the initiation of treatment, influenced by healthcare system limitations such as inadequate primary care resources and ineffective referral processes [10]. Both types of delays have been shown to negatively impact patient outcomes; a meta-analysis by Hanna T.P. et al. (2020) revealed that a four-week treatment delay post-diagnosis significantly increases mortality risk in breast cancer patients. Therefore, addressing these delays through enhanced awareness, improved healthcare access, and strengthened healthcare systems is crucial for improving survival rates.

In Bangladesh, breast cancer represents a significant health disparity. According to the 2020 GLOBOCAN report, breast cancer is the leading cause of cancer deaths among women, responsible for 6.2% of all cancer-related fatalities and accounting for 19% of all female cancer cases (1). These statistics underscore the substantial burden of breast cancer on women's health and the urgent need for targeted healthcare interventions.

Women play a vital role in Bangladesh's economy and social development, particularly in sectors such as clothing and microfinance. Their health is essential for fostering healthy families and communities. However, issues related to women's health, including breast cancer, often receive insufficient attention. Alarmingly, about 90% of breast cancer patients in Bangladesh are diagnosed at advanced stages (III and IV) [11]. Delayed diagnosis significantly worsens outcomes and reduces survival rates, while early detection improves prognosis and lowers treatment costs [12,13]. Therefore, reducing diagnostic delays is critical for improving health outcomes.

In Bangladesh, a number of factors, including age, education, occupation, living in a rural area, consulting a traditional healer, armpit lumps, and other medical conditions, can contribute to the delayed presentation of breast cancer (2). Due to a lack of awareness, a lack of understanding of available treatments, and uncertainty about where to seek care, many patients receive their diagnoses later than they should (3). Almost one-fourth of those surveyed were unsure of who to start with. Many first resort to alternative medicine because of its accessibility, affordability, and low literacy rates (4)(5). Significant obstacles prevent rural women, particularly those from lower socioeconomic backgrounds, from receiving timely diagnosis and care, which causes additional delays (6) (7,8).

Despite the fact that breast cancer is becoming a more significant public health issue in Bangladesh, little is known about early detection. Although we published the nation's first thorough review of breast cancer in 2014 [11], there hasn't been much progress in addressing diagnostic delays. Recent research has examined perceived barriers to screening [15] or general awareness and knowledge among particular groups, such as female university students [14]. These studies, however, do not fully investigate the underlying reasons for delayed diagnosis or take into account factors at the patient and provider levels. The lack of a comprehensive understanding of diagnostic delays is a major gap, since early detection is essential for bettering results. There is currently no systematic analysis of the ways in which cultural beliefs, healthcare system inefficiencies, and socioeconomic circumstances interact to postpone diagnosis in Bangladesh. This study aims to examine the socioeconomic and health system-related factors contributing to diagnostic delays in breast cancer from both patient and provider perspectives. The results are intended to guide focused interventions and policy plans to shorten diagnostic wait times and enhance the prognosis of breast cancer in Bangladesh.

**Methods**

We adhered to the STROBE guidelines to ensure high-quality reporting in our observational cross-sectional study (Table S1).

**Study Site**

This study was conducted at the National Institute of Cancer Research and Hospital (NICRH), the only public facility in Bangladesh dedicated exclusively to cancer treatment. Public hospitals, like NICRH, primarily serve individuals from economically disadvantaged and lower-middle-class backgrounds, as the costs of treatment in private facilities are often unaffordable for most Bangladeshis [11]. Currently, Bangladesh lacks organized breast cancer screening programs, leading to almost all cases being diagnosed through clinical evaluation rather than early detection. Additionally, unlike in developed countries, there is no systematic referral system in place, and medical record-keeping is inadequate.

**Patients**

The study focused on women over 18 years old who presented with suspected breast cancer or had been diagnosed with the disease. Only those patients were enrolled whose initial cancer stage was documented in their medical records or, in cases where staging was unavailable, if the initial diagnosis occurred no more than six months prior to staging at our study center.

**Questionnaire**

We adapted a structured questionnaire from previous studies [5,16]. The questionnaire comprised sections on sociodemographic variables, including age, education level, marital status, residence, and access to media and electronic devices. It also collected clinical history regarding breast cancer symptoms, capturing the type of initial symptoms (e.g., lump, breast pain, nipple discharge), the date of first symptom recognition, and participants’ perceptions of their symptoms’ severity.

Furthermore, the questionnaire explored barriers to seeking care, encompassing emotional factors (e.g., fear, embarrassment), practical constraints (e.g., financial limitations, time constraints), and health service-related issues (e.g., challenges in accessing healthcare, arranging transportation, or scheduling appointments). Participants were asked about their healthcare utilization, including the type of medical facility they first visited and any alternative treatments sought prior to diagnosis. The survey also assessed family support by gathering information on initial discussions about health concerns, recommendations to seek medical attention, and the level of support received after diagnosis. Knowledge and practices related to early detection were evaluated, focusing on breast self-examinations, prior clinical breast examinations, and awareness of mammography. Clinical variables, including tumor size and cancer stage classified by the tumor, node, and metastasis (TNM) system, were recorded. The data collected to analyze associations between these variables and delays in diagnosis, offering insights into factors contributing to late-stage detection and their potential impact on treatment outcomes. The questionnaire was finalized for data collection after piloting it with five patients. The data collected during the pilot phase were consistent with the main study objectives and met the quality criteria for inclusion.

**Data Collection**

A convenience sampling method was employed due to the unavailability of patient registries. Eligible participants were patients presenting at the participating facilities during the study period who met the predefined inclusion and exclusion criteria. Data collection was conducted from January to March 2024. Prior to participation, verbal informed consent was obtained in accordance with the approved study protocol. Structured, face-to-face interviews were carried out by trained final-year female undergraduate students who were not involved in the clinical management of the patients. Considering the conservative cultural context, all interviewers were female and worked under the close supervision of the team’s oncologist at the National Institute of Cancer Research & Hospital (NICRH).

Participants included women aged 18 years and older who had either been diagnosed with breast cancer or were suspected cases referred to the participating centers. Clinical data related to symptom onset, first medical consultation, and diagnosis were extracted from patients' medical records where available. In cases where specific dates could not be recalled, participants were asked to provide an approximate month or range of months and the year. If a single month was given, the 15th day of that month was recorded; for a range of months, the midpoint between the 15th of each month was used. When only the year was recalled, the date was recorded as June 30th of that year. Cancer staging was determined by the team’s oncologist based on available medical documentation. However, staging could not be determined for 355 patients due to insufficient clinical records.

**Outcome Variables**

In this study, delay is defined as the time interval experienced by women in the diagnostic and treatment processes. Patient delay, refers to the time between the onset of symptoms and the first medical consultation, with a commonly accepted threshold for defining this delay being three months. Provider delay, or system delay, refers to the time that passes between the initial medical consultation and the final diagnosis or treatment, with a commonly accepted threshold of one month [5]. Total delay encompasses the entire duration from the patient's first recognition of symptoms to the start of definitive treatment, integrating both patient and provider delays. In our study, total delay is considered significant when it exceeds four months. To quantify our outcome variables related to delays, we categorized each patient as "1" or "Yes" if they experienced patient delay, provider delay, or total delay that surpassed the thresholds of three months, one month, and four months, respectively. Conversely, patients who did not meet these criteria were recorded as having no delays, designated by "0" or "No."

Data were collected on factors associated with patient delays, such as believing the problem would resolve on its own, fear of cancer diagnosis and/or treatment, financial constraints, competing life priorities, embarrassment about breast examinations, negligence or carelessness, etc. Additionally, system-related delays included appointment delays, misinterpreted mammography, difficulty arranging transport, lack of information, etc.

**Possible factors**

To find out potential risk factors associated with various types of delays, we examined a range of socioeconomic factors and the medical history of the patients as independent variables. These included the patient's age, geographic location (division), residency (urban or rural), educational attainment (illiterate, primary, and secondary) of both the patient and their spouse, household monthly income, access to portable electronic devices, exposure to mass media, lump breast pain, nipple discharge, skin changes, bone pain, breast self-examination, and family history of breast cancer.

**Statistical analyses**

We conducted descriptive statistics and also differences between delays associated with other factors tested by Chi-square tests and Fisher's exact test (in case of low frequency). Univariable (unadjusted) and multivariable (adjusted) logistic regression were utilized to identify factors that are associated with patient delay, provider delay, and total delay. In the univariable analysis, variables were individually added to the logistic regression model. We used an arbitrary p-value of ≤ 0.20 as a criterion for including covariates in the multivariable models from univariable model [17] . It is crucial to understand that a very small p-value does not prove the null hypothesis or the alternative. Furthermore, the p-value by itself cannot reveal the magnitude or significance of the group differences. Even with large sample sizes or extremely accurate measurements, differences that are not clinically meaningful may be reflected in statistically significant results (9).

In this study, three models were utilized to identify associated risk factors of patient delay, provider delay, and total delay, designated as Model 1, Model 2, and Model 3, respectively. Results were reported as unadjusted/crude odds ratios (COR) and adjusted odds ratios (AOR) with their respective 95% confidence intervals. We considered a p-value of less than 0.05 to be statistically significant, indicating a 5% level of significance for interpreting our results. Additionally, we assessed multicollinearity in the final model using a cut-off value of 4.00 for the variance inflation factor (VIF) analysis [18]. At this stage, all variables were incorporated into the model since the VIF values for each variable were below 4.00. All analyses were performed using R software.

**Results**

**Study Population**

A total of 355 women participated in our study. The largest age group was 40-49 years, comprising 35.0% of participants. Most women resided in the Dhaka division (44.0%), with a significant proportion (72.8%) from rural areas. A notable majority of participants were married (82.8%). Illiteracy was prevalent, affecting 42.9% of patients, while primary education was the most common level of education among spouses (37.1%). Over a third of families reported a monthly income of less than 5,000 BDT. Access to electronic devices was high (89.9%), but 59.4% lacked access to mass media (Table 1).

**Clinical Characteristics and Associated Factors**

As shown in Table 2, 88.5% of patients initially presented with a lump. Only 11.1% practiced breast self-examination, and 9.5% reported a family history of breast cancer. Patient delay (defined as a delay of more than three months) occurred in 41.0% of cases, while provider delay (more than one month) was noted in 24.3%. Total delay (more than four months) affected 55.7% of participants. Most patients sought medical help at stage II (48.8%) or stage III (44.1%).

Statistical analysis revealed significant differences in patient delay across cancer stages, with mean delays of 0.93 months for stage I, 5.23 months for stage II, 6.33 months for stage III, and 3.21 months for stage IV. Provider and total delays did not show significant variation across stages. Notably, stage III exhibited the highest patient delay (51.5%) and total delay (48.6%), while stage I had the lowest patient delay (2.0%) and total delay (1.4%). These findings underscore the urgent need for targeted interventions to reduce delays at various cancer stages (Table 3 and Fig. 1).

Fig. 2 illustrates that the most common symptoms experienced by patients included breast discomfort (52.1%), followed by a lump (45.9%), arm discomfort (34.8%), itching (33.8%), changes in breast shape (31.4%), skin changes (12.7%), nipple discharge (12.1%), and ulcer or sore skin (11.5%).

**Reasons for Delay in Medical Care**

Table 4 identifies the primary reasons for delays in seeking medical care. The most common belief was that the issue would resolve on its own (79.1%), followed by negligence (75.5%), financial constraints (65.5%), family responsibilities (54.7%), embarrassment (44.6%), busy schedules (41.0%), and fear of a cancer diagnosis (38.1%). Additional factors included transportation difficulties (27.3%), lack of information (24.5%), delays in securing appointments (21.6%), and other reasons (20.1%).

**Types of Delay and Associated Factors**

Table S2 highlights key risk factors for patient delay. This delay was particularly prevalent among illiterate individuals (47.7%), those with a monthly income below 5,000 BDT (50.4%), and those lacking access to electronic devices (60.0%) or mass media (43.9%). Additionally, the absence of breast pain was linked to a higher rate of delay (44.1%). Adjusted analyses revealed that illiterate patients had nearly double the odds of experiencing delay (AOR: 1.96, 95% CI: 1.04-3.74) compared to those with secondary or higher education. Patients with a monthly income of 5,000-10,000 BDT had 1.45 times higher odds of delay compared to those earning over 20,000 BDT. Conversely, those experiencing breast pain had 45% lower odds of delay (AOR: 0.55, 95% CI: 0.32-0.94) than those without pain.

Table S3 presents significant factors associated with provider delay. Patients from the Rangpur division had over four times higher odds of experiencing provider delay (AOR: 4.60, 95% CI: 1.11-7.52) compared to those from Barisal. Rural residents had three times higher odds (AOR: 3.07, 95% CI: 1.49-6.98), and those with nipple discharge had nearly three times higher odds (AOR: 2.92, 95% CI: 1.04-8.06).

Table 5 summarizes the factors associated with total delay, indicating that patients from the Rangpur division had over six times higher odds of total delay (AOR: 6.07, 95% CI: 1.76-8.02). Rural residents faced double the odds of total delay (AOR: 2.04, 95% CI: 1.17-3.61). Unmarried patients and those with lower educational attainment also exhibited higher odds of total delay, along with symptoms such as breast pain, nipple discharge, and bone pain.

**Discussion**

This study highlights several key factors contributing to diagnostic delays in breast cancer care in Bangladesh, including self-perceived beliefs and negligence, fear, embarrassment, economic and educational barriers, and geographic disparities. Understanding these factors is critical for developing effective interventions to reduce delays and improve outcomes for breast cancer patients.

A significant portion of patients (79.1%) delayed seeking medical attention due to the belief that their symptoms would resolve on their own. This suggests a pervasive lack of awareness about the severity of breast cancer symptoms, such as lumps or nipple discharge, which often leads to advanced-stage diagnoses. This self-perceived belief is dangerous as it allows the disease to progress unchecked, increasing the risk of mortality. Negligence or carelessness was also cited by 75.5% of participants, indicating that even when symptoms are acknowledged, there is a tendency to delay seeking care due to underestimating the potential severity of the symptoms. This finding aligns with similar studies conducted in Tunisia and Libya, where a significant percentage of women delayed seeking medical help due to the perception that their symptoms were not serious [7,19] . Improving awareness and education about the early warning signs of breast cancer is essential to encourage prompt medical consultation and reduce patient delay.

Fear of a cancer diagnosis or treatment emerged as a critical factor in delaying medical consultation, reported by 38.1% of participants. This fear is often compounded by a lack of knowledge and misconceptions about the disease and its treatment. Negative perceptions about the toxicity of cancer treatments, such as chemotherapy, can deter patients from seeking help. This is particularly evident in developing countries where fear of diagnosis is more prevalent among those with a family history of breast cancer [7,20]. In contrast, in the UK, only 4.9% of delays are attributed to fear, highlighting a significant difference in perception between developed and developing nations [21]. Disseminating positive information about cancer survivorship and organizing awareness campaigns can help alleviate this fear. Furthermore, encouraging cancer survivors to share their experiences could normalize discussions about the disease and reduce the stigma associated with cancer diagnosis and treatment.

Embarrassment related to breast examinations and discussing reproductive health is another significant barrier, particularly in societies with conservative norms. In Bangladesh, where concepts like 'Purdah' promote modesty, women may feel uncomfortable undergoing breast examinations or discussing their symptoms with healthcare providers. This cultural barrier is evident in our study, where 44.6% of participants reported embarrassment as a reason for delay. Similar trends are observed among South Asian women residing in developed countries, indicating that cultural influences on health-seeking behavior persist even outside their native contexts [22,23]. Efforts to increase awareness and normalize breast health discussions are crucial. Training healthcare providers, particularly female staff, to handle these situations sensitively can also reduce patient discomfort and encourage timely medical consultations.

Socio-economic factors, including education level and household income, significantly impact patient delays. Our study found that patients with a monthly income of 5,000-10,000 BDT had 1.45 times higher odds of experiencing delays compared to those with incomes over 20,000 BDT Financial constraints often prevent patients from seeking timely medical care, as many may prioritize other family needs over personal health. Moreover, education plays a crucial role in health-seeking behavior. Illiterate patients were found to delay diagnosis at twice the rate of those with secondary education or higher. Educated women are more likely to recognize symptoms and seek medical attention promptly, which is consistent with findings from other studies [24,25]. Lack of access to electronic devices and mass media further exacerbates this issue, as these are primary sources of health information. Women without access to these resources are less likely to be aware of breast cancer symptoms and the importance of early detection [26,27]. Targeted interventions, such as community-based educational programs and mass media campaigns, are needed to address these barriers.

Geographic location and area of residence significantly contribute to provider delays. Patients from rural areas and the Rangpur division experienced longer diagnosis times due to limited access to healthcare resources, long waiting times, and a scarcity of specialized medical professionals. In Bangladesh, there are approximately two nurses and five physicians per 10,000 people, which severely limits the capacity to provide timely care, particularly in rural areas [11]. A systematic review identified deficiencies in primary healthcare and referral processes as major factors influencing provider delays in breast cancer diagnosis [10] . Moreover, most specialized healthcare facilities are located in urban areas, forcing rural patients to rely on primary healthcare centers that may not be equipped for early cancer detection [28]. Training healthcare providers in early detection and improving referral systems are essential for reducing provider delays.

There are several limitations to this study. First, the study was conducted in two public hospitals in Dhaka, without including private healthcare facilities. This limits the generalizability of the findings to the broader population, as private hospitals may have different patient demographics and healthcare delivery models. Second, the lack of a systematic referral system and organized cancer screening programs in Bangladesh hampers early detection efforts, and cancer staging data were not comprehensively available for all patients, limiting the analysis of the impact of delays on cancer progression. Additionally, the use of a non-random convenience sampling method may introduce selection bias, and recall bias may affect the accuracy of self-reported data on symptom onset and first medical consultation.

**Conclusions**

The study underscores the urgent need for targeted interventions to reduce delays in breast cancer diagnosis in Bangladesh. Public awareness campaigns, especially in rural areas, are essential to educate women about the early signs and symptoms of breast cancer and the importance of early medical consultation. Expanding organized screening programs and training healthcare providers in early detection are crucial steps to improve early diagnosis and treatment outcomes. Efforts should also be made to improve healthcare accessibility, particularly in underserved areas, and to address socio-economic barriers that prevent women from seeking timely medical care.

Policymakers should prioritize the development of a robust referral system to streamline patient management and reduce provider delays. Collaborations with non-governmental organizations (NGOs) and community health workers to disseminate information and support women in accessing healthcare can further enhance the effectiveness of these interventions. Implementing educational programs targeting both patients and healthcare providers, and ensuring the availability of affordable healthcare services, will be essential to mitigate the impact of delayed breast cancer diagnosis in Bangladesh.

These findings provide a baseline for future research and policy-making aimed at improving breast cancer outcomes in Bangladesh. Addressing the identified barriers holistically will be key to reducing diagnostic delays and enhancing the quality of life for breast cancer patients in the country.

**Abbreviations**

LMICs Low- and middle-income countries

AOR Adjusted Odds Ratio

COR Crude Odds Ratio

NICRH National Institute of Cancer Research and Hospital

NGOs non-governmental organizations

TNM Tumor, node, and metastasis

VIF Variance inflation factor

CI Confidence Interval

**Acknowledgements**

We would like to extend our gratitude to Maliha Nuzhat Munir, Nazam Laila, Ishrat Binte Aftab, Akash Ahmed and SM Abdullah Al Mamun for their invaluable contributions to data collection.

**Author contributions**

MSH conceived the study concept. MSH and WH designed the study and oversaw data collection, while MNH and HKK handled data curation and formal analysis. The manuscript was drafted by MSH, SKS, MNH, and HKK. All authors critically reviewed the manuscript and fully endorse its results and conclusions.

**Funding**

None

**Data availability**

The datasets used and/or analyzed during the current study are available from the corresponding author on reasonable request

**Declarations**

**Ethics approval and consent to participate**

This study protocol was approved by the Ethical Review Board of the National Institute of Cancer Research and Health (NICRH/Ethics/2017/29). Informed written consent was taken from each patient. Trained research assistants used a structured questionnaire to conduct in-person interviews with illiterate respondents in order to gather data. The interviewer recorded the responses after reading the questions out loud in the local tongue. A literate witness, typically a family member or caregiver who was with the patient, signed the consent form on the participant's behalf after verbally obtaining informed consent. The ethics committee approved this procedure, which made sure that participants understood the goals and methods of the study before they participated.

**Consent for publication**

Not applicable.

**Competing interests**

The authors declare no competing interests.

**References**

1. Anderson BO, et al. The Global Breast Cancer Initiative: a strategic collaboration to strengthen health care for non-communicable diseases. The Lancet. Oncology 2021; 22: 578–581.

2. Sung H, et al. Global Cancer Statistics 2020: GLOBOCAN Estimates of Incidence and Mortality Worldwide for 36 Cancers in 185 Countries. CA: a cancer journal for clinicians 2021; 71: 209–249.

3. Arnold M, et al. Current and future burden of breast cancer: Global statistics for 2020 and 2040. Breast (Edinburgh, Scotland) 2022; 66: 15–23.

4. Rivera-Franco MM, Leon-Rodriguez E. Delays in Breast Cancer Detection and Treatment in Developing Countries. Breast Cancer: Basic and Clinical Research 2018; 12: 1178223417752677.

5. Maghous A, et al. Factors influencing diagnosis delay of advanced breast cancer in Moroccan women. BMC cancer 2016; 16: 356.

6. Donkor A. Factors contributing to late presentation of breast cancer in Africa: a systematic literature review. 2015; Published online: 21 December 2015.

7. Ermiah E, et al. Diagnosis delay in Libyan female breast cancer. BMC research notes 2012; 5: 452.

8. Ezeome ER. Delays in presentation and treatment of breast cancer in Enugu, Nigeria. Nigerian Journal of Clinical Practice 2010; 13: 311–316.

9. Jassem J, et al. Delays in diagnosis and treatment of breast cancer: a multinational analysis. European Journal of Public Health 2014; 24: 761–767.

10. Sobri FB, et al. Factors Affecting Delayed Presentation and Diagnosis of Breast Cancer in Asian Developing Countries Women: A Systematic Review. Asian Pacific journal of cancer prevention: APJCP 2021; 22: 3081–3092.

11. Hossain MS, Ferdous S, Karim-Kos HE. Breast cancer in South Asia: a Bangladeshi perspective. Cancer Epidemiology 2014; 38: 465–470.

12. Caplan L. Delay in breast cancer: implications for stage at diagnosis and survival. Frontiers in Public Health 2014; 2: 87.

13. Kothari A, Fentiman IS. 22. Diagnostic delays in breast cancer and impact on survival. International Journal of Clinical Practice 2003; 57: 200–203.

14. Sarker R, et al. 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 2022; 17: e0270417.

15. Hoq MI, et al. Breast cancer screening awareness, practice, and perceived barriers: A community-based cross-sectional study among women in south-eastern Bangladesh. Health Science Reports 2024; 7: e1799.

16. Unger-Saldaña K, Peláez-Ballestas I, Infante-Castañeda C. Development and validation of a questionnaire to assess delay in treatment for breast cancer. BMC cancer 2012; 12: 626.

17. Hasan MN, et al. Cesarean delivery and early childhood diseases in Bangladesh: An analysis of Demographic and Health Survey (BDHS) and Multiple Indicator Cluster Survey (MICS). Kabir R, ed. PLOS ONE 2020; 15: e0242864.

18. Hasan MN, et al. Early childhood developmental status and its associated factors in Bangladesh: a comparison of two consecutive nationally representative surveys. BMC Public Health 2023; 23: 687.

19. Landolsi A, et al. [Reasons of diagnostic delay of breast cancer in Tunisian women (160 patients in the central region of Tunisia)]. La Tunisie Medicale 2010; 88: 894–897.

20. Ukwenya AY, et al. Delayed treatment of symptomatic breast cancer: the experience from Kaduna, Nigeria. South African Journal of Surgery. Suid-Afrikaanse Tydskrif Vir Chirurgie 2008; 46: 106–110.

21. Nosarti C, et al. Delay in presentation of symptomatic referrals to a breast clinic: patient and system factors. British Journal of Cancer 2000; 82: 742–748.

22. Ahmad F, et al. Concept Mapping with South Asian Immigrant Women: Barriers to Mammography and Solutions. Journal of Immigrant and Minority Health 2012; 14: 242–250.

23. Ginsburg OM. Breast and cervical cancer control in low and middle-income countries: Human rights meet sound health policy. Journal of Cancer Policy 2013; 1: e35–e41.

24. Facione NC, et al. The Self-Reported Likelihood of Patient Delay in Breast Cancer: New Thoughts for Early Detection. Preventive Medicine 2002; 34: 397–407.

25. Sharma K, et al. A Systematic Review of Barriers to Breast Cancer Care in Developing Countries Resulting in Delayed Patient Presentation. Journal of Oncology 2012; 2012: 1–8.

26. Maree JE, Wright SCD. How would early detection be possible? An enquiry into cancer related knowledge, understanding and health seeking behaviour of urban black women in Tshwane, South Africa. European Journal of Oncology Nursing 2010; 14: 190–196.

27. Okobia MN, et al. Knowledge, attitude and practice of Nigerian women towards breast cancer: a cross-sectional study. World Journal of Surgical Oncology 2006; 4: 11.

28. Subedi R, et al. Factors influencing the time to diagnosis and treatment of breast cancer among women in low- and middle-income countries: A systematic review. The Breast 2024; 75: 103714.

**Tables and Figures**

**Table 1:** Characteristics of women diagnosed with breast cancer and of their spouses, Bangladesh (N=355)

|  |  |  |
| --- | --- | --- |
| **Characteristics** | **n** | **%** |
| **Age at presentation (years)** |  |  |
| <40 | 114 | 33.24 |
| 40-49 | 120 | 34.98 |
| 50-59 | 79 | 23.03 |
| ≥60 | 30 | 8.75 |
| **Regions of origin** |  |  |
| Barisal | 26 | 7.67 |
| Chittagong | 52 | 15.34 |
| Dhaka | 149 | 43.95 |
| Khulna | 39 | 11.50 |
| Mymensingh | 33 | 9.73 |
| Rajshahi | 21 | 6.19 |
| Rangpur | 14 | 4.13 |
| Sylhet | 5 | 1.47 |
| **Area of residence** |  |  |
| Rural | 251 | 72.75 |
| Urban | 94 | 27.25 |
| **Current marital status** |  |  |
| Single | 59 | 17.25 |
| Married | 283 | 82.75 |
| **Patient education level** |  |  |
| Illiterate | 147 | 42.86 |
| Primary | 115 | 33.53 |
| Secondary/higher | 81 | 23.62 |
| **Spouse education level** |  |  |
| Illiterate | 89 | 27.99 |
| Primary | 118 | 37.11 |
| Secondary/higher | 111 | 34.91 |
| **Household monthly income (BDT)** |  |  |
| <5000 | 113 | 34.88 |
| 5000-10000 | 100 | 30.86 |
| 10001-20000 | 44 | 13.58 |
| >20000 | 67 | 20.68 |
| **Portable electronic devices access** |  |  |
| Yes | 319 | 89.86 |
| No | 36 | 10.14 |
| **Mass media access** |  |  |
| Yes | 144 | 40.56 |
| No | 211 | 59.44 |

**Table 2:** Medical history of the patients

|  |  |  |
| --- | --- | --- |
| **Characteristics** | **n** | **%** |
| First clinical presentations1 |  |  |
| Lump | 314 | 88.45 |
| Breast pain | 93 | 26.20 |
| Nipple discharge | 20 | 5.63 |
| Skin changes | 15 | 4.23 |
| Bone pain | 12 | 3.38 |
| Breast self-examination | 37 | 11.11 |
| Family history of breast cancer | 32 | 9.52 |
| Patient delay | 139 | 41.00 |
| Provider delay | 82 | 24.33 |
| Total delay | 190 | 55.72 |
| **Stage of cancer** |  |  |
| Stage I | 10 | 3.94 |
| Stage II | 124 | 48.82 |
| Stage III | 112 | 44.09 |
| Stage IV | 8 | 3.15 |

1multiple answer

**Table 3:** Summary of patient delay, provider delay, and total delay with stage of cancer (in weeks)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Patient delay** | | | | |  |
| Stage of cancer | Mean | Standard Deviation | Median | Minimum | Maximum | P-value\* |
| Stage I | 0.93 | 1.89 | 0.07 | 0.00 | 6.00 | 0.022 |
| Stage II | 5.23 | 8.60 | 2.00 | 0.00 | 48.67 |
| Stage III | 6.33 | 10.22 | 3.00 | 0.00 | 60.83 |
| Stage IV | 3.21 | 3.80 | 2.50 | 0.00 | 12.17 |
| Total | 5.69 | 9.23 | 2.00 | 0.00 | 60.83 |  |
|  | **Provider delay** | | | | |  |
| Stage I | 1.80 | 2.55 | 0.53 | 0.00 | 6.57 | 0.973 |
| Stage II | 1.75 | 2.50 | 0.53 | 0.00 | 7.20 |
| Stage III | 1.40 | 2.10 | 0.48 | 0.00 | 7.13 |
| Stage IV | 1.22 | 2.04 | 0.40 | 0.00 | 6.00 |
| Total | 1.49 | 2.25 | 0.47 | 0.00 | 7.20 |  |
|  | **Total delay** | | | | |  |
| Stage I | 2.73 | 3.93 | 0.93 | 0.03 | 12.57 | 0.120 |
| Stage II | 6.89 | 8.52 | 5.70 | 0.00 | 48.67 |
| Stage III | 7.73 | 10.14 | 5.92 | 0.00 | 61.33 |
| Stage IV | 4.43 | 4.01 | 3.67 | 0.13 | 12.17 |
| Total | 7.13 | 9.22 | 5.40 | 0.00 | 66.83 |  |

\*Kruskal-Wallis test

**Table 4:** Factors contributing to patient and provider delay based on family history

|  |  |  |  |
| --- | --- | --- | --- |
|  | **Family History** | | |
|  | Total | Yes | No |
| **Characteristics** | n (%) | n (%) | n (%) |
| Thought the problem would disappear by itself | 110 (79.14) | 9 (8.49) | 97 (91.51) |
| Negligence or carelessness | 105 (75.54) | 8 (7.92) | 93 (92.08) |
| Financial constraints | 91 (65.47) | 8 (8.99) | 81 (91.01) |
| Competing life priorities (taking care of family) | 76 (54.68) | 7 (9.59) | 66 (90.41) |
| Embarrassment about having a breast examination | 62 (44.60) | 5 (8.06) | 57 (91.94) |
| Too busy (other reason) | 57 (41.01) | 6 (11.11) | 48 (88.89) |
| Fear of cancer diagnosis and/or treatment | 53 (38.13) | 5 (9.43) | 48 (90.57) |
| Difficult to arrange transport | 38 (27.34) | 4 (10.53) | 34 (89.47) |
| Lack of information | 34 (24.46) | 4 (11.76) | 30 (88.24) |
| Appointment delay | 30 (21.58) | 4 (13.33) | 26 (86.67) |
| Other reason | 28 (20.14) | 3 (10.71) | 25 (89.29) |

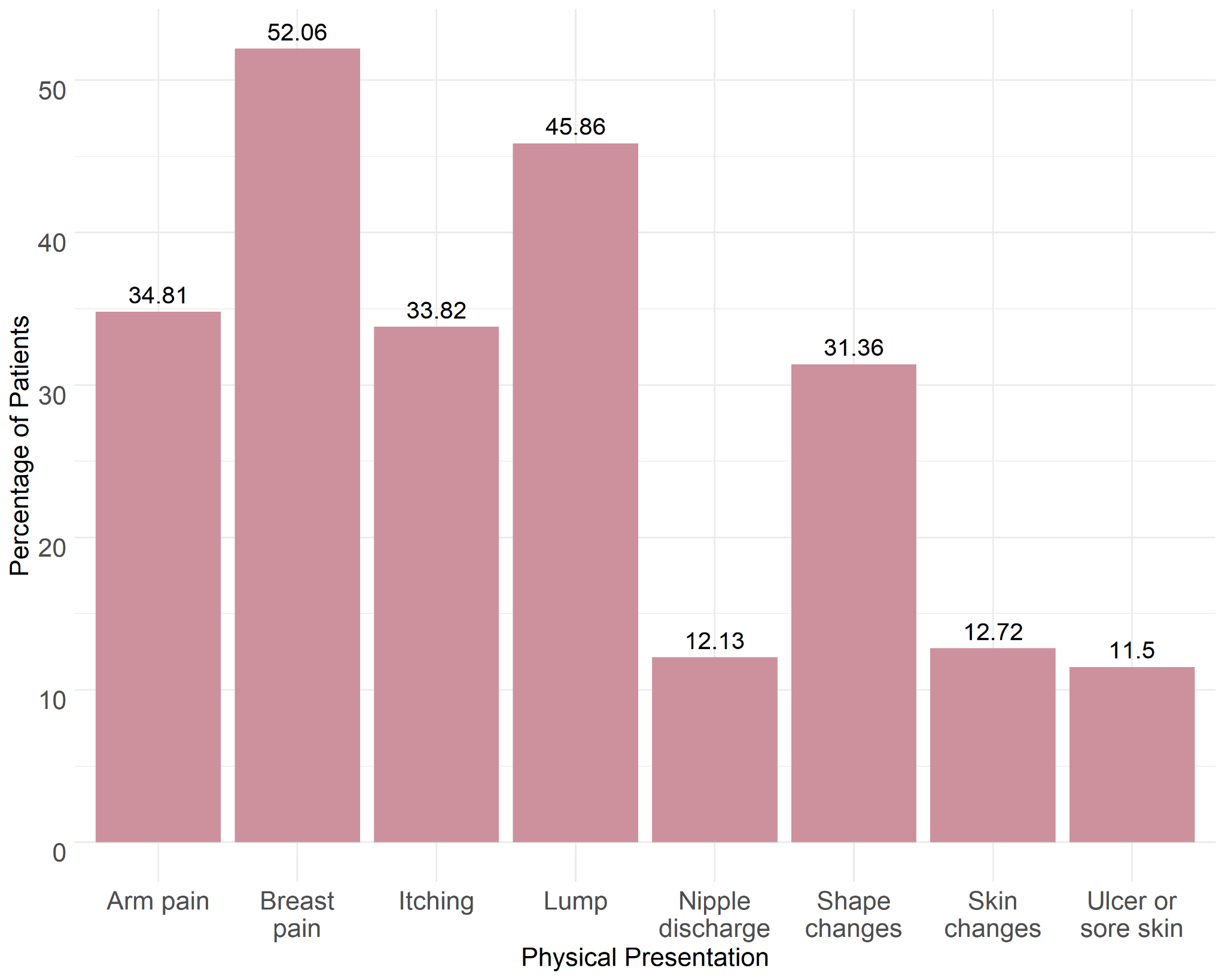
**Table 5:** Prevalence and associated risk factors of total delay (N=341)

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
|  | **Total delay** | | | | | |
| **Characteristics** | **Chi-square test** | | **Unadjusted model** | | **Adjusted model** | |
| n (%) | P-value | COR (95% CI) | P-value | AOR (95% CI) | P-value |
| **Socioeconomic characteristics** |  |  |  |  |  |  |
| **Age at presentation (years)** |  |  |  |  |  |  |
| <40 | 62 (55.36) | 0.960 | 0.82 (0.36 – 1.86) | 0.649 |  |  |
| 40-49 | 65 (54.62) |  | 0.80 (0.35 – 1.80) | 0.597 |  |  |
| 50-59 | 44 (56.41) |  | 0.86 (0.35 – 2.02) | 0.736 |  |  |
| ≥60 | 18 (60.00) |  | Reference |  |  |  |
| **Geographic location** |  |  |  |  |  |  |
| Chittagong | 33 (63.46) | 0.024 | 2.03 (1.78 – 5.35) | 0.014 | 2.85 (0.99 – 8.39) | 0.052 |
| Dhaka | 78 (52.35) |  | 1.28 (0.56 – 3.00) | 0.560 | 1.51 (0.60 – 3.89) | 0.387 |
| Khulna | 25 (65.79) |  | 2.24 (1.81 – 6.36) | 0.012 | 2.91 (1.95 – 9.25) | 0.044 |
| Mymensingh | 13 (39.39) |  | 0.76 (0.27 – 2.15) | 0.602 | 0.87 (0.28 – 2.71) | 0.807 |
| Rajshahi | 10 (50.00) |  | 1.67 (0.36 – 3.79) | 0.796 | 1.51 (0.43 – 5.39) | 0.520 |
| Rangpur | 13 (92.86) |  | 5.17 (2.46 – 6.41) | 0.014 | 6.07 (1.76 – 8.02) | 0.030 |
| Sylhet | 3 (60.00) |  | 1.75 (0.25 – 5.03) | 0.573 | 1.47 (0.14 – 5.55) | 0.735 |
| Barisal | 12 (46.15) |  | Reference |  | Reference |  |
| **Area of residence** |  |  |  |  |  |  |
| Rural | 150 (60.48) | <0.001 | 2.08 (1.28 – 3.40) | 0.003 | 2.04 (1.17 – 3.61) | 0.013 |
| Urban | 39 (42.39) |  | Reference |  | Reference |  |
| **Current marital status** |  |  |  |  |  |  |
| Single | 37 (64.91) | 0.011 | 1.60 (1.10 – 2.95) | 0.017 | 1.46 (1.14 – 2.94) | 0.027 |
| Married | 151 (53.55) |  | Reference |  | Reference |  |
| **Patient education level** |  |  |  |  |  |  |
| Illiterate | 89 (60.96) | 0.012 | 1.77 (1.02 – 3.09) | 0.043 | 1.59 (1.18 – 3.05) | 0.015 |
| Primary | 62 (54.39) |  | 1.35 (0.76 – 2.41) | 0.303 | 1.51 (1.17 – 2.95) | 0.022 |
| Secondary/Higher | 37 (46.84) |  | Reference |  | Reference |  |
| **Spouse education level** |  |  |  |  |  |  |
| Illiterate | 52 (58.43) | 0.683 | 1.28 (0.73 – 2.26) | 0.383 |  |  |
| Primary | 64 (55.17) |  | 1.12 (0.67 – 1.90) | 0.659 |  |  |
| Secondary/Higher | 58 (52.25) |  | Reference |  |  |  |
| **Household monthly income (BDT)** |  |  |  |  |  |  |
| <5000 | 73 (64.60) | <0.001 | 1.48 (0.95 – 2.75) | 0.121 | 1.26 (0.59 – 2.68) | 0.551 |
| 5000-10000 | 47 (47.96) |  | 1.74 (1.40 – 2.39) | 0.036 | 1.55 (0.99 – 2.11) | 0.101 |
| 10001-20000 | 23 (52.27) |  | 1.19 (0.41 – 1.91) | 0.760 | 1.21 (0.35 – 1.87) | 0.618 |
| >20000 | 37 (55.22) |  | Reference |  | Reference |  |
| **Portable electronic devices** |  |  |  |  |  |  |
| Yes | 173 (54.75) | 0.019 | 1.56 (1.23 – 2.32) | 0.020 | 1.55 (1.18 – 2.52) | 0.025 |
| No | 17 (68.00) |  | Reference |  | Reference |  |
| **Mass media access** |  |  |  |  |  |  |
| Yes | 79 (55.63) | 0.009 | 0.79 (0.94 – 1.12) | 0.070 | 0.98 (0.81 – 1.38) | 0.240 |
| No | 111 (55.78) |  | Reference |  | Reference |  |
| **Medical history of the patients** |  |  |  |  |  |  |
| **Lump** |  |  |  |  |  |  |
| Yes | 174 (55.59) | 0.874 | 0.94 (0.42 – 2.04) | 0.874 |  |  |
| No | 16 (57.14) |  | Reference |  |  |  |
| **Breast pain** |  |  |  |  |  |  |
| Yes | 46 (50.00) | 0.019 | 1.73 (1.45 – 2.18) | 0.019 | 1.60 (1.34 – 2.05) | 0.016 |
| No | 144 (47.83) |  | Reference |  | Reference |  |
| **Nipple discharge** |  |  |  |  |  |  |
| Yes | 14 (70.00) | 0.018 | 1.92 (1.75 – 5.54) | 0.018 | 2.19 (1.73 – 7.52) | 0.018 |
| No | 176 (54.83) |  | Reference |  | Reference |  |
| **Skin changes** |  |  |  |  |  |  |
| Yes | 9 (60.00) | 0.733 | 1.20 (0.42 – 3.66) | 0.733 |  |  |
| No | 181 (55.52) |  | Reference |  |  |  |
| **Bone pain** |  |  |  |  |  |  |
| Yes | 5 (41.67) | 0.031 | 1.56 (1.16 – 2.77) | 0.032 | 1.37 (1.09 – 2.30) | 0.012 |
| No | 185 (36.23) |  | Reference |  | Reference |  |
| **Breast self-examination** |  |  |  |  |  |  |
| Yes | 20 (54.05) | 0.859 | 0.94 (0.47 – 1.88) | 0.859 |  |  |
| No | 164 (55.59) |  | Reference |  |  |  |
| **Family history of breast cancer** |  |  |  |  |  |  |
| Yes | 15 (46.88) | 0.306 | 0.68 (0.33 – 1.42) | 0.308 |  |  |
| No | 169 (56.33) |  | Reference |  |  |  |

AOR: adjusted odds ratio, CI: confidence interval, COR: crude odds ratio



**Fig. 1:** Breast cancer delays at various stages



**Fig. 2:** Physical presentations of the patients