# Introduction

# Methods

## Population and study sites

## Data collection

## Patient and system delay

## Statistical analysis

Descriptive statistics (e.g., counts and percentages for categorical variables) were calculated to summarize all variables. The Chi-square tests and the Fisher test were used to explore the factors associated with different delays. We used binary logistic regression to identify the factors associated with total diagnosis delay. The final adjusted model was chosen based on the backward elimination criterion. We reported the unadjusted/crude odds ratio (COR), adjusted odds ratio (AOR) with the 95% confidence interval (95% CI). All analyses were conducted in Stata version 13.0.

# Results

## Study population

Summary statistics of the analytic sample are presented in Table 1. Among the 339 study participants, 68.4% were aged <50 years, 73.2% were from rural areas, and 82.9% were currently married. A total of 43.4% of participants and 33.3% of spouses were illiterate. Also, one-third of participants had a monthly family income of <5,000 BDT, and 19.8% had a monthly family income of more than 20,000 BDT.

The medical history of the patients is shown in Table 2. The majority (91.7%) of the patients reported lump as the first clinical presentation. Only 10.9% of patients reported breast self-examination, and 9.4% had a family history of breast cancer. Approximately 41.0% of participants had a patient delay (>12 weeks), and 20.1% experienced system delay. Overall, 44.3% of patients had a diagnostic delay (>16 weeks). Physical presentations of the participants are shown in Figure 1.

## Diagnosis delay and associated factors

Table 3 shows the causes of diagnosis delay and associated factors that are related to patient delay. Among the 150 patients who had a diagnosis delay, 62.0% were related to the patient, 12.7% were related to the health system, and 25.3% were related to both patient and system. The major factors associated with diagnosis delay related to the patient are: thought the problem would disappear by itself (77.9%), negligence or carelessness (74.8%), financial constraints (67.9%), competing life priorities (54.2%), and embarrassment about having a breast examination (42.7%).

Table 4 shows the patients’ socioeconomic and medical history according to the principal five causes of delay. Older age (aged 60 years or more) is associated with thinking that the problem would disappear by itself (100%), negligence or carelessness (100.0%), financial constraints (80.0%), and competing life priorities (80.0%). Patients from urban areas reported a comparatively higher prevalence of thinking that the problem would disappear by itself (90.6% vs. 73.7%). Also, the prevalence of diagnosis delay related to the patient is relatively higher among those patients who were illiterate, the spouse was illiterate, had monthly family income <5,000 BDT, had breast pain, experienced skin changes, and those did the breast self-examination.

According to total diagnosis delay, Table 5 shows the prevalence by socioeconomic and medical history, result of crude and adjusted logistic regression. Overall, 44.3% of patients had a diagnosis delay. The prevalence of diagnostic delay was comparatively higher among those patients who were illiterate (50.3%), had monthly family income <5,000 BDT (53.1%), did not lump (53.6%) and had no breast pain (47.4%). In the unadjusted analysis, patients’ education, family income, and breast pain were associated with the diagnosis delay. **In the adjusted analysis after backward elimination,** factors such as patient's education, family income, lump, and breast pain have remained in the model. We observed that the odds of diagnostic delay was 81% higher among illiterate patients than those with secondary/higher education (AOR: 1.81, 95% CI: 1.00-3.28). Also, the odds of diagnostic delay was 80% higher among those patients who had monthly family income <5,000 BDT than >20,000 BDT (AOR: 0.95-3.41). On the other hand, the odds of diagnosis delay was 39% less among those patients who lumped (AOR: 0.61, 95% CI: 0.27-1.38), while it was 44% less among those patients who had breast pain (AOR: 0.56, 95% CI: 0.33-0.94).

# Discussion

# References

# Figures

Figure 1: Physical presentations of the patients

# Tables

Table 1: Background characteristics of the patients (N=339)

|  |  |  |  |
| --- | --- | --- | --- |
| Characteristics | | n | % |
| Age at presentation (years) | |  |  |
|  | <40 | 112 | 33.0 |
|  | 40-49 | 120 | 35.4 |
|  | 50-59 | 77 | 22.7 |
|  | ≥60 | 30 | 8.9 |
| Area of residence | |  |  |
|  | Rural | 248 | 73.2 |
|  | Urban | 91 | 26.8 |
| Current marital status | |  |  |
|  | Single | 58 | 17.1 |
|  | Married | 281 | 82.9 |
| Patient education level | |  |  |
|  | Illiterate | 147 | 43.4 |
|  | Primary | 114 | 33.6 |
|  | Secondary/higher | 78 | 23.0 |
| Spouse education level | |  |  |
|  | Illiterate | 113 | 33.3 |
|  | Primary | 116 | 34.2 |
|  | Secondary/higher | 110 | 32.5 |
| Household monthly income (BDT) | |  |  |
|  | <5000 | 113 | 33.3 |
|  | 5000-10000 | 115 | 33.9 |
|  | 10001-20000 | 44 | 13.0 |
|  | >20000 | 67 | 19.8 |

Table 2: Medical history of the patients (N=339)

|  |  |  |  |
| --- | --- | --- | --- |
| Characteristics | | n | % |
| First clinical presentations 1 | |  |  |
|  | Lump | 311 | 91.7 |
|  | Breast pain | 92 | 27.1 |
|  | Nipple discharge | 19 | 5.6 |
|  | Skin changes | 15 | 4.4 |
|  | Bone pain | 12 | 3.5 |
| Breast self-examination | | 37 | 10.9 |
| Family history of breast cancer | | 32 | 9.4 |
| Patient delay | | 139 | 41.0 |
| System delay | | 68 | 20.1 |
| Diagnostic delay | | 150 | 44.3 |
| Stage of cancer 2 | |  |  |
|  | Stage I | 10 | 3.0 |
|  | Stage II | 121 | 35.7 |
|  | Stage III | 112 | 33.0 |
|  | Stage IV | 9 | 2.7 |

1 multiple answer

2 not add up to 100 due to missing data

Table 3: Diagnosis delay and associated factors

|  |  |  |  |
| --- | --- | --- | --- |
| Characteristics | | n | % |
| Causes of Diagnosis Delay (n = 150) | |  |  |
|  | Cause related to patient | 93 | 62.0 |
|  | Cause related to health system | 19 | 12.7 |
|  | Cause related to patient and system | 38 | 25.3 |
| Factors related to patient delay 1 (n = 131) | |  |  |
|  | Thought the problem would disappear by itself | 102 | 77.9 |
|  | Negligence or carelessness | 98 | 74.8 |
|  | Financial constraints | 89 | 67.9 |
|  | Competing life priorities | 71 | 54.2 |
|  | Embarrassment about having a breast examination | 56 | 42.7 |
|  | Use of traditional methods | 53 | 40.5 |
|  | Fear of cancer diagnosis and/or treatment | 46 | 35.1 |
|  | Difficult to arrange transport | 40 | 30.5 |
|  | Lack of information | 38 | 29.0 |
|  | Appointment delay | 36 | 27.5 |

1 multiple answer

Table 4: Comparison of patients according to the principal **five causes of delay**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Characteristics | | | n | Problem disappear itself | | Negligence or carelessness | | Financial constraints | | Competing life priorities | | Embarrassment | |
| % | *P* | % | *P* | % | *P* |  | *P* | % | *P* |
| Total | | | 131 | 77.9 |  | 74.8 |  | 67.9 |  | 54.2 |  | 42.7 |  |
| **Socioeconomic characteristics** | | | |  |  |  |  |  |  |  |  |  |  |
|  | Age at presentation (years) | | |  |  |  |  |  |  |  |  |  |  |
|  |  | <40 | 41 | 82.9 | 0.096 | 73.2 | 0.251 | 73.2 | 0.112 | 61.0 | 0.179 | 53.7 | 0.289 |
|  |  | 40-49 | 50 | 68.0 |  | 70.0 |  | 72.0 |  | 48.0 |  | 38.0 |  |
|  |  | 50-59 | 30 | 80.0 |  | 76.7 |  | 50.0 |  | 46.7 |  | 33.3 |  |
|  |  | ≥60 | 10 | **100.0** |  | **100.0** |  | **80.0** |  | **80.0** |  | 50.0 |  |
|  | Area of residence | |  |  |  |  |  |  |  |  |  |  |  |
|  |  | Rural | 99 | 73.7 | 0.045 | 73.7 | 0.619 | 65.7 | 0.325 | 54.6 | 0.889 | 42.4 | 0.895 |
|  |  | Urban | 32 | **90.6** |  | 78.1 |  | 75.0 |  | 53.1 |  | 43.8 |  |
|  | Current marital status | |  |  |  |  |  |  |  |  |  |  |  |
|  |  | Single | 26 | 80.8 | 0.690 | 76.9 | 0.782 | 73.1 | 0.531 | 50.0 | 0.631 | 34.6 | 0.349 |
|  |  | Married | 105 | 77.1 |  | 74.3 |  | 66.7 |  | 55.2 |  | 44.8 |  |
|  | Patient education level | |  |  |  |  |  |  |  |  |  |  |  |
|  |  | Illiterate | 68 | 83.8 | 0.155 | 80.9 | 0.247 | 73.5 | 0.022 | 52.9 | 0.949 | 39.7 | 0.579 |
|  |  | Primary | 40 | 75.0 |  | 67.5 |  | 72.5 |  | 55.0 |  | 42.5 |  |
|  |  | Secondary/Higher | 23 | 65.2 |  | 69.6 |  | **43.5** |  | 56.5 |  | 52.2 |  |
|  | Spouse education level | |  |  |  |  |  |  |  |  |  |  |  |
|  |  | Illiterate | 51 | 78.4 | 0.909 | 70.6 | 0.622 | **80.4** | 0.022 | 49.0 | 0.496 | 45.1 | 0.806 |
|  |  | Primary | 41 | 75.6 |  | 75.6 |  | 68.3 |  | 53.7 |  | 43.9 |  |
|  |  | Secondary/Higher | 39 | 79.5 |  | 79.5 |  | 51.3 |  | 61.5 |  | 38.5 |  |
|  | Household monthly income (BDT) | | | |  |  |  |  |  |  |  |  |  |
|  |  | <5000 | 55 | 78.2 | 0.699 | 80.0 | 0.587 | **81.8** | 0.006 | 47.3 | 0.580 | 34.6 | 0.394 |
|  |  | 5000-10000 | 35 | 82.9 |  | 68.6 |  | 62.9 |  | 60.0 |  | 51.4 |  |
|  |  | 10001-20000 | 18 | 77.8 |  | 77.8 |  | 38.9 |  | 55.6 |  | 50.0 |  |
|  |  | >20000 | 23 | 69.6 |  | 69.6 |  | 65.2 |  | 60.9 |  | 43.5 |  |
| **Medical history of the patients** | | | |  |  |  |  |  |  |  |  |  |  |
|  | Lump | |  |  |  |  |  |  |  |  |  |  |  |
|  |  | No | 11 | 81.8 | 0.741 | 72.7 | 0.868 | 54.6 | 0.320 | 72.7 | 0.197 | 36.4 | 0.655 |
|  |  | Yes | 120 | 77.5 |  | 75.0 |  | 69.2 |  | 52.5 |  | 43.3 |  |
|  | Breast pain | |  |  |  |  |  |  |  |  |  |  |  |
|  |  | No | 105 | 79.1 | 0.511 | 75.2 | 0.820 | 69.5 | 0.435 | 49.5 | 0.031 | 43.8 | 0.622 |
|  |  | Yes | 26 | 73.1 |  | 73.1 |  | 61.5 |  | **73.1** |  | 38.5 |  |
|  | Nipple discharge | |  |  |  |  |  |  |  |  |  |  |  |
|  |  | No | 124 | 78.2 | 0.673 | 75.8 | 0.268 | 67.7 | 0.839 | 54.0 | 0.872 | 41.1 | 0.115 |
|  |  | Yes | 7 | 71.4 |  | 57.1 |  | 71.4 |  | 57.1 |  | 71.4 |  |
|  | Skin changes | |  |  |  |  |  |  |  |  |  |  |  |
|  |  | No | 124 | 79.0 | 0.175 | 75.8 | 0.268 | 67.7 | 0.839 | 53.2 | 0.347 | 39.5 | 0.002 |
|  |  | Yes | 7 | 57.1 |  | 57.1 |  | 71.4 |  | 71.4 |  | **100.0** |  |
|  | Bone pain | |  |  |  |  |  |  |  |  |  |  |  |
|  |  | No | 127 | 78.7 | 0.173 | 75.6 | 0.246 | 67.7 | 0.759 | 54.3 | 0.864 | 41.7 | 0.185 |
|  |  | Yes | 4 | 50.0 |  | 50.0 |  | 75.0 |  | 50.0 |  | 75.0 |  |
|  | Breast self-examination | |  |  |  |  |  |  |  |  |  |  |  |
|  |  | No | 119 | 79.8 | 0.087 | 77.3 | 0.038 | 68.1 | 0.921 | 53.8 | 0.763 | 40.3 | 0.079 |
|  |  | Yes | 12 | 58.3 |  | **50.0** |  | 66.7 |  | 58.3 |  | **66.7** |  |
|  | Family history of breast cancer | | |  |  |  |  |  |  |  |  |  |  |
|  |  | No | 120 | 77.5 | 0.741 | 75.0 | 0.868 | 68.3 | 0.749 | 53.3 | 0.512 | 42.5 | 0.850 |
|  |  | Yes | 11 | 81.8 |  | 72.7 |  | 63.6 |  | 63.6 |  | 45.5 |  |

Table 5: Comparison of patients according to **total diagnosis delay**

|  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| Characteristics | | | n | Diagnosis delay | | Unadjusted analysis | | | Adjusted analysis | | |
| % | *P* | COR | 95% CI | *P* | AOR | 95% CI | *P* |
| Overall | | | 339 | 44.3 | *-* |  |  |  |  |  |  |
| **Socioeconomic characteristics** | | | |  |  |  |  |  |  |  |  |
|  | Age at presentation (years) | |  |  |  |  |  |  |  |  |  |
|  |  | <40 | 112 | 44.6 | 0.927 | Ref |  |  | Not in the model | |  |
|  |  | 40-49 | 120 | 43.3 |  | 0.95 | 0.56-1.59 | 0.841 |  |  |  |
|  |  | 50-59 | 77 | 46.8 |  | 1.09 | 0.61-1.95 | 0.775 |  |  |  |
|  |  | ≥60 | 30 | 40.0 |  | 0.83 | 0.36-1.88 | 0.649 |  |  |  |
|  | Area of residence | |  |  |  |  |  |  |  |  |  |
|  |  | Rural | 248 | 44.4 | 0.948 | Ref |  |  | Not in the model | |  |
|  |  | Urban | 91 | 44.0 |  | 0.98 | 0.61-1.60 | 0.948 |  |  |  |
|  | Current marital status | |  |  |  |  |  |  |  |  |  |
|  |  | Single | 58 | 48.3 | 0.498 | Ref |  |  | Not in the model | |  |
|  |  | Married | 281 | 43.4 |  | 0.82 | 0.47-1.45 | 0.498 |  |  |  |
|  | Patient education level | |  |  |  |  |  |  |  |  |  |
|  |  | Illiterate | 147 | 50.3 | 0.099 | 1.81 | 1.03-3.18 | 0.039 | 1.81 | 1.00-3.28 | 0.052 |
|  |  | Primary | 114 | 42.1 |  | 1.30 | 0.72-2.35 | 0.388 | 1.33 | 0.71-2.49 | 0.373 |
|  |  | Secondary/Higher | 78 | 35.9 |  | Ref |  |  | Ref |  |  |
|  | Spouse education level | |  |  |  |  |  |  |  |  |  |
|  |  | Illiterate | 113 | 51.3 | 0.175 | 1.58 | 0.93-2.69 | 0.090 | Not in the model | |  |
|  |  | Primary | 116 | 41.4 |  | 1.06 | 0.62-1.80 | 0.833 |  |  |  |
|  |  | Secondary/Higher | 110 | 40.0 |  | Ref |  |  |  |  |  |
|  | Household monthly income (BDT) | | | |  |  |  |  |  |  |  |
|  |  | <5000 | 113 | 53.1 | 0.053 | 1.90 | 1.03-3.53 | 0.041 | 1.80 | 0.95-3.41 | 0.073 |
|  |  | 5000-10000 | 115 | 37.4 |  | 1.00 | 0.54-1.87 | 0.992 | 0.96 | 0.50-1.82 | 0.893 |
|  |  | 10001-20000 | 44 | 50.0 |  | 1.68 | 0.78-3.63 | 0.187 | 1.70 | 0.77-3.74 | 0.191 |
|  |  | >20000 | 67 | 37.3 |  | Ref |  |  | Ref |  |  |
| **Medical history of the patients** | | | |  |  |  |  |  |  |  |  |
|  | Lump | |  |  |  |  |  |  |  |  |  |
|  |  | No | 28 | 53.6 | 0.300 | Ref |  |  | Ref |  |  |
|  |  | Yes | 311 | 43.4 |  | 0.66 | 0.31-1.44 | 0.302 | 0.61 | 0.27-1.38 | 0.236 |
|  | Breast pain | |  |  |  |  |  |  |  |  |  |
|  |  | No | 247 | 47.4 | 0.058 | Ref |  |  | Ref |  |  |
|  |  | Yes | 92 | 35.9 |  | 0.62 | 0.38-1.02 | 0.059 | 0.56 | 0.33-0.94 | 0.029 |
|  | Nipple discharge | |  |  |  |  |  |  |  |  |  |
|  |  | No | 320 | 44.4 | 0.847 | Ref |  |  | Not in the model | |  |
|  |  | Yes | 19 | 42.1 |  | 0.91 | 0.36-2.33 | 0.847 |  |  |  |
|  | Skin changes | |  |  |  |  |  |  |  |  |  |
|  |  | No | 324 | 43.8 | 0.469 | Ref |  |  | Not in the model | |  |
|  |  | Yes | 15 | 53.3 |  | 1.46 | 0.52-4.14 | 0.519 |  |  |  |
|  | Bone pain | |  |  |  |  |  |  |  |  |  |
|  |  | No | 327 | 44.3 | 0.855 | Ref |  |  | Not in the model | |  |
|  |  | Yes | 12 | 41.7 |  | 0.90 | 0.28-2.88 | 0.855 |  |  |  |
|  | Breast self-examination | |  |  |  |  |  |  |  |  |  |
|  |  | No | 302 | 44.4 | 0.896 | Ref |  |  | Not in the model | |  |
|  |  | Yes | 37 | 43.2 |  | 0.96 | 0.48-1.90 | 0.896 |  |  |  |
|  | Family history of breast cancer | | |  |  |  |  |  |  |  |  |
|  |  | No | 307 | 44.6 | 0.665 | Ref |  |  | Not in the model | |  |
|  |  | Yes | 32 | 40.6 |  | 0.85 | 0.40-1.78 | 0.665 |  |  |  |

AOR: adjusted odds ratio, CI: confidence interval, COR: crude odds ratio, Ref: reference category.