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Understanding Barriers to Mammography Screening among Women in Bangladesh

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ABSTRACT

This study examined the cognitive, structural, psychosocial, and social determinants of mammography screening intention among women in Bangladesh. A quantitative cross-sectional survey was conducted among 615 women aged 40 years and older. Data were collected using a structured questionnaire grounded in an extended Health Belief Model and analysed through structural equation modelling. The measurement model demonstrated satisfactory reliability, convergent validity, discriminant validity, and overall model fit. The structural model explained 71.9% of the variance in mammography screening intention. Perceived benefits emerged as the strongest positive predictor, followed by self-efficacy, cues to action, screening knowledge and awareness, subjective norms, and perceived susceptibility. Structural barriers and psychosocial barriers exerted significant negative effects, with psychosocial barriers showing the stronger adverse influence. Perceived severity did not significantly predict screening intention. Only 23.9% of respondents had ever undergone mammography. Previous mammography use was significantly associated with age, household income, and provider advice. These findings indicate that improving mammography participation in Bangladesh requires more than awareness-focused interventions. Public health strategies should emphasize the benefits of early detection, strengthen women's confidence, increase provider recommendations, reduce financial and service-access constraints, and address fear, embarrassment, and procedural anxiety through culturally sensitive, supportive screening programmes for eligible women across Bangladesh.

INTRODUCTION

Breast cancer is one of the most critical Public Health issues in the world for women. It is a leading cause of cancer related morbidity and mortality for women. The overwhelming majority of breast cancers are found in women with no other risk factors other than being female and of a certain age. This is particularly relevant to health in women as early detection and screening are crucial factors (Agide *et al.*, 2024). The burden of breast cancer is also increasing in low- and middle-income countries. Lots of women in these situations are diagnosed later. Diagnosis delayed to later in the disease course may diminish the treatment options available and lead to emotional, financial and social challenges for patients and families (Amin *et al.*, 2020). Early detection is thus an important public health priority. The breast cancer problem is also aggravated in Bangladesh. Breast Cancer is one of the most frequently diagnosed cancers in women nationwide. There is still a lack of access to early detection services for many women. Women may be influenced in whether or not they seek screening based on awareness, affordability, access to the health system, families, and providers (Naik *et al.*, 2024). Breast cancer is considered to be a significant tool for detecting abnormalities in the breast prior to symptoms. Catching this disease in its early stages also can make treatment more successful and lessen the impact if it is diagnosed late in the condition. But mammography screening isn't just a medical procedure. Also influenced by women's knowledge, beliefs, feelings, family support, advice from health providers, cost, distance, and availability of diagnostic centres (Akter & Ullah, 2022). Breast cancer screening awareness, practice and perceived barriers are important issues with significant gaps reported in Bangladesh. Screening behaviour may be limited by lack of knowledge, fear, embarrassment, social discomfort, financial constraints, and provider recommendation (Olasehinde *et al.*, 2019). Women may not take the action necessary because of these barriers even though they may have information about the seriousness of breast cancer. The Health Belief Model is a valuable theoretical model for explaining mammography screening intention. The model is based on the following components: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy. Perceived benefits and perceived barriers have been shown to be powerful predictors of screening intention and behaviour in breast cancer screening research. But there are a lot of studies where barriers are seen as a blanket construct. This can mask significant distinctions between the practical and psychological problems. For instance, cost of mammography and the distance from a diagnostic centre is not necessarily the same as fear of diagnosis, embarrassment, or anxiety about pain. These barriers can impact screening intention in various ways. Hence, distinction between structural barriers and psychosocial

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barriers can give a more exact explanation on screening intention. Barriers to access are structural barriers such as cost, travel distance, limited time and limited services. Psychosocial concerns are fear, embarrassment, fear of pain, and fear of outcomes. The aim of this study is to fill the gap by constructing and testing an expanded SEM model of intention to undergo mammography screening among women in Bangladesh. Screening knowledge and awareness, perceived susceptibility, perceived severity, perceived benefits, structural barriers, psychosocial barriers, self-efficacy, cues to action and subjective norms are included in the model. The study adds to the breast cancer screening literature by identifying best predictors of mammography screening intention in a Bangladeshi context. It also offers pragmatic evidence to inform the development of screening promotion programmes that take both health beliefs and barriers into consideration. This study has primarily focused on exploring the factors associated with the intention to undergo mammography screening among Bangladeshi women aged 40 years and older. This study also includes previous mammography use and its linkage to socio-demographic and health status.

LITERATURE REVIEW

Health Belief Model

The HBM is a widely adopted model to explain the nature of preventive health behaviour. It posits that people will undertake a health behaviour if they think they are susceptible to the disease; think the disease is serious; think the behavior will have a positive outcome; think there are no or few barriers to the behaviour (Hoq *et al.*, 2024). Also included is the role of cues to action and confidence in performing the behaviour. This model is particularly relevant to breast cancer screening as mammography is a 'preventive' behaviour. It is based on the women's beliefs, perceived risk, perceived benefit and access conditions (Mann *et al.*, 2022). It is possible for a woman to be aware of breast cancer and to not get screened for it if she does not consider herself to be at risk or if she isn't able to make the appointment (Martinez *et al.*, 2024). The current study is an adaptation of the Health Belief Model, incorporating subjective norms as well as separating perceived barriers into structural barriers and psychosocial barriers (Zhang *et al.*, 2021). This strategy fits in Bangladesh, where women may face health-system based barriers and emotional/cultural barriers as well.

Mammography Screening Intention

Screening intention" is defined as a woman's willingness or intentions to get a mammogram if clinically indicated. The intent is crucial, as there are many women who know about breast cancer who may not get to regular screening (Van Den Broek-Altenburg *et al.*, 2024). Factors that can influence intention include perceived benefits, self-confidence, health provider's recommendation and perceived obstacles (Sarker *et al.*, 2022). The primary outcome of this study is intention to have mammography. Previous mammography experience is examined separately since it is based on previous behaviour and does not represent current intention.

Screening Knowledge and Awareness

Knowledge and awareness are a critical component to making decisions about preventive health. Familiarity with the reasons for having mammograms may make women more likely to talk with a health professional about screening (Alam *et al.*, 2021). The information could help to decrease uncertainty and change the prevailing belief that screening should only happen after the presence of symptoms (Ghaffari *et al.*, 2019). Not knowing can lead to confusion on who should think about screening, where to find services and the importance of screening early. Thus, knowledge and awareness can lead to the intention to get a mammogram among women.

Hypothesis 1 (H1): There is a positive and significant relationship between screening knowledge and screening awareness with the intention to undergo mammography screening.

Perceived Susceptibility

Perceived susceptibility is a woman's sense that she might be at risk for breast cancer. Increasing awareness that breast cancer can affect their age group could be more likely to prompt women to consider screening. But if the threat is not perceived, it can lead to diminished motivation, particularly if no run is in the family (Alam *et al.*, 2021). Some women may think that breast cancer only happens to women who have symptoms or a family history of breast cancer. Such beliefs can decrease screening intention. Thus, it is hypothesized that perceived susceptibility will have a positive impact on mammography intention.

H2 is accepted, as perceived susceptibility is positively and significantly related to mammography screening intention.

Perceived Severity

Perceived severity was the belief that breast cancer is serious and could impact health, family life, finances, and quality of life. Women who perceive breast cancer as a threat are more likely to think about early detection. But if screening is thought of as expensive, embarrassing, or complicated, then severity may not result in higher intentions (Farr *et al.*, 2020). In this study, an improvement in perceived severity is likely to lead to a strengthening in intention for mammography screening as women who see breast cancer as a dangerous condition might be more motivated to take preventive steps.

H3A positive and significant influence of perceived severity on intention to get a mammogram.

Perceived Benefits

Perceived benefits is the perception that mammography will benefit health and identify breast issues earlier. Women who feel the benefits of screening are real may

be more likely to be screened. However, the perception of benefits can also contribute to reduce uncertainty by making women know that the screening is useful (Manson & Achel, 2023). Women's intention to get a mammogram may increase when they feel that they can get reassurance or determine an early diagnosis. Thus, benefits are likely to play an important role in predicting the intention to undergo mammography screening.

H4: Perceived benefits is positively and significantly related to the intention to practice mammography screening.

Structural Barriers

Structural barriers are practical barriers that limit access to mammography. These include the cost, the distance of travel, time constraints, and limited availability of the services. Such obstacles might be more significant in Bangladesh where access to diagnostic services can differ in urban from rural areas (Ebrahimoghli *et al.*, 2025). Another factor that may limit women from following their intention to screen is a lack of financial resources. Even if women feel that mammography is helpful, they may not attend if the service is too costy and/or hard to access.

H5: Structural barriers negatively and significantly impact mammography screening intention.

Psychosocial Barriers

Psychosocial barriers are emotional/cultural. This can be related to fear of a diagnosis, embarrassment, fear of pain and fear of the results of the test. These barriers might lessen the desire to get screened even when the services are offered (Chin & Mansori, 2019). Women can be reluctant to undergo mammography, due to the fear that something is wrong. They can also be uncomfortable with the test procedure. Hence, psychosocial barriers

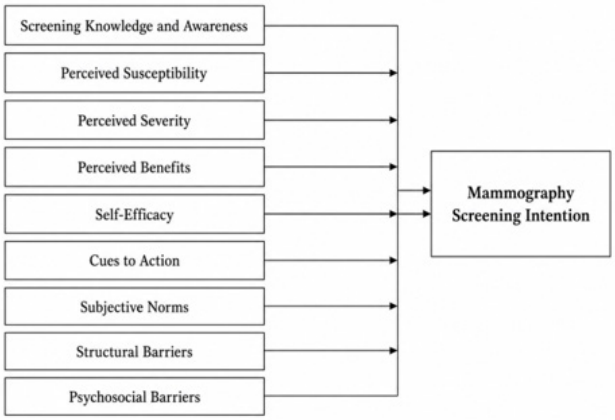

Figure 1: Conceptual Framework of the Study

are expected to negatively affect the intention to have a mammogram (Tu *et al.*, 2024).

H6: There is a significant and negative relationship between Psychosocial Barriers and mammography screening intention.

Self-Efficacy

Self-efficacy is defined as women's confidence to schedule, attend and complete a mammogram. A strong sense of self-efficacy is more likely to help women feel better equipped to ask a health professional, to make travel plans, to handle the expense, and to be less embarrassed (Tabár *et al.*, 2019). Even women who have positive beliefs about mammography may not be getting screened because of a lack of confidence. Thus, self-efficacy should lead to higher intentions to get screened.

H7: There is a positive and significant relationship between self-efficacy and intention to make the mammography screening.

Cues to Action

Cues to action are 'triggers' that prompt health action from outside the individual. This can include physician recommendations, press campaigns, family experience, community efforts and health messages. In screening contexts, provider recommendation can be a strong motivator as it helps to decrease uncertainty and validates the need for screening (Ritchie *et al.*, 2021). Cues to action can assist women to shift from awareness to intention. As such, women receiving more cues should be more likely to report intention to receive mammography screening.

H8: Cues to action positively and significantly affect the intention for mammography screening.

Subjective Norms

Subjective norms are perceived social support and approval by family, friends, and significant others. In a collectivist society, women's choice of health care might be swayed by approval from their family. Family members can be an influence for women to attend screening if they feel they are supported (Mahboobighazaani *et al.*, 2024). Social support can also help decrease fear and embarrassment. Based on this, subjective norms are likely to contribute to the intention to get a mammogram.

H9: Subjective norm has a positive and significant effect on intention to have mammography screening.

Conceptual Framework

An explanatory model is used to describe the intention to attend for mammary screening, due to cognitive, emotional, structural and social factors. The outcome variable is intention to have a mammogram. Independent Factors are screening knowledge and awareness, perceived susceptibility, perceived severity, perceived benefits, structural barriers, psychosocial barriers, self-efficacy, cues to action and subjective norm. It is assumed that knowledge, perceived susceptibility, perceived severity, perceived benefits, self-efficacy, cues to action and subjective norms will enhance the screening intention. Structural barriers and psychosocial barriers are hypothesized to negatively affect intentions to screen, respectively (Wang *et al.*, 2019). This is significant as women could agree to screening in theory, but not actually go due to price, distance, embarrassment, fear, or lack of confidence. This model helps to support the multi-dimensional concept of mammography intention. It is appropriate for SEM, since there are several observed items measuring each construct. The direct effects of each construct on the intention to screen can also be statistically tested.

MATERIALS AND METHODS

Research Design

A quantitative cross sectional survey design was used to explore determinant of intention to get a mammogram among women. This design was suitable as the purpose of the study was to assess knowledge, beliefs, perceived barriers, social influences and screening intention at a single point in time. The data collected was numeric and done by a structured questionnaire. The proposed conceptual model was examined using structural equation modeling (SEM) which enabled the study of the hypothesized relationships among the latent constructs while simultaneously examining the quality of measurement.

Study Population and Setting

The target group were women living in Bangladesh aged 40 years old and over. The reason for choosing this age group is that mammography screening is more relevant to women of middle and older age. Territorial selection was performed to have both urban and rural areas to guarantee variations in education, income, health service access, and screening exposure. Eligible women were those 40 years of age or older, with the ability to understand the questionnaire, who were willing to consent. Women who had been diagnosed with breast cancer before, or were undergoing treatment, were not included since this study targeted women's intentions to screen when they did not know they had breast cancer.

Sampling Technique and Sample Size

615 responses were used for final analysis. There were multiple latent variables and multiple observed indicators in the model; thus, the sample size was regarded as adequate for structural equation modeling. Sampling was done to cover women with different socio demographic background. Access to participants was sought through community settings, contact points within health, and local networks. An attempt has been made to include respondents of various age groups, education, employment and income groups and residential areas. This enhanced the analytical value of the sample and enabled analysis of differences in prior mammography use according to selected characteristics.

Research Instrument

A structured questionnaire based on the Health Belief Model and literature on breast cancer screening was used for data collection. The questionnaire was divided into two parts. The first section asked for socio demographic and health related details, such as age, marital status, education, employment, residence, monthly household income, travel time to the diagnostic centre, insurance funding, family history of breast cancer, advice from provider and past mammography. The second part was comprised of measuring the main constructs of the study by the Likert scale items (Wang *et al.*, 2019). Ten constructs were included in the questionnaire: screening knowledge and awareness, perceived susceptibility, perceived severity, perceived benefits, structural barriers, psychosocial barriers, self-efficacy, cues to action, subjective norms, and mammography screening intention. There were three to four items measuring each construct. The responses were on a 5-point Likert scale with 1 being strongly disagree and 5 being strongly agree. A higher score represented a higher level of the respective construct. In the case of structural barriers, higher scores represented greater perceived barriers, whereas the reverse is true for psychosocial barriers.

Data Collection Procedure

The procedure of data collection was carried out after explaining the purpose of the study to the participants. The respondents were told that the survey was voluntary and they were free to not answer any question. The questionnaire was presented in an understandable and clear format. If the respondent encounter problems to read/understand, any item is assisted, but does not influence his/her answer. During data collection the privacy of the participants was respected. Completed questionnaires were screened both for the completeness of the answers and for analysis. Partial or ambiguous answers were not included in the final data set.

Data Analysis Procedure

Descriptive statistics and structural equation modelling were used for data analysis. Categorical variables were analyzed first to determine their frequencies and percentages. For the item level and construct level variables, means, standard deviations, medians, minimum values, maximum values, skewness and kurtosis were computed. These analyses took the form of descriptions

of the distribution of respondent characteristics and manifest constructs of the study. Cronbach's alpha and standardized alpha was used to determine reliability. Acceptable values were those of 0.70 or more. The standardized factor loadings, composite reliability, and Average Variance Extracted (AVE) were used to assess the measurement model. Items that were considered reliable had a factor loading ≥ 0.70. Construct reliability was confirmed by the composite reliability value > 0.70 and the Average Variance Extracted value > 0.50 confirmed convergent validity. The Fornell Larcker criterion and the Heterotrait Monotrait ratio were applied to check the discriminant validity. Model fit indices, path coefficients, standard errors, z values, p values, confidence intervals and the coefficient of determination have been used to assess the structural model. When the path coefficient was statistically significant and the direction of the path was the same as the hypothesis, the hypothesis was supported. R squared value of the model was used to measure the explanatory power of the model on intention to attend mammography screening. Chi square analyses was performed to explore associations between selected socio demographic characteristics and past mammography experience.

Ethical Considerations

The study followed ethical principles for human participant research. Data collection was voluntary and informed consent was secured prior to it. It was explained to respondents that their information would not be disclosed and used for academic research only. No personally identifying information was collected. The participants could terminate their participation in the study at any time without penalty.

Table 1: Socio-Demographic Characteristics of Participants

Characteristic	Category	n (%)
Age group	40–44 years	165 (26.8%)
	45–54 years	244 (39.7%)
	55–64 years	137 (22.3%)
	65 years or above	69 (11.2%)
Marital status	Divorced/Separated	25 (4.1%)
	Married	473 (76.9%)
	Single	38 (6.2%)
	Widowed	79 (12.8%)
Education level	No formal education	88 (14.3%)
	Primary education	109 (17.7%)
	Secondary education	145 (23.6%)
	Higher secondary education	127 (20.7%)
	Undergraduate degree	102 (16.6%)
	Postgraduate degree	44 (7.2%)
Employment status	Employed	157 (25.5%)
	Homemaker	278 (45.2%)
	Self-employed	78 (12.7%)
	Retired	48 (7.8%)
	Unemployed	41 (6.7%)
	Other	13 (2.1%)
Residence	Rural	280 (45.5%)
	Urban	335 (54.5%)
Monthly household income	Below BDT 20,000	190 (30.9%)
	BDT 20,000–39,999	196 (31.9%)
	BDT 40,000–59,999	128 (20.8%)
	BDT 60,000 or above	74 (12.0%)
	Prefer not to say	27 (4.4%)
Travel time to diagnostic centre	Less than 30 minutes	159 (25.9%)
	30–59 minutes	193 (31.4%)
	1–2 hours	168 (27.3%)
	More than 2 hours	95 (15.4%)

Insurance/financial support	Yes	111 (18.0%)
	No	460 (74.8%)
	Not sure	44 (7.2%)
Family history of breast cancer	Yes	48 (7.8%)
	No	530 (86.2%)
	Not sure	37 (6.0%)
Provider advice regarding mammography	Yes	321 (52.2%)
	No	263 (42.8%)
	Not sure	31 (5.0%)
Ever had mammography	Yes	147 (23.9%)
	No	443 (72.0%)
	Not sure	25 (4.1%)
Most recent mammography	Within the last 12 months	55 (8.9%)
	1–2 years ago	52 (8.5%)
	More than 2 years ago	40 (6.5%)
	Not applicable	468 (76.1%)

RESULTS AND DISCUSSION

Socio-Demographic Characteristics of Respondents

Total of 615 women were involved in this study. Table 1 shows their socio-demographic and health-related characteristics (age, marital status, education, employment, residency, income, travel time to diagnostic centre, financial support, family history of breast cancer, provider advice, and mammography experience).

Majority of the respondents were in the age group 45-54 (244 respondents or 39.7%). Following that was 40-44 age group with 165 respondents (26.8%) followed by women in the age group of 45-49 years with 115 respondents (23.5%). A total of 137 (22.3%) were between 55 and 64 years old, and 69 (11.2%) were 65 or older years. This means that the majority of the respondents were middle aged female. The majority of the respondents were married. 76.9% (473) reported they were married. The widows were 12.8% (79 respondents) and women who were single were 6.2% (38 respondents). There were 25 divorced women who made up 4.1% of the respondents and 21 separated women who made up 3.4% of the respondents. So, the majority of the sample consisted of married females. The educational background of all the respondents was varied. Secondary education had the highest percentages (23.6%) with 145 respondents. 127 (20.7%) had higher secondary education and 109 (17.7%) had a primary education. There was a total of 102 undergraduate degree holders, representing 16.6% of the respondents. 88 (14.3%) respondents did not have formal schooling while 44 (7.2%) have postgraduate degrees. With respect to employment status, the largest group were homemakers (278, 45.2%). Among the women, 157 (25.5%) were employed and 78 (12.7%) were self-employed. Retired, unemployed and other employment categories accounted for 7.8%, 6.7% and 2.1%, respectively. A few more of the respondents resided in urban settings. There were 335 respondents (54.5%) from the urban and 280 (45.5%) from the rural areas. The maximum monthly household income of the households was BDT 20000-24999 with the participation of 31.9% households. This was followed by those in less than BDT 20,000 earning bracket which accounts for 30.9%. There was a variation in time taken to get to diagnostic centres among respondents. The largest percentage, 31.4%, said that they used to travel for 30–59 minutes. Another 27.3% said they took 1-2 hours to travel, and 25.9% said they travelled less than 30 minutes. However, 15.4% needed more than 2 hours, suggesting that access to some women might be problematic. The majority of respondents had no insurance policy or financial aid to cover the cost of diagnostic testing. 460 participants or 74.8% reported no such supports. 18.0% said they had financial support and 7.2% were not sure. Majority of respondents also reported no family history of breast cancer with 86.2% reporting no family history. Over half (52.2%) said that they had been advised by their provider about mammography. But 42.8% of the respondents said they had not received such advice. The experience with mammography was low. Of those who responded, 147 or 23.9% had ever had a mammogram and 72.0% never had a mammogram. When it came to recent mammograms, just 8.9% had had mammograms within the past year.

Descriptive Statistics of the Study Constructs

Descriptive statistics for the constructs are shown in Table 2. The subjective norms had the highest mean score of 3.738 scores with a SD of 0.736 scores. This means that, overall, respondents felt that there was support for mammography screening from their family and social circles. The mean score for perceived benefits was also high at 3.682, followed by perceived severity (3.667). These results indicate that the respondents had a good awareness regarding the benefit of mammography and the gravity of the breast cancer disease. Mammography screening intention had a mean score of 3.441. This suggests that the respondents are moderately inclined

towards the renovation. Self-efficacy mean score was 3.207 and cues to action was 3.185. The mean score for screening knowledge and awareness was 2.992 indicating moderate knowledge, but not strong knowledge. The mean scores of structural barriers and psychosocial barriers were 3.000 and 3.039, respectively. Based on the findings, it can be seen that there were practical and emotional obstacles among the respondents. The values for skewness and kurtosis were satisfactory. Thus, there were no serious distributional issues found in the data.

Table 2: Construct-Level Descriptive Statistics

Code	Construct	n	Mean	SD	Median	Minimum	Maximum	Skewness	Kurtosis
SK	Screening Knowledge and Awareness	615	2.992	0.755	3.000	1.250	4.750	0.062	-0.535
PS	Perceived Susceptibility	615	3.015	0.751	3.000	1.000	5.000	0.037	-0.163
PV	Perceived Severity	615	3.667	0.705	3.667	1.333	5.000	-0.225	0.051
PBen	Perceived Benefits	615	3.682	0.711	3.750	1.750	5.000	-0.064	-0.555
SB	Structural Barriers	615	3.000	0.756	3.000	1.000	5.000	0.082	-0.150
PBar	Psychosocial Barriers	615	3.039	0.731	3.000	1.000	5.000	0.175	-0.178
SE	Self-Efficacy	615	3.207	0.731	3.250	1.000	5.000	-0.125	-0.151
CA	Cues to Action	615	3.185	0.756	3.000	1.000	5.000	0.142	-0.149
SN	Subjective Norms	615	3.738	0.736	3.667	1.667	5.000	-0.229	-0.499
MSI	Mammography Screening Intention	615	3.441	0.778	3.333	1.000	5.000	-0.053	-0.492

Correlation among the Study Constructs

The correlation results revealed that there were significant relationships among the constructs of the study. Screening knowledge and awareness, perceived susceptibility, perceived severity, perceived benefits, self-efficacy, cues to action, and subjective norms were positively correlated with mammography screening intention. Mammography screening knowledge and awareness, self-efficacy, and perceived benefits were the factors with the highest positive correlation to intention to have mammography screening. The screening knowledge and awareness was highly correlated with the mammography screening intention. This indicates that those women who had higher awareness levels were more likely to endorse high levels of intention to get a mammogram. Women who were more self efficacious about arranging and attending screening were also more likely to consider screening, suggesting a strong link between self efficacy and screening intention (Duffy *et al.*, 2020). On the other hand, there was a negative correlation between structural barriers and mammography screening intention; as well as a negative correlation between psychosocial barriers and mammography screening intention. This suggests that the greater the perceived barriers, the less likely was the intention to participate in screening. There was a greater negative correlation between the barriers in the psychosocial category and screening intention than for the barriers in the structural category.

Table 3: Correlation Matrix of Construct Mean Scores

Construct	SK	PS	PV	PBen	SB	PBar	SE	CA	SN	MSI
SK	1.000	0.168	0.248	0.443	-0.149	-0.278	0.530	0.424	0.189	0.571
PS	0.168	1.000	0.246	0.227	-0.068	-0.042	0.113	0.093	0.077	0.243
PV	0.248	0.246	1.000	0.278	-0.026	-0.030	0.215	0.186	0.148	0.265
PBen	0.443	0.227	0.278	1.000	-0.051	-0.136	0.390	0.272	0.067	0.500
SB	-0.149	-0.068	-0.026	-0.051	1.000	0.017	-0.205	-0.090	-0.013	-0.274
PBar	-0.278	-0.042	-0.030	-0.136	0.017	1.000	-0.222	-0.160	-0.057	-0.336
SE	0.530	0.113	0.215	0.390	-0.205	-0.222	1.000	0.256	0.152	0.542
CA	0.424	0.093	0.186	0.272	-0.090	-0.160	0.256	1.000	0.099	0.413
SN	0.189	0.077	0.148	0.067	-0.013	-0.057	0.152	0.099	1.000	0.220
MSI	0.571	0.243	0.265	0.500	-0.274	-0.336	0.542	0.413	0.220	1.000

Reliability and Convergent Validity

Cronbach's alpha and standardized alpha were used to evaluate the internal consistency reliability. These results are presented in Table 4. The Cronbach's alpha for all of them was above the minimum value of 0.70. These values were between 0.785 (perceived severity) and 0.863 (screening knowledge and awareness). This shows that the internal consistency of all constructs was acceptable.

Also, composite reliability and Average Variance Extracted was analysed. Composites had acceptable construct reliabilities, ranging between 0.833 and 0.896. AVE values ranged from 0.625 to 0.706. Convergent validity was determined as all the AVE values were above 0.50. These findings support the notion that the items were representative in order to capture each latent construct.

Table 4: Reliability and Convergent Validity

Code	Construct	Items	Cronbach's Alpha	Composite Reliability	AVE	Decision
SK	Screening Knowledge and Awareness	4	0.863	0.896	0.682	Accepted
PS	Perceived Susceptibility	3	0.815	0.860	0.672	Accepted
PV	Perceived Severity	3	0.785	0.833	0.625	Accepted
PBen	Perceived Benefits	4	0.857	0.896	0.684	Accepted
SB	Structural Barriers	4	0.861	0.896	0.683	Accepted
PBar	Psychosocial Barriers	4	0.857	0.893	0.677	Accepted
SE	Self-Efficacy	4	0.854	0.890	0.669	Accepted
CA	Cues to Action	3	0.816	0.858	0.669	Accepted
SN	Subjective Norms	3	0.831	0.878	0.706	Accepted
MSI	Mammography Screening Intention	3	0.825	0.865	0.682	Accepted

Standardized Factor Loadings

To examine the item-level validity, the standardized factor loadings were examined. Factor loading for all items were acceptable. The loadings ranged from 0.772 to 0.884. PV2 showed the lowest loadings and SN1 showed the highest loadings. All of the factor loadings were significant. The results show all the observed items had sufficient contribution to the respective constructs. Thus, no variable was extracted from the measurement model. The loadings of the scale were high and significant, thus supporting the validity of the measurement instrument.

Discriminant Validity

The Fornell-Larcker criterion and the HTMT ratio were adopted for checking the discriminant validity. The Fornell-Larcker results indicated a value of the square root of AVE of each construct was greater than the correlation between constructs. This substantiates that each construct was sufficiently different from the other constructs. The value of HTMT was also found within the acceptable limit. The maximum HTMT value was 0.679 which is less than the suggested cut-off value of 0.85. Thus, the result of discriminant validity was supported.

Table 5: Discriminant Validity Summary

Construct	Square Root of AVE	Highest Correlation with Other Constructs	Highest HTMT Value	Decision
SK	0.826	0.680	0.679	Accepted
PS	0.820	0.312	0.310	Accepted
PV	0.791	0.346	0.345	Accepted
PBen	0.827	0.597	0.596	Accepted
SB	0.826	0.327	0.327	Accepted
PBar	0.823	0.403	0.402	Accepted
SE	0.818	0.651	0.648	Accepted
CA	0.818	0.508	0.506	Accepted
SN	0.840	0.271	0.268	Accepted
MSI	0.826	0.680	0.679	Accepted

Measurement and Structural Model Fit

Fit indices of both the measurement model and the structural model are given in Table 6. Chi-square was equal to 497.903 degrees of freedom 515. A p-value of 0.6977 shows that there was no significant difference between the observed and estimated covariance matrices. The CFI value was 1.000 and the TLI value was 1.001. Both values were above the recommended value of 0.90. The RMSEA value was 0.000, and the SRMR value was 0.0269. Both values fell below the recommended level of 0.08. These results show that the measurement and structural models proposed are acceptable.

Table 6: Measurement and Structural Model Fit Indices

Model	Fit Index	Value	Recommended Value
Measurement model	Chi-square	497.903	Lower is preferred
	Degrees of freedom	515	Reported value
	p-value	0.6977	$p > 0.05$ preferred
	CFI	1.000	≥ 0.90 acceptable
	TLI	1.001	≥ 0.90 acceptable
	RMSEA	0.000	≤ 0.08 acceptable
	RMSEA 90% CI	0.000–0.011	Reported value
	SRMR	0.0269	≤ 0.08 acceptable
Structural model	Chi-square	497.903	Lower is preferred
	Degrees of freedom	515	Reported value
	p-value	0.6977	$p > 0.05$ preferred
	CFI	1.000	≥ 0.90 acceptable
	TLI	1.001	≥ 0.90 acceptable
	RMSEA	0.000	≤ 0.08 acceptable
	RMSEA 90% CI	0.000–0.011	Reported value
	SRMR	0.0269	≤ 0.08 acceptable

Structural Path Analysis and Hypothesis Testing

The results of structural path analysis are shown in Table 7. All 9 hypotheses were tested, 8 of them were accepted and 1 was rejected. Results indicated that screening knowledge and awareness, perceived susceptibility, perceived benefits, structural barriers, psychosocial barriers, self-efficacy, cues to action and subjective norms were significant determinants of mammography screening intention. The screening knowledge and awareness were positively and significantly associated with mammography screening intention. The beta value (standardized) was 0.154 with a p value of 0.0075. So, H1 was supported. This suggests that women with greater screening knowledge also were more likely to have greater mammography screening intention. Perceived susceptibility also had significant and positive effect on screening intention. The standardised beta value was 0.100 and the p value was 0.0038. So, it was said in favour of H2. These findings indicate that those women who believed they were at risk for breast cancer were more likely to think about mammography screening. There was a positive but non-significant relationship between perceived severity and screening intention. Standardized beta = 0.022 and P value = 0.5948. Hence, H3 was rejected. This suggests that when other factors were added to the model, there was no direct link between breast cancer seriousness and intention to get a mammography (Shubayr *et al.*, 2022). The strongest positive impact on the intention to undergo mammography screening was seen for perceived benefits. The standardized beta value was 0.259, and the p-value was < 0.001. Thus, H4 was accepted. This discovery indicates that women who thought screening mammography was helpful were more likely to plan to get a screening mammogram. Structural barriers negatively and significantly influenced intention to get a mammogram. The standardized beta value was -0.192 with a p value of <0.001. Thus, H5 was accepted. This means there were cost, travel, time and service availability constraints that lowered women's interest in obtaining mammograms. There was also a negative and significant association for screening intention with psychosocial barriers. The standardised beta value was -0.198 with a P < 0.001. So, H6 was accepted. This indicates that fear, embarrassment, worry about pain, and worries about the outcome were significant factors in not wanting to be screened for breast cancer by mammogram. Positive and significant relationships were found between self-efficacy and screening intention. The standardized beta was 0.243 and the p value was < 0.001. Hence, H7 was upheld. This suggests that women who believed that they could arrange and attend a mammogram were more likely to plan to screen. The CTA cues had a significant and positive impact on mammography screening intentions. The standardized beta value was 0.178, and the p value was < 0.001. As such, H8 was supported. This means that screening intention could be stimulated by health provider, media information and people's experiences of breast cancer (Nduka *et al.*, 2023). The results indicated that subjective norms was positively and significantly related to screening intention. Standardized beta value was 0.116 while p value was 0.0008. Hence, H9 was favoured. This suggests that family and social factors can help women to think about screening for breast cancer via mammograms.

Table7: Structural Paths and Hypothesis Testing

Hypothesis	Path	Expected Direction	β	SE	z-value	p-value	95% CI	Decision
H1	SK → MSI	Positive	0.154	0.058	2.673	0.0075	0.041 to 0.268	Supported
H2	PS → MSI	Positive	0.100	0.035	2.895	0.0038	0.032 to 0.168	Supported
H3	PV → MSI	Positive	0.022	0.042	0.532	0.5948	-0.060 to 0.105	Not supported
H4	PBen → MSI	Positive	0.259	0.044	5.837	<0.001	0.172 to 0.346	Supported
H5	SB → MSI	Negative	-0.192	0.034	-5.661	<0.001	-0.258 to -0.125	Supported
H6	PBar → MSI	Negative	-0.198	0.034	-5.848	<0.001	-0.264 to -0.132	Supported
H7	SE → MSI	Positive	0.243	0.046	5.281	<0.001	0.153 to 0.334	Supported
H8	CA → MSI	Positive	0.178	0.043	4.172	<0.001	0.094 to 0.261	Supported
H9	SN → MSI	Positive	0.116	0.035	3.368	0.0008	0.049 to 0.184	Supported

Coefficient of Determination

The coefficient of determination for mammography screening intention was 0.719. This means that the independent variables explained 71.9% of the variance in mammography screening intention. This indicates strong explanatory power. The result indicated that the proposed model was a good fit to the data and captured the most important cognitive, emotional, structural, and social determinants of mammography screening intention. Perceived benefits and self-efficacy were the more positive predictors. Psychosocial barriers and structural barriers were the most powerful negative predictors.

Table 8: Coefficient of Determination

Outcome Variable	R^2	Interpretation
Mammography Screening Intention	0.719	Strong explanatory power

Association between Participant Characteristics and Previous Mammography

The association between selected participant characteristics and previous mammography experience is presented in Table 9. Previous mammography experience was significantly related with age group. The chi-square value was 21.277, with a p-value of 0.0001. The percentage of women that had a mammography was higher with age. Of the women in the age group 40 – 44 years, 13.3% also had mammograms. This ratio rose to 40.0% for women 65 years and over. Monthly household income was also significantly related to prior experience with mammography. The chi-square value was 22.675, with a p-value of 0.0001. Household income was positively associated with previous mammography. The percentage of women who had a mammogram in the lower income groups was only 13.7% for women who earned less than BDT 20,000. By comparison, 39.4% of female earners who earned BDT 60,000 or more had been screened with mammography. There was a strong association between provider recommendation on mammography and prior mammography experiences. Chi square value was 21.346 and p value was < 0.001. Of women who were given provider advice, 32.9% had been screened for mammography. For those women who were not advised by the provider, only 16.4% had had a mammogram (Mascara & Constantinou, 2021). There was no statistically significant association between previous mammography experience with marital status, level of education, employment status, residence, travel time to obtain mammograms, insurance status, or family history of breast cancer.

Table 9: Association between Characteristics and Previous Mammography

Characteristic	Test	χ^2	df	p-value	Interpretation
Age group	Pearson chi-square	21.277	3	0.0001	Statistically significant
Marital status	Pearson chi-square	1.493	3	0.6838	Not statistically significant
Education level	Pearson chi-square	8.681	5	0.1225	Not statistically significant

Employment status	Fisher's exact test	—	—	0.9305	Not statistically significant
Residence	Pearson chi-square	3.307	1	0.0690	Not statistically significant
Monthly household income	Pearson chi-square	22.675	4	0.0001	Statistically significant
Travel time to diagnostic centre	Pearson chi-square	4.395	3	0.2218	Not statistically significant
Insurance/financial support	Pearson chi-square	1.647	2	0.4389	Not statistically significant
Family history of breast cancer	Pearson chi-square	0.954	2	0.6208	Not statistically significant
Provider advice regarding mammography	Pearson chi-square	21.346	2	<0.001	Statistically significant

Table 10: Significant Cross-Tabulation Results for Previous Mammography

Characteristic	**Category**	**Mammography Yes n**	**Mammography No n**	**Total**	**Mammography Yes (%)**
Age group	40–44 years	21	137	158	13.3
	45–54 years	60	174	234	25.6
	55–64 years	40	93	133	30.1
	65 years or above	26	39	65	40.0
Monthly household income	Below BDT 20,000	25	157	182	13.7
	BDT 20,000–39,999	54	137	191	28.3
	BDT 40,000–59,999	35	86	121	28.9
	BDT 60,000 or above	28	43	71	39.4
	Prefer not to say	5	20	25	20.0
Provider advice	Yes	100	204	304	32.9
	No	42	214	256	16.4
	Not sure	5	25	30	16.7

Summary of Results

The results showed that the measurement model had acceptable reliability, convergent validity, and discriminant validity. Good fit indices were also found for the models. The structural model accounted for 71.9% of the variance in mammography screening intention. There were 8 hypotheses supported. Screening knowledge and awareness, perceived susceptibility, perceived benefits, self-efficacy, cues to action and subjective norms were each found to have positive and significant effects on mammography screening intention. The structural barriers and psychosocial barriers had a negative and significant effect. The only predictor that was not significant was perceived severity. Perceived benefits were the highest of the positive predictoSelf-efficacy was the second largest positive predictor. The psychosocial barriers were the most negative predictor followed by structural barriers. Household income, provider advice, and age were all significantly associated with previous mammography experience.

Discussion

The authors conducted this study to ascertain the determinants of intention to undergo mammography screening amongst women in Bangladesh through structural equations. Results offer valuable insights regarding the role of knowledge, beliefs, barriers, confidence, social influences, and provider cues in determining intention to receive mammography by women (Abed *et al.*, 2025). Results of the proposed model revealed that it accounted for 71.9% of the variance of mammography screening intention; therefore, the explanatory power of the model is strong. Among the three components, perceived benefits positively

influenced mammography screening intention the most. That is, those women who thought that mammography could help with early detection of breast cancer and give them peace of mind were more likely to say they planned to have a mammogram. This finding illustrates a need for health communication for benefit. Women who seem to understand the utilitarian benefit of mammography also are more willing to screen. The second strongest positive predictor of intention for mammography screening was self-efficacy. This is an indication that confidence plays an important role in screening decisions. While women do know that mammograms are important, they also may not be able to fix an appointment or to talk to their health care provider about them, make the trip to the clinic or hospital, or even complete the test. Thus, confidence and skills might be more significant than knowledge (Ezema *et al.*, 2021). Cues to action were significantly positively associated. This suggests that women can be stimulated to think about mammography by the impact of external prompts. These can include provider suggestions, health messages, media messages, as well as breast cancer experiences in family and community networks. This is also confirmed by the association analysis. Women with provider recommendation (PR) were more likely to have had a mammography than women without provider recommendation (No PR). Whether respondents had knowledge and awareness of screening was positively and significantly associated with intention to screen with mammography. This discovery indicates that knowledge is still significant. There was an association between intent to get screened and knowledge of purpose and availability of mammography among women (Mascara & Constantinou, 2021). The average score for screening knowledge and awareness was however only moderate. This indicates that even if women have a lay understanding of breast cancer as a serious health problem, they may not have specific knowledge about mammography. The perceived susceptibility also proved to be significant and positive. Women who perceived the risk of breast cancer was personal to them were more likely to have the intention to get a mammography. This is significant as some women might not think they need screening if they do not have any symptoms nor a family history. A breast cancer health education message should therefore make it clear that breast cancer risk may be present, even if there are no signs or symptoms (Alam *et al.*, 2021). Subjective norms was found to have positive and significant impact on the intention to get mammography screening. This discovery suggests that women's screening choices could be affected by social validity and family support. Family dynamics, domestic duties, and cultural norms play a key role in influencing health choices for women in the Bangladeshi context. Having a family member support them might decrease hesitation and increase participation in screening. Structural barriers had a significant negative effect on screening intention. This indicates that physical constraints (service availability, time and distance, and cost) may be discouraging women from thinking about mammography. This is in line with the income level association noted in this study. Previous mammography was more likely to be reported by women with higher household income (Farr *et al.*, 2020). Thus, economy capacity seems to be a key factor in screening access. The strongest negative impact on screening intention was the psychosocial barriers. This meant fear, embarrassment, fear of pain and fear of outcomes were all significant barriers to overcome. Even when women are aware about screening and understand the benefits, these barriers can stop them from getting screened. Emotion and cultural issues therefore are to be viewed as serious issues rather than the personal concerns of a few. When considering the perceived severity as a predictor for mammography screening intention, it was not significant. This is a significant discovery. Overall, respondents had a positive awareness of the seriousness of breast cancer, but this was not directly related to higher intentions to perform a breast screening (Manson & Achel, 2023). A possible explanation is that if it is taken seriously, it can lead to fear, not action. Even if women perceive cancer as a serious illness, but are not willing to go for screening because of fear, embarrassment or lack of access to services, they may not form a stronger intention to go for screening. The results indicate that all messages about the seriousness of breast cancer should not be utilized to promote breast cancer screening in Bangladesh. Rather, programmes need to emphasise the advantages of early detection, boost women's confidence, share clear information about services, engage health providers, address structural obstacles, and address the fear and embarrassment directly. Further results revealed that uptake of previous mammograms was also low. 23.9% of those who answered said they ever had a mammogram. This is worrisome given that over half of the respondents said that they received provider advice. The gap between advice and uptake suggests uptake of advice is probably not enough. Women might require additional support, affordable services, assistance in scheduling appointments, and reassurance about the procedure. Previous mammography was significantly related to age. There was higher association of mammography with older women compared to younger women in the population studied. This could be due to increase in health contacts, perceived risk and provider recommendation with age (Ritchie *et al.*, 2021). But females in the 40–44 age group had the least experience with mammography. This indicates a need for education and guidance on screening in early middle-aged women. Previous mammography was also a significant factor with monthly household income. A greater proportion of women with a higher income also had undergone mammography. This is an indicator of inequity in access to screening. Even if mammography is still a costly option for women with low incomes, the use will likely be limited to those with more income resources (Tabár *et al.*, 2019). Provider advice was significantly associated with previous mammography. This is a key action takeaway from the study. Health

professionals have a key role in increasing participation in screening. Counselling at regular intervals by doctors, nurses and health workers in the community might help women transition from awareness to action.

Theoretical Implications

This study adds to the body of literature on breast cancer screening behaviour by testing an extended model of mammography screening intention. The model accounted for a large amount of variance in screening intention demonstrating its theoretical and empirical relevance of the selected constructs. The results confirm the role of perceived benefits, self-efficacy, cues to action, knowledge, subjective norms, and perceived susceptibility in the understanding of the intention to screen using mammography. The findings also validate tha barriers are not to be regarded as a generic concept. Both structural and psychosocial barriers had significant effects, with psychosocial barriers demonstrating a slightly larger effect. This distinction brings the theoretical understanding of the different effects of various barriers on screening intention closer. The insignificant impact of perceived severity has theoretical implications as well. It indicates that understanding the severity of disease is not sufficient to encourage screening, taking into account other beliefs and barriers. This finding aligns with the need for models of behaviour that take into account factors other than perceived severity, such as confidence, benefits, social influences, emotional barriers and access conditions.

Practical Implications

The results have key implications for promoting breast cancer screening in Bangladesh. The first step in health education is to emphasize the benefits of mammography. Messages should include the information that mammography can detect breast changes earlier and can help to reassure women if no abnormalities are detected. Communication that garners benefits might be more effective than fear-based messages. Secondly, programs must build women's self-efficacy. There needs to be clear information indicating what happens when women go for screening, how to make an appointment, what the procedure is, and what they may expect during screening. Uncertainties may be lessened and confidence raised with practical support. Third, the health care provider should be more engaged in promoting mammograms. There was a statistically significant relationship between provider advice and previous mammography. For this reason, doctors, nurses and community health workers should talk about mammograms with eligible women at their health check-ups. Fourth, barriers to structure have to be lowered. Increasing access may be achieved by lower-cost screening, through mobile mammography units and community referral systems and service information campaigns. These strategies may be particularly effective for women of low socio-economic status or those who are a distance away from diagnostic centres. Fifth, psychosocial obstacles need to be tackled head-on. Fear, embarrassment, anxiety, and pain are all reasons why women may choose not to get a mammogram. These concerns can be minimised through the use of female service providers, privacy protection, respectful communication and counselling. Lastly, family support should be incorporated into promotion of screening. As subjective norms were strongly related to screening intention, awareness programmes that leverage family members and community networks could be more effective.

Limitations and Future Research

This study has some limitations. First, the designs used in this study were cross sectional. Thus it is not possible to prove causal relationships. Findings indicate important relationships and predictive links and are not causal. Secondly, the dependent variable was mammogram screening intention. Will is well and good but it doesn't always translate to screening behaviour. Further studies will be needed to determine if intention translates to mammography uptake over time. Thirdly, the data was gathered by self-reported responses. Respondents might have provided more positive beliefs and/or provider advice and/or screening intention than they actually had. There may have also been a certain number of participants who were not able to remember when they had a mammography previously. Fourth, the sample consisted of women from various socio-demographic backgrounds, and may not be representative of women in Bangladesh. Women in remote areas, very poor families and poorly-served communities may face other and more severe constraints. Longitudinal research design should be used in future studies to investigate the gap between intention to participate in screening and actually getting mammograms. Intervention studies can examine the effect of provider counselling, navigation support, subsidised mammography (screening), and community education, on screening participation. Future studies can also investigate differences between rural and urban settings, family decision making, and whether women trust healthcare providers and the role of their husbands caregivers in their screening decision.

CONCLUSION

This study investigated how the factors relate to mammography intention among women in Bangladesh using structural equation modeling. The results indicated that perceived benefits, self-efficacy, cues to action, screening knowledge and awareness, subjective norms, and perceived susceptibility positively and significantly increased the screening intention. Structural barriers and psychosocial barriers had negative and significant effects. Perceived severity did not significantly predict. With regard to the explanatory power of the model, the model accounted for 71.9% of the variance in the mammography screening intention. Of the predictors, perceived benefits and self-efficacy had the greatest positive impact. Structural barriers and psychosocial

barriers were found to be the highest barriers. These results support that, beyond awareness, factors of confidence, emotional comfort, social support, provider encouragement, affordability, and access play a role in women's mammography intention. Of the respondents, only 23.9% had ever had a mammography which is a low uptake in the past. Previous mammography experience was significantly associated with age group, household income and provider advice. The findings indicate that individual and health-system factors influence participation in screening. The study recommends that raising the intention of mammography screening in Bangladesh needs to be done in a holistic manner. Public health programmes should educate women of the benefits of early detection, boost their confidence, decrease financial and service limitations, alleviate fear/embarrassment, and ensure that women are recommended for services often. Integrated strategies like this could increase the intention to receive mammograms and facilitate the detection of women's breast cancer at an early stage in Bangladesh.

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