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The mediating role of breast Self-Examination education based on the stages of change and health belief model on factors affecting breast cancer early detection ability

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Abstract

Breast cancer remains the leading cause of death among women worldwide. Early detection through Breast Self-Examination (BSE) is a simple yet effective measure to increase the likelihood of recovery. However, limited knowledge, motivation, and skills among women of reproductive age in performing BSE remain major barriers. Educational interventions based on the Stages of Change and Health Belief Model (HBM) frameworks have the potential to strengthen behavioral changes toward early detection. To analyze the influence of women's characteristics, health service facilities, and cues to action on the ability for early breast cancer detection, as well as the mediating role of BSE education using the Stages of Change technique and the Health Belief Model. This study employed an observational analytic design with a cross-sectional approach involving 120 women of reproductive age in Pidie District, Aceh. Samples were selected using a multistage random sampling technique. Data were collected through standardized questionnaires and analyzed using Structural Equation Modeling–Partial Least Square (SEM–PLS) to examine direct and indirect relationships among variables. Women's characteristics (p=0.000) and health service facilities (p=0.009) had significant effects on BSE education using the Stages of Change technique, whereas cues to action showed no direct effect (p=0.171). BSE education strongly influenced perceived health threat (p=0.000) and perceived health benefits (p=0.000), both of which enhanced early breast cancer detection ability (R^2=0.992). The research model demonstrated strong predictive relevance (Q^2>0.8). The characteristics of women of reproductive age and the support of health service facilities play crucial roles in improving early breast cancer detection through BSE education based on the Stages of Change and Health Belief Model frameworks. This approach is effective in strengthening awareness, motivation, and sustainable early detection behavior.

Keywords: Breast Self-Examination (BSE), Stages of change, Health belief model, Early breast cancer detection, Women of reproductive age

Introduction

Breast cancer is a non-communicable disease that predominantly affects women (Feriani et al., 2023). Recognizing one's own breast changes and the signs and symptoms of breast cancer is one of the best ways to achieve early detection (American Cancer Society, 2022). Breast cancers detected at an earlier clinical stage have a significantly higher survival rate compared to those identified at later stages (Rivera et al., 2018; Yildirim et al., 2020). However, many breast cancer patients seek medical attention only after the disease has reached an advanced stage, when treatment options become limited and the prognosis poor, often resulting in death (Maharani, 2020). The World Health Organization (2023) identifies three key elements in achieving early detection of breast cancer: health promotion for early awareness, accurate diagnosis, and comprehensive management of breast cancer.

The development of BSE (Breast Self-Examination) educational models using the Stages of Change approach has the potential to enhance women's confidence in performing early breast cancer detection through regular self-examination (Lee-Lin et al., 2016). However, many women still lack confidence to perform BSE. This hesitation is often due to insufficient knowledge and skills, which create barriers to behavioral change—such as not knowing the correct technique, difficulty adapting to new habits, or underestimating the seriousness of the disease. Consequently, these barriers contribute to the rising mortality rate associated with breast cancer.

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According to the World Cancer Research Fund International, breast cancer is the most common cancer among women. In 2022, there were 2,296,840 cases globally, with a total of 666,103 deaths. Indonesia reported one of the highest numbers of new cases—66,271 cases (41.8% of global cancer cases)—and 22,598 deaths (14.4%) (WHO, 2023). Projections based on population growth estimate that by 2030 there will be over 596,000 new cases and more than 142,100 deaths due to breast cancer (Juárez-García et al., 2020). Surveillance data from the Non-Communicable Disease Division in Aceh Province reported 1,117 female breast cancer cases in 2022, with 22 cases occurring in Pidie District (Directorate General of Disease Prevention and Control, 2023; İkizler et al., 2022).

The strong relevance of women's educational interventions based on the Stages of Change technique—a component of the Transtheoretical Model—lies in its focus on deliberate and conscious behavioral modification. This model assumes that behavioral change does not occur instantly but progresses through five cyclical stages: Precontemplation – women have no intention to perform BSE within the next six months, Contemplation – women are not yet performing BSE but plan to within six months, Preparation – women intend to perform BSE within the next 30 days, Action – women begin performing BSE, and Maintenance – women continue performing BSE for more than six months.

These Stages of Change can serve as a framework for designing innovative educational interventions to promote BSE behavior (Velasquez, Maurer, & Crouch, 2016). This educational approach is further integrated with the Health Belief Model (HBM), which consists of several core constructs: perceived susceptibility, perceived severity, perceived benefits, perceived barriers, and self-efficacy (Pirzadeh & Golshiri, 2022). According to this theory, when a woman perceives herself as susceptible to breast cancer, recognizes its seriousness, and weighs the benefits against the barriers of performing BSE, she is more likely to engage in regular self-examination (Ashtarian et al., 2018; Masih et al., 2025).

The Stages of Change model conceptualizes behavioral and experiential transformation as a natural part of the change process—reflecting an individual's cognitive and behavioral efforts to modify emotions, thoughts, and habits associated with health-related behavior. Therefore, BSE education based on the Stages of Change integrated with the Health Belief Model is expected to reinforce women's confidence through these five behavioral stages (precontemplation, contemplation, preparation, action, and maintenance), thereby enhancing their ability for early breast cancer detection (Velasquez, Maurer, & Crouch, 2016).

Aims

The aim of this study was to analyze the influence of several factors, including the characteristics of women of reproductive age (WRA), health service facility factors, and cues to action, on the ability for early breast cancer detection. In addition, this study sought to examine the mediating role of education based on the Stages of Change technique and the Health Belief Model within these relationships.

Materials and Methods

Study design

This study employed a quantitative research design using an observational analytic method with a cross-sectional approach. The study population consisted of Women Of Reproductive Age (WRA) residing within the working areas of community health centers (Puskesmas) in Pidie District, Nanggroe Aceh Darussalam, comprising a total of 26 service areas. These areas represented diverse geographical characteristics, including urban, rural, remote, and very remote regions.

The sampling technique used was multistage random sampling, which was conducted in the following stages:

- Stage 1: Determination of the study population using a cluster sampling approach to ensure proportional representation of Puskesmas service areas in Pidie District, from which four working areas were selected.
- Stage 2: Selection of specific Puskesmas working areas using simple random sampling.

- Stage 3: Selection of potential respondents from each village within the chosen Puskesmas areas based on predefined inclusion and exclusion criteria.

Inclusion criteria

- Women of reproductive age residing within the working areas of Puskesmas in Pidie District.
- Women aged 18–49 years.
- Willingness to participate as a respondent.

Exclusion criteria:

- Women with a history of breast cancer.
- Women experiencing or with a history of mental disorders.
- Women with visual and/or hearing impairments.
- Women who are pregnant or breastfeeding at the time of data collection.

Instrument

The research instrument used in this study was a structured questionnaire consisting of several components, each representing key variables and subvariables as follows:

1. Characteristics of Women of Reproductive Age (WRA): This section included subvariables such as age, education, occupation, marital status, family history of disease, and health motivation, comprising 10 items (Ahmad *et al*, 2022, Luthans, 2011).
2. Health Service Factors: This dimension included subvariables on accessibility of health services (5 items), health facilities and infrastructure (12 items), and the role of health workers (10 items) (R. Penchasky & J. Thomas, 1981; WHO, 2015).
3. Cues to Action: Subvariables included mass media information (7 items), support from health workers (5 items), and peer suggestions (4 items) (2)
4. Early Breast Cancer Detection Ability: This section covered subvariables on Breast Self-Examination (BSE) practices (13 items), recognition of breast abnormality symptoms (8 items), and follow-up actions for medical treatment (8 items) (3)).
5. Education Using the Stages of Change Technique: Subvariables included knowledge (10 items), attitude (10 items), and skills (10 items) (4) (5).
6. Perceived Health Threat (Health Belief Model): Subvariables included perceived susceptibility (5 items) and perceived seriousness (10 items) (Champion, 1984).
7. Perceived Health Expectancy (Health Belief Model): Subvariables included perceived barriers (6 items), perceived benefits (10 items), and self-efficacy (10 items).

The validity test was conducted among women of reproductive age residing in the working area of Batee Public Health Center (Puskesmas Batee) with a total of 30 respondents.

Based on the results of the analysis, an item was considered valid if the correlation coefficient (r count) ≥ r table (0.361) and the significance value (p-value) ≤ 0.05. All questionnaire items were declared reliable, with Cronbach's alpha values greater than 0.70, ranging between 0.759 and 0.907, indicating high internal consistency.

Data collection procedure

This study was conducted in the working areas of Reubee Community Health Center, Titeue Community Health Center, Simpang Tiga Community Health Center, and Muara Tiga Community Health Center in Pidie District. Data collection was carried out from March to May 2025.

Prior to completing the questionnaire, each participant received a detailed explanation regarding the objectives, procedures, rights, and responsibilities involved in the study.

Participants were then asked to sign an informed consent form after confirming their understanding of their rights, which included the freedom to withdraw from the study at any time and assurance of the confidentiality of all personal data.

Result

Respondent characteristics and descriptive findings

This study involved 120 women of reproductive age as respondents. Among them, the majority were aged 36–49 years (n = 59; 49.2%). Most participants had completed secondary education (n = 77; 64.2%), were farmers by occupation (n = 35; 29.2%), and were married (n = 84; 70.0%). The majority reported no family history of breast cancer (n = 111; 92.5%) and demonstrated low health motivation (n = 67; 55.8%).

Regarding health service factors, most respondents rated accessibility of health services as moderate (n = 102; 85.0%), health facilities and infrastructure as adequate (n = 96; 80.0%), and the role of health workers as adequate (n = 95; 79.2%).

For cues to action, the majority of respondents reported low exposure to mass media information (n = 112; 93.3%), limited support from health workers (n = 112; 93.3%), and infrequent peer suggestions (n = 73; 60.8%).

In the domain of education using the Stages of Change technique, most respondents had low knowledge (n = 115; 95.8%), negative or low attitudes (n = 100; 83.3%), and limited skills (n = 79; 65.8%).

For perceived health threat, most respondents reported moderate perceived susceptibility (n = 94; 78.3%) and low perceived seriousness (n = 91; 75.8%).

Regarding perceived health expectancy, the majority perceived moderate benefits (n = 74; 61.4%), low barriers (n = 91; 75.8%), and high self-efficacy (n = 80; 66.7%).

Finally, in terms of early breast cancer detection ability, most respondents demonstrated moderate BSE (Breast Self-Examination) practices (n = 46; 38.3%), moderate recognition of breast cancer symptoms (n = 46; 38.3%), and moderate follow-up for medical treatment (n = 53; 44.2%).

Outer model evaluation

1. Convergent validity test

The assessment of convergent validity was conducted to ensure that the indicators within each construct were highly correlated and measured the same underlying concept. Convergent validity is considered satisfactory when both the factor loading and the Average Variance Extracted (AVE) values exceed 0.5. The results of the convergent validity test are presented in the following table:

Table 1. Results of convergent validity test after indicator reduction

Variable	Indicators	Outer loading	AVE	Interpretation
(X1) Factors: Women of childbearing age	X1.1 Age	0,964	0.904	Valid
	X1.2 Education	0,963		Valid
	X1.4 Marital status	0,972		Valid
	X1.5 Family history of breast cancer	0,969		Valid
	X1.6 Health motivation	0,883		Valid
(X2) Health service facility factors	X2.1 Accessibility of health services	0,963	0.918	Valid
	X2.2 Infrastructure	0,951		Valid
	X2.3 The role of health workers	0,960		Valid
(X3) Cue action	X3.1 The role of health workers	0,948	0.907	Valid
	X3.2 Health worker support	0,933		Valid
	X3.3 Friend's suggestion	0,975		Valid
(X4) BSE education, stages of change technique	X4.1 Knowledge	0,957	0.896	Valid
	X4.2 Attitude	0,908		Valid
	X4.3 Skills	0,974		Valid

(Y1) Health Threats	Y1.1 Perceived vulnerability	0,985	0.971	Valid
	Y1.2 Perceived seriousness felt	0,985		Valid
(Y2) Health Hope	Y2.1 Perceived benefits	0,950	0.909	Valid
	Y2.2 Perceived benefits	0,962		Valid
	Y2.3 Perceived self-confidence	0,948		Valid
(Y3) Early detection capability of breast cancer	Y3.1 BSE examination	0,928	0.903	Valid
	Y3.2 Know the signs and symptoms	0,940		Valid
	Y3.3 Knowing the follow-up treatment	0,981		Valid

Based on the table above, it can be seen that after reducing invalid indicators, all indicators produce a loading factor value of more than 0.5 and all variables produce an Average Variance Extracted (AVE) value greater than 0.5.

Thus, based on convergent validity, all indicators are declared valid to measure the variables, where it can be explained that indicators of factors of women of childbearing age, health service factors, cues to action, BSE education, stages of change techniques, health threats, health expectations and the ability to detect early breast cancer can measure variables or these indicators are declared suitable for measuring latent variables.

2. Discriminant validity test

Discriminant validity is calculated using cross loading with the criteria that if the cross loading value in a corresponding variable is greater than the indicator correlation value in another variable, then the indicator is declared valid in measuring the corresponding variable.

Table 2. Cross-Landing discriminant validity test results

Indicators	X1	X2	X3	X4	Y1	Y2	Y3
X1.1	0.964	0.884	0.876	0.951	0.874	0.896	0.910
X1.2	0.963	0.928	0.920	0.949	0.921	0.891	0.928
X1.4	0.972	0.901	0.920	0.942	0.911	0.885	0.914
X1.5	0.969	0.910	0.923	0.959	0.931	0.887	0.924
X1.6	0.883	0.903	0.822	0.901	0.867	0.939	0.932
X2.1	0.921	0.963	0.882	0.925	0.883	0.920	0.923
X2.2	0.904	0.951	0.914	0.919	0.905	0.911	0.921
X2.3	0.912	0.960	0.905	0.918	0.911	0.930	0.944
X3.1	0.907	0.901	0.948	0.898	0.894	0.892	0.895
X3.2	0.868	0.879	0.933	0.865	0.906	0.876	0.897
X3.3	0.908	0.905	0.975	0.900	0.911	0.896	0.892
X4.1	0.968	0.921	0.934	0.957	0.940	0.891	0.928
X4.2	0.877	0.911	0.822	0.908	0.874	0.948	0.940
X4.3	0.964	0.897	0.890	0.974	0.903	0.903	0.925
Y1.1	0.938	0.925	0.945	0.943	0.985	0.935	0.951
Y1.2	0.930	0.926	0.925	0.943	0.985	0.964	0.973
Y2.1	0.904	0.904	0.930	0.916	0.950	0.950	0.936
Y2.2	0.926	0.934	0.914	0.936	0.931	0.962	0.945
Y2.3	0.877	0.911	0.822	0.908	0.874	0.948	0.940
Y3.1	0.968	0.957	0.934	0.968	0.891	0.934	0.928
Y3.2	0.877	0.908	0.822	0.877	0.948	0.822	0.940
Y3.3	0.919	0.939	0.921	0.919	0.972	0.921	0.981

Table 3. Construct reliability test results

Variables	Cronbach's Alpha	Composite Reliability
(X1) Factors: Women of childbearing age	0,973	0,979
(X2) Health service facility factors	0,955	0,971
(X3) Cue action	0,949	0,967
(X4) BSE education, stages of change technique	0,942	0,963
(Y1) Health Threats	0,970	0,985
(Y2) Health Hope	0,950	0,968
(Y3) Early detection capability of breast cancer	0,946	0,965

The table above shows that the composite reliability values of all variables in this study are greater than 0.7, and the Cronbach's alpha values of all variables are greater than 0.6. These results indicate that each variable meets the composite reliability criteria; therefore, it can be concluded that all variables have a high level of reliability.

Table 4. Determinant coefficient results (*R-Squares*)

Indicator Variables	*R-Squares*	*R Square Adjusted*	Interpretation
(X4) BSE education, stages of change technique	0,984	0,983	Strong
(Y1) Health Threats	0,916	0,916	Strong
(Y2) Health Hope	0,932	0,931	Strong
(Y3) Early detection capability of breast cancer	0,992	0,992	Strong

The test results show that the R Square value of the latent variable BSE education using the stages of change technique is 0.984, the latent variable health threat is 0.916, health expectation is 0.932, and breast cancer early detection ability is 0.992. These results can be interpreted as follows: the BSE education using the stages of change technique can be explained by the factors of women of reproductive age, health services, and cues to action by 98.4%, while the remaining variance is explained by other variables outside this study.

Furthermore, the health threat variable can be explained by BSE education using the stages of change technique by 91.6%, and the rest by variables outside this study. The health expectation variable can be explained by BSE education using the stages of change technique by 93.2%, and the remaining portion by other variables not included in this study. Meanwhile, the early detection ability variable can be explained by the factors of women of reproductive age, health services, cues to action, BSE education using the stages of change technique, health threat, and health expectation by 99.2%, with the remaining variance explained by factors outside this study.The overall structural model validation in this study used the Q-square value.

Table 5. Q-Square predictive relevance value (Q^2)

Structural Model	SSO	SSE	Q^2 (=1-SSE/SSO)
(X4) BSE education, stages of change technique	360.000	46.501	0,871
(Y1) Health Threats	240.000	28.138	0,883
(Y2) Health Hope	360.000	57.069	0,841
(Y3) Early detection capability of breast cancer	360.000	45.161	0,875

The Q-Square value of the BSE Education Model using the Stages of Change technique in this study is 0.871, the health threat variable is 0.883, the health expectation variable is 0.841, and the breast cancer early detection ability variable is 0.875. This means that the model is considered good and has strong predictive relevance, as the Predictive Relevance (Q^2) value is greater than 0 (zero) (Ghozali, 2021). The BSE Education Model using the Stages of Change technique based on the *Health Belief Model* has a predictive relevance of 87.1% for application in different settings or areas.

The evaluation of precision of estimation aims to test whether the proposed hypotheses are accepted or rejected. If the t-statistic value is greater than 1.96 (two-tailed) and the probability value (p-value) is less than 0.05 or 5%, it indicates a significant influence of the exogenous variable on the endogenous variable. The results of the significance testing and model evaluation can be seen in the following table:

Table 6. Path coefficients – bootstraping

Variables	**Path Coefficients**	**Sample Mean (M)**	**Standard Deviation (STDEV)**	**T-Statistics**	***p* - *value***
Characteristics of Women of Reproductive Age (WRA) → BSE Education using the Stages of Change Technique	0,833	0,844	0,085	9,840	0,000
Health Care Facility Factor → BSE Education using the Stages of Change Technique	0,230	0,220	0,088	2,629	0,009
Cues to Action Factor → BSE Education using the Stages of Change Technique	-0,066	-0,067	0,048	1,369	0,171
Characteristics of Women of Reproductive Age (WRA) → Breast Cancer Early Detection Ability	0,031	0,014	0,192	0,160	0,873
Health Care Facility Factor → Breast Cancer Early Detection Ability	0,149	0,144	0,062	2,402	0,017
Cues to Action Factor → Breast Cancer Early Detection Ability	-0,090	-0,089	0,061	1,459	0,145
BSE Education using the Stages of Change Technique → Breast Cancer Early Detection Ability	0,286	0,302	0,216	1,323	0,186
BSE Education using the Stages of Change Technique → Health Threat among Women of Reproductive Age	0,957	0,957	0,010	92,111	0,000
BSE Education using the Stages of Change Technique → Health Expectation among Women of Reproductive Age	0,965	0,965	0,009	107,004	0,000
Health Threat Factor → Breast Cancer Early Detection Ability	0,276	0,271	0,077	3,562	0,000
Health Expectation Factor → Breast Cancer Early Detection Ability	0,355	0,366	0,100	3,546	0,000

Based on Table 6 above, it can be explained that the hypothesis test results in Table 6 show that the characteristics of women of reproductive age (WRA) are the strongest factor influencing BSE education using the Stages of Change technique, while BSE education using the Stages of Change technique is the strongest factor influencing health expectation.

Model fit

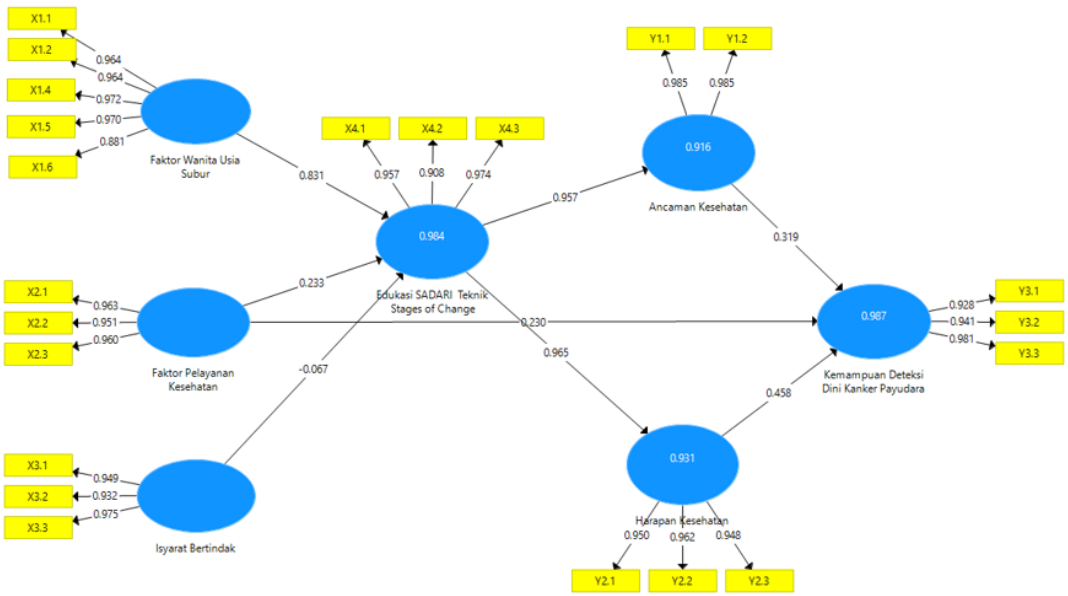

Figure 1. Model fit

The final model in this study is the model that has eliminated insignificant correlations between variables. The final model is presented in Figure 1. The results of the indirect hypothesis testing were used to determine the influence and pathway analysis of independent variables on the dependent variable. Based on the results of the direct effect analysis, it was found that the pathway of the characteristics factors of women of reproductive age (WUS) on the ability of early breast cancer detection did not produce a significant effect. However, based on the results of the indirect testing, it was shown that the variables of BSE education using the stages of change technique and the health threat variable could mediate the characteristics factors of WUS on the ability of early breast cancer detection. Furthermore, based on the results of the direct effect analysis, it was found that the pathway of cues to action on the ability of early breast cancer detection did not produce a significant effect, but based on the results of the indirect testing, it was shown that the variables of BSE education using the stages of change technique and the health expectation variable could mediate the cues to action on the ability of early breast cancer detection.

Discussion

This study demonstrated that several factors significantly influence the ability of women of reproductive age to perform early breast cancer detection. The application of Breast Self-Examination (BSE) education based on the Stages of Change framework and the Health Belief Model (HBM) proved effective in enhancing behavioral readiness, awareness, and early detection capacity. Women's characteristics and health service facilities were found to have a positive and significant impact on BSE education, while cues to action showed only indirect influence. Furthermore, BSE education strongly affected perceived health threat and perceived health expectation, both of which mediated the relationship between individual and environmental factors with early detection ability.

Characteristics of women and BSE education

The characteristics of women—particularly age, education, marital status, family history, and health motivation—were identified as the most influential predictors of BSE education ($p = 0.000$). This supports previous studies indicating that

demographic and motivational attributes are crucial determinants of preventive health behavior (Legi et al., 2024; Abo Al-Shiekh et al., 2021). Educational attainment enhances cognitive preparedness and awareness of breast cancer risks (Siregar, 2022), while higher health motivation strengthens self-efficacy, a core construct of the HBM (Ashtarian et al., 2018).

Although the direct association between these characteristics and early detection ability was not significant (p = 0.873), the indirect pathway through BSE education and perceived health threat was significant, suggesting that education acts as a behavioral mediator translating personal attributes into preventive practice.

Health service facilities

Health service factors—including accessibility, infrastructure, and the role of health workers—significantly influenced both BSE education (p = 0.009) and early detection ability (p = 0.017). This highlights the critical role of a supportive health system in enabling behavioral change. Adequate facilities and the proactive role of health professionals facilitate information dissemination, skill development, and regular follow-up (Dewi et al., 2021). In line with WHO (2023), community-based primary care plays a strategic role in promoting early detection through consistent health education and empowerment. Strengthening health service accessibility, particularly in rural regions like Pidie, is essential to ensure equitable and sustained delivery of educational interventions.

Cues to action

Cues to action—such as media information, peer encouragement, and professional support—did not show a direct effect on early detection (p = 0.145) but demonstrated indirect influence through BSE education and perceived health expectation. The limited exposure to media information (93.3%) and health worker support (93.3%) may explain this finding. Similar studies (Kandasamy et al., 2024) reported that low exposure to health messages diminishes preventive behavior. Nevertheless, even minimal cues can positively impact perceptions when embedded within structured educational programs. Therefore, expanding the use of diverse communication channels—schools, community centers, and digital platforms—is recommended to enhance message continuity and outreach.

Mediating role of education and health perceptions

The study confirmed that BSE education significantly mediates the influence of external and individual factors on early detection ability through perceived health threat and expectation (p = 0.000). The Stages of Change model conceptualizes behavior modification as a gradual, cyclical process—from pre-contemplation to maintenance (Velasquez et al., 2016)—while the HBM explains how cognitive perceptions of risk and benefit shape behavioral intention (Pirzadeh & Golshiri, 2022). Integrating these models provides a robust framework for fostering lasting preventive behavior. Women who receive structured, theory-based education demonstrate greater self-efficacy and readiness to perform regular BSE, consistent with findings from Noori et al. (2021) and Sari et al. (2022).

Health threat, health expectation, and early detection

Both perceived health threat and expectation were significantly associated with early detection ability (p = 0.000), affirming the HBM principle that higher risk perception and awareness of benefits drive protective behavior (Notoatmodjo, 2012). Although most respondents had moderate susceptibility awareness, their perceived seriousness of breast cancer was low, suggesting the need for emotionally engaging interventions. Increasing both cognitive understanding and emotional motivation is essential to strengthen commitment to preventive actions. The relatively high self-efficacy level (66.7%) among respondents also reflects readiness for empowerment-based health education.

Conclusion

This study highlights that women's characteristics and the quality of health care services significantly influence Breast Self-Examination (BSE) education based on the Stages of Change framework, which in turn enhances perceived health threat, health expectations, and early breast cancer detection ability.

While cues to action showed no direct effect, they contributed indirectly by strengthening educational impact and shaping health perceptions. These findings emphasize that behavioral change in early detection is influenced by both individual and systemic factors.

The integration of the Stages of Change and Health Belief Model represents an effective, theory-based approach to improve awareness, motivation, and self-efficacy in performing BSE. Continuous application of this model through community and primary health programs is recommended to empower women in recognizing early signs of breast cancer and promoting timely intervention.

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