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The Influence of SADARI Interactive Education on the Knowledge, Attitudes, and Practices of Women of Childbearing Age

[1,2]Caroline Natalia[*], [3]Rosmala Nur, [4]Fauzan, [4]Ni Wayan Sridani, [4]Rosa Dwi Wahyuni
[1]Student of Master of Public Health Program, Faculty of Public Health, Universitas Tadulako, Palu, Indonesia
[2]UPT Balai Pendidikan Pelatihan Kesehatan Provinsi Sulawesi Tengah
[3]Faculty of Public Health, Universitas Tadulako, Palu, Indonesia
[4]Faculty of Medicine, Universitas Tadulako, Palu, Indonesia
carolineluntungan79@gmail.com

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Abstract
Introduction: *In 2024, Central Sulawesi recorded 74 breast tumours cases, with Palu showing the highest screening coverage and North Morowali the lowest. At the Health Training Center, only one of eight staff demonstrated proper breast self-examination (BSE) knowledge and technique, indicating poor preventive practice. These findings underscore the urgency for effective education to strengthen early breast cancer detection behaviours.* ***Objective:*** *This study aimed to evaluate the effectiveness of interactive BSE education in improving knowledge, attitudes, and practices among women of reproductive age (WRA).* ***Method:*** *A quantitative study with a quasi-experimental design was conducted in August 2025 involving all 41 registered WRA at the Health Training Center, selected through total sampling. Data were analyzed using univariate analysis for participant characteristics, paired sample t-test for pre–post comparisons, and One Way ANOVA to determine group differences post-intervention.* ***Results and Discussion:*** *The paired t-test showed significant improvements in knowledge, attitudes, and practices after the intervention ($p < 0.05$). ANOVA revealed significant intergroup differences, with behavioral changes yielding the highest F-value. Interactive education with demonstrations and hands-on practice effectively enhanced understanding and strengthened consistent BSE behavior.* ***Conclusion:*** *Interactive BSE education significantly improved participants' knowledge, attitudes, and practices, with direct practice playing a key role in sustaining long-term behavior change.*

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Introduction

Women of Reproductive Age (WRA), aged 15–49 years, represent an important group in efforts to improve family health, including the early detection of breast abnormalities. However, various breast conditions such as lumps or changes in texture are often not examined early, resulting in delayed detection of breast cancer (Yus et al., 2025). Globally, approximately 10% of women experience fibroadenoma, and breast cancer is the second most common cancer in the world, with 2,296,840 new cases and 670,000 deaths recorded in 2022 (Zhang et al., 2025).

In Indonesia, breast cancer has the highest incidence among women, reaching 42.1 per 100,000 population with a mortality rate of 17 per 100,000. WHO (2024) reported 65,858 breast cancer cases, accounting for 30.8% of all cancer cases, while GLOBOCAN 2020 recorded 68,858 cases with 22,000 deaths. In the early detection program, among 2,277,407 women aged 30–50 years who were examined, 2,762 (0.12%) were found to have lumps and 1,142 (0.05%) were suspected breast cancer cases (Kemenkes RI, 2023).

In Central Sulawesi Province, there were 74 cases of breast tumors or lumps in 2024, with the highest screening coverage reported in Palu City (4,884 individuals) and the lowest in North Morowali District (309 individuals) (Dinas Kesehatan Provinsi Sulawesi Tengah, 2024). Preliminary findings at the Health Training Center (UPT Balai Pendidikan Pelatihan Kesehatan) showed low BSE (Breast Self-Examination) practices, where only 1 out of 8 staff members knew and performed BSE correctly, while 6 did not perform it routinely, and 1 was not familiar with BSE.

Nationally, BSE practices are also low: only 46.3% of Indonesian women have ever performed BSE, while 53.7% have never done so (Fitriani et al, 2022). Similar patterns of low practice rates have been reported across different populations, including female university students, general university students, and students in Islamic boarding schools. These low levels of routine practice are consistently associated with insufficient knowledge, negative attitudes, and suboptimal motivation and behavioral formation, which have been identified as key determinants of preventive health behavior in multiple studies (Rachmawati et al, 2020). Limited access to information and weak health-seeking behavior further contribute to the overall low engagement in routine health practices among young women in Indonesia (D. A. Sari & Putri, 2022). Various studies state that health education has been proven to increase knowledge and BSE behavior, for example, raising knowledge from <2% to >60% after counseling (Fitriani et al., 2022). However, many women still know about BSE but do not perform it correctly and regularly. This indicates the need for more interactive educational approaches to encourage stronger behavioral changes.

Considering the high number of breast tumor and cancer cases and the low rate of BSE practice, this study was conducted to analyze the effect of Breast Self-Examination (BSE) education through interactive health education on the knowledge, attitudes, and practices of WRA at the Health Training Center of Central Sulawesi Province.

Method

This study is a quantitative study using a Quasi-Experimental design aimed at assessing the effect of Breast Self-Examination (BSE) education through interactive health education on the knowledge, attitudes, and practices of women of reproductive age. The research was conducted at the Health Training Center of Central Sulawesi Province in August 2025.

The population in this study consisted of all women of reproductive age (15–49 years) registered at the Health Training Center of Central Sulawesi Province, totaling 41 individuals. The sampling technique used was total sampling, meaning the entire population was included as the research sample.

Data analysis was conducted in three stages. First, univariate analysis was used to describe the characteristics of each variable independently without linking them to other variables. Second, bivariate analysis using a paired sample t-test was conducted to compare the mean scores of knowledge, attitudes, and practices before and after health education. This test aimed to determine whether there were significant changes in these variables within the same group after the intervention, delivered through PowerPoint media and hands-on BSE practice. Third, multivariate analysis was carried out using One Way ANOVA to examine differences in means between groups after the intervention. The use of ANOVA provides a more comprehensive analysis by allowing comparison of intervention effects on several variables simultaneously, thereby offering a broader overview of the impact of education on knowledge, attitudes, and practices.

Result and Discussion

1. Result

Univariate Analysis

The univariate analysis includes demographic characteristics such as age, education, number of children, and family history of breast cancer. In addition, this analysis presents the distribution of knowledge, attitudes, and practices related to Breast Self-Examination (BSE) before and after the interactive health education intervention, as shown in the following table:

Table 1
Univariate Analysis

Variable	f	%
Age Classification		
15–24 Years	2	5
15–34 Years	17	42.5
35–44 Years	17	42.5
35–49 Years	4	10
Total	40	100
Education Level		
Senior High School or Equivalent	8	20
Diploma/Bachelor's Degree	31	77.5
Master's/Postgraduate	1	2.5
Total	**40**	**100**
No Children		
One Child	15	37.5
Two Children	6	15
Three Children	12	30
Four Children	4	10
Total	**40**	**100**
Family History		
There is History	7	17.5
No History	33	82.5
Total	**40**	**100**

Source: Primary Data, 2025

Based on the table above, the majority of respondents fall within the age groups of 15–34 years and 35–44 years, each representing 42.5%, indicating that most respondents are in the productive age range and are within the peak to mature phases of reproductive life. The 15–24-year age group accounts for only 5%, while the 45–49-year group accounts for 10%. Overall, this composition shows that respondents are predominantly women who are well-established in their reproductive phase and actively engaged in family health activities.

In terms of education, most respondents hold a Diploma or Bachelor's degree (77.5%), followed by those with a senior high school education (20%), and only 2.5% with a Master's degree. This relatively high educational level has the potential to enhance respondents' understanding of health, including their ability to make preventive decisions related to reproductive health.

Regarding the number of children, 37.5% of respondents do not yet have children, making them the largest group, followed by those with two children (30%), one child (15%), and three to four children totaling 17.5%. This distribution suggests that most respondents are in the early stages of family life or just beginning their reproductive journey, which may influence their level of experience, knowledge, and need for reproductive and maternal health information.

Additionally, most respondents (82.5%) reported no family history of breast cancer, while 17.5% reported having such a history. Although the proportion without a family history is relatively high, the presence of respondents with genetic risk factors remains important to consider, as a family history of breast cancer can increase vulnerability and

influence early detection behaviors, including awareness and regular practice of breast self-examination.

Bivariate Analysis

The following table presents the descriptive analysis results of the Paired Sample t-test used to compare the pretest and posttest scores of the three research variables, namely knowledge, attitude, and practice. This test was conducted to determine whether there were significant changes after the intervention was given to the respondents. The information displayed includes the mean value, number of respondents (N), standard deviation, and standard error of the mean for each variable before and after the intervention.

Table 2
Paired Sample Mean Test

Paired	Variable	N	Mean	Std. Deviation	Std. Error Mean
Pair 1	Pretest Knowledge	40	7.13	1.727	0.273
	Posttest Knowledge	40	9.07	0.859	0.136
Pair 2	Pretest Attitude	40	33.30	3.976	0.629
	Posttest Attitude	40	35.03	2.966	0.469
Pair 3	Pretest Practice	40	4.00	2.819	0.446
	Posttest Practice	40	8.65	1.145	0.181

Source: Primary Data, 2025

The analysis results in Table 2 show an increase in all variables after the intervention was administered. For the knowledge variable, the mean pretest score of 7.13 increased to 9.07 in the post-test, with a difference of 1.94 points. Additionally, the smaller standard deviation in the post-test indicates that respondents' understanding became more uniform and consistent after the intervention.

For the attitude variable, the mean score increased from 33.30 in the pretest to 35.03 in the post-test, an increase of 1.73 points, indicating a positive shift in respondents' attitudes. Meanwhile, the practice variable showed the largest improvement, rising from an average of 4.00 in the pretest to 8.65 in the post-test, with an increase of 4.65 points. This substantial improvement demonstrates that the intervention not only influenced knowledge and attitude but was also effective in driving actual behavioural change among respondents.

The following Table 2 presents the results of the Paired Sample t-test used to determine the differences between pretest and post-test scores on the three variables: knowledge, attitude, and practice. This test was conducted because the variables were measured on the same group of respondents before and after the intervention, allowing the analysis to identify whether the intervention resulted in statistically significant changes. The values presented include the mean, t-value, and significance level (p-value).

Table 3
Paired Sample T-Test Results

Paired	Variable	Mean	t	Nilai Sig
Pair 1	Pretest Knowledge-Posttest Knowledge	-1.950	-7.948	0.000
Pair 2	Pretest Attitude-Posttest Attitude	-1.725	-2.890	0.006
Pair 3	Pretest Practice - Posttest Practice	-4.650	-9.974	0.000

Source: Primary Data, 2025

The results of the Paired Sample t-test in Table 3 show that the intervention provided was able to improve the three variables examined, namely knowledge, attitudes, and practices. For the knowledge variable, there was a significant increase with a mean difference of 1.95 points. The negative mean difference indicates that the posttest score was higher than the pretest. This is supported by the t-value of –7.948 and a p-value of 0.000, which is far below the significance threshold of 0.05. Thus, the intervention was proven effective in improving the respondents' understanding. The attitude variable also showed a meaningful change, with the average score increasing by 1.73 points after the intervention. The t-value of –2.890 and a p-value of 0.006 indicate that this change is statistically significant. These findings show that the intervention not only increased knowledge but also influenced the respondents' perspectives and affective responses.

Meanwhile, the practice variable showed the greatest increase compared to the other two variables, at 4.65 points. A t-value of –9.974 with a p-value of 0.000 indicates that the difference before and after the intervention was highly significant. This suggests that the intervention provided did not only affect cognitive and affective aspects but also strongly encouraged real behavioral changes among the respondents. Overall, the three variables showed significant improvements, meaning that the intervention successfully produced comprehensive positive effects.

The overall results of the Paired Sample t-test indicate that the intervention had a significant effect on the knowledge, attitudes, and practices of women of reproductive age. All three variables experienced substantial improvement after the intervention, as shown by p-values < 0.05 for all test pairs. The increase in knowledge serves as a strong foundation for changes in attitudes and practices. More positive attitudes reflect acceptance of the information and values delivered through the intervention. The greatest change was observed in practices, indicating that the intervention was not only cognitively understood but also motivated respondents to adopt better behaviors in daily life. Thus, overall, the intervention can be declared effective in improving the respondents' knowledge, attitudes, and practices.

Multivariate Analysis

The multivariate analysis in this study used the One-Way ANOVA test. The One-Way ANOVA test was conducted to determine whether there were differences in the mean scores of knowledge, attitudes, and practices between two or more groups after the intervention was given. This analysis is important to determine whether the intervention had varying effects across respondent groups. The following table presents the ANOVA test results for the three main variables examined.

Table 4
One Way ANOVA Test

Variable		ONEWAY ANOVA Sum of Squares	df	Mean Square	F	Nilai Sig
Knowledge	Between Groups	76.050	1	76.050	40.867	0.000
	Within Groups	145.150	78	1.861		
	Total	221.200	79			
Attitude	Between Groups	59.513	1	59.513	4.839	0.031
	Within Groups	959.375	78	12.300		
	Total	1018.888	79			
Practice	Between Groups	432.450	1	432.450	93.412	0.000
	Within Groups	361.100	78	4.629		
	Total	793.550	79			

Source: Primary Data, 2025

Based on the results of the One-Way ANOVA test in Table 4 above, it is shown that there are significant differences in the three analyzed variables, namely knowledge, attitude, and practice. For the knowledge variable, the F value of 40.867 with a p-value of 0.000 indicates a highly significant difference between groups, allowing the conclusion that the intervention produced different effects on the improvement of knowledge in each group. For the attitude variable, the F value of 4.839 with a p-value of 0.031 shows that there is a significant difference in attitude changes between groups; some groups demonstrated more positive attitude improvements than others. Meanwhile, for the practice variable, the very high F value of 93.412 with a p-value of 0.000 confirms a highly significant difference between groups, indicating that the intervention strongly influenced behavioral changes, and there were clear differences among the groups in the level of practice improvement achieved. Overall, these results emphasize that the intervention did not produce uniform effects but instead had varying impacts on each group for all measured variables.

The results of the One-Way ANOVA test indicate that the intervention provided different effects across groups for all three measured variables, namely knowledge, attitude, and practice. For the knowledge variable, the high F statistic (40.867) and the highly significant p-value (0.000) demonstrate that the respondent groups did not experience the same level of knowledge improvement. This condition suggests that factors such as delivery method, initial level of understanding, or group characteristics may influence the magnitude of knowledge improvement. For the attitude variable, although the F value is smaller compared to knowledge and practice, the p-value (0.031) still indicates a significant difference between groups. This means that the intervention not only affected knowledge but also produced different emotional or affective impacts across groups. These differences may occur due to how each group responded to the material or how group environments influenced attitude change. For the practice variable, the very large F value (93.412) shows that behavioral changes varied greatly between groups. This illustrates that the effectiveness of the intervention in encouraging real actions was not evenly distributed across groups. Some groups may have been more motivated or practically ready to perform the recommended actions based on the provided material.

2. Discussion

The Effect of Breast Self-Examination (BSE) Education Through Interactive Health Education on Knowledge

The ANOVA test indicated a highly significant difference in knowledge between groups ($F = 40.867$; $p = 0.000$). These findings illustrate that each type of intervention, such as health education or training, is capable of producing varying levels of knowledge improvement. In the context of the Health Belief Model (HBM), knowledge serves as the fundamental basis for building individuals' perceptions of susceptibility and the seriousness of a health problem (Rosenstock, 1974). This increase in knowledge subsequently contributes to the emergence of motivation to engage in more appropriate and targeted preventive actions. The consistency of these findings is evident in studies by Fitriani et al., (2022) and Wulandari & Ayu, (2023), which emphasized that the use of interactive educational methods is effective in improving knowledge through cues to action. Interactive approaches allow participants to better understand information and feel encouraged to change. In addition, (Amalia et al, 2021) explained that differences in the intensity of intervention delivery, including frequency, duration, and material quality, may influence variations in knowledge improvement between groups. The educational background of respondents also plays a role in differentiating their ability to receive and process information.

The author assumes that the high increase in knowledge in this study is not solely due to the intervention provided, but also to the characteristics of the respondents as women of reproductive age working in a health training environment. Their frequent exposure to educational material and supportive work conditions related to health information likely made them more responsive and quicker to experience knowledge improvement. Thus, these results indicate that the effectiveness of the intervention is strongly influenced by the readiness and characteristics of the audience receiving the education.

The Effect of Breast Self-Examination (BSE) Education Through Interactive Health Education on Attitudes

The results showed significant differences in attitudes between groups ($F = 4.839$; $p = 0.031$). These findings indicate that each intervention produced different effects on participants' affective aspects. Attitude itself is an internal response formed through cognitive and emotional processes; therefore, changes in attitude are strongly influenced by how participants understand and interpret their experiences during the intervention. Azwar, (2015) states that attitude is formed through a combination of knowledge, feelings, and behavioural tendencies. Thus, changes in attitude demonstrate that participants not only received material cognitively but were also emotionally involved in the learning process.

These results align with the Health Belief Model (HBM), which posits that attitudes toward health behaviours are influenced by perceptions of susceptibility, severity, benefits, barriers, and cues to action. In this study, the intervention likely strengthened perceptions of benefits and reduced internal barriers felt by participants, causing some groups to experience more pronounced attitude improvements than others. This confirms that attitude change does not occur uniformly but is influenced by how individuals evaluate the risks and benefits of the information received.

In accordance with theory, these findings are supported by previous studies such as Putri & Lestari, (2020), who explained that interactive health education methods are more effective in shaping attitudes compared to passive lecture approaches. Meanwhile, (K. M. Sari et al, 2022) demonstrated that education based on risk perception an important component of HBM plays a significant role in improving positive attitudes toward health behaviours. Research by Rahmawati, (2022) also reinforces these results, showing that groups receiving interventions emphasizing risk and benefit perceptions displayed more notable attitude changes. Thus, variations in attitude change between groups in this study were influenced not only by the delivery method or group dynamics but also by the internalization process of health messages according to HBM principles.

Based on field observations, the author assumes that variations in attitudes between groups were influenced by differences in individual characteristics and group dynamics during the intervention. Some groups appeared more enthusiastic, as reflected through active participation in asking questions, engaging in discussions, and providing feedback on the material. These conditions strengthened benefit perceptions and enhanced internal motivation, resulting in more positive attitudes toward health behaviours. Conversely, less active groups tended to remain passive and merely received information without deeper interaction, leading to smaller attitude changes compared to other groups. Other factors, such as educational background, previous experiences related to health issues, and confidence in understanding the material, also influenced how participants interpreted the intervention. Thus, the author concludes that the quality of interaction, level of participation, and psychological readiness of participants during the activity were key factors contributing to variations in attitude changes between groups.

The Effect of Breast Self-Examination (SADARI) Education Through Interactive Health Education on Behaviour

The ANOVA test on the behaviour variable showed a highly significant difference between groups ($F = 93.412$; $p = 0.000$), with the highest F value compared to other variables. This finding indicates that the educational intervention, particularly the interactive health education approach, had a very strong influence on changes in breast self-examination (SADARI) behaviour. Within the framework of the Health Belief Model (HBM), health behaviours such as BSE/SADARI are influenced by core elements including perceived susceptibility, perceived severity, perceived benefits, perceived barriers, cues to action, and self-efficacy (Glanz et al, 2015). When interactive education is able to enhance perceptions of susceptibility to breast cancer and strengthen perceptions of the benefits of BSE, participants tend to be more motivated to perform the practice routinely.

The effectiveness of HBM-based interventions in changing breast cancer–related behaviours has been widely supported by previous studies. Yilmaz & Ucar (2019) found that HBM-based health education significantly improved BSE practice by strengthening perceived benefits and enhancing self-efficacy. Similarly, Interactive educational approaches have been shown to outperform traditional lecture-based methods in improving breast self-examination (BSE) practices. These approaches provide opportunities for discussion, demonstrations, and hands-on practice, enabling participants to actively engage with the material rather than passively receive information (Masturo et al, 2020). Interactive learning also enhances participants' mastery of BSE techniques by reducing perceptual and psychological barriers, increasing motivation, and improving

confidence in performing BSE correctly. Furthermore, simulation-based or practice-oriented breast health education has been shown to significantly strengthen BSE skills and self-efficacy among diverse populations, reinforcing the superiority of interactive modalities over conventional lectures (Alici et al, 2025). The significant improvement in behaviour in this study also aligns with the findings of Sari et al., (2022), which emphasize that repeated and structured interventions provide opportunities for participants to directly apply the knowledge they receive. Interactive education provides strong cues to action, such as simulations, instructional videos, and direct feedback from facilitators, which are essential HBM components for encouraging health behaviour change. The marked differences between groups may also be linked to variations in information acceptance, differences in self-efficacy, and environmental support during the learning process.

Overall, the results of this study show that applying the HBM in interactive health education not only contributes to improved knowledge and attitudes but also results in a substantial increase in BSE behaviour. Interventions that offer hands-on experience, demonstrations, and practice opportunities are proven to be more effective in generating consistent and sustainable health behaviour change.

Based on field observations, the author assumes that the improvement in participants' behaviour in performing BSE is primarily influenced by the interactive educational methods implemented at the Health Training Center of the Central Sulawesi Provincial Health Office. The use of anatomical models and direct practice enhanced participants' confidence and made them feel capable of performing BSE independently, as described in the self-efficacy component of the HBM. Instructor support and a conducive learning environment further encouraged participants to genuinely apply the material provided. In addition, differences in motivation and prior experience among participants appear to explain variations in the level of behavioural improvement.

Conclusion

The results indicate that Breast Self-Examination (SADARI) education through interactive health education has a significant impact on three key aspects knowledge, attitudes, and behaviour among women of reproductive age at the Health Training Centre of the Central Sulawesi Provincial Health Office. This intervention effectively improved participants' knowledge of BSE, while also shaping more positive attitudes through enhanced risk perception and belief in the benefits of early detection. Furthermore, participants' BSE behaviour increased very significantly after the educational program, with the interactive approach combining demonstrations and hands-on practice serving as the key driver of more consistent and sustainable behaviour change.

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