



Factors Associated with Breast Self-Examination Behaviour among Female Adolescents: The Role of Knowledge and Information Sources

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Abstract

Breast Self-Examination (BSE/SADARI) is a simple and cost-effective method for the early detection of breast cancer. However, many female adolescents still do not practice BSE regularly. This study aimed to analyze the relationship between knowledge level, information sources, and BSE behaviour among female students at SMA Pelita Rantepao. A quantitative analytic study with a cross-sectional design was conducted involving 81 Grade XI female students selected through total sampling. Data were collected using validated self-administered questionnaires and analyzed using descriptive statistics and the Chi-square test. The results showed that most respondents had good knowledge (76.5%) and adequate information sources (53.1%), yet the majority demonstrated poor BSE behaviour (67.9%). No significant association was found between knowledge level and BSE behaviour ($p = 0.537$). In contrast, information sources were significantly associated with BSE behaviour ($p = 0.001$). Respondents with adequate access to BSE information had higher odds of demonstrating good BSE behaviour than those with inadequate information sources (OR = 6.300; 95% CI: 2.067–19.204). This indicates a statistically significant association between information sources and BSE behaviour, with the confidence interval excluding 1. These findings indicate that access to reliable health information plays a more important role than knowledge alone in promoting BSE practice among adolescent girls. Strengthening school-based health education and improving access to credible information may enhance early breast cancer prevention behaviours.

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Introduction

Breast cancer remains one of the most significant public health challenges worldwide and continues to be the leading cause of cancer-related morbidity and mortality among women. Early

detection is widely recognized as one of the most effective strategies to reduce mortality because breast cancer identified at an early stage has a substantially greater chance of successful treatment. One of the simplest and most accessible methods for early detection is Breast Self-Examination (BSE), known in Indonesia as Pemeriksaan Payudara Sendiri (SADARI). BSE enables women to recognize normal breast conditions and identify abnormalities at an early stage without requiring specialized equipment or financial cost. Therefore, promoting BSE from adolescence is considered an important preventive strategy for improving breast health awareness and encouraging early detection practices (Hijrah et al., 2024; Krisdianto, 2024).

Adolescence represents a critical developmental period during which individuals experience rapid physical, psychological, and reproductive changes. Female adolescents undergo breast development as part of puberty, making this stage an appropriate time to introduce breast health education and establish positive health behaviours. Developing awareness of breast health during adolescence may encourage lifelong preventive practices, including regular BSE. Furthermore, health education delivered during adolescence has been shown to strengthen knowledge, increase awareness, and promote positive health-related behaviours before adulthood (Damayanti et al., 2024; Dartiwen & Aryanti, 2021; Kusmiran, 2017). Recent intervention studies further demonstrate that structured breast health education significantly improves adolescents' knowledge and readiness to perform Breast Self-Examination (Aurilia, 2023; Kurt & Kayşkan, 2026). Similarly, school-based health promotion programs have been reported to enhance adolescents' understanding of breast cancer prevention through continuous educational activities (Nurianti & Batubara, 2025).

Knowledge is widely recognized as an important determinant of preventive health behaviour because it provides individuals with the cognitive foundation to understand the purpose, benefits, and procedures of Breast Self-Examination (BSE). Adolescents with adequate knowledge are generally expected to demonstrate better awareness and greater willingness to perform BSE regularly (Dewi, 2022; Windyastuti et al., 2019). Recent evidence also indicates that adolescents with higher breast cancer knowledge tend to report better BSE practice, although behavioural adoption remains influenced by additional psychosocial factors (Alam et al., 2026; Hardianto & Kuswandari, 2025). However, emerging evidence suggests that knowledge alone does not always lead to behavioural change. The adoption of regular BSE practice is also influenced by psychological factors, such as perceived susceptibility and perceived barriers, as well as the availability of supportive educational interventions, indicating that behavioural change is a more complex process than cognitive understanding alone (Sivagami & Padihar, 2024; Tauho et al., 2025).

Besides knowledge, access to reliable information sources has been recognized as another important factor influencing adolescents' preventive health behaviours. Information obtained from healthcare professionals, teachers, family members, peers, printed materials, television, and digital media may improve adolescents' understanding of breast health and increase their awareness of early breast cancer detection (Anisa & Suminar, 2023; Hidayani et al., 2022). Educational media, including audiovisual materials and printed media, have also been shown to improve adolescents' understanding of Breast Self-Examination when incorporated into health education programs (Widyaswara et al., 2025). Nevertheless, increasing access to health information does not automatically encourage adolescents to practice BSE consistently. Recent studies emphasize that the effectiveness of information depends not only on its availability but also on how it is delivered, reinforced, and translated into practical skills through educational approaches such as peer education and hands-on demonstrations (Saputra et al., 2024; Waliyanti & Arinandika, 2025). Peer education has also been found to improve adolescents' knowledge and attitudes toward Breast Self-Examination by facilitating interactive learning and experience sharing among students (Salsabila et al., 2025).

Previous studies have generally reported that knowledge and information sources are positively associated with BSE behaviour among adolescent girls (Baswedan & Listiowati, 2014; Hidayani et al., 2022; Nuraeni et al., 2024). Comparable findings have also been reported among

adolescent populations in other countries, indicating that breast cancer knowledge is consistently associated with greater awareness and BSE practice despite variations in educational and cultural contexts (Alam et al., 2026). However, recent evidence suggests that these factors alone may not adequately explain adolescents' BSE behaviour because behavioural adoption is also shaped by psychological, social, and educational influences (Sivagami & Padihar, 2024; Tauho et al., 2025). These findings indicate that the relationship between knowledge, information sources, and BSE behaviour remains insufficiently understood, particularly in adolescent populations where preventive health behaviours are still developing.

Moreover, previous studies have predominantly examined knowledge, attitudes, peer support, or information exposure as separate determinants of BSE behaviour and were conducted in various educational settings and geographical regions. Limited studies have simultaneously investigated the roles of knowledge and information sources among female senior high school students within the same analytical framework. Furthermore, evidence regarding adolescent BSE behaviour in school settings with limited reproductive health education remains scarce. Preliminary observations conducted at SMA Pelita Rantepao also revealed that many female students had never received structured education regarding BSE and had never practiced breast self-examination because of limited exposure to reliable health information. These conditions highlight the need to clarify whether knowledge and information sources independently contribute to BSE behaviour among adolescent girls in this context.

Despite growing attention to breast self-examination (BSE/SADARI) among adolescent girls, it remains unclear how knowledge and different sources of health information jointly relate to BSE behaviour within specific school settings. Previous studies have often examined knowledge or information exposure as individual determinants, leaving limited evidence on their combined relevance among female adolescents in senior high schools. This gap is important because adolescence represents an appropriate stage for establishing breast health awareness and preventive practices before adulthood. Therefore, this study aimed to analyze the relationship between knowledge level, information sources, and BSE behaviour among female adolescents at SMA Pelita Rantepao. The school provides an important context for this investigation because it represents a specific adolescent school population in which health knowledge, access to information, and preventive behaviour can be examined within the same educational and social environment. The findings are expected to contribute empirical evidence for developing more comprehensive school-based breast health promotion programs that integrate knowledge enhancement, accessible health information, and practical education to encourage BSE/SADARI as an early breast cancer prevention behaviour among adolescent girls.

Materials and Methods

This study employed a quantitative analytic design using a cross-sectional approach to examine the associations between knowledge level, sources of information, and Breast Self-Examination (BSE/SADARI) behaviour among female adolescents. A cross-sectional design allows independent and dependent variables to be measured simultaneously at a single point in time and is appropriate for identifying associations within a defined population (Kurniawan & Agustini, 2021; Nursalam, 2020). The study was conducted at SMA Pelita Rantepao, Tana Toraja, Indonesia, from April to June 2026. The target population consisted of all female students enrolled in Grade XI during the study period. Because the accessible population consisted of 81 female students, total sampling was applied. The inclusion criteria were female students officially enrolled in Grade XI at SMA Pelita Rantepao during the study period, willing to participate, able to understand and complete the questionnaire independently, and willing to provide informed consent. Students were excluded if they were absent during data collection, submitted substantially incomplete questionnaires, or withdrew from the

study before completing the questionnaire. Based on these criteria, all 81 eligible female students were included in the final analysis.

The independent variables were knowledge level and sources of information, while the dependent variable was BSE/SADARI behaviour. Knowledge level was defined as respondents' understanding of BSE, including its purpose, procedure, frequency, warning signs of breast abnormalities, and the importance of early detection. Sources of information referred to respondents' exposure to BSE-related information obtained from healthcare professionals, teachers, family members, peers, printed media, electronic media, and social media. BSE behaviour referred to respondents' reported practice of performing breast self-examination routinely and appropriately.

Data were collected using a structured self-administered questionnaire consisting of three sections. The knowledge questionnaire consisted of 20 dichotomous items, with correct answers scored 1 and incorrect answers scored 0. The total knowledge score was converted into a percentage of the maximum possible score. Based on the percentage-based classification used in health research, scores of 76–100% were categorized as good knowledge and scores of 56–75% as moderate knowledge (Arikunto, 2013; Nursalam, 2020). The source-of-information questionnaire initially consisted of 21 Likert-scale items with four response options: never (1), sometimes (2), often (3), and always (4). Four items were removed following validity testing, resulting in a final 17-item instrument. Accordingly, the final possible score ranged from 17 to 68. The cut-off was standardized according to the original scoring principle of an average response of 2.5 points per item. Thus, the equivalent cut-off for the validated 17-item instrument was 42.5 points (17×2.5). Scores of ≥ 42.5 were categorized as adequate information sources, whereas scores < 42.5 were categorized as inadequate information sources.

BSE behaviour was initially assessed using 24 Likert-scale items with the same four response options, ranging from never (1) to always (4). One item was removed after validity testing, resulting in a final 23-item instrument. The possible score therefore ranged from 23 to 92. Consistent with the original scoring principle of an average response of 2.5 points per item, the equivalent cut-off for the validated 23-item instrument was 57.5 points (23×2.5). Respondents with scores of ≥ 57.5 were categorized as having good BSE behaviour, while those with scores < 57.5 were categorized as having poor BSE behaviour. This recalculation ensured that the categorization remained consistent after the removal of invalid items and that the cut-off was based on the final validated instruments.

Prior to the main data collection, the research instruments underwent validity and reliability testing. Four items from the source-of-information questionnaire and one item from the BSE behaviour questionnaire were removed because they did not meet the predetermined validity criteria. Following item refinement, the final source-of-information questionnaire demonstrated excellent internal consistency, with a Cronbach's alpha coefficient of 0.960, while the final BSE behaviour questionnaire demonstrated a Cronbach's alpha coefficient of 0.956. Data collection was conducted after permission had been obtained from the school administration. Eligible participants received an explanation of the study objectives, procedures, confidentiality measures, voluntary nature of participation, and their right to withdraw. Participants who agreed to participate provided informed consent and completed the questionnaire independently under the supervision of the researcher. Completed questionnaires were checked for completeness before analysis.

Data were analyzed using IBM SPSS Statistics version 25. Univariate analysis was used to describe respondent characteristics and the distributions of knowledge level, information sources, and BSE behaviour using frequencies and percentages. Bivariate analysis was performed using the Chi-square test to examine the associations between knowledge level and BSE behaviour and between information sources and BSE behaviour. Odds ratios (ORs) with 95% confidence intervals (CIs) were calculated to estimate the strength and direction of the observed associations. Statistical significance was established at $p < 0.05$. An association was considered statistically significant when the p-value was below 0.05 and the corresponding 95% CI for the OR did not include 1. Ethical

principles were maintained throughout the study by ensuring voluntary participation, informed consent, confidentiality, anonymity, and participants' right to withdraw at any stage without consequences. Participant identities were protected through identification codes, and the study adhered to the principles of respect for human dignity, justice, beneficence, and non-maleficence.

Results and Discussions

Characteristics of Respondents

A total of 81 female students from Grade XI at SMA Pelita Rantepao participated in this study. Most respondents were categorized as early adolescents, accounting for 73 participants (90.1%), while the remaining 8 participants (9.9%) were classified as late adolescents (Table 2).

Table 2
Characteristics of Respondents

Variable	Category	n	%
Age	Early adolescence	73	90.1
	Late adolescence	8	9.9
Total		81	100.0

Distribution of Knowledge Level, Information Sources, and BSE Behaviours

Most respondents demonstrated a good level of knowledge regarding Breast Self-Examination (BSE/SADARI), with 62 participants (76.5%), whereas 19 respondents (23.5%) had a moderate level of knowledge. Regarding information sources, 43 respondents (53.1%) had adequate access to BSE-related information, while 38 respondents (46.9%) had inadequate information sources. Despite these findings, the majority of respondents (67.9%) demonstrated poor BSE behaviour, and only 32.1% reported good BSE practice (Table 3).

Table 3
Distribution of study variables (n = 81)

Variable	Category	n	%
Knowledge level	Moderate	19	23.5
	Good	62	76.5
Information sources	Inadequate	38	46.9
	Adequate	43	53.1
BSE behaviour	Poor	55	67.9
	Good	26	32.1

Association Between Knowledge Level and BSE Behaviour

Table 4 presents the association between knowledge level and Breast Self-Examination (BSE/SADARI) behaviour among female adolescents. Among respondents with moderate knowledge, 14 (17.3%) demonstrated poor BSE behaviour, whereas 5 (6.2%) demonstrated good BSE behaviour. Among respondents with good knowledge, 41 (50.6%) demonstrated poor BSE behaviour, while 21 (25.9%) demonstrated good BSE behaviour.

The Chi-square test showed that there was no statistically significant association between knowledge level and BSE behaviour in the study population ($p = 0.537$). Respondents with good knowledge had higher odds of demonstrating good BSE behaviour than those with moderate

knowledge (OR = 1.434; 95% CI: 0.455–4.523). However, the confidence interval included 1, indicating that the observed association was not statistically significant. Thus, although good knowledge was associated with higher observed odds of good BSE behaviour, the findings do not provide sufficient statistical evidence of an association between knowledge level and BSE behaviour in this study population.

Table 4
Association between knowledge level and BSE behaviour (n = 81)

Knowledge level	Poor BSE n (%)	Good BSE n (%)	Total n (%)	p-value	OR	95% CI
Moderate	14 (17.3)	5 (6.2)	19 (23.5)	0.537	1.434	0.455–4.523
Good	41 (50.6)	21 (25.9)	62 (76.5)			
Knowledge level	Poor BSE n (%)	Good BSE n (%)	Total n (%)			
Total	55 (67.9)	26 (32.1)	81 (100)			

Association Between Information Sources and BSE Behaviour

The relationship between information sources and BSE behaviour is presented in Table 5. Among respondents with inadequate information sources, 33 participants (40.7%) reported poor BSE behaviour, while only 5 participants (6.2%) demonstrated good BSE behaviour. Conversely, among respondents with adequate information sources, 21 respondents (25.9%) reported good BSE behaviour, compared with 22 respondents (27.2%) who still demonstrated poor BSE behaviour.

The Chi-square analysis revealed a statistically significant association between information sources and BSE behaviour ($p = 0.001$). Respondents with adequate information sources were 6.30 times more likely to demonstrate good BSE behaviour than those with inadequate information sources (OR = 6.300).

Table 5.
Association between information sources and BSE behaviour (n = 81)

Information sources	Poor BSE n (%)	Good BSE n (%)	Total n (%)	p-value	OR	95% CI
Inadequate	33 (40.7)	5 (6.2)	38 (46.9)	0.001	6.300	2.067–19.204
Adequate	22 (27.2)	21 (25.9)	43 (53.1)			
Total	55 (67.9)	26 (32.1)	81 (100)			

Discussion

This study found no significant association between knowledge level and Breast Self-Examination (BSE/SADARI) behaviour among female adolescents ($p = 0.537$). Although most respondents had good knowledge of BSE, many still demonstrated poor BSE practices, indicating that knowledge alone was insufficient to encourage preventive behaviour. This finding suggests that behavioural adoption depends not only on cognitive understanding but also on factors such as perceived susceptibility, self-efficacy, motivation, and environmental support. Limited opportunities for practical training may also explain why knowledge does not consistently translate into behaviour (Nursalam, 2020). These findings are consistent with Baswedan & Listiowati (2014), Siregar (2022) and Milyarona et al. (2021), who reported that good knowledge alone does not necessarily lead to regular BSE practice because health behaviour is influenced by multiple psychological and social determinants. Similarly, Hardianto & Kuswandari (2025) emphasized that knowledge contributes to

BSE practice only when accompanied by supportive psychological factors, particularly lower levels of fear and greater confidence in performing breast self-examination.

In contrast, this study demonstrated a significant association between information sources and BSE behaviour ($p = 0.001$). Adolescents with adequate access to BSE information had higher odds of demonstrating good BSE behaviour than those with inadequate information sources ($OR = 6.300$; $95\% CI: 2.067-19.204$; $p = 0.001$). The confidence interval did not include 1, supporting the statistical significance of the observed association in this study population. Continuous exposure to reliable information from healthcare professionals, schools, families, and digital media may strengthen awareness, confidence, and motivation to practice BSE regularly. This finding is supported by studies demonstrating that peer education, structured health promotion, and educational media are effective strategies for translating health information into practical BSE skills among adolescents (Salsabila et al., 2025; Waliyanti & Arinandika, 2025; Widyaswara et al., 2025). These findings support previous studies by Hidayani et al. (2022) and Sari et al. (2026), which highlighted the importance of accessible and credible health information in promoting preventive health behaviour among adolescents. However, information alone may still be insufficient if adolescents face barriers such as low motivation, fear, or limited confidence in performing BSE correctly.

These findings imply that school-based health promotion programs should extend beyond improving knowledge by incorporating practical demonstrations, peer education, audiovisual media, and collaboration with healthcare professionals. Such comprehensive interventions may enhance adolescents' self-efficacy and encourage regular BSE practice (Hidayani et al., 2022). Previous intervention studies have similarly demonstrated that structured health education programs significantly improve adolescents' knowledge, attitudes, and practical BSE skills, supporting the implementation of comprehensive school-based breast health promotion programs (Aurilia, 2023; Kurt & Kayşkan, 2026; Nurianti & Batubara, 2025). Nevertheless, this study has several limitations, including its cross-sectional design, single-school setting, relatively small sample, and reliance on self-reported questionnaires. Furthermore, only knowledge and information sources were examined, whereas other determinants such as parental support, peer influence, self-efficacy, and health beliefs were not included. Future studies should investigate these additional factors using larger and more diverse populations.

Conclusion

This study found that knowledge level was not significantly associated with Breast Self-Examination (BSE/SADARI) behavior among female adolescents at SMA Pelita Rantepao ($p = 0.537$), whereas information sources showed a significant association with BSE behavior ($p = 0.001$). Although most respondents demonstrated good knowledge regarding BSE, this knowledge alone was insufficient to encourage regular breast self-examination. In contrast, adolescents who had adequate access to reliable health information were more likely to perform BSE appropriately, suggesting that continuous exposure to credible information plays a more influential role in shaping preventive health behavior than knowledge alone. These findings emphasize the importance of strengthening school-based breast health promotion through comprehensive educational programs that integrate knowledge enhancement, practical BSE training, and continuous access to evidence-based health information. Future research should include larger and more diverse populations and examine additional behavioral determinants, such as self-efficacy, health beliefs, parental support, and peer influence, to provide a more comprehensive understanding of factors affecting BSE behavior among adolescent girls.

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