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Article Title

Determinants of Breast Self-Examination Practices Among Female Vocational High School Students

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ABSTRACT

Breast cancer remains a global public health challenge with increasing morbidity, necessitating secondary prevention efforts as early as possible, particularly among adolescents. This study aims to analyze the relationship between knowledge, attitudes, and breast cancer early detection practices using the BSE method among female adolescents at SMKN 2 Palangka Raya. Methodologically, an analytical observational research design with a cross-sectional approach was employed. The sample consisted of 79 female students selected through purposive sampling. Primary data were collected via structured questionnaires and analyzed using the Chi-Square statistical test at a 5% significance level. Based on the results, univariate analysis revealed that most respondents (54.44%) had knowledge in the "fair" category and demonstrated highly positive attitudes toward BSE (73.42%). Nonetheless, field findings indicated that the majority of students (58.20%) had never practiced early detection. Bivariate testing proved a statistically significant relationship between knowledge and BSE practice (p=0.005). Conversely, no significant relationship was found between attitudes and these preventive practices (p=0.906). Consequently, it can be concluded that knowledge is the primary determinant driving students to perform self-examinations, whereas positive attitudes alone are insufficient to trigger actual practice without additional support. These findings recommend the need for health education innovation in schools, shifting from theoretical counseling to practical training using breast phantoms to bridge the gap between intention and optimal early-detection implementation.

Keywords: Attitudes; Breast Cancer; BSE; Early Detection; Knowledge.

INTRODUCTION

Breast cancer is a significant global public health concern, with morbidity and mortality rates increasing each year substantially. According to 2020 Globocan data, the new incidence of breast cancer in Indonesia reached 68,858 cases, accounting for 16.6% of the total 396,914 new cancer cases, with mortality exceeding 22,000 deaths (Sibuea et al., 2022). Epidemiologically, the cancer incidence rate in Indonesia is 136.2 per 100,000 population, ranking the country 8th in the Southeast Asian region. Specifically, among the female population, breast cancer ranks first with an incidence rate of 42.1 per 100,000 and an average mortality of 17 per 100,000 (Kurniawan et al., 2019). The high burden of this disease poses a serious threat and demands the implementation of comprehensive control strategies, particularly by strengthening secondary prevention efforts, such as early detection in primary healthcare facilities and communities.

Early detection through Breast Self-Examination (BSE) is scientifically recognized as the most accessible, safe, and cost-effective screening method for preventing advanced-stage breast cancer. Delays in detecting breast cell changes at an early stage are a primary cause of high mortality; therefore, preventive education must be provided as early as possible, especially during adolescence. Female adolescents who experience early menarche have a longer duration of estrogen exposure, which increases the biological risk of developing breast tissue abnormalities in the future

(Astuti, 2021; Noriani, 2023). Unfortunately, adolescent awareness of the importance of this early detection method remains low, as a significant portion of the student population is assessed as having inadequate reproductive health literacy (Khalip et al., 2021; Mohebi et al., 2023). Consequently, establishing BSE practice among adolescent groups is vital for building long-term healthy habits.

In health promotion science, the formation of a behavior is strongly influenced by predisposing factors, where knowledge serves as the primary cognitive foundation (Wei & Arisani, 2024). Sufficient knowledge of breast cancer and BSE procedures is a prerequisite for individuals to adopt such preventive behaviors (Dwitania et al., 2021; Triana et al., 2023). Knowledgeable female adolescents tend to be more aware of their vulnerability, which motivates them to perform independent physical examinations. However, various observational studies indicate that most secondary school students still lack knowledge of correct BSE methods, categorized as poor (Rezi, 2021; Burhanto & Norwanda, 2024). There is a significant gap between the high prevalence of cancer in the field and the low understanding among adolescents, which may ultimately hinder the success of national breast cancer control programs.

Beyond cognitive factors, affective aspects in the form of attitudes play a crucial role as drivers that connect knowledge with actual BSE practice. Attitudes represent a person's internal response or evaluation of a health recommendation, which ultimately determines their readiness to act (Amalia et al., 2021; Aulia & Salina, 2024). This concept explains that female adolescents with high knowledge do not necessarily perform BSE if that understanding is not followed by positive attitudes, such as overcoming taboos regarding touching private areas or reducing fear of potential examination results. A harmonious relationship between knowledge and attitudes has been demonstrated in several populations, where sound understanding can transform negative attitudes into responses that support early detection (Ayattulla et al., 2024). In other words, the combination of accurate knowledge and supportive attitudes is a key predictor in assessing the implementation of BSE practice.

Although the relationship between knowledge, attitudes, and preventive practice has been widely discussed across various literatures, evaluations of previous studies indicate differences in focus that create a knowledge gap. Most current public health research focuses on measuring outcomes after providing health education or interventions, whether through direct counseling (Jaya et al., 2020; Ernawati et al., 2022; Florentina et al., 2024), video-based modules (Vadakkepatt, 2022), or mobile applications (Aprianti et al., 2022). These experimental research designs have indeed proven that external interventions can significantly increase student knowledge (Amosu & Akpo, 2021; Uruntie et al., 2024). However, the abundance of intervention-based research has led to a lack of baseline evidence regarding the natural condition

of predisposing factors in adolescent populations who have not received specific educational programs, especially in vocational school environments, which have their own student characteristics.

Given these limitations, assessing behavioral determinants at the local level is essential, as reproductive health programs in Indonesia still vary in implementation. In the Palangka Raya City area, early detection programs for breast and cervical cancer have been priority programs since 2015, yet the target remains focused on women of reproductive age (30-50 years). This clinical program leaves a prevention gap, as it has not reached the female adolescent population widely. SMKN 2 Palangka Raya, as a vocational education institution with a student population representing urban adolescent characteristics, has the potential to be an ideal observation site. Local literature reviews indicate a lack of definitive statistical data on students' knowledge and attitudes regarding BSE methods at this school. Correlational research is urgently needed to assess this behavioral gap.

Building on these literature gaps and local data needs, this study is designed to offer novelty and originality distinct from previous publications. The primary difference lies in the selection of the vocational high school (SMK) setting and the use of an analytical, observational, cross-sectional design, given that the SMK curriculum generally allocates less time to reproductive health materials than general high schools (SMA). Unlike previous research that evaluates the success of a treatment, this study aims solely to demonstrate the potential natural relationship among the independent variables (knowledge and attitudes) and the dependent variable (early detection of breast cancer). Through this approach, the research at SMKN 2 Palangka Raya is expected to objectively capture the adolescent behavioral profile, free from the influence or bias of experimental treatments.

Based on the problem formulation and study gaps described, this analytical quantitative study specifically aims to analyze the relationship between the knowledge and attitudes of female adolescents and the practice of early breast cancer detection using the BSE method at SMKN 2 Palangka Raya. Scientifically, the results of this study are expected to enrich health promotion theoretical concepts related to mapping predisposing factors for disease prevention behavior among adolescent groups in vocational schools. At a practical level, the statistical values generated by this research are expected to serve as evidence for policy-making by the local government and stakeholders in Palangka Raya to develop reproductive health education programs that are more targeted, measurable, and grounded in factual data.

METHOD

This study was designed using a quantitative approach with an analytical observational type and applied a cross-sectional study design (Notoatmodjo, 2018). This design was selected as the most relevant methodological framework for addressing the research questions and achieving the study objectives. The primary characteristic of this design allowed the researchers to observe and measure the independent variables (knowledge and attitudes) and the dependent variable (early breast cancer detection practice through the BSE method) simultaneously using a point-in-time approach.

The primary data source in this study relied on data collected directly from the target group (Sugiyono, 2019), specifically female adolescents who were active students at SMKN 2 Palangka Raya. Sampling was conducted in detail using a non-probability sampling technique, specifically purposive sampling. In this technique, sample units were selected based on specific inclusion criteria established by the researchers to ensure data accuracy. The inclusion criteria applied included female students within the middle puberty age range (14 to 16 years), present at school during data collection, and willing to participate as voluntary respondents. Meanwhile, the exclusion criterion was students who did not complete the research instrument. Through this rigorous sampling scheme, a final total sample of 79 respondents was obtained and deemed representative for analysis. The data collection process complied with scientific ethical principles, where each respondent was first provided with an understanding of the study objectives before signing the informed consent form.

The main instrument used for data collection was a validated, self-administered structured questionnaire. This questionnaire was designed to map demographic characteristics and measure the core research variables as parameters defined by operational definitions. Referring to demographic data mapping, the instrument described variations in respondent age (14, 15, and 16 years), Body Mass Index (BMI) classification (severely underweight, underweight, normal, overweight, and obese), and confirmation of the presence or absence of a family history of breast tumors or cancer. For the measurement of independent variables, respondents' knowledge regarding BSE was classified ordinally into three categories (good, fair, and poor), while the attitude variable was divided into positive and negative response categories. Meanwhile, the dependent variable focused on respondents' factual practice history of implementing early detection (BSE), which was binarized into "ever" and "never" categories. This categorization scheme was developed to minimize information bias and facilitate the transfer of raw data into a numerical format.

The final stage of this methodology involved a systematic data processing and analysis phase using computer-based statistical software. Data analysis was performed

at two levels: univariate and bivariate (Dahlan, 2020). Univariate analysis was used to provide a descriptive overview in the form of frequency distributions and percentages for each demographic characteristic and research variable, capturing the basic profile of the student sample. Furthermore, to test the hypothesis and assess the significance of the relationship between the variables, a bivariate analysis was conducted using the nonparametric Chi-Square test, as the variables were categorical (nominal and ordinal). The statistical test decision was drawn based on the determination of the probability value (p-value), with the significance level set at 0.05 (α = 5%). If the cross-tabulation results yielded a probability value of less than 0.05, it mathematically confirmed a significant relationship between knowledge or attitudes and the implementation of early breast cancer detection at SMKN 2 Palangka Raya.

RESULTS

Based on the primary data collected from 79 female students at SMKN 2 Palangka Raya using a structured questionnaire, the research findings are divided into two stages of analysis: univariate and bivariate. Univariate analysis aims to describe the frequency distribution of each variable, while bivariate analysis aims to test the significance of the relationship between variables.

A. Univariate Analysis

Univariate analysis presents a mapping of respondents' demographic characteristics and the frequency distributions for the independent variables, which consist of knowledge and attitudes.

Table 1. Frequency Distribution of Respondents' Demographic Characteristics at SMKN 2 Palangka Raya

Demographic Characteristics	Frequency (n)	Percentage (%)
Age		
14 Years Old	5	6.33
15 Years Old	58	73.42
16 Years Old	16	20.25
Body Mass Index (BMI)		
Severely Underweight	16	20.25
Underweight	14	17.73
Normal	42	53.16
Overweight	2	2.53
Obese	5	6.33

Demographic Characteristics	Frequency (n)	Percentage (%)
History of Breast Tumor/Cancer		
Present	0	0.00
Absent	79	100.00

Source: Primary Data, 2023.

An exploration of the demographic profiles of the 79 observed sample units (Table 1) reveals specific distribution patterns. Based on the age parameter, the majority of respondents were concentrated in the 15-year-old group, accounting for 73.42% (58 students), while the 14-year-old group represented the lowest frequency at 6.33% (5 students). Regarding Body Mass Index (BMI), more than half of the sample population fell within the normal range, with 53.16% (42 students) achieving this level. Conversely, respondents classified as overweight had the smallest representation at 2.53% (2 students). Furthermore, the investigation into family health history yielded a definitive finding, where all students (100.00%) were confirmed to have no history of breast tumors or cancer in their lineage.

Table 2. Frequency Distribution of Knowledge and Attitudes

Research Variables	Frequency (n)	Percentage (%)
Knowledge		
Good	18	22.78
Fair	43	54.44
Poor	18	22.78
Attitudes		
Positive	58	73.42
Negative	21	26.58

Source: Primary Data, 2023.

Further investigation into the distribution of independent variables can be examined specifically in terms of respondents' cognitive and affective parameters (Table 2). In the cognitive dimension, respondents' knowledge of BSE methods was dominated by the "fair" category, with 43 students (54.44%). Meanwhile, the proportions of respondents with knowledge in the "good" and "poor" categories were equal at 22.78% (18 students each). Turning to the affective domain, the data structure confirms a dominant trend toward a positive attitude. Most respondents (58 students, 73.42%) demonstrated positive and supportive attitudes toward early breast cancer detection, leaving a minority (26.58%; 21 students) who still held negative affective responses.

B. Bivariate Analysis

Bivariate analysis was performed using nonparametric statistical tests to assess the relationships among knowledge and attitudes, and the practice of early breast cancer detection. Statistical decisions were drawn from the probability value (p-value) with a significance threshold (α) of 0.05.

Table 3. Relationship Between Knowledge and Attitudes and Early Breast Cancer Detection Practice (BSE)

Independent Variables	BSE Practice				Total		P-Value
	Ever		Never				
	n	%	n	%	n	%	
Knowledge							
Good	14	17.7%	7	8.9%	18	22.8%	0.005
Fair	10	12.7%	30	38.0%	43	54.4%	
Poor	9	11.4%	9	11.4%	18	22.8%	
Attitudes							
Positive	24	30.4%	34	43.0%	58	73.4%	0.906
Negative	9	11.4%	12	15.2%	21	26.6%	

Source: Primary Data, 2023.

Hypothesis testing to assess the significance of the relationship between variables was conducted using cross-tabulation analysis (Table 3). In evaluating the relationship between knowledge and BSE practice, the group of respondents with "good" knowledge who had ever performed early detection comprised 14 students, representing 17.7% of the total sample. On the other hand, in the group with a "fair" level of understanding, the majority of respondents had factually never performed the practice, peaking at 30 students (38.0%). The statistical test for this variable yielded a p-value of 0.005. Given that this empirical probability value is below the significance threshold (0.005 < 0.05), the null hypothesis (H0) was rejected. This finding provides strong mathematical evidence that knowledge is significantly associated with early breast cancer detection practices using the BSE method at SMKN 2 Palangka Raya.

Meanwhile, in the analysis of the interaction between the attitude variable and early detection practice, the data distribution showed a different pattern. Of the 58 respondents with a positive attitude, 24 students (30.4%) had performed BSE, while 34 students (43.0%) had never done so. Among respondents with negative attitudes, 9 students (11.4%) reported performing the practice, while 12 students (15.2%) had never performed it. The statistical test for this affective variable yielded a probability value of 0.906. Since this value is well above the

significance threshold (0.906 > 0.05), the null hypothesis (H0) is not rejected (accepted). This statistical finding definitively confirms that there is no significant relationship between the attitudes of female adolescents and the implementation of early breast cancer detection using the BSE method in this study population.

DISCUSSION

This analytical observational study with a cross-sectional design has yielded empirical results regarding predisposing factors for breast cancer early detection practice among female students at SMKN 2 Palangka Raya. Based on the demographic data of 79 respondents, the majority were within the 15-year-old age group (73.42%), had a normal nutritional status or Body Mass Index (BMI) (53.16%), and collectively reported no family history of breast cancer (100.00%). The concentration of respondents in the middle puberty group is a crucial finding, as estrogen exposure starting from menarche is directly related to the duration of biological risk in the future. This condition aligns with the research by Astuti (2021), which emphasizes that adolescence is the most critical intervention period for introducing BSE methods before cancer cells have the opportunity to develop in breast tissue.

Regarding the cognitive variable measurement, the frequency distribution indicates that students' knowledge concerning BSE methods was mostly in the "fair" category (54.44%), while the "good" and "poor" categories showed balanced percentages (22.78% each). These figures provide a quantitative illustration that reproductive health literacy in this vocational school environment has not reached an optimal level. The lack of comprehensive understanding among this adolescent group is not merely a local issue but aligns with global and regional epidemiological trends identified by Khalip et al. (2021) and Mohebi et al. (2023). Both large-scale studies objectively prove that most secondary school students still face obstacles due to a lack of precise technical understanding regarding breast cancer early detection procedures.

Turning to the affective dimension, the univariate analysis results in this study surprisingly show a very positive trend, where 73.42% of respondents demonstrated supportive attitudes toward BSE implementation. This high percentage of positive attitudes indicates a good initial acceptance of health information, where female adolescents are inherently very open to reproductive health issues even if their technical understanding has not yet fully formed. The high rate of positive attitudes in this adolescent group is highly consistent with and supported by the findings of Amalia et al. (2021) and Aulia and Salina (2024). Findings from both literatures reinforce the idea that an open perspective and the disappearance of taboos about touching one's private areas have spread evenly among students today.

Although the attitude variable measurement showed a highly dominant positive percentage, the accumulated data in the bivariate tabulation revealed a contradictory reality of early detection practice in the field. Based on the total practice recapitulation, it was confirmed that the majority of respondents (58.20%) had never practiced BSE, while only 41.80% had performed the preventive practice. This gap between high affective acceptance (73.42%) and low actual practice (41.80%) indicates barriers in the health behavior change process. This gap phenomenon aligns with observational findings from Rezi (2021) and Burhanto and Norwanda (2024), which emphasize the need for further statistical testing to prove the extent to which knowledge or attitude factors truly influence the low level of breast self-examination implementation.

To address the research problem and test the significance of the relationship between variables, bivariate analysis using the Chi-Square statistical test was conducted. Based on the calculated relationship between knowledge and BSE practice, a probability value of 0.005 was obtained, which is well below the significance threshold ($\alpha = 0.05$). This statistical figure provides a solid foundation for rejecting the null hypothesis (H0), indicating a very statistically significant relationship between knowledge and breast cancer early detection practice at SMKN 2 Palangka Raya. Based on row percentage calculations, the highest proportion of students performing BSE came from the group with "good" knowledge (17.7% of the total study population). This finding aligns with and reinforces the observations of Dwitania et al. (2021) and Noriani (2023), who previously found identical relationships among female adolescent groups.

The proven significant relationship between knowledge and self-examination practice also justifies Lawrence W. Green's behavioral theory framework in health promotion science. Knowledge is the primary predisposing factor in forming an individual's rational basis for changing their habits (Triana et al., 2023). A lack of mastery of material on breast anatomy, the development of breast cancer, and palpation techniques leaves students without a strong reason to practice the BSE method. The high significance value ($p=0.005$) in this observational study strongly supports the conclusions of Ayattulla et al. (2024), which state that improving cognitive understanding can reduce hesitation, thereby accelerating behavioral change in adolescents from initially passive to proactive in detecting breast cancer as early as possible.

Furthermore, baseline evidence from vocational students who have never received educational interventions provides strong evidence of the importance of applied health education research. The suboptimal knowledge condition in this cross-sectional sample logically explains why external health education is highly effective in improving adolescent behavior. Various experimental research designs by Jaya et al. (2020), Ernawati et al. (2022), and Florentina et al. (2024) have produced statistical

data proving that health counseling, through both classical lectures and practical demonstrations, can significantly increase students' knowledge scores. This literature shows that the low percentage of BSE practice at SMKN 2 Palangka Raya can be addressed quickly if the school regularly organizes reproductive health education.

In contrast to the findings for the knowledge variable, the statistical test for the attitude variable showed opposite results. The bivariate analysis to measure the relationship between attitudes and breast cancer early detection practice yielded a p-value of 0.906. Since this value is far above the statistical significance threshold (0.906 > 0.05), the null hypothesis (H0) must be accepted. This quantitative conclusion mathematically confirms that there is no significant relationship between the attitudes of female adolescents and BSE implementation in this study sample. This lack of relationship is clearly evident in the data distribution: among the 58 students with positive attitudes, the percentage who had never performed BSE (43.0%) was actually higher than that of those who had (30.4%).

The absence of a consistent relationship between supportive attitudes and the implementation of BSE practice might seem to deviate from general habit-formation theories, but this pattern is highly logical when analyzed using public health science principles. Conceptually, attitudes are classified as covert behavior or limited to positive evaluations in the mind, which do not necessarily translate into overt behavior or actual practice. Most female adolescents at SMKN 2 Palangka Raya respond positively to early detection recommendations. However, this intention has not become a practice due to a lack of enabling factors, such as easily accessible step-by-step guides or tangible peer support. The statistical result (p=0.906) in this study shows that attitudes alone do not have a strong enough influence to drive someone to engage in independent medical practice.

The presence of positive attitudes accompanied by low practice implementation rates further reinforces the importance of combining media innovation with school-based health education. Given that attitudes are not directly linked to practice, providing health programs that serve as bridging interventions becomes crucial. This problem-solving has been demonstrated by the research results of Aprianti et al. (2022), who successfully used smartphone-based digital detection applications, and by the findings of Vadakkepatt (2022), who used animated video-based teaching modules, both of which increased students' practice compliance rates. Similarly, structured education that teaches direct breast palpation skills has been shown numerically to close the gap between intention and practice, as reported by Amosu and Akpo (2021) and Uruntie et al. (2024).

Overall, the results of the quantitative descriptive analysis and cross-tabulation testing in this study have successfully addressed the research problem and objectives

comprehensively and in measurable terms. Statistical figures convincingly show that knowledge is the primary determinant (p=0.005) of students' willingness to practice BSE, whereas the attitude component (p=0.906) is unrelated to their operational practice. These percentage findings and significance values at SMKN 2 Palangka Raya ultimately provide scientific input for the formulation of evidence-based local-level policy. Health departments and educational institutions need to refine old approaches that rely solely on attitude awareness campaigns and implement practical BSE simulation curricula to improve understanding, which is statistically proven to be the strongest factor in suppressing breast cancer risk from adolescence.

CONCLUSION AND SUGGESTIONS

Based on the research findings and quantitative data analysis conducted to address the problem formulation and objectives, several conclusions can be drawn regarding the predisposing factors of health behavior among female adolescents. This study successfully gathered comprehensive data from 79 student respondents at SMKN 2 Palangka Raya. Univariate analysis indicates that the majority of respondents' knowledge falls in the "fair" category, at 54.44%. Regarding affective aspects, most students demonstrate strong acceptance, with 73.42% of respondents holding positive attitudes toward early breast cancer detection. Nevertheless, these high positive attitudes are inversely proportional to actual practice in the field, where the majority of respondents (58.20%) have never practiced the BSE method.

Statistical results from the bivariate analysis confirm and address the primary objective regarding the relationship between variables. The first conclusion establishes a highly significant relationship between knowledge and breast cancer early detection practice, with a probability value of 0.005 ($p < 0.05$). This underscores that a sound understanding is a primary determinant of students' adoption of preventive practices. Conversely, the second conclusion confirms no significant relationship between attitudes and breast cancer early detection practice, with a probability value of 0.906 ($p > 0.05$). This statistical evidence shows that positive attitudes—which remain internal intentions among female adolescents—do not have sufficient influence to become overt practice, especially when not accompanied by adequate technical understanding.

The academic implications of these findings offer significant scientific contributions to the development of health promotion and behavioral sciences, particularly among vocational secondary school populations. The fact that knowledge has a significant relationship while attitudes are entirely unrelated provides a new perspective: health intervention programs can no longer stop at emotional awareness or merely building positive attitudes. Good intentions among adolescents are not translated into actual practice without support from enabling factors. Therefore,

health education approaches must begin integrating practical skill training to bridge the gap between affective acceptance and the field implementation of BSE.

Based on these conclusions and implications, several tangible follow-up recommendations and policy implications are suggested to stakeholders. For SMKN 2 Palangka Raya, it is recommended to collaborate with local primary healthcare facilities (*Puskesmas*) to design extracurricular activities focused on reproductive health practice simulations. Conventional counseling methods should be enhanced with clinical demonstrations using breast phantoms, ensuring students not only memorize theory but also master correct palpation techniques. For the Palangka Raya City Health Office, the results of this study can serve as a basis for evidence-based policy in designing more applicable programs. Such programs could include interactive video modules on BSE steps or the use of adolescent-friendly health reminder applications on smartphones. Structured and sustainable interventions are expected to increase adolescent participation in early detection as an optimal preventive measure against breast cancer risks.

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