

EMPOWERING ADOLESCENT GIRLS VIA BREAST HEALTH APP TO IMPROVE CANCER PREVENTION KNOWLEDGE

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ABSTRACT

Breast cancer is one of the leading causes of death among women in Indonesia, with low levels of knowledge and limited early detection behaviors among adolescent girls identified as important risk factors that require early intervention. This community service activity aimed to improve the knowledge, awareness, and skills of adolescent girls in Meranjat Village regarding early breast cancer prevention using the Breast Health application as a digital educational medium. The program integrates health education with application-based technology as an innovative strategy to enhance preventive behaviors, particularly in rural or semi-peripheral areas where such approaches are still limited. The implementation included health education sessions on breast cancer, demonstrations of breast self-examination techniques (SADARI), installation and training on the use of the Breast Health application, and ongoing assistance in utilizing its educational and reminder features. Evaluation was conducted using a pre-test and post-test design to measure knowledge improvement, along with monitoring participant engagement with the application. The results showed a significant increase in knowledge about early detection of breast cancer, improved ability to perform SADARI correctly and independently, and a high level of acceptance and satisfaction with the use of the application as a learning tool. In conclusion, this program proved effective in enhancing awareness, knowledge, and early detection practices among adolescent girls, with the Breast Health application offering a practical, accessible, and sustainable technology-based educational approach that can be recommended as an innovative model for community-level breast cancer prevention efforts.

Keywords: Adolescent Girls, Breast Cancer, Early Detection, Health Education.

1. INTRODUCTION

Breast cancer is the type of cancer with the highest prevalence of cancer in women in Indonesia. Based on Globocan data in 2022, breast cancer ranks first with an estimated more than 80,000 new cases per year in Indonesia. Early prevention efforts through increasing knowledge and awareness need to be carried out as early as possible, including among young women. Adolescents are a strategic group because they are in an important transition phase that is greatly influenced by knowledge and attitudes

towards reproductive health, including breast health (Bray et al., 2024; Sadoh et al., 2021).

Meranjat Village in Indralaya District, Ogan Ilir Regency, is one of the assisted villages of Sriwijaya University (UNSRI) which has the potential to be developed in the promotive and preventive aspects of public health, especially in the group of adolescent girls at the high school level. The region is populated by communities with semi-urban characteristics but still faces challenges in access to information and health services, especially related to reproductive health and cancer issues.

Until now, there have been no community service activities or research that specifically targets increasing the knowledge of adolescent girls about breast cancer in Meranjat Village. Information obtained through informal communication with educators and community leaders shows that there is a need for more systematic and sustainable education on early detection of breast cancer, including an understanding of the importance of doing SADARI (Breast Self-Check). The high level of smartphone ownership and use among teenagers opens opportunities for the use of interactive and easy-to-understand digital application-based educational media as a means of increasing health knowledge (American Cancer Society, 2022).

In response to these needs, the service team initiated the use of the Breast Health Application as an educational medium developed to answer the information gap while strengthening the awareness of young women on the importance of prevention and early detection of breast cancer. This approach is expected to be an innovative solution in supporting sustainable community-based promotive and preventive efforts, in line with the achievement of SDGs 3 (Good Health and Well-being) and 4 (Quality Education), supporting KPIs 2, 3 and 6, and reflecting collaborative, innovative, adaptive, and solution-oriented impactful behaviors (Budiarto et al., 2021).

The identification of needs shows that there is still low knowledge about breast health in adolescents, especially due to the lack of reproductive health education in schools that specifically discuss breast cancer and early detection. Adolescents also lack understanding of the importance of self-examination (SADARI) as a first step in prevention. In addition, access to educational media that is interesting and youth-friendly is still limited because the educational materials available tend to be conventional, less attractive, and have not fully utilized digital technology that meets local needs. Low digital literacy in the use of educational applications is also an inhibiting factor. However, there is great potential in the target community, such as the high ownership and use of smartphones among adolescents, so technology-based interventions have a great opportunity to be implemented. Mobile applications can be an effective and efficient educational medium, plus support from schools, BK teachers, and village youth organizations such as Karang Taruna. Meranjat Village is also a village assisted by Sriwijaya University, so collaboration between universities and the community can be carried out more easily (Rosdiana et al., 2022).

The solution offered is the development and implementation of the Breast Health application which contains information about breast anatomy, how to do SADARI, breast cancer risk factors, and prevention tips. This application is designed to be interactive with quiz features, educational videos, and AWARE reminders, and will be supported by socialization,

training, and comprehension evaluation activities. The implementation of this application is expected to result in increased adolescent knowledge and awareness about breast cancer, an increase in regular SADARI practice, and the formation of breast health support and advocacy groups. Measurable output targets include an increase of at least 80% of user knowledge about breast health, an increase in SADARI practices at least 70% of users, the formation of at least one active support community in each socialization area, and an increase in user satisfaction with the app's features by at least 15% after feedback-based improvements. Various studies show that interactive education can increase awareness about breast cancer and that apps with reminders have been shown to be effective in increasing adherence to health practices. Community support also strengthens prevention and early detection efforts, while the design of an app that is evaluated on an ongoing basis increases long-term effectiveness (National Breast Cancer Foundation, 2021; Yulita & Marlina, 2020).

The purpose of this community service activity is to increase the knowledge of young women in Meranjat Village about breast cancer, risk factors, signs and symptoms, and the importance of early detection; improve their understanding and skills in doing SADARI with the help of the Breast Health app; encourage preventive behavior through regular use of the app; developing adolescent independence in maintaining reproductive health; and building a technology-based sustainable health education ecosystem. Benefits for young women include increased correct knowledge about breast cancer, the ability to self-diagnose, and increased awareness of the importance of early prevention. For the people of Meranjat Village, this activity can form a community of health-conscious adolescents, create a technology-based educational culture, and improve early detection in young age groups. For institutions, this activity strengthens the role of universities in technology-based community service, becomes a model of intervention that can be replicated, and increases collaboration with the community and health centers. Meanwhile, health workers have obtained educational partners who help breast cancer prevention efforts at the village level.

2. METHOD

Application development is carried out by utilizing Breast Health, which is a breast health education application that has been developed from the results of previous research. The Breast Health application is a mobile technology-based educational media innovation designed to improve adolescent girls' understanding of breast health through an interactive learning approach. This application provides complete information about breast anatomy, AWARE measures, risk factors, and breast cancer prevention strategies in simple and easy-to-understand language. Additionally, interactive features such as quizzes, educational videos, and animations are included to increase user engagement and motivation. This application is also equipped with automatic reminders to encourage teenagers to do SADARI regularly every month. The visual display is designed to be attractive and according to the preferences of young women so that it is easier to accept and use. The Breast Health application can be downloaded through an Android smartphone, so that it is widely accessible and supports the independent education process (Handayani & Rahmawati, 2021; World Health Organization, 2020).

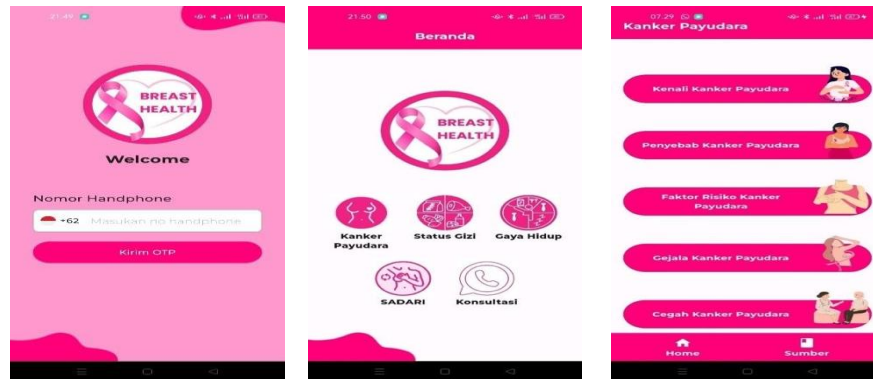


Figure 1. Breast Heath Application

This study employed a quasi-experimental design with a one-group pretest-posttest approach to evaluate the effectiveness of the Breast Health application in improving adolescent girls' knowledge and behavior regarding breast health and early detection of breast cancer. The population of this study consisted of adolescent girls aged 14-19 years residing in Meranjat Village, Indralaya. The sample was selected using a purposive sampling technique, targeting participants who met the inclusion criteria, namely adolescent girls who owned Android smartphones and were willing to participate in the entire program. The intervention was conducted through several stages, including socialization and training on the use of the Breast Health application, independent application use, mentoring, and evaluation. Participants were introduced to the application, guided on how to download and use its features, and encouraged to utilize it regularly, including performing breast self-examination (SADARI). Data were collected using structured questionnaires administered before (pretest) and after (posttest) the intervention to measure changes in knowledge related to breast health, risk factors, and early detection practices. Additional data on user satisfaction and engagement with the application were also collected. Data analysis was performed using descriptive and inferential statistical methods to compare pretest and posttest results, to determine the effectiveness of the intervention in improving participants' knowledge and preventive behaviors related to breast cancer.

1) Socialization and Training

The service team conducts socialization and training on the use of the Breast Health application to teachers and student representatives in target schools. This stage aims to introduce the program to young women in Meranjat Village, Indralaya. Through socialization, young women will understand the purpose, benefits, and how the Breast Health application works as well as the importance of early prevention of breast cancer. This activity can be carried out through direct meetings, seminars, or counseling. After socialization, it was followed by training on the use of the Breast Health application in depth. This training includes how to download, install, use the in-app features, and understand the information presented regarding breast health and breast cancer prevention.



Figure 2. Socialization

2) Technology Implementation and Deployment

Students use the Breast Health application independently and take quizzes and other educational activities. This stage focuses on the use of Breast Health applications by young women in their daily lives. This involves using the app to access information, conduct self-examinations, and record breast health history.



Figure 3. Implementation

3) Mentoring and Evaluation

During the application application, assistance will be provided periodically to help young women if they have difficulty using the application or understanding the information obtained. Evaluations were conducted to measure program effectiveness, knowledge improvement, and behavioral changes related to breast cancer prevention. The service team evaluates the increase of adolescent girls' knowledge about breast health and breast cancer prevention through pre-tests and post-tests. An evaluation was also carried out on user satisfaction with the Breast Health application.

4) Program Dissemination and Sustainability

The results of the service are disseminated through activity reports, scientific publications, and social media. This stage aims to ensure the continuity of the benefits of the application and knowledge that has been gained after the program is completed. This can be done by educating young women about the importance of maintaining breast health independently, as well as encouraging them to become agents of change in their environment.

5) Design and Evaluation

The implementation of activities is designed through several stages. In the preparation stage, the team coordinated with village officials and health centers to ensure support and smooth activities. The team also prepared educational modules and SOPs for the use of the Breast Health application, as well as carried out internal training so that all members understood the material and flow of activities. In addition, various educational media such as SADARI tutorial videos are prepared to support the learning process. The implementation stage began with socialization and health education about breast cancer, SADARI, risk factors, and the importance of early detection, accompanied by interactive discussions. This was followed by a demonstration and practice of SADARI using a breast anatomy model or a video from the app, where the young women were guided to understand and practice the movements correctly. The next activity is the introduction and installation of the Breast Health application, including assistance in the use of educational features, SADARI reminders, and learning modules. After that, assistance in using the application was carried out directly to ensure that teenagers could follow the material properly. As a form of program sustainability, activities also include strengthening the community through the formation of youth Peer Educators and the delivery of educational media to target groups (Kim & Park, 2020; R. Putri & Susanti, 2023).

Evaluation of activities is carried out through two components, namely process evaluation and result evaluation. Process evaluation includes monitoring the presence of participants in each session, activities and participant involvement during education, SADARI practice, and application use, including the availability of facilities and the smooth running of activities. The evaluation of the results was carried out through pre-test and post-test knowledge provided before and after education to measure the extent of the increase in participants' knowledge about breast health and SADARI after participating in the entire series of activities.

6) Time and Schedule of Activities

Tabel 1

No.	Activity Name	Moon							
		1	2	3	4	5	6	7	8
1	Initial coordination and validation of needs	✓							
2	Application Development	✓	✓						
3	Socialization and training of teachers and student representatives			✓					
4	Application implementation among students				✓				
5	Pre-test & post-test evaluation and					✓			

	feedback		
6	Dissemination of results and reporting of activities	✓	✓

3. RESULTS AND DISCUSSION

a. Result

This community service activity is in the form of empowering young women through breast health applications to increase knowledge of early prevention of breast cancer in Meranjat village which will be carried out in the October 2025 period, participants in this activity are 50 young women who have been selected and participate in community service activities. This community service activity was carried out with 2 activities. After the licensing administration process is completed, the next stage is the implementation at the start of the community service process. The first stage is the implementation of preparation and initial assessment of willing young women. The second stage is the implementation of training and coaching as well as evaluation. The participants who were mentored and empowered in this community service activity were young women in Merwakat village.

1) Education and Implementation Results

The educational activities showed very positive results, where as many as 50 young women participated in counseling on breast cancer and SADARI. All participants were able to download and use the Breast Health application according to the guidelines provided. The enthusiasm of the teenagers was high, especially during the SADARI practice session using anatomical models or silicone breasts. In addition, this activity succeeded in forming a small community of adolescent cadres who will act as a driving force in further education related to breast health in Meranjat Village.

2) Knowledge Measurement Results

Measurement of knowledge before and after education showed a significant increase. The average pre-test score of participants was 61.5, while the average post-test increased to 92.3, resulting in an increase in the average score of 30.8. This illustrates the effectiveness of education and the use of Breast Health applications in increasing adolescents' understanding of early detection of breast cancer.



Figure 4. Knowledge Measurement

3) Initial Impact Results

The initial impact of the activity was also evident, marked by the increasing awareness of adolescent girls about the importance of early detection of breast cancer. Participants stated that the Breast Health application is easier to use than conventional guidebooks. In addition, parents and village health cadres provide full support for the sustainability of this program and hope that activities can continue to be carried out continuously.

4) Participant Feedback

The feedback given by participants was generally very positive. Participants felt that the material presented was easy to understand and the application helped them learn independently. They also proposed further education that includes reproductive health more comprehensively. Meanwhile, village cadres suggested that this application be introduced to PKK women's groups so that the benefits can reach more residents.

b. Discussion

The community service activity "Empowerment of Adolescent Girls Through Breast Health Applications to Increase Knowledge of Early Prevention of Breast Cancer in Meranjat Village" showed positive results in increasing the knowledge and skills of adolescent girls related to early detection of breast cancer. Activities show that the use of digital applications is very effective in improving the knowledge of young women. The use of technology makes it easier to understand material, especially through images and videos. The improvement of SADARI skills proves that practical education is needed in the adolescent age group. These results are in line with research showing that app-based interventions can improve early detection behavior.

1) Improving Young Women Knowledge

The results of the pre-test and post-test showed a significant increase in knowledge after participants participated in education and used the Breast Health application. This is in accordance with the Health Belief Model (HBM) theory which states that increasing understanding of diseases and risks is the first step in influencing a person's health behavior. The education provided increases the

perception of susceptibility and the perception of benefits, so that adolescents become more motivated to take preventive measures (Olumide & Adebimpe, 2016; Sari & Wulandari, 2020).

Research by Budiarto et al. (2021) shows that health education about breast cancer can significantly increase the knowledge of adolescent girls. These findings are in line with service activities, where adolescents can answer more questions correctly after being educated. In line with the research, World Health Organization (2020) also emphasized that community-based education strategies are an effective approach to improve early detection of breast cancer in developing countries.

2) Improving AWARE Skills

The observation results showed that most of the participants were able to perform the SADARI procedure correctly after the hands-on demonstration and guidance through the app. According to Bloom's theory of psychomotor learning, motor skills will develop optimally when a person gets visual instruction, demonstrations, and repetitive exercises. With a step-by-step video on the Breast Health application, participants can repeat the material independently. This supports the research of Yulita & Marlina (2020) which states that interactive digital media improves SADARI skills more effectively than conventional lectures. In addition, research by Handayani & Rahmawati (2021) also found that adolescents who received direct demonstrations had better SADARI skills than adolescents who only read leaflets. This explains why the combination of demonstrations and digital applications on this activity is effective in improving the skills of participants.

3) Effectiveness of Using Breast Health Apps

Field findings showed that the app was actively used by most participants during the mentoring week. SADARI's educational, video, and auto-reminder features encourage participants to have monthly breast checkups. Application-based interventions like this have proven effective in international research. Kim & Park (2020) stated that mobile health (m-health) interventions improve knowledge, attitudes, and behaviors related to breast cancer prevention. This is in line with the results of the service which shows that the application is easy to understand, interesting, and able to motivate teenagers to do SADARI. Local research by Rosdiana et al. (2022) also shows that health apps are more effective than conventional media in increasing adolescent awareness of breast cancer prevention. This reinforces the findings that digital approaches are particularly relevant for the adolescent population that is accustomed to mobile devices (Akhtari-Zavare et al., 2014; A. N. Putri et al., 2021).

4. CONCLUSIONS

The community service activity "Empowerment of Young Women Through Breast Health Applications to Increase Knowledge of Early Prevention of Breast Cancer in Meranjat Village" has proven to be effective in increasing the knowledge and skills of adolescent girls related to early detection of breast cancer. The use of digital applications plays a big role in

strengthening participants' understanding, because the delivery of material through images, videos, and interactive features has proven to be more accessible and understood by adolescents. Increased pre-test and post-test scores indicate a significant increase in knowledge, in line with Health Belief Model theory which emphasizes that increased risk and benefit perceptions will affect preventive measures (Ningsih & Safitri, 2019; Yilmaz et al., 2017).

In addition, SADARI practice skills are improved through a combination of hands-on demonstrations and application use, supporting psychomotor learning theories and previous research results that state that visual instruction and repetitive exercises are highly effective in shaping motor skills. The use of the Breast Health application has also been proven to increase the motivation and independence of adolescents in doing SADARI regularly, supported by reminder features and easy access to information (Doshi et al., 2012; Nassaji et al., 2020; Ningsih & Safitri, 2019; Wati et al., 2022).

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The authors state that there is no conflict of interest. Despite being affiliated with UNSRI, all necessary steps have been taken to ensure objectivity and integrity of the program and its results.



Figure 5. Documentation

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