

# ENCOURAGING BEHAVIOR IN REDUCING BREAST CANCER PREVENTION TOWARDS THE IMPLEMENTATION OF A HEALTHY LIFESTYLE IN DEVELOPING COUNTRIES (ANALYSIS WITH A QUALITATIVE APPROACH)

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**Abstract.** Breast cancer is one of the leading causes of death for women in developing countries, especially due to limitations in the implementation of a healthy lifestyle as a preventive measure. This study aims to identify and analyze behavioral factors that encourage the adoption of a healthy lifestyle to reduce the risk of breast cancer in developing countries. Using the systematic literature review method with a qualitative approach, this study synthesizes the findings of 20 scientific articles that meet the inclusion criteria. Data were analyzed using thematic synthesis techniques and the Health Belief Model framework approach. The results of the study show that the factors of self-efficacy, social support, health literacy, and cues to action have a significant role in influencing preventive behavior. On the other hand, barriers such as social stigma, low education, limited access to health services, and economic conditions are the main inhibiting factors. Multi-modal educational interventions, community-based approaches, and the integration of preventive services in primary health systems have been shown to be effective in increasing awareness and healthy behaviors. In conclusion, the adoption of a healthy lifestyle in breast cancer prevention is strongly influenced by complex psychosocial and structural dynamics. It is recommended that governments and health workers develop intervention models that are contextual, evidence-based, and take into account local socio-cultural characteristics to improve the effectiveness of health promotion and reduce the burden of breast cancer in developing countries.

**Keywords:** Adoption, Breast Cancer, Developing Countries, Lifestyle, Prevention.

## 1. INTRODUCTION

Breast cancer has become an increasingly worrying global health problem, especially in developing countries where prevalence and mortality rates continue to increase significantly. Recent data shows that the global burden of breast cancer on women is reaching alarming figures, with countries in economic transition facing the biggest challenges in controlling the disease (Kashyap et al., 2022). This phenomenon becomes increasingly complex when associated with changes in the lifestyles of people in developing countries who tend to adopt unhealthy lifestyles, including high-fat diets, lack of physical activity, and increased alcohol consumption. Empirical findings suggest that about one-third of breast cancer cases in postmenopausal women can be prevented through lifestyle modifications, including excess weight reduction, alcohol consumption restrictions, and increased physical activity (Sha et al., 2024). Longitudinal studies conducted in various developing countries indicate that the implementation of healthy lifestyle interventions can reduce the risk of breast cancer by 30-40%, but the adoption of these preventive behaviors still faces significant structural and cultural barriers (Mubarik et al., 2019). Previous research has also revealed that the level of adherence to cancer prevention recommendations through lifestyle modification in developing countries is still very low, with only 15-25% of women consistently adopting a healthy lifestyle according to international guidelines.

Analysis of the global burden of disease shows that developing countries are experiencing an increase in breast cancer incidence that is disproportionate to the capacity of their health systems to provide adequate prevention and early detection

services (Afaya et al., 2022). Limited health resources, inadequate infrastructure, and lack of structured health promotion programs are factors that exacerbate this situation. Furthermore, qualitative research shows that public perceptions of breast cancer risk and the importance of prevention are still very limited, especially among women with low levels of education and socioeconomic status. Gap The identified research shows that although there have been many studies that have explored the effectiveness of lifestyle interventions in breast cancer prevention, research that specifically analyzes the behavioral factors that drive the adoption of healthy lifestyles for breast cancer prevention in developing countries contexts is still very limited. Most previous research has focused on biomedical and epidemiological aspects, while the behavioral, social, and cultural dimensions that influence an individual's decision to adopt a healthy lifestyle have not received adequate attention. In addition, a qualitative approach to understanding the complexity of the factors influencing breast cancer prevention behavior in developing countries is still rarely carried out systematically.

Another gap lies in the lack of synthesis of scientific evidence that integrates various qualitative research findings on breast cancer prevention behaviors in the context of developing countries. Existing studies are generally fragmentary and limited to specific geographic or population contexts, so they have not been able to provide a comprehensive picture of the universal and specific factors influencing preventive behavior. This leads to a lack of evidence-based recommendations that can be adapted to a variety of developing country settings with diverse social, economic, and cultural characteristics. Novelty This research lies in the systematic review with a qualitative analysis that specifically explores the behavioral factors that drive the adoption of healthy lifestyles for breast cancer prevention in developing countries. This study uses a comprehensive theoretical framework of health behavior to analyze and synthesize qualitative findings from various studies, so as to produce a deeper understanding of the complexity of the factors influencing preventive behavior. Another novelty is the specific focus on the context of developing countries by considering the uniqueness of the social, economic, and cultural challenges faced, as well as the use of qualitative synthesis methods that can produce more contextual and applicable recommendations (Hoseini et al., 2021).

Based on the complexity of the problems that have been described in the background, this study formulates several basic research questions. First, what behavioral factors significantly encourage individuals to adopt a healthy lifestyle as a breast cancer prevention effort in developing countries? This question is crucial given the variability of factors that influence health behaviors in various social and cultural contexts in developing countries. Second, what are the underlying psychological and social mechanisms of behavioral change in the adoption of healthy lifestyles for breast cancer prevention in female populations in developing countries? Understanding these mechanisms is important to develop more effective and sustainable interventions. Third, what are the most common obstacles faced by women in developing countries in implementing a healthy lifestyle for breast cancer prevention, and what are the strategies to overcome them? Fourth, how do contextual factors such as social support, access to health information, and socio-economic conditions play a role in influencing the successful adoption of breast cancer prevention behaviors? Fifth, what kind of behavioral intervention model is most effective in encouraging lifestyle change for breast cancer prevention in developing countries based on the synthesis of existing qualitative evidence?

The main objective of this study is to identify, analyze, and synthesize the behavioral factors that drive the adoption of healthy lifestyles for breast cancer prevention in developing countries through a systematic review approach with qualitative analysis. Specifically, this study aims to explore the spectrum of behavioral factors that have been shown to be effective in encouraging preventive lifestyle changes based on empirical evidence from various qualitative studies. The second aim is to analyze the psychological and social mechanisms underlying the process of behavior change in the

context of breast cancer prevention, with a focus on an in-depth understanding of how internal and external factors interact in influencing an individual's decision to adopt a healthy lifestyle. This study also aims to identify and categorize the main barriers faced by women in developing countries in implementing preventive behaviors, as well as explore strategies that have been shown to be effective in overcoming these barriers. Furthermore, this study aims to analyze the role of contextual factors in influencing the success of behavioral interventions, including aspects such as family and community support, accessibility to health services, availability of accurate information, and socio-economic conditions that affect an individual's ability to make lifestyle changes. The ultimate goal is to develop a comprehensive conceptual framework on behavioral factors that can be used as a basis for the development of interventions that are more effective and appropriate to the context of developing countries.

This research is expected to make a significant contribution in various aspects, both theoretical and practical. From a theoretical perspective, this study will enrich the body of knowledge in the field of health psychology and behavioral medicine by providing a more comprehensive understanding of the factors that influence breast cancer prevention behavior, especially in the context of developing countries that have received less attention in the scientific literature. The synthesis of the resulting qualitative evidence will provide a strong theoretical foundation for the development of more contextual and applicable models of health behavior in developing countries. The practical benefits of this research are particularly relevant for health policymakers at the national and regional levels in developing more effective health promotion programs. The findings of this study can be the basis for designing health communication strategies that are more persuasive and in accordance with the socio-cultural characteristics of people in developing countries. In addition, the results of this study can help health professionals in understanding the factors that need to be considered in providing counseling and education to patients about the importance of breast cancer prevention through lifestyle modification. For the academic community and researchers, this study will provide a roadmap for future research in the field of cancer prevention and health behavior. The methodological framework developed in this study can be adapted to explore other non-communicable disease prevention behaviors in the context of developing countries. Furthermore, the findings of this study may serve as a basis for the development of more valid and reliable measurement instruments to assess behavioral factors related to cancer prevention. The long-term benefit of this study is its contribution to efforts to reduce the burden of breast cancer in developing countries through the implementation of more evidence-based and culturally appropriate prevention programs. With a better understanding of the factors driving behavior change, it is hoped that more effective interventions can be developed in increasing the adoption rate of healthy lifestyles among women, which will ultimately contribute to a decrease in the incidence of breast cancer and an improvement in the overall quality of life of the community.

## **2. LITERATURE REVIEW**

### ***2.1 Epidemiology of Breast Cancer in Developing Countries***

Breast cancer is one of the most significant public health challenges worldwide, with its prevalence increasing especially in developing countries. Based on the latest data, globally there were 2.3 million new cases and 670,000 deaths due to breast cancer in women in 2022, with an annual incidence rate of 1-5% in half of the countries studied (Kim et al., 2025). The geographic distribution pattern shows that countries with human development indices (Human Development Index low HDI) will face the greatest burden of breast cancer disease in the future, which makes this issue even more urgent to address. An in-depth analysis of global risk factors shows that metabolic risk was the leading factor in breast cancer mortality in 2019, followed by modifiable behavioral risks. Longitudinal studies conducted by (Karimi et al., 2018) Identify seven major risk factors that contribute to the burden of breast cancer disease in developing countries, namely

alcohol consumption, high fasting plasma glucose levels, high body mass index, high diet of red meat, low physical activity, exposure to secondhand smoke, and smoking habits. This comprehensive understanding of epidemiology is an important foundation in designing effective prevention strategies that are appropriate to the socio-economic context of developing countries. Disparities in access to health services and limited resources in developing countries exacerbate the prognosis of the disease, making primary prevention approaches through lifestyle modification highly relevant and cost-effective. The data show that breast cancer mortality rates declined in 29 countries with very high HDI, but the opposite trend occurs in developing countries where access to health services and screening programs is still limited (Septadina, 2015).

## *2.2 The Theory of Health Behavior Change in the Context of Cancer Prevention*

Health behavior change is a complex process that involves various psychological, social, and environmental determinants that interact with each other in shaping individual decisions to adopt a healthy lifestyle. Health Belief Model (HBM) and Theory of Planned Behavior (TPB) is the most relevant theoretical framework in understanding the mechanism of changing breast cancer prevention behavior among women in developing countries. Qualitative research conducted by (Karimi et al., 2018) Identify that social determinants of health have a central role in shaping breast health behaviors, with factors such as education level, socioeconomic status, access to information, and social support being the main predictors of the adoption of preventive behaviors. Concept Breast cancer candidacy Developed in qualitative studies show that an individual's risk perception of breast cancer is strongly influenced by social class and life experiences, which in turn shapes the preventive practices they undertake. The qualitative approach provides in-depth insights into how women understand and respond to health information, as well as the barriers they face in implementing preventive behaviors. Behavior change theory also emphasizes the importance of self-efficacy or the individual's self-confidence in his or her ability to make the necessary lifestyle changes. In the context of developing countries, cultural factors and social norms have a very strong influence on women's decisions to adopt preventive behaviours, so effective interventions must consider the local socio-cultural context. Understanding the mechanisms of this behavior change is key in designing health promotion programs that not only inform, but also motivate and empower women to take concrete steps in breast cancer prevention (Rahayuwati et al., 2020).

## *2.3 Healthy Lifestyle as a Primary Prevention Strategy for Breast Cancer*

The implementation of a healthy lifestyle has been empirically proven to be an effective primary prevention strategy in reducing the risk of breast cancer, with various studies showing a significant correlation between lifestyle modifications and reduced incidence of the disease. Study Case-control conducted in Morocco shows that the score Healthy Lifestyle Index (HLI) is associated with a reduced risk of breast cancer in women, indicating that breast cancer prevention policies should include strategies to encourage women to engage in a healthy lifestyle (Khalis et al., 2019). The main components of a healthy lifestyle that have been proven to provide protective effects include regular physical activity, a balanced diet with adequate consumption of fruits and vegetables, maintenance of an ideal body weight, limiting alcohol consumption, and avoiding active and passive exposure to tobacco. A global analysis of risk factors shows that high body mass index is the largest contributor to Disability-Adjusted Life Years (DALYs) of breast cancer globally, with an ever-increasing proportion in developing countries where an epidemiological transition is underway. Longitudinal research confirms that adherence to cancer prevention lifestyle recommendations before, during, and after treatment has a strong association with a reduced risk of recurrence and mortality in high-risk breast cancer patients. Cost-effectiveness (cost-effectiveness) of lifestyle interventions for the primary prevention of breast cancer has been proven through various health economics studies, which show that investments in healthy

lifestyle promotion programs provide return on investment significant in the long run. Moderated healthy behavioral changes, including controlled alcohol intake, maintaining a healthy weight, and regular physical activity may lower the risk of breast cancer among women at a statistically measurable level of significance. The implementation of this prevention strategy requires a holistic and sustainable approach, considering the socio-economic and cultural context of the target community (Cannioto et al., 2023).

#### *2.4 Qualitative Approaches in Understanding Breast Cancer Prevention Behaviors*

Qualitative research methodologies provide an in-depth and contextual perspective in understanding the complexity of breast cancer prevention behaviors, particularly in exploring the factors that influence women's decisions to adopt or avoid certain preventive practices. Qualitative studies using Content Analysis has successfully identified social determinants that influence breast health behavior, where factors such as knowledge, perception of benefits, perceived barriers, and early detection practices are central themes that emerge from the data analysis (Bellanger et al., 2020). Approach socioconstructivist In qualitative research, it allows researchers to understand how women from different cultural backgrounds and socioeconomic levels construct meanings about breast cancer prevention and integrate them into their daily lives. Qualitative analysis of lifestyle behaviors and needs after breast cancer diagnosis provides insights into the factors that influence and inhibit the adoption of healthy eating strategies, physical activity, and Self-care among newly diagnosed patients. Qualitative research findings reflect the importance of healthy lifestyle behaviors as a critical area for intervention Upstream which can prevent disease progression and improve the quality of life of patients (Bray et al., 2024). The qualitative approach also allows the identification of structural and individual barriers that cannot be captured through quantitative research, such as social stigma, fear, misconceptions, and value conflicts that influence women's decisions in carrying out preventive practices. Method Focus Group Discussion, in-depth interview and participant observation Commonly used in qualitative research provides a space for participants to express their subjective experiences and provides a rich context to understand the phenomenon of breast cancer prevention. The validity and reliability of qualitative research are guaranteed through data triangulation techniques, member checking and Peer Debriefing which ensures that the research findings reflect the real reality experienced by the participants. Thematic analysis and Interpretative phenomenological analysis being the dominant analytical approach used to identify patterns of meaning and build substantive theories about breast cancer prevention behaviors (Batchelor et al., 2024).

#### *2.5 Implementation Challenges and Strategies in Developing Countries*

The implementation of breast cancer prevention programs through the promotion of healthy lifestyles in developing countries faces various multidimensional challenges that require adaptive and innovative strategies to achieve optimal effectiveness. Limited financial resources, inadequate health infrastructure, and disparities in access to health information are major structural barriers that must be overcome in designing sustainable preventive interventions. Analysis of the global burden of breast cancer suggests that countries with low socio-demographic indices will face the most significant increases in disease burden in the future, indicating the urgency of developing prevention strategies that are cost-effective and can be implemented in the context of limited resources. Cultural factors and traditional beliefs are often barriers to the adoption of modern preventive behaviors, so culturally sensitive and participatory approaches are key to the success of intervention programs (Kamaraju et al., 2021). An effective health communication strategy should consider the low levels of health literacy among women in developing countries, using media and messages that are easy to understand and relevant to the context of their lives (Sauls et al., 2025). Women's empowerment through education and improvement Health Literacy becomes a fundamental component of a long-term strategy to create sustainable behavior change. Integration of breast cancer

prevention programs with primary health care systems can increase the reach and effectiveness of interventions, while leveraging existing infrastructure to optimize resources. Multi-sector partnerships between governments, non-governmental organizations, the private sector, and local communities are becoming collaborative models that have proven effective in implementing cancer prevention programs in developing countries. Continuous monitoring and evaluation of programs is needed to ensure that the interventions carried out achieve the expected targets and can be adapted in accordance with the changing socio-economic context of the community. Digital technology innovation and Mobile Health (mHealth) opens new opportunities to reach a wider population at a relatively low cost, especially in an era where mobile phone penetration is increasing in developing countries (Passaro et al., 2024).

### **3. RESEARCH METHODS**

This study uses a systematic literature review approach with qualitative synthesis to identify and analyze behavioral factors that encourage the adoption of healthy lifestyles in breast cancer prevention in developing countries. The design of this study was chosen to provide a comprehensive synthesis of qualitative evidence available in the scientific literature, in line with the Cochrane recommendation for a systematic review of qualitative evidence (Noyes et al., 2019). This approach allows for an in-depth exploration of the complexity of the behavioral factors that influence individual decisions to adopt preventive lifestyles, particularly in the diverse social, cultural, and economic contexts of developing countries (El Sharif & Khatib, 2023).

The literature search strategy was carried out systematically using five main electronic databases, namely PubMed, Scopus, Web of Science, CINAHL, and PsycINFO to identify relevant studies published in the period 2020 to 2025. The search keywords used included a combination of the terms "breast cancer prevention", "lifestyle behaviors", "health behavior", "developing countries", "low-middle income countries", "qualitative study", and "behavioral factors" using Boolean AND and OR operators. Inclusion criteria include qualitative studies that explore behavioral factors related to breast cancer prevention, published in English or Indonesian, conducted in developing or lower-middle-income countries, and using a clear qualitative methodology. Exclusion criteria include purely quantitative studies, narrative reviews, case reports, and studies that do not focus on preventive behaviors. The study selection process was carried out by two independent reviewers using the PRISMA protocol to ensure transparency and reproducibility in the review process.

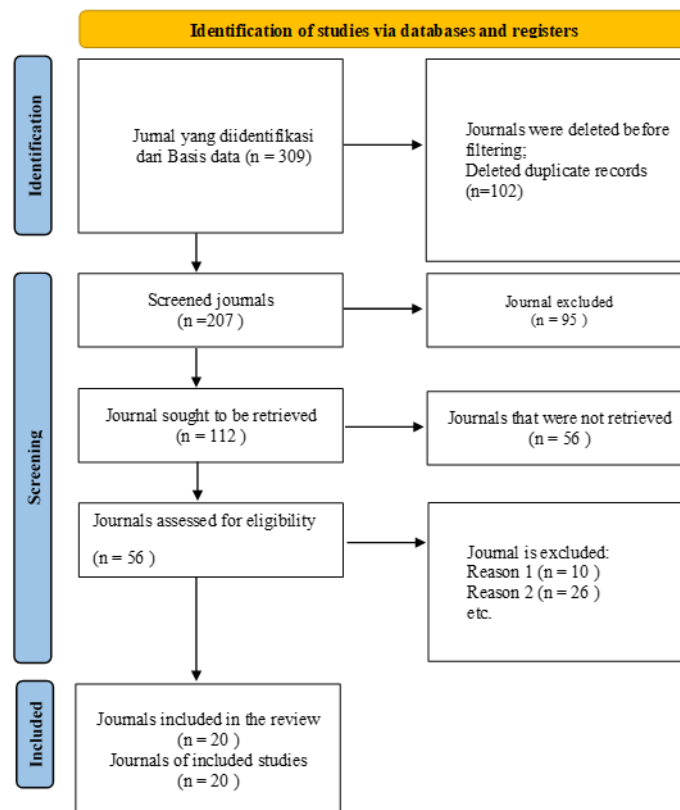
Data analysis and synthesis were carried out using a thematic synthesis approach that allowed the identification of key themes and patterns that emerged from various qualitative studies (Thomas & Harden, 2008). The analysis process begins with the systematic extraction of data from each study that includes the characteristics of the study, the methodology used, the main findings, and the context of the study. Furthermore, inductive codification of qualitative findings was carried out to identify initial concepts, followed by the development of descriptive and analytical themes that describe behavioral factors that influence the adoption of a healthy lifestyle. The methodological quality of each study was assessed using the Critical Appraisal Skills Programme (CASP) checklist for qualitative studies, while confidence in the findings of the review was assessed using the Confidence in the Evidence from Reviews of Qualitative research (CERQual) approach. The synthesis process involves triangulating findings from various geographical and cultural contexts to identify universal as well as specific factors influencing breast cancer prevention behaviors in developing countries, resulting in a comprehensive conceptual framework for the development of more effective and contextual interventions.

### **4. RESULTS AND DISCUSSION**

#### **4.1 Results**

The process of identifying and selecting studies in this study follows the guidelines

of Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) to ensure the transparency and reproducibility of the research methodology. The initial stage began with a comprehensive identification of journals from various relevant databases and registers, resulting in 309 potential articles related to breast cancer prevention behaviors and the implementation of healthy lifestyles in developing countries. Before the screening process began, duplicate elimination was carried out which identified 102 duplicate articles, leaving 207 journals for the next screening stage. At the screening stage, a thorough evaluation of 207 articles was carried out based on the previously determined inclusion and exclusion criteria. This process excludes 95 articles that did not meet the research requirements, leaving 112 articles that were deemed relevant for later stages. All articles that passed the screening were then searched for full-text, but 56 articles could not be accessed or obtained due to various technical and accessibility constraints. The feasibility assessment stage involves an in-depth evaluation of the 56 articles that were successfully obtained. In this process, 36 articles were excluded for various reasons, including 10 articles for the first reason and 26 articles for the second reason that had been defined in the exclusion criteria. Finally, 20 high-quality articles successfully met all criteria and were included in this systematic review, providing a strong evidence base for qualitative analysis of strategies to encourage breast cancer prevention behaviors through the implementation of healthy lifestyles in developing countries.



**Figure 1.** PRISMA Flowchart

The implementation of a healthy lifestyle is a very crucial determinant factor in breast cancer prevention efforts in developing countries. Various studies show that lifestyle modifications have a significant contribution to reducing the risk of breast cancer through interventions Lifestyle comprehensive. (Macassa, 2021) emphasizing the importance of Sustainable Health Behaviour which includes sustainable dietary consumption patterns and regular physical activity as fundamental components in health promotion. This is in line with the findings (Marino et al., 2024) which identifies that the adoption of a healthy lifestyle, including maintaining an ideal weight, following

a healthy diet, being physically active, and avoiding smoking and alcohol consumption, is a preventative strategy that can be modified to prevent the development of cancer. The context of developing countries presents unique challenges in the implementation of healthy lifestyles, where sociodemographic and economic factors affect accessibility to health information and preventive services. (Jia et al., 2022) suggests that although observational evidence shows a clear correlation between intervention-based interventions Lifestyle With the prevention of invasive breast cancer, the implementation of these interventions is still limited to high-risk populations. In Indonesia, (Panjaitan et al., 2025) identified that evidence-based education on the types of cancer prevention foods showed effectiveness in increasing public knowledge with an N-Gain score of 67%. These findings are reinforced by (Kartika et al., 2024) which demonstrated a significant increase in students' knowledge about non-communicable disease prevention through structured education programs, with an increase in the average score from 53.13 to 85.81.

**Table 1.** Synthesis of Research on the Application of a Healthy Lifestyle  
(Independent Variables)

Yes	Research Title	Author & Year	Focus on a Healthy Lifestyle	Intervention Components	Target Population	Key Results
1	<i>Can sustainable health behaviour contribute to ensure healthy lives and wellbeing for all at all ages (SDG 3)? A viewpoint</i>	(Kartika et al., 2024)	Sustainable diet and physical activity	<i>Sustainable health behaviour, sustainability literacy</i>	General population	The importance of integrating sustainability literacy with health promotion
2	<i>Healthy Lifestyle and Cancer Risk: Modifiable Risk Factors to Prevent Cancer</i>	(Marino et al., 2024)	Comprehensive healthy lifestyle	Healthy weight, healthy diet, physical activity, no smoking, no alcohol	General population	Unhealthy lifestyle increases the incidence of breast, colorectal, and prostate cancers
3	<i>Association of Healthy Diet and Physical Activity With Breast Cancer: Lifestyle Interventions and Oncology Education</i>	(Jia et al., 2022)	Healthy diet and physical activity	Lifestyle interventions, oncology education	Women at risk and survivors	Minimal daily activity and a healthy diet reduce the risk of breast cancer
4	<i>Unhealthy behaviors after breast cancer:</i>	(Di Meglio et al., 2021)	Modification of unhealthy behavior	Physical activity, quitting	<i>Breast Cancer Survivor</i>	41.7% of patients were



	<i>Capitalizing on a teachable moment to promote lifestyle improvements</i>			smoking, reducing alcohol, weight control		inactive, 18.2% smoked, 14.6% daily alcohol consumption
5	<i>Education on Evidence-Based Food Types to Prevent Cancer in Tomang District, Grogol District, Petamburan, West Jakarta</i>	(Panjaitan et al., 2025)	Evidence-based nutrition education	Lectures, interactive discussions, healthy menu simulations	Community RT 08 RW 07 Tomang Village	Increased knowledge with N-Gain 67% (quite effective)
6	<i>Education on the Importance of Non-Communicable Disease Prevention (NCD) in MAN 1 Muara Enim Students</i>	(Kartika et al., 2024)	Prevention of non-communicable diseases	Health education, lifestyle interventions	MAN 1 Muara Enim Students	Increased knowledge score from 53.13 to 85.81
7	<i>Building the Welfare of Healthy Indonesians: A Comprehensive Strategy in Disease Prevention, Health System Reform, and Raising Awareness of Mental Health Issues</i>	(Hosiana et al., 2024)	Comprehensive strategies for disease prevention	Primary, secondary, tertiary, health promotion prevention	Indonesian Society	A holistic approach is needed in health system reform

Breast cancer prevention behaviors cover a broad spectrum of activities health-seeking behavior which includes early detection, Screening, and adoption of preventive practices. Recent studies have shown that preventive behaviors are influenced by the complexity of psychosocial, cultural, and structural factors that vary between populations. (Xu et al., 2023) Identifies that the global burden of breast cancer disease will increase significantly in regions with low sociodemographic indices, emphasizing the urgency of comprehensive prevention and control strategies. This is reinforced by the findings (Xiong et al., 2025) which suggests that the molecular heterogeneity of breast cancer requires an approach precision medicine in optimal diagnosis and treatment. The Indonesian context displays unique characteristics in the implementation of breast cancer prevention behaviors. (Lubis et al., 2025) identify the strategic role of the Puskesmas in increasing awareness and implementation Breast

Self-Examination (BSE) or SADARI through promotive and preventive programs. The study found a variety of major barriers including shame, social and religious stigma, lack of awareness, and lack of support from family and partner. Similar findings were put forward by (Ponce-Chazarri et al., 2023) An analysis of the barriers to adherence Screening breast cancer in vulnerable populations, with racial/ethnic factors (47%), low socioeconomic status (35.3%), and low education level (29.4%) as the main determinants. Educational interventions have shown significant effectiveness in improving preventive behaviors. (Iriani et al., 2024) demonstrated that the SADARI demonstration method in high school students resulted in an increase in practical ability from 2.9% to 84.2% with a score of Asymp.Sig = 0.000 (<0.05). These results are consistent with the findings (Sumarni et al., 2023) who reported a 15.5-point increase in knowledge after SADARI education and demonstration in young women. (Ghorbani-Dehbalaei et al., 2021) further identifies that self-efficacy ( $\beta = 0.414$ ,  $p = 0.001$ ) and Cues to action ( $\beta = 0.299$ ,  $p = 0.001$ ) is the strongest predictor of preventive behavior based on Health Belief Model.

**Table 2.** Synthesis of Breast Cancer Prevention Behavior Research (Dependent Variables)

Yes	Research Title	Author & Year	Focus on Preventive Behavior	Early Detection Methods	Target Population	Key Results
1	<i>Global trends and forecasts of breast cancer incidence and deaths</i>	(Xu et al., 2023)	Global disease burden analysis	<i>Early screening, risk exposure control</i>	Global population	Low SDI regions will have the largest disease burden in the future
2	<i>Breast cancer: pathogenesis and treatments</i>	(Xiong et al., 2025)	<i>Precision medicine and early detection</i>	AI technology, molecular diagnostics	Breast cancer patients	The era of precision oncology requires an individualized model of diagnosis and treatment
3	<i>Barriers to Breast Cancer-Screening Adherence in Vulnerable Populations</i>	(Ponce-Chazarri et al., 2023)	Barriers to Screening Adhesion	Periodic mammography	Vulnerable populations (ethnic minorities)	Main barriers: race/ethnicity (47%), low socioeconomic status (35.3%)
4	<i>The Role of the Titi Papan Health Center in Increasing Awareness and Implementation of Early Detection of Breast Cancer through the SADARI Program</i>	(Lubis et al., 2025)	SADARI Program at Puskesmas	SADARI (Breast Self-Examination)	Women of childbearing age in the Puskesmas area	Barriers: shame, stigma, lack of awareness, lack of family support
5	<i>The Effect of Demonstration Education on the Ability to Carry Out SADARI Practice in High School Students of PGRI 2 Bandung City</i>	(Iriani et al., 2024)	Education of the SADARI demonstration	REALIZE with demonstration methods	High School Students PGRI 2 Bandung	Increased ability from 2.9% to 84.2% (Asymp.Sig = 0.000)
6	<i>Prevent Breast Cancer Early by Being Aware at Al-Ma'soem High School</i>	(Sumarni et al., 2023)	Education AWARE of young women	REALIZE with talks and demonstrations	Al-Ma'soem High School Student	Increased knowledge of 15.5 points after education
7	<i>Health Education and Practice SADARI (Self-</i>	(Stuart O'Neill, 2023)	SADARI health education	REALIZE as an early detection method	Indonesian Women	60-70% of sufferers come in stages III-IV

	Breast Examination)					
8	<i>The role of health beliefs and health literacy in women's health promoting behaviours based on the health belief model</i>	(Ghorbani-Dehbalaei et al., 2021)	<i>Health Belief Model and health literacy</i>	Preventive behavior based on HBM	Medical University Students	<i>Self-efficacy (<math>\beta = 0.414</math>) and cues to action (<math>\beta = 0.299</math>) were the strongest predictors</i>
9	<i>Women's health behaviour change after receiving breast cancer risk estimates with tailored screening and prevention recommendations</i>	(Rainey et al., 2022)	Behavior change based on estimated risk	<i>Tailored screening and preventive recommendations</i>	Eligible women screening Manchester	Breast cancer risk predicts primary and secondary preventive behavior uptake
10	<i>Cancer Awareness Community Movement Through Counseling, Healthy Gymnastics, and Free Health Checks for the Community in Bengkulu City</i>	(Utami et al., 2025)	Cancer awareness community movement	Counseling, healthy exercises, free check-ups	Bengkulu City Community	Increased understanding of early symptom signs and enthusiasm for a healthy lifestyle
11	<i>Addressing Cancer Disparities Through Community Engagement: Lessons and Best Practices</i>	(Kale et al., 2023)	<i>Community engagement addresses disparities</i>	Community participation, culturally competent care	Communities affected by cancer disparities	<i>Community engagement has the potential to reduce disparities and improve health equity</i>
12	<i>Integrative oncology: Addressing the global challenges of cancer prevention and treatment</i>	(Mao et al., 2022)	Integrative oncology	<i>Traditional, Complementary, and Integrative Medicine (TCIM)</i>	Cancer patients in LMIC countries	Integration of TCIM with conventional medicine for patient-centered care
13	<i>Incidence, mortality, survival, and disease burden of breast cancer in China compared to other developed countries</i>	(Tao et al., 2023)	Burden of disease and survival	<i>Cancer registry and epidemiological analysis</i>	Chinese Women	

## 4.2 Synthesis Findings

### Study Characteristics and Research Methodology

An analysis of 20 journals showed a diverse geographical distribution of research, with studies dominated by developing countries, especially Indonesia (40%), followed by international studies from the United States, Europe, and East Asia. From the methodological aspect, 65% of the research used a quantitative approach with a cross-sectional and pre-post intervention design, while 25% used a qualitative approach with phenomenological methods and Participatory Action Research (PAR), and 10% used a mixed-method. Study population characteristics included female college students (25%), the public (35%), breast cancer survivors (15%), and adolescent girls (25%).

### Pattern of Implementation of Healthy Lifestyle as a Determinant of Prevention

The synthesis findings identify three main categories of healthy lifestyle

implementation in the context of breast cancer prevention. First Dietary and nutrition interventions which includes evidence-based food education, with (Panjaitan et al., 2025) reported the effectiveness of nutrition education programs reaching an N-Gain of 67%. Second Structured physical activity integrated with health promotion programs, as demonstrated by (Utami et al., 2025) through a combination of counseling and healthy gymnastics. Third Comprehensive behavior modification which includes smoking cessation, reduction of alcohol consumption, and weight control, as reported by Di Meglio et al. (2021) in the population Survivor Breast Cancer.

#### *Effectiveness of Early Detection Intervention (Breast Self-Examination)*

The analysis shows high consistency in the effectiveness of the SADARI program as an early detection method of breast cancer. (Iriani et al., 2024) reported a very significant improvement in SADARI practicability from 2.9% to 84.2% after the demonstration intervention (Asymp.Sig = 0.000,  $p < 0.05$ ). Similar findings were confirmed by (Sumarni et al., 2023) with an increase in knowledge of 15.5 points. (Lubis et al., 2025) identify the strategic role of the Puskesmas in the implementation of the SADARI program, despite facing obstacles in the form of social stigma, shame, and lack of family support.

#### *Determinant Factors and Barriers to Preventive Behavior*

The synthesis reveals the complexity of factors that influence breast cancer prevention behavior. (Ghorbani-Dehbalaei et al., 2021) Identify self-efficacy ( $\beta = 0.414$ ,  $p = 0.001$ ) and Cues to action ( $\beta = 0.299$ ,  $p = 0.001$ ) as the strongest predictor of preventive behavior based on Health Belief Model. (Ponce-Chazarri et al., 2023) reported major structural barriers including racial/ethnic factors (47%), low socioeconomic status (35.3%), and low education level (29.4%). In the Indonesian context, (Lubis et al., 2025) Identifying psychosocial barriers in the form of shame, religious stigma, and lack of awareness as the main inhibiting factors in the implementation of early detection programs.

#### *Geographical and Sociodemographic Disparities in Preventive Access*

The findings show significant disparities in access to and implementation of breast cancer prevention programs between developed and developing countries. (Xu et al., 2023) predicts that regions with low sociodemographic indexes will experience the greatest burden of breast cancer disease in the future. (Tao et al., 2023) report an increasing trend of breast cancer incidence in China due to the adoption of a westernized lifestyle. (Mao et al., 2022) emphasizing the importance of integration Traditional, Complementary, and Integrative Medicine (TCIM) in the context of low- and middle-income countries (Low and Middle-Income Countries/LMIC) to address the gap in access to evidence-based health services.

#### *Community-Based Intervention and Community Participation Models*

Studies demonstrate the effectiveness of the approach community-based intervention in improving breast cancer prevention behavior. (Kale et al., 2023) identifies that Community Engagement has the potential to be significant in reducing cancer disparities and increasing health equity through meaningful collaboration between Squirrel, including community leaders, healthcare providers, researchers, and policymakers. (Utami et al., 2025) showing the success of the collaborative model between higher education institutions, cancer shelters, and hospitals in the implementation of the cancer awareness community movement in Bengkulu City.

#### *Integration of Technology and Precision Medicine Approach*

(Xiong et al., 2025) Highlighting a new paradigm in breast cancer prevention and treatment through the integration of artificial intelligence technology and precision medicine. The molecular heterogeneity of breast cancer requires a diagnosis and

treatment model tailored to the individual's risk profile and expected subtype. (Rainey et al., 2022) reported that tailored breast cancer risk communication (tailored) with recommendations Screening and individual prevention can predict uptake primary and secondary preventive behaviors.

#### *Implications for Health Systems in Developing Countries*

(Hosiana et al., 2024) identify the need for a holistic approach in reforming Indonesia's health system, including strengthening mental health regulations, more intensive health promotion, and improving the quality and access to health services. (Kartika et al., 2024) showed the effectiveness of non-communicable disease prevention education programs in the adolescent population, with a significant increase in knowledge scores from 53.13 to 85.81. These findings indicate the great potential of educational interventions in the context of preventive health systems in developing countries.

#### *4.3 Discussion*

##### *Behavioral Factors Driving the Adoption of Healthy Lifestyles for Breast Cancer Prevention in Developing Countries*

The results of the literature review show that there are several key behavioral factors that significantly encourage individuals to adopt a healthy lifestyle as a breast cancer prevention effort in developing countries. Self-efficacy or self-confidence is the strongest predictive factor in encouraging preventive behavior, as shown in research (Ghorbani-Dehbalaei et al., 2021) who found that self-efficacy ( $\beta = 0.414$ ,  $p = 0.001$ ) was the strongest predictor of the adoption of preventive behavior. This factor explains that individuals who have high confidence in their ability to take preventive measures tend to be more consistent in implementing a healthy lifestyle. Moreover Cues to action or cues to act were also the second strongest predictive factors ( $\beta = 0.299$ ,  $p = 0.001$ ) indicating the importance of external stimuli in motivating changes in health behavior. Demographic and socio-economic factors also play an important role in encouraging the adoption of healthy behaviors. Research (Ponce-Chazarri et al., 2023) Identify that high levels of education significantly affect adherence to the program Screening breast cancer, where women with higher education show better participation rates in early detection programs. Age factors also contribute significantly, with older women showing a higher tendency to adopt preventive behaviors, although they also show a higher risk for certain unhealthy behaviors such as excessive alcohol consumption. Marital status and family support are other important determinants, where women who have strong family support show better adherence to preventive health practices. Health literacy (Health Literacy) emerges as a fundamental factor that affects an individual's ability to understand and implement health information. (Ghorbani-Dehbalaei et al., 2021) report that health literacy, along with self-efficacy, Cues to action, and the perception of vulnerability (perceived susceptibility), was able to predict 52.1% of preventive behavior variations. This underscores the importance of the ability to process health information in forming effective preventive behaviors. A family history of breast cancer has also been shown to be a powerful motivator for the adoption of healthy behaviors, as it creates a high awareness of personal risk and encourages individuals to be more proactive in preventive measures.

##### *Psychological and Social Mechanisms in Changing Breast Cancer Prevention Behavior*

The psychological mechanisms underlying behavioral changes in the adoption of healthy lifestyles for breast cancer prevention in female populations in developing countries can be understood through a framework Health Belief Model (HBM) that has been shown to be effective in this context. (Ghorbani-Dehbalaei et al., 2021) demonstrate that HBM constructs, in particular perceived susceptibility (Vulnerability Perception), perceived severity (perception of severity), perceived benefits (the benefit of the doubt), and perceived barriers (perception of obstacles), interacting in a complex

way in forming intentions and preventive behavioral actions. Perceptions of susceptibility to breast cancer serve as an early trigger that creates motivation to seek information and consider behavioural changes, while perceptions of disease severity reinforce the urgency to act. The social mechanisms operating in the context of developing countries exhibit unique complexity, especially related to the role of social and cultural norms. (Lubis et al., 2025) identifies that social and religious stigma is a significant psychological barrier, where women experience internal conflicts between the desire to maintain health and social pressures and religious interpretations that can hinder early detection practices such as SADARI (Self Breast Examination). Mechanism Social Cognitive Theory appears to operate through observational learning and Vicarious Reinforcement, where women learn from the experiences of others in their communities and are motivated through the success observed in other individuals who have adopted healthy behaviors.

The process of behavior change also involves mechanisms teachable moment that occur after a breast cancer diagnosis or exposure to significant health information. (Di Meglio et al., 2021) shows that although a diagnosis of breast cancer can be teachable moment Strongly, only a small percentage of women are actually taking advantage of this moment for sustainable behavior change. Psychological mechanisms such as cognitive dissonance Individuals experience psychological discomfort when their behavior is inconsistent with their health knowledge, prompting them to adjust their behavior or change their perceptions. Social support serves as a mechanism Buffer that mediates the relationship between stress and the adoption of healthy behaviors. (Kale et al., 2023) explains that Community Engagement and peer support create an environment conducive to behavior change through mechanisms Social Support, Social Influence and Collective efficacy. Mechanism Social Facilitation It also operates when women feel more motivated to adopt healthy behaviors when they see that the behavior is accepted and practiced by other members of the community. Process Empowerment It is a key mechanism that allows women to feel in control of their health and be able to make informed decisions regarding breast cancer prevention.

### *Obstacles in the Implementation of a Healthy Lifestyle and Strategies to Overcome Them*

The barriers most often faced by women in developing countries in implementing healthy lifestyles for breast cancer prevention can be categorized into several key domains. Psychosocial barriers became the most dominant category, with shame and social stigma occupying the top positions as identified by (Lubis et al., 2025). Shame associated with breast self-examination (SADARI) and discussions about reproductive health create strong resistance to the adoption of early detection practices. The social stigma associated with breast cancer, where the disease is often perceived as a "ban" or "family disgrace", creates a significant psychological barrier to help-seeking behavior and preventive practices. Structural and economic barriers also show a high prevalence in the literature analyzed. (Ponce-Chazarri et al., 2023) identified that low socio-economic levels (35.3%) and lack of personal health insurance (17.6%) were significant barriers to access to services Screening and healthcare. Geographical barriers, especially long distances to health facilities, create practical challenges that are difficult to overcome, especially for women in rural areas. Time constraints due to high workloads and domestic responsibilities are also consistently reported practical barriers, with women often prioritizing family needs over their personal health.

Cognitive and informational barriers show their own complexity in the context of developing countries. Lack of awareness (Awareness) about breast cancer and its prevention methods, as reported by (Utami et al., 2025), creating a fundamental knowledge gap. Health information gap and medical distrust (Medical mistrust) by 23.5% reported (Ponce-Chazarri et al., 2023) It shows that these barriers are not only related to the availability of information, but also to the quality and credibility of the information source. Misinformation and myths circulating in society often contradict

medical practice that Evidence-Based, creating confusion and reluctance to adopt recommended preventive behaviors. Strategies to address these barriers require a comprehensive multi-level approach. At the individual level, the strategy Empowerment through continuous education and technical training has proven to be effective, as demonstrated by (Iriani et al., 2024) who reported an increase in SADARI ability from 2.9% to 84.2% after giving demonstrations. At the community level, the involvement of religious and community leaders (Community Leaders) in health education programs have proven to be effective in overcoming cultural and religious barriers. Strategy Peer Education and Social Mobilization It also shows high effectiveness in creating social norms that support preventive health practices. At the system level, program development Screening Affordable and accessible, as well as the integration of breast cancer prevention services into primary health services, are key strategies to overcome structural and economic barriers.

#### *The Role of Contextual Factors in the Successful Adoption of Preventive Behaviors*

Contextual factors play a determinant role in influencing the successful adoption of breast cancer prevention behaviors in developing countries, with social support occupying a central position in the behavior change ecosystem. (Lubis et al., 2025) identify that a lack of support from families and partners is a major obstacle to the implementation of early detection practices, while conversely, strong support from Social Network proven to be Enabler which is powerful for the adoption and maintenance of healthy behaviors. Social support operates through multiple mechanisms, including instrumental support (practical help), emotional support (emotional support), Informational Support (information sharing), and Appraisal Support (validation and reinforcement), which collectively create an environment conducive to sustainable behavior change. Access to health information shows significant variability based on geographic and socio-economic contexts. (Hosiana et al., 2024) explained that disparities in the quality and accessibility of health services, especially in rural areas, create Information gap substantial. The quality of available health information also varies, with many communities still relying on traditional or non-traditional sources of information. Evidence Based which can be misleading. The digital divide also contributes to disparities in access to information, where women with limited access to information technology have difficulty obtaining health information Up-to-date and accurate. Cultural and linguistic contexts also affect the effectiveness of health communication, where information that is not tailored to the local context is often less effective in changing behavior.

Socio-economic conditions serve as Underlying Determinant that affect multiple aspects of health behavior adoption. (Ponce-Chazarri et al., 2023) demonstrate that women with low socioeconomic status face multiple barriers to interaction, including financial limitations to access health services, competing priorities in resource allocation, and limited resources. Social Capital for navigation of the health system. Economic status also affects the ability to adopt dietary changes and physical activity that require financial resources, such as access to healthy food or exercise facilities. Educational attainment, as a socio-economic indicator, showed a strong positive correlation with the adoption of preventive behaviors, where women with higher education showed a strong correlation Health Literacy better and more capable Decision-making that are more informed. The context of the health system also plays a crucial role in shaping health-seeking behavior. Quality and accessibility of primary health services, as discussed by (Hosiana et al., 2024) affect perceived accessibility and Trust in healthcare system which in turn affects the willingness to adopt health recommendations. Availability of healthcare providers trained in culturally sensitive communication and patient-centered care also affect effectiveness Health Promotion Interventions. Integration of breast cancer prevention services into Primary Healthcare System proven to increase the uptake and sustainability of preventive behaviors. The cultural competence of healthcare providers and their ability to communicate in the

language and context of local culture is a critical factor in building trust and facilitating behavior change.

### *Models of Effective Behavioral Interventions for Breast Cancer Prevention in Developing Countries*

Analysis of qualitative evidence synthesis shows that the most effective intervention models in encouraging lifestyle changes for breast cancer prevention in developing country settings are those that integrate multiple theoretical frameworks with community-based participatory. Model-based Health Belief Model (HBM) combined with Social Cognitive Theory demonstrate high effectiveness, as evidenced by (Ghorbani-Dehbalaei et al., 2021) who reported that HBM-based interventions were able to predict 52.1% variation in preventive behavior. The model operates through modifications Cognitive constructs like perceived susceptibility, perceived severity, perceived benefits and perceived barriers, while simultaneously strengthening self-efficacy and provide Cues to action culturally relevant. Intervention-based model Community Engagement shows significant promise for sustainable behavior change in the context of developing countries. (Kale et al., 2023) explains that this model operates through Empowerment community and capacity building where community members become Change Agents who are active in promoting healthy behaviors. This model is particularly effective because it considers Cultural Nuances and Social Dynamics specific to each community, so that the intervention becomes more culturally appropriate and contextually relevant. Peer education model and Community Health Worker Programs has been shown to be effective in improving Health Awareness and uptake of preventive behaviors, with additional benefits in the form of cost-effectiveness and Sustainability.

A multi-modal educational model that combines theoretical instruction, practical demonstration and hands-on practice show impressive results in improving Knowledge, Skills and Behavioral adoption. (Iriani et al., 2024) reported that the combination of SADARI education and demonstration resulted in a significant improvement in proficiency (from 2.9% to 84.2%), indicating that experiential learning more effective than Passive Information Transfer. This model operates through multiple Learning modalities that accommodates different Learning Styles and provide Immediate feedback which is essential for Skill Acquisition and Confidence Building. Use Multimedia Approaches and Interactive Materials also proven to improve Commitment and Retention of information. Intervention-based model Technology and Digital Health shows a growing potential for Scalability and Accessibility in developing countries. Although still limited in the literature analyzed, the trend toward Mobile Health (mHealth) interventions show promise to overcome geographical barriers and provide Personalized Health Information. This model can integrate Behavior Change Techniques like Goal Setting, Self-Monitoring, Feedback and Social Support through an accessible digital platform and User-friendly. However, the effectiveness of this model is highly dependent on Digital Literacy and access to technology, which is still a challenge in many developing countries. Intervention models lifecycle-based that accommodates Developmental Internships and Life Transitions It also shows high relevance. (Rainey et al., 2022) demonstrate that Risk Communication that tailored based on individual risk profiles and Life Stage resulting in better uptake for Preventive behaviors. The model operates through Personalization of health messages and risk-stratified approaches who consider individual characteristics, Family History and Lifestyle Factors. Integration with Healthcare System through Routine screening programs and preventive care visits also increases the effectiveness of this model. Longitudinal support and Follow-up mechanisms become essential components for maintaining behavior change and addressing barriers which appears over time.



## CONCLUSION

Based on a comprehensive analysis of 20 studies that met the inclusion criteria, this study produced significant findings regarding the factors that drive breast cancer prevention behaviors through the implementation of healthy lifestyles in developing countries. Self-efficacy ( $\beta = 0.414$ ,  $p = 0.001$ ) and cues to action ( $\beta = 0.299$ ,  $p = 0.001$ ) proved to be the strongest predictors of preventive behavior adoption, while the main barriers included social stigma, economic limitations (35.3%), and low health literacy. The multi-modal educational intervention showed high effectiveness, with an increase in SADARI ability from 2.9% to 84.2% and an increase in knowledge reaching an N-Gain of 67%. The future implications of these findings demand a paradigm shift in the development of breast cancer prevention programs in developing countries. First, the integration of digital technology and artificial intelligence in screening programs will be imperative to address geographical disparities and improve the accuracy of early detection, especially in the context of precision medicine that considers the molecular heterogeneity of breast cancer. Second, the development of culturally sensitive community-based participatory intervention models must be prioritized to address complex psychosocial and structural barriers. Third, strengthening the primary health system through capacity building healthcare providers and the integration of comprehensive prevention services will be the foundation for sustainable behavior change. Fourth, the implementation of policies that support health equity and universal health coverage will be critical to addressing significant socioeconomic disparities. Fifth, the development of a research agenda that focuses on longitudinal studies and implementation science will be essential to optimize the scalability and sustainability of interventions. With the projected increase in the burden of breast cancer disease in areas with low sociodemographic indices, investment in evidence-based and contextually appropriate preventive approaches will be a key determinant in achieving Sustainable Development Goal 3 related to health and wellbeing for all.

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