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Empowering minds: Unveiling determinants of breast cancer information dissemination among non-medical undergraduates in Sri Lanka

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Abstract

Introduction. Breast cancer is a significant global public health concern, and Sri Lanka is no exception. This research employs a survey to identify the critical factors shaping breast cancer information dissemination among non-medical female undergraduates in Sri Lanka. A comprehensive literature review preceded the study, highlighting gaps in understanding information dissemination dynamics within this demographic.

Method. Randomly selected 455 non-medical female undergraduates from five state universities in Sri Lanka were used as the sample. A validated questionnaire was used to collect data.

Analysis. A principal component analysis was done to identify the components and factors that affect successful information dissemination within the studied context.

Results. The research assesses students' cognitive, attitudinal, and behavioural dimensions concerning breast cancer prevention and early detection, identifying three influencing factors: the *Nature of the information*, the *Inductive effect and/or Motivation of information*, and the *Fusion of knowledge*.

Conclusion. Effective dissemination requires customised, transparent, credible content utilising visual aids, timely delivery, and a culturally inclusive, empathetic tone. Initial findings emphasise the imperative for targeted educational interventions to enhance breast cancer awareness among non-medical undergraduates. The insights from this study aim to cultivate a more enlightened and active undergraduate populace, fortifying the collective societal effort to mitigate breast cancer's impact in Sri Lanka.

Introduction

Breast cancer is a significant global health concern requiring increased awareness and effective information dissemination. In Sri Lanka, healthcare consciousness necessitates addressing breast cancer, which is currently lacking awareness. Cultural nuances, educational environments, information behaviour, and healthcare accessibility are pivotal in breast cancer awareness. Despite global advances, Sri Lanka faces unique challenges, including rural-urban disparities, cultural taboos, and resource constraints. By identifying and analyzing the determinants influencing breast cancer information dissemination among non-medical undergraduates in Sri Lanka, this study seeks to enhance the effectiveness of information dissemination strategies, thereby contributing to improved health education and the overall well-being of university students.

Non-medical undergraduates were selected as the target population for this study because they constitute a substantial segment of the university community who are not formally engaged in health or medical education within their academic curricula. Consequently, their knowledge and understanding of breast cancer are likely to be limited, despite belonging to an age group for whom early awareness and preventive health practices are particularly critical. Moreover, this cohort exhibits a high degree of social connectivity, positioning them as potential conduits for peer-to-peer health communication and awareness dissemination. Therefore, examining this population is a way of formulating evidence-based and contextually relevant strategies to enhance breast cancer information dissemination and promote health literacy within university environments.

This research marks the initial investigation into the factors affecting breast cancer information sharing among non-medical undergraduates in Sri Lanka, utilizing Principal Component Analysis (PCA). The study delivers a statistically informed perspective on how various elements collectively influence the effectiveness of information sharing within this group. In contrast to earlier studies that mainly concentrated on describing awareness or knowledge levels, this research identifies the fundamental latent factors that influence dissemination, specifically the type of information, the motivational or inductive impact of that information, and the integration of knowledge. These factors embody the cognitive, emotional, and cultural aspects of how young women acquire, interpret, and communicate breast cancer information. The application of Principal Component Analysis enhances the methodological rigor in health information research and offers fresh insights into the domains of information behaviour and health communication, providing a replicable analytical framework for analogous studies in other developing countries.

Literature review

Breast cancer is a significant public health concern globally, and Sri Lanka is no exception. Most recent statistics highlight that breast cancer incidence increased to 4,447 in 2019 and 5,189 in 2020 (National Cancer Control Programme, 2019; 2020). The National Cancer Registry (2021) identifies breast cancer as the third most prevalent cancer among women aged 15 to 34 (9.7% of all cancers). However, with advancing age, breast cancer has become the most common cancer type, affecting 35.7% of women aged 35-49, 30.7% of those aged 50-64, and 23% of women over 65. These trends underscore the need for age-specific and targeted interventions to address breast cancer prevention and treatment across different demographics. Abeykoon (2015) notes that Sri Lanka's rapidly ageing population contributes to the rising incidence of breast cancer among older women, who often have lower survival rates compared to younger women. The researcher further asserts that younger and middle-aged women are more likely to engage in mammographic screening as a preventive measure.

The system of classifying breast cancer as localized (confined to the breast, Stage I), regional (spread to nearby lymph nodes or adjacent tissues, Stage II and Stage III), or distant (metastatic to other parts of the body, Stage IV). Generally, localized disease corresponds to Stage I and some Stage II cancers; regional disease aligns with Stages II and III; and distant disease represents Stage

IV. These staging classifications play a vital role in understanding disease progression, estimating prognosis, and guiding treatment decisions and public health interventions. Therefore, early detection correlates with better outcomes, emphasising the importance of timely screening and diagnosis. Despite efforts to enhance early detection through Well-Women Services, many cases in Sri Lanka are diagnosed at later stages. The National Cancer Control Programme (2020) reports significant delays in diagnosis, contributing to lower five-year survival rates. Effective early detection prolongs survival and allows for less aggressive treatments and better body image preservation. For instance, Balawardena et al. (2020) found that while 24% of patients presented with Stage I disease, only 4% underwent breast-conserving surgery, underscoring the need for better early detection initiatives.

Despite the availability of screening services, many women in Sri Lanka need to be more active in utilising these resources. The reasons include a need for more knowledge about available services, cultural taboos, and lack of interest in seeking accurate information (Vithana et al., 2013). Studies highlight the need for targeted awareness campaigns and improved accessibility to health services, particularly in underserved and rural areas. Sri Lanka's Well-Women Services have grown substantially. Approximately 1000 Well Women Clinics are currently functioning Sri Lanka-wide (Annual Report on Family Health, 2017).

However, barriers such as insufficient education about the importance of early detection and a lack of community engagement continue to impede their effectiveness. Furthermore, many women need to be made aware of the screening services offered, further highlighting gaps in health education and dissemination.

Information dissemination plays a pivotal role in promoting awareness and early diagnosis of breast cancer. Studies have shown that effective dissemination of knowledge about breast cancer and its risk factors can positively change attitude towards early detection and screening, and encourage behaviour changes such as adopting self-examination practices and seeking timely medical advice. Dissemination strategies must consider the socio-economic and cultural factors influencing how information is received and acted upon. Duggan and Banwell (2004) emphasise the importance of audience-specific targeting and the use of opinion leaders to enhance information receptivity.

Non-medical female undergraduates in Sri Lanka are an influential demographic for breast cancer awareness campaigns. Their diverse networks and access to educational institutions position them as effective peer educators and advocates. Engaging this group in awareness initiatives can break down cultural stigmas, promote early detection behaviour, and encourage active health management within their communities. By leveraging their communication skills and social networks, non-medical undergraduates can organise workshops, seminars, and awareness events that target underserved populations. This approach also empowers students, fostering leadership skills, empathy, and social responsibility. However, addressing gaps in their information literacy and providing them with accurate, credible resources are critical for the success of these initiatives.

Despite its importance, information dissemination in Sri Lanka faces several challenges. Non-medical undergraduates often struggle to identify reliable sources for breast cancer information, limiting their ability to acquire accurate knowledge. Societal stigmas surrounding breast health hinder open discussions, delaying early detection efforts, and limited access to digital tools and healthcare resources restricts the reach and impact of awareness programmes. Addressing these barriers is essential to ensuring effective dissemination. Strategies such as developing culturally sensitive educational programmes, utilising digital platforms, training peer educators,

collaborating with healthcare providers, and continuously evaluating dissemination efforts are critical for improving breast cancer awareness and prevention.

This paper forms part of a broader research project on breast cancer information behaviour among non-medical undergraduates in Sri Lanka to develop a structural model to explain the overall process of breast cancer information dissemination within this population (Manatunga & Kuruppu, 2025). The present study focused on identifying the underlying determinants that shape this process through the application of Principal Component Analysis (PCA). The study delivers a statistically informed perspective on how various elements collectively influence the effectiveness of information dissemination within the participant group. In contrast to earlier studies that mainly concentrated on describing awareness or knowledge levels, this research identifies the fundamental latent factors that influence dissemination, specifically the type of information, the motivational or inductive impact of that information, and the integration of knowledge. These factors embody the cognitive, emotional, and cultural aspects of how young women acquire, interpret, and communicate breast cancer information. The application of Principal Component Analysis enhances the methodological rigor in health information research and offers fresh insights into the domains of information behaviour and health communication, providing a replicable analytical framework for analogous studies in other developing countries.

Information dissemination in breast cancer awareness and prevention

Effective information dissemination plays a central role in improving breast cancer awareness, shaping health beliefs, and promoting early detection behaviour among undergraduates. Across global studies, undergraduates, especially in developing regions, demonstrate low to moderate knowledge of breast cancer risk factors, symptoms, and screening practices despite having generally positive attitudes toward learning about the disease (Al-Naggar et al., 2011; Boulos & Ghali, 2013; Sambanje & Mafuvadze, 2012). Mass media remains the dominant information source in most settings, while practical screening knowledge such as breast self-examination techniques remains limited (Ayed et al., 2015; Godfrey et al., 2016). Studies from Africa, the Middle East, and Asia consistently show that lack of knowledge; fear, misconceptions, and absence of symptoms contribute to poor screening practices (Latif, 2014; Noreen et al., 2015; Suleiman, 2014). Interventions such as peer education and structured awareness programmes significantly improve knowledge and breast self-examination practice, demonstrating the importance of targeted educational efforts (Abduelkarem et al., 2015; Ali & Hussein, 2018).

Research also highlights the potential of integrating communication strategies that use clear, culturally appropriate language to enhance comprehension, especially in multilingual societies such as Sri Lanka (Kuruppu et al., 2021; World Bank, 2018). Sri Lankan studies indicate an even greater gap, with undergraduates showing familiarity with breast cancer but insufficient understanding of risk factors, early detection methods, and services such as Well Woman Clinics (Seneviratne et al., 2016). Despite the availability of mass media and the internet, undergraduates often fail to translate awareness into practice, underscoring the need for university-based health promotion initiatives. Language plays a crucial mediating role in information seeking behaviour, reinforcing the necessity for plain language communication in health education. Overall, the literature shows that systematic, language-sensitive, and youth-focused information dissemination strategies can significantly improve early detection behaviour and contribute to reducing the breast cancer burden. This highlights the need for tailored educational programmes, accessible information materials, and peer-driven interventions to strengthen knowledge, attitudes, and preventive practices among undergraduates globally and within the Sri Lankan context.

Outcomes of effective information dissemination

Increase in knowledge: A study conducted by Manatunga and Kuruppu (2025), examined breast cancer knowledge, attitudes, and practices among non-medical female undergraduates in Sri Lanka. This work differs from the broader body of literature as it specifically focuses on the information behaviour and preventive practices of undergraduate populations within the Sri Lankan university context, rather than on patient populations or general community groups. The findings emphasise the need for targeted educational interventions that strengthen health education and promote early detection strategies targeted towards young adult learners.

Change in attitudes: Effective dissemination can lead to positive attitudinal shifts, such as reduced anxiety about screening and greater openness to discussing breast health. This is particularly relevant in cultural contexts where stigma or fear may surround cancer diagnosis and treatment. Perera et al. (2025) examined breast cancer awareness among female undergraduates in government universities in Sri Lanka. Unlike this study, which focuses specifically on the information behaviour and dissemination factors among non-medical undergraduates, Perera et al.'s work concentrates on general awareness levels and attitudinal patterns across a broader undergraduate population. Their findings highlight notable knowledge and attitude gaps, reinforcing the need for improved education on preventive health behaviour.

Change in behaviour: A key outcome of effective information dissemination is behavioural change, including increased participation in cancer screening programmes and the adoption of preventive practices such as breast self-examination. Kuruppu et al. (2020) investigated the information needs of breast cancer patients receiving care at the National Cancer Institute of Sri Lanka. Unlike undergraduate-focused studies, this research centres on patient experiences and clinical information needs, providing insights into how access to relevant, comprehensible information directly influences health-related behaviours. Their findings demonstrate that appropriate dissemination strategies can support informed decision-making and promote timely engagement in preventive and diagnostic activities.

The success of information dissemination strategies in breast cancer awareness and prevention hinges on their ability to increase knowledge, shift attitudes, and change behaviour. Addressing the identified gaps in current dissemination methods is essential for improving the effectiveness of breast cancer information campaigns in Sri Lanka.

Theoretical perspectives on behavioural change and health information dissemination

Effective information dissemination depends on several critical factors, including the recipient's need for new knowledge, their awareness of available knowledge sources, and their willingness to act upon this new knowledge. When combined, these factors contribute to successful dissemination processes and are essential in the context of public health campaigns, particularly in areas such as breast cancer prevention.

Understanding the determinants of health behaviour and information dissemination requires drawing from established behavioural theories. Over the past several decades, multiple models have attempted to explain how individuals acquire, internalize, and act upon health information. Key theories such as Bandura's (1986) Social Cognitive Theory (SCT), Becker's (1974) Health Belief Model (HBM), Ajzen's (1991) Theory of Planned Behavior (TPB), Prochaska and DiClemente's (1992) Transtheoretical Model (TTM), as well as Attribution Theory (Heider, 1958; Weiner, 1972) and broader social psychological perspectives, have significantly shaped research on health communication and behavioural change. Collectively, these models provide a comprehensive framework for understanding how cognitive, social, and environmental factors interact to influence behaviour, making them particularly relevant to the current study on breast cancer information dissemination among non-medical undergraduates in Sri Lanka.

Central to most behavioural theories is the understanding that behavioural change is a process rather than a single act, influenced by multiple interrelated factors, including knowledge, perceptions, attitudes, motivation, self-efficacy, and the surrounding social environment. For example, the Transtheoretical Model (TTM) conceptualizes change as a progressive process occurring through stages such as precontemplation, contemplation, preparation, action, and maintenance (Prochaska & DiClemente, 1992). This perspective suggests that undergraduates' awareness and willingness to seek, share, or apply breast cancer information may evolve gradually, shaped by exposure, peer interaction, and institutional encouragement.

Similarly, Social Cognitive Theory (SCT) emphasizes the reciprocal interaction between personal factors, behaviour, and the environment, a concept known as reciprocal determinism (Bandura, 1986). Within this framework, self-efficacy, or confidence in one's ability to perform a behaviour, is crucial, as it directly influences engagement. Observational learning further underscores that undergraduates model behaviour they observe in peers, lecturers, or public health campaigns; this highlights the importance of role modelling and supportive academic environments for promoting information dissemination.

The Health Belief Model (HBM) provides a complementary perspective, suggesting that behaviour is influenced by perceptions of susceptibility, severity, benefits, and barriers, alongside cues for action (Becker & Maiman, 1975). For non-medical undergraduates, beliefs about vulnerability to breast cancer and the seriousness of the disease can determine motivation to seek and share information. Institutional or social prompts, such as campus awareness campaigns, act as cues for action, whereas barriers like cultural taboos, misinformation, or limited access to credible resources may inhibit engagement.

Building on these ideas, the Theory of Planned Behavior (TPB) posits that behavioural intentions are shaped by attitudes toward the behaviour, subjective norms, and perceived behavioural control (Ajzen, 1991). In the Sri Lankan undergraduate context, social norms related to gender, health discussions, and openness to communication can influence whether students feel comfortable engaging in breast cancer-related discourse. Supportive peer and institutional norms strengthen intentions to disseminate information, while perceived lack of control, such as limited access to reliable sources, can reduce these intentions.

Further insights emerge from Attribution Theory and social psychological perspectives, which explain how individuals assign causes and responsibility for health outcomes (Heider, 1958; Weiner, 1972). Undergraduates' interpretations of breast cancer causation, whether viewed as controllable through lifestyle choices or determined by external factors, can shape empathy, motivation, and advocacy. For instance, believing prevention is achievable may encourage active information sharing, whereas fatalistic beliefs may reduce engagement.

Across all models, social and environmental factors are repeatedly emphasized. Peer influence, cultural norms, institutional support, and technological access form the ecological backdrop that shapes individual and collective behaviour (Sallis & Nader, 1988). Within the university environment, enabling structures, such as awareness campaigns, academic discussions, and digital media engagement, serve as catalysts for sustained information dissemination.

Taken together, these theories provide a multi-dimensional lens for understanding how breast cancer information flows among young adults in educational settings. They highlight that effective dissemination requires more than knowledge: it involves cognitive awareness, social reinforcement, emotional coping, and an enabling environment. Therefore, exploring the determinants of breast cancer information dissemination among non-medical undergraduates in Sri Lanka necessitates considering how individual perceptions, self-efficacy, social norms, and institutional support collectively contribute to empowering minds and fostering a culture of health awareness.

There are many studies carried out globally and locally to explore these determinants. The subsequent section explores the contextual background of the study.

Relevance of the information: For dissemination to be effective, the information must be relevant to the target audience. Tailoring information to address a particular group's specific needs, interests, and challenges increases the likelihood that the message will resonate and lead to behavioural change (Liu et al., 2023; McKinley et al., 2020).

Interactivity with the information: The ability to interact with the information through discussions, workshops, or hands-on activities enhances its effectiveness. Engaging the audience through different formats or media also ensures the message is retained and acted upon (Hovick et al., 2017).

Cultural and socio-economic constraints: Cultural norms, social taboos, and economic barriers can significantly hinder the effectiveness of information dissemination. In Sri Lanka, cultural stigmas surrounding breast health often prevent women from seeking information or participating in screening programs. Similarly, socio-economic factors such as access to education and healthcare services can create barriers that must be addressed in the dissemination process (Barrera et al., 2015).

Internal and external factors influencing dissemination

The factors influencing information dissemination can be broadly categorised as internal (personal to the recipient) and external (related to the information source or the context of dissemination).

Internal factors include the recipient's recognition of the need for new information, their psychological traits (such as whether they are an *information seeker*), and their openness to new knowledge. The more the recipient is willing to engage with new information, the more influential the dissemination will be. This is crucial for seeking cancer screening or adopting preventive measures (Tucker et al., 2017).

External factors include the recipient's socio-economic and cultural context, the information source's effectiveness, and the dissemination method. For instance, if the source of information lacks credibility or does not speak to the cultural nuances of the target audience, the information may be dismissed or ignored (Kreuter & McClure, 2004).

The role of opinion leaders and audience-specific targeting

Duggan and Banwell (2004) emphasise the importance of using opinion leaders to enhance the effectiveness of information dissemination. Opinion leaders are individuals who influence the target audience and can help sway public opinion or encourage behaviour change. In the context of breast cancer awareness, opinion leaders such as community leaders, healthcare professionals, or local celebrities can play a key role in promoting early detection behaviour and reducing the stigma around breast cancer (Patel et al., 2019).

Audience-specific targeting ensures that the message is delivered in a way that will resonate with the particular demographic group being addressed. This could involve tailoring the message based on age, gender, educational level, or cultural background. For example, young women may be more receptive to messages delivered via social media, while older women may prefer information disseminated through community events or health clinics (Norris et al., 2013).

Psychological and Demographic Factors Influencing Information Seeking

Tucker et al. (2017) have identified several factors influencing information seeking behaviour and engagement with breast cancer information. Psychological traits, such as being an active

information seeker versus a passive recipient, can significantly impact how an individual engages with health information. Preferences for information formats (e.g., written material versus video content) or learning styles (e.g., visual versus. auditory) also affect how effectively a person engages with the information (Hovick et al., 2017). Additionally, socio-demographic characteristics such as age, ethnicity, and educational level can influence how individuals approach information seeking. For example, younger women may have different information needs and preferences than older women. Likewise, individuals from other ethnic or socio-economic backgrounds may seek information in varying formats or from various sources, which need to be accounted for when designing dissemination strategies.

Information overload and quality dimensions

Liu et al. (2023) identifies healthcare conversational agents' critical information quality dimensions, emphasising the importance of understandability and trustworthiness in the participants' perceptions. The authors surveyed Chinese subjects, revealing that prior experience with healthcare conversational agents influenced their perceived importance of various quality dimensions, including completeness, clarity, and helpfulness. These findings suggest that the design of conversational agents and users' prior exposure to such tools significantly shape their evaluation of healthcare information.

Information overload, where individuals are overwhelmed by the volume and complexity of available information, can impede understanding and decision-making. This phenomenon is particularly detrimental in cancer care, where it correlates with lower health literacy, reduced engagement with preventative behaviours, and poorer outcomes (Bawden & Robinson, 2009). Addressing these challenges requires simplifying information and presenting it in ways that resonate culturally and emotionally with the target audience (Fox & Duggan, 2013).

Breast cancer information dissemination among undergraduates

Non-medical undergraduates are an underutilised demographic for breast cancer information dissemination in Sri Lanka. This group has significant potential to act as peer educators and community advocates, yet studies indicate that their awareness and understanding of breast cancer remain limited.

Peer education is a particularly effective strategy in this demographic, leveraging the relatability and trust inherent in peer-to-peer interactions. Studies show that students are more likely to engage with and act on information delivered by their peers, making this approach especially valuable in hierarchical cultural contexts like Sri Lanka (World Health Organization, 2020). However, challenges include academic pressures, limited institutional support, and reliance on social media as a primary information source. While social media offers a broad reach, the variability in information quality and the risk of misinformation necessitate careful curation and validation of shared content (Fox & Duggan, 2013).

Digital platforms also play a pivotal role in breast cancer information dissemination, enabling rapid distribution and interactive engagement. These platforms provide informational content and emotional support through peer interactions, addressing individuals' informational and psychological needs (Bawden & Robinson, 2009). Tailored digital campaigns that blend traditional knowledge with modern medical insights can enhance acceptance and effectiveness in Sri Lanka.

Problem statement

The effective dissemination of breast cancer information among non-medical undergraduates in Sri Lanka is a significant challenge that requires immediate attention and action. Academic pressures, cultural taboos, and limited engagement in health-related discourse exacerbate this challenge. Despite the importance of early detection and active health management, lacking targeted communication strategies, underutilised peer education frameworks, and inadequate

access to university health services contribute to low awareness levels. Furthermore, more collaboration among stakeholders and the absence of comprehensive program evaluations hinder the development of effective interventions. This study aims to explore these factors by identifying the determinants of information dissemination, with the goal of enhancing breast cancer awareness, supporting early diagnosis, and fostering a health-promoting environment within university settings.

Material and methods

Population and sample

The study population consists of non-medical female undergraduates from five selected state universities enrolled in 2023. These universities were chosen based on geographical distribution and academic disciplines to ensure a comprehensive representation of Sri Lanka. Stratified self-weighting random sampling was used, treating each university as a stratum. Selection was based on availability, geographic distribution, and the variety of study programs offered. Together, these universities account for approximately 30% of all state universities in the country. The sample of 455 was determined using the Krejcie and Morgan table, a standard method for calculating the required sample size for a given population. Random samples of female non-medical undergraduates were drawn from each non-medical discipline using student databases, and stratified sampling was employed to ensure proportional representation from each discipline. This approach enables the findings to be generalized across the academic diversity of undergraduates in Sri Lankan state universities.

Developing the instrument

A two-part questionnaire was designed. Part I gathered demographic information, and Part II focused on factors affecting information dissemination using a 5-point Likert scale and comments (see Appendix 1). Six experts from medicine, behavioural studies, and information studies validated the questionnaire, leading to its final version. A pilot study involving 100 randomly selected non-medical undergraduates tested the questionnaire's reliability. Cronbach's α, measuring internal consistency, yielded an overall coefficient of 0.876 and 0.978 thematically, surpassing the 0.70 threshold for reliability. This comprehensive methodological approach ensures the questionnaire's robustness and reliability, making it a valuable tool for investigating the multifaceted aspects of breast cancer awareness and information dynamics.

Data collection

The study used Google Forms to distribute the questionnaires via email to non-medical undergraduates. Approval was obtained from the five universities' Vice-Chancellors and Deans of Faculties and from the researcher's institution ethics committee. Participants were given sufficient time to complete the questionnaire and could seek clarification. They were assured of their right to refuse or withdraw without consequences, and confidentiality was guaranteed. Data were collected from March to April 2023, avoiding conflicts with significant academic events. An open-ended question was included to allow participants to share their views on breast cancer information.

Principal component analysis

A principal component analysis (PCA), which is similar to factor analysis, was done to identify the components or factors that affect successful information dissemination. Principal component analysis is the name given to a collection of multivariate statistical techniques generally used to find the underlying structure in data, i.e., to establish the links (correlations) among many variables. Variables identified as socio-demographics in Part 1 of the questionnaire were considered along with the components identified to make inferences. Principal component analysis was used to extract the factors associated with breast cancer information on reception and dissemination. Before the analysis, data adequacy was tested using the Kaiser–Meyer–Olkin (KMO) procedure.

The factor extraction was made using the following criteria: Eigenvalues >1, Varimax rotation, and loading of the item > 0.70.

Results

Table 1 summarises the results of the perception of the distribution of breast cancer information (23 indicators).

	Component 1	Component 2	Component 3
Eigenvalue	**7.786**	**6.455**	**3.865**
% of Variance	**33.853**	**28.064**	**16.803**
Cumulative %	**33.853**	**61.916**	**78.719**
1. I was able to access information easily	**0.816**	0.304	0.250
2. I got accurate information	**0.796**	0.333	0.228
3. I got adequate information	**0.775**	0.237	0.206
4. I got clear information	**0.750**	0.232	0.347
5. I got information that is easy to understand	**0.743**	0.501	0.095
6. I got meaningful information	**0.741**	0.355	0.368
7. I got the relevant information for my needs	**0.731**	0.230	0.393
8. I got up-to-date information	**0.728**	0.499	0.116
9. Demonstration of information is attractive	0.638	0.308	0.442
10. The language of information is easy to understand	0.611	0.497	0.355
11. The cost of information is reasonable	0.605	0.442	0.478
12. I was aware of information sources	0.305	**0.811**	0.350
13. Information sources are user-friendly	0.289	**0.803**	0.321
14. Interactivity with information sources is adequate	0.360	**0.788**	0.321
15. The information I got made me confident about future decisions	0.374	**0.765**	0.322
16. The information I got created the need to seek more information	0.293	**0.761**	0.434
17. There was a knowledge change due to the information	0.490	0.632	0.377
18. There was an attitude change due to the information	0.583	0.621	0.096
19. There was a change of practices due to the information	0.552	0.605	0.365
20. I was willing to get this information	0.589	0.602	0.259
21. There was a conflict between the message given by the information and my traditional knowledge	0.327	0.314	**0.794**
22. A national effort to increase awareness is adequate	0.319	0.364	**0.766**
23. The involvement of health professionals is adequate	0.192	0.306	**0.732**

Table 1. Summary of the results obtained from the analysis of 23 indicators

The study identified three components that affect participants' reception of breast cancer information. The analysis identified three principal components that collectively explain 78.719% of the total variation in the original data set. These components can be detailed as follows:

PCA 1: *Nature of the information*. This component accounts for 33.853% of the total variance. It represents the intrinsic qualities of breast cancer information, including its accuracy, relevance, and comprehensiveness.

PCA 2: *Inductive effect or motivation of information*. This component explains 28.064% of the variance. It captures the motivational aspects and inductive influence of the information on the recipients, reflecting how it encourages understanding and proactive behaviour.

PCA 3: *Fusion of knowledge*. This component covers 16.803% of the variance. It encompasses integrating and assimilating the information into the recipients' existing knowledge base, indicating how well the information is understood and retained.

Together, these principal components provide a comprehensive understanding of the critical factors affecting the dissemination and reception of breast cancer information among non-medical undergraduates.

Discussion

The study identified three principal factors affecting the dissemination of breast cancer information among non-medical undergraduates: the nature of the information, the inductive effect or motivation of the information, and the fusion of knowledge. These factors highlight how students receive, interpret, and act on breast cancer-related messages, providing a foundation for targeted recommendations. Table 2 provides an overview of these factors and the variables associated with each.

Factor	Variables
Nature of the information	Clear, accurate, accessible, adequate, understandable, meaningful, relevant, and up-to-date information
Inductive effect or motivation	Information that creates the need to seek more details induces changes in knowledge, attitude, and practice and motivates further engagement.
Fusion of knowledge	Integration of traditional and modern knowledge, adequate national awareness efforts, and involvement of health professionals

Table 2. Identified factors affecting breast cancer information dissemination

The *Nature of the information* was found to significantly influence undergraduates' understanding and engagement. Survey results indicated that clarity, accuracy, accessibility, adequacy, and relevance were critical in shaping comprehension and subsequent actions. Participants emphasized the importance of non-technical language, visual aids, and timely information. This aligns with previous studies showing that health information should be clear, simple, and tailored to the audience's literacy level to improve comprehension and engagement (Kreuter & McClure, 2004; McKinley et al., 2020). Visual materials, such as infographics and videos, have been shown to enhance retention and engagement (Liu et al., 2023), while empathetic and culturally sensitive messaging supports understanding and encourages preventive behaviour (Tavakol & Dennick, 2011). Based on both the survey and literature, it is recommended that breast cancer information be presented in clear language, supported with visuals, and disseminated through multiple channels to maximize reach and comprehension.

The *Inductive effect or motivation* of information was another critical factor identified. Information that motivated undergraduates to seek additional knowledge was associated with positive attitude changes, such as willingness to perform breast self-examinations and participate in screenings.

Participants reported that information, including actionable steps, was most effective in driving behaviour. This is consistent with the Health Belief Model, which suggests that awareness of health risks, perceived severity, benefits, and cues to action encourage adoption of preventive behaviour (Rosenstock et al., 1988). Additionally, research on breast cancer awareness supports the idea that accessible and actionable information empowers individuals to engage in early detection practices (Hovick et al., 2017). Accordingly, it is recommended that breast cancer education include actionable steps for preventive practices, highlight the benefits of early detection, and address stigma and fear to encourage openness and participation.

The third factor, *Fusion of knowledge*, emphasized integrating traditional and modern knowledge to enhance the acceptability and effectiveness of health education. Results highlighted undergraduates' appreciation for culturally relevant practices alongside modern medical advice, including attention to hereditary factors and family health history. Literature similarly supports the value of culturally tailored health communication, noting that combining traditional practices with evidence-based information increases engagement and comprehension (Barrera et al., 2015; Norris et al., 2013; Patel et al., 2019). This study supports implementing educational strategies that blend traditional and modern knowledge, use culturally relevant examples, and incorporate family health history to improve understanding and encourage preventive actions.

The study also highlighted the importance of university- and community-based strategies to disseminate breast cancer information. Survey participants reported limited access to reliable sources, underscoring the need for structured education programs. Literature confirms that university-based and community awareness campaigns enhance knowledge, shift attitudes, and promote preventive behaviour (Kreuter & McClure, 2004; McKinley et al., 2020). Therefore, it is recommended that universities develop structured breast cancer education programmes for non-medical undergraduates, while community campaigns expand reach to populations with limited access. Interactive workshops and peer education can reinforce learning and promote engagement.

Overall, by clearly linking survey findings and literature to recommendations, this study provides actionable strategies for improving breast cancer awareness among non-medical undergraduates in Sri Lanka. Addressing the nature of information, its motivational effect, and cultural relevance will enhance knowledge, shift attitudes, and encourage preventive behaviour, ultimately supporting early detection and better health outcomes.

Recommendations

The findings of this study reveal three critical factors that shape the dissemination of breast cancer information among non-medical undergraduates in Sri Lanka.

First, the nature of the information, its clarity, accuracy, accessibility, relevance, meaningfulness, and timeliness, emerged as fundamental for effective communication. Students are more likely to engage with information that is understandable and directly applicable to their knowledge and experiences.

Second, the inductive effect or motivational quality of information plays a key role: information that stimulates curiosity, encourages further inquiry, or highlights the importance of breast health can induce positive changes in knowledge, attitudes, and practices.

Third, the fusion of knowledge, which integrates traditional and modern health perspectives, leverages national awareness initiatives, and involves health professionals, enhances credibility and relevance, making the information more impactful.

Building on these findings, several recommendations are proposed to strengthen information dissemination. Educational strategies should focus on delivering content that is not only accurate

and up-to-date, but also tailored to the unique needs of non-medical undergraduates. This could include interactive workshops, seminars, and discussion sessions that actively engage students and encourage dialogue. Peer education programmes can amplify reach and influence, as students are more likely to relate to and adopt behaviours modelled by their peers. Digital platforms, including social media, educational websites, and online forums, provide avenues to disseminate information widely and consistently, particularly among tech-savvy undergraduates. Incorporating breast cancer awareness into curricula, through lectures or co-curricular modules, can provide structured exposure and reinforce key concepts.

Additional recommendations include ensuring cultural sensitivity, by respecting local beliefs and norms, and collaborating with community leaders and health professionals to enhance relevance and trust. Accessible resources, such as pamphlets, brochures, and online content, alongside regular awareness events, can maintain engagement and reinforce learning over time. Partnerships with healthcare institutions, non-profit organisations, and sponsors can provide expertise, financial support, and additional outreach opportunities. Finally, establishing evaluation and feedback mechanisms will allow continuous monitoring of programme effectiveness, enabling adaptation to student needs and emerging challenges.

By explicitly linking the characteristics of effective information identified in the survey, clarity, motivational impact, and knowledge integration, to these comprehensive strategies, dissemination efforts can foster proactive knowledge seeking, empowerment, and advocacy among undergraduates. This approach not only enhances awareness of breast cancer but also cultivates a culture of health literacy, social responsibility, and sustained engagement within the university setting, with potential implications for broader public health promotion.

Conclusion

The findings of this study highlight that effective breast cancer information dissemination among non-medical female undergraduates is influenced by three interconnected factors: *Nature of the information*, *Inductive effect or motivation of information*, and *Fusion of knowledge*. Clear, accurate, relevant, and accessible information enhances understanding and supports informed decision-making, while motivational elements encourage positive attitudes and active health behaviour, including breast self-examination. Integrating traditional and modern knowledge ensures culturally sensitive communication that resonates with undergraduates' lived experience. Overall, the study reveals a gap between awareness and preventive practices, emphasizing that knowledge alone is insufficient to drive behaviour change. Universities can play a pivotal role by delivering structured, timely, and culturally appropriate breast health education, implementing peer-led awareness initiatives, and collaborating with healthcare professionals. Targeted, credible, and relatable dissemination strategies can empower young women, improve early detection, and contribute to better breast cancer outcomes in Sri Lanka.

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Appendix 1 Questionnaire

Determinants of Breast Cancer Information Dissemination among Non-Medical Undergraduates in Sri Lanka

The results generated by this study will help improve the quality of cancer health dissemination, thus providing undergraduates with better decision-making power on breast cancer. Answering the questions will take approximately 10-15 minutes. If you agree to participate, please follow the instructions below and answer the questions.

Thank you for your contribution!

Part I: Personal Information

1. University:
☐ University of Colombo
☐ University of Ruhuna
☐ Sabaragamuwa University
☐ Eastern University
☐ University of Jaffna

2. Faculty: _____

3. Academic Year:
☐ First Year
☐ Second Year
☐ Third Year
☐ Fourth Year
☐ Fifth Year

4. Age:
☐ 18–20
☐ 21–23
☐ 24–26
☐ Over 26

5. Permanent Residence (Province):
☐ Central
☐ Eastern
☐ North Central
☐ Northwestern
☐ Northern
☐ Sabaragamuwa
☐ Southern
☐ Uva
☐ Western

Part II: Breast Cancer Information Experience

Please indicate your opinion about the breast cancer information you received:

Statement	1 – Strongly Disagree	2 – Disagree	3 – Neutral	4 – Agree	5 – Strongly Agree
1. I was able to access information easily	☐	☐	☐	☐	☐
2. I received accurate information	☐	☐	☐	☐	☐
3. I received adequate information	☐	☐	☐	☐	☐
4. The information was clear	☐	☐	☐	☐	☐
5. The information was easy to understand	☐	☐	☐	☐	☐
6. The information was meaningful	☐	☐	☐	☐	☐
7. The information was relevant to my needs	☐	☐	☐	☐	☐
8. The information was up-to-date	☐	☐	☐	☐	☐
9. The presentation of information was attractive	☐	☐	☐	☐	☐
10. The language of information was easy to understand	☐	☐	☐	☐	☐
11. The cost of information was reasonable	☐	☐	☐	☐	☐
12. I was aware of information sources	☐	☐	☐	☐	☐
13. Information sources were user-friendly	☐	☐	☐	☐	☐
14. Interactivity with information sources was adequate	☐	☐	☐	☐	☐
15. The information increased my confidence in future decisions	☐	☐	☐	☐	☐
16. The information encouraged me to seek more information	☐	☐	☐	☐	☐
17. My knowledge changed due to the information	☐	☐	☐	☐	☐
18. My attitude changed due to the information	☐	☐	☐	☐	☐
19. My practices changed due to the information	☐	☐	☐	☐	☐
20. I was willing to receive this information	☐	☐	☐	☐	☐
21. There was a conflict between the information and my traditional knowledge	☐	☐	☐	☐	☐
22. National efforts to increase awareness are adequate	☐	☐	☐	☐	☐
23. Involvement of health professionals is adequate	☐	☐	☐	☐	☐

Additional Comments (Optional)

Please share your thoughts regarding your experience (max 300 words):

Contact Details (Optional)

If you wish to contribute further to this research, please provide your contact information:

Thank you for your participation!