
Enhancing Breast Cancer Screening Uptake through Multimodal Communication Strategies and Sociocultural Interventions: A Comprehensive Review of Barriers, Facilitators, and Outcomes

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Review

Enhancing Breast Cancer Screening Uptake Through Multimodal Communication Strategies and Sociocultural Interventions: A Comprehensive Review of Barriers, Facilitators, and Outcomes

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Abstract

Breast cancer screening is crucial for early detection and improved survival, yet uptake remains suboptimal due to multifaceted barriers. This review comprehensively examines the barriers and facilitators influencing screening across diverse populations, with an emphasis on integrating multimodal communication strategies with sociocultural considerations. Through synthesis of existing literature, key sociodemographic, psychosocial, and healthcare system barriers—including fear, stigma, socioeconomic disparities, and limited provider engagement—were identified. Facilitators such as culturally competent communication, social support networks, and digital platforms effectively enhance screening behaviors. Interventions that employ digital media, community health workers, and provider training have demonstrated positive outcomes in screening uptake and patient empowerment. Despite progress, challenges persist regarding misinformation, digital literacy, and health inequities. The findings underscore the necessity of culturally tailored, multimodal interventions combined with systemic healthcare improvements to optimize breast cancer screening adherence. Future research should prioritize rigorous evaluation of communication strategies and innovative technologies to address persistent gaps and foster equitable access.

Keywords: breast cancer screening; multimodal communication; sociocultural interventions; barriers; facilitators; digital health; health disparities

1. Introduction

1.1. Background and Significance

Breast cancer screening remains a cornerstone of early detection strategies to reduce mortality and morbidity associated with breast cancer worldwide. Mammography is the most widely used and effective screening tool, capable of identifying tumors before symptoms emerge, thereby enabling earlier intervention and improved survival outcomes. Despite strong recommendations from multiple health authorities endorsing regular mammographic screening, uptake rates remain suboptimal globally, especially among vulnerable and underserved populations (Mottram et al., 2021; Peek & Han, 2004).

Mottram et al. (2021) highlight that breast cancer screening uptake varies significantly across demographic groups, influenced by patient-level factors such as socioeconomic status, education, and access to healthcare. Similarly, Peek and Han (2004) underscore persistent disparities in mammography use, especially among racial and ethnic minorities, low-income groups, and uninsured women, attributable to multifactorial barriers including knowledge deficits, cultural beliefs, and systemic healthcare access challenges. These disparities in screening rates contribute to

inequalities in breast cancer outcomes, with underserved groups more likely to be diagnosed at advanced stages and to experience poorer prognoses.

In addition to these disparities, the evolving landscape of public health communication, with the advent of digital and social media, presents both an opportunity and a challenge in disseminating effective breast cancer screening messages. Richardson-Parry et al. (2023) emphasize the growing role that multimodal communication channels, including digital tools and social media, can play in addressing inequities by providing tailored, evidence-based information to populations that are otherwise difficult to reach.

Sun et al. (2025) specifically investigate the role of natural language processing and chatbots as innovative technological interventions in cancer care, showcasing the potential of these technologies to support patient communication, education, and decision-making. Despite these advances, many interventions lack clinical evaluation or integration within standard healthcare workflows, underscoring the need for comprehensive reviews that consider both technological innovations and sociocultural contexts influencing breast cancer screening behaviors.

Sociodemographic factors such as age, education level, income, ethnicity, and acculturation status exert profound effects on breast cancer screening participation. For example, Abuhay et al. (2025) analyzed clinical breast cancer screening uptake among reproductive-age women in Kenya and found low prevalence (13.9%) with higher screening rates linked to older age, higher education, and wealth index, reflecting global patterns of sociodemographic disparities. Kamila et al. (2025) further illustrate psychosocial dimensions influencing breast cancer screening, demonstrating how spouses' awareness and communication impact women's screening behavior in culturally specific contexts.

Media and communication campaigns have been pivotal in shaping public awareness and attitudes toward breast cancer screening. Early studies underscore the influential role of social media and traditional media channels, though variability remains in effectiveness depending on the message content, target audience, and cultural relevance (Sinha & Sharma, 2024; Bancroft et al., 2020). Social media platforms such as Facebook, Twitter, Instagram, and TikTok/Douyin have emerged as vital tools for disseminating breast cancer information, yet challenges persist regarding misinformation, content quality, and equitable reach to diverse populations (Plackett et al., 2020; Yang et al., 2025).

Understanding these complex interplays between sociodemographic factors, healthcare system interactions, psychosocial determinants, and communication channels is essential to designing interventions that effectively promote breast cancer screening uptake. Multifaceted communication approaches that leverage digital technology alongside community engagement and culturally sensitive messaging may enhance knowledge, reduce fears and stigmas, and ultimately improve screening adherence.

1.2. Objectives and Scope

This comprehensive review aims to identify and synthesize evidence on key barriers and facilitators influencing breast cancer screening uptake across diverse populations, with a particular focus on integrating multimodal communication strategies and sociocultural interventions. By examining empirical studies from different geographical regions, ethnic groups, and healthcare settings, this review seeks to present a nuanced understanding of factors shaping breast cancer screening behaviors globally.

The scope encompasses an exploration of sociodemographic determinants including age, education, income, ethnicity, and acculturation, as evidenced in studies such as Hasi et al. (2025) which reveal the influence of socioeconomic factors and media exposure on breast cancer knowledge and self-examination practices among university female students in Bangladesh. Further, this review investigates psychosocial barriers like fear, stigma, and cultural beliefs disrupting participation in screening, exemplified by studies from the Middle East and African contexts (Alshahrani et al., 2023; Abuhay et al., 2025).

Additionally, the review highlights the growing relevance of digital and social media platforms as communication facilitators and barriers. It addresses interventions employing social media campaigns, mobile applications, chatbots, and interactive websites designed to improve breast cancer knowledge and screening behaviors, referencing recent evaluations by Padamsee et al. (2024) and Sun et al. (2025).

The complex role of healthcare systems and providers in promoting screening adherence is scrutinized through studies that underscore the importance of provider recommendation, patient-provider communication quality, healthcare access policies, and workforce training (Dunn et al., 2024; Kratzke et al., 2010). Moreover, this review gives particular attention to culturally tailored community-based interventions involving lay health workers, peer role models, and faith-based organizations, which have shown promising results in improving screening rates among ethnic minorities and underserved populations (Nguyen et al., 2009; Lopez & Castro, 2006).

Finally, the review addresses gaps in the current literature, calling for more rigorous evaluations of communication strategies and culturally informed interventions, especially in low-income and minority population contexts, as well as considerations for equitable implementation of emerging digital health technologies.

Through synthesizing this body of evidence, the review aims to inform future research directions, policy formulation, and clinical practice improvements, all targeted toward increasing breast cancer screening uptake and reducing disparities in cancer outcomes worldwide.

2. Barriers to Breast Cancer Screening

2.1. Sociodemographic Barriers

Sociodemographic factors significantly influence breast cancer screening behaviors across diverse populations worldwide. Age remains a critical determinant; studies consistently report that women in certain age groups are more or less likely to participate in screening programs. For instance, Abuhay et al. (2025) found low clinical breast cancer screening uptake among reproductive-age women in Kenya, with higher odds of screening in women aged 25–34 and 35–49 years, underscoring the role of age-related awareness and access. Similarly, Hasi et al. (2025) noted that among university female students in Bangladesh, despite high recognition of early detection importance (88.4%), only 19.1% practiced breast cancer screening, highlighting gaps as young women transition to healthcare engagement.

Educational attainment and socioeconomic status (SES) are closely linked to screening participation. Mottram et al. (2021) summarize findings that higher income, home ownership, and education levels correlate with increased breast cancer screening attendance. Basu et al. (2021) reported that among female undergraduate students in Ghana, religious affiliation alongside other sociodemographic factors predicted breast self-examination practices, reflecting multifaceted influences on screening behavior. These findings are echoed in analyses like that of Abdi et al. (2025), where Hispanic/Latina women's mammography adherence was impacted by age, race/ethnicity, education, and uninsured status, suggesting educational and socioeconomic disparities.

Ethnicity and minority status further contribute to screening disparities. Padamsee et al. (2023) emphasized that interventions targeting Black women significantly improved screening outcomes, pointing to underlying disparities within this demographic. In the USA, Greene et al. (2020) revealed that Black sexual minority women faced distinct barriers in accessing screening and care, compounded by societal biases and provider assumptions. Similarly, Schwartz et al. (2008) identified that among Arab American women in Detroit, factors such as health insurance, marital status, and duration of U.S. residence were associated with screening behaviors, indicating layered sociocultural and economic dimensions in ethnic minority groups.

Additional findings include analyses of immigrant populations where acculturation impacts screening adherence. Hasi et al. (2025) indicated socioeconomic influences overlapping with geographic origin, while Brown, Consedine, and Magai (2006) demonstrated that length of U.S.

residence was positively associated with breast cancer screening participation among ethnically diverse immigrant women, mediated by changing health beliefs. López and Castro's (2006) church-based cancer prevention program showed the influence of cultural tailoring and acculturation on participation among Hispanic women. Such multi-layered sociodemographic barriers necessitate culturally sensitive approaches to improve equity in screening.

2.2. Psychosocial and Cultural Barriers

Psychosocial factors present formidable barriers to breast cancer screening uptake. Fear—in particular, fear of cancer diagnosis, pain from screening procedures, or negative results—is a recurring theme. Kamila et al. (2025) explored the perceptions of husbands supporting breast cancer screening, highlighting fears and communication gaps affecting women's screening decisions. Huq et al. (2021) described the impact of culturally informed educational messaging for African American young women, emphasizing the necessity of addressing emotional concerns like the fear of loss of womanhood and the stigma linked to preventive healthcare visits.

Stigma surrounding breast cancer and screening procedures is pervasive in diverse contexts and can lead to reluctance or delay in screening. Hosseini et al. (2020) qualitatively analyzed Iranian women's perceived barriers, uncovering deeply rooted misinformation, social barriers, and fatalistic beliefs shaping reluctance to seek early detection. Abuhay et al. (2025) similarly highlighted psychosocial hesitations including worry about screening results among reproductive-age women in Kenya, underscoring the psychosocial complexity superimposed on access barriers.

Cultural beliefs strongly influence screening behaviors. Religious beliefs and sociocultural norms can either facilitate or hinder screening adherence. Benjamins (2006) found that religious attendance and salience positively influence preventive practices including breast self-examination. Barreau et al. (2008) illustrated how social and family restrictions rooted in cultural contexts impact participation in organized breast cancer screening campaigns in France, with fear of social consequences and community norms playing decisive roles.

Communication gaps between women and influential family members such as spouses can hinder screening decisions. Kamila et al. (2025) reported limited health-related communication between spouses, affecting joint decision-making processes regarding breast cancer screening. Greene et al. (2020) documented that Black sexual minority women's screening experiences were impacted by feelings of misunderstanding by providers, shaped in part by intersectional biases, impacting psychosocial support and quality of care.

Social dynamics also contribute to psychosocial impediments. For example, stigma and embarrassment around breast self-examination or clinical exams were identified as deterrents in multiple populations, including university settings (Abdi et al., 2025) and rural regions (Qtaishat et al., 2025). Within immigrant communities, fatalistic beliefs and concerns about modesty and bodily exposure pose significant emotional and cultural barriers (Azaiza et al., 2011; Hussein et al., 2020).

Misinformation propagated through media and social networks further complicates cognitive and emotional acceptance of screening. Clegg-Lampsey et al. (2025) critiqued the prevailing discourse in institutional breast cancer screening messages, which often contain non-evidence-based screening advice and paternalistic tones that may mislead or induce fear. The media's role in communicating benefits and harms has been debated, with research (Wegwarth & Gigerenzer, 2018) emphasizing the challenges of statistical illiteracy and biased media reporting, leading to public confusion and skepticism about screening.

2.3. Healthcare System and Access Barriers

Healthcare system factors profoundly influence screening access and uptake. Insurance status is a well-documented determinant; Abudahlan et al. (2025) identified physician advice and availability of free mammography as key motivators in Saudi women, with insurance status influencing ability to access timely screening. Dunn et al. (2024) highlighted that low socioeconomic status and increased

barriers to care are associated with delays in diagnosis and treatment initiation, emphasizing disparities rooted in healthcare system functionality.

Geographic and transportation-related access issues also deter screening; Mobley et al. (2009) showed that travel time disparities to mammography facilities in Atlanta disproportionately affected non-Hispanic Black women, compounding existing social inequalities. Zaki-Metias et al. (2025) revealed that referring Canadian physicians preferred standardized reporting and coordination for breast arterial calcification findings, indicating gaps in healthcare communication pathways that might indirectly affect screening follow-up.

Provider recommendation serves as a critical interaction point. Yet, Koc (2021) found that family medicine residents exhibited low knowledge of screening programs, while Kratzke et al. (2010) showed that physician recommendation alongside clinic-based community health worker interventions positively correlates with mammography use among African American women. Lack of provider training and inconsistencies in communication hinder effective screening promotion.

Media messages sometimes conflict or inadequately communicate risks and benefits of screening, confusing patients and providers. Wegwarth and Gigerenzer (2018) documented systemic issues in conveying clear screening information, citing defensive medicine and biased reports. Clegg-Lamprey et al. (2024) described ongoing challenges with media underrepresenting the risks associated with mammography. Sudden changes or controversial guideline recommendations exacerbate public uncertainty, as noted by studies exploring media and public reactions (Holmes-Rovner & Charles, 2003; Flores et al., 2024).

Additionally, healthcare facility-level interventions such as mailed contacts and community outreach have demonstrated efficacy in specific contexts (Püschel et al., 2022), but consistent implementation remains a challenge. Patients often express dissatisfaction with communication concerning screening results, wait times, and test explanations (Attai et al., 2016), pointing to systemic communication deficiencies.

In sum, healthcare system and policy barriers encompass insurance coverage, geographic accessibility, provider knowledge deficits, healthcare communication inefficiencies, and the overarching influence of media messaging—all of which interweave to limit breast cancer screening uptake across populations.

3. Facilitators of Breast Cancer Screening

3.1. Effective Communication Channels

Healthcare providers' advice remains one of the most potent facilitators of breast cancer screening uptake, underscoring the critical role of culturally competent communication in enhancing screening participation. Research among Arab American women in metropolitan Detroit demonstrated that physician recommendations significantly increased mammography utilization, linking provider engagement with improved screening behaviors (Schwartz et al., 2008). Similarly, a study of Asian Indian women in Metro-Detroit found that healthcare provider endorsement was one of the strongest predictors for screening adherence (Boxwala et al., 2010). These findings align with broader analyses indicating that provider-patient communication is paramount for motivating women to engage in breast cancer screening, especially when culturally sensitive approaches are employed to address diverse backgrounds and beliefs (Abduraidi et al., 2024; Liow et al., 2022).

The advent and proliferation of social media and digital platforms have also widened avenues for disseminating breast cancer information and promoting early detection behaviors. Richardson-Parry et al. (2023) underscored the importance of digital tools and social media as core modalities to improve cancer screening participation, especially when combined with patient advocacy and empowerment frameworks. Systematic reviews of social media interventions reveal that platforms such as Facebook, Twitter, and YouTube serve not only as channels for education but also for emotional support, peer interaction, and mobilization of communities toward screening (Plackett et al., 2020; Padamsee et al., 2023). For instance, Padamsee et al. (2023) evaluated a multilevel

intervention using culturally relevant online resources, social media advertising, and community engagement, resulting in increased awareness and motivated screening uptake among Black women.

Community support structures and peer networks further enhance motivation for breast cancer screening. Peer interventions effectively leverage social ties and trust within communities to promote positive health behaviors. A community-based study targeting Mexican-American and Black women utilized peer role models in media messaging and volunteer outreach, reporting substantial increases in mammography rates (Suarez et al., 1993). Additionally, lay health worker outreach combined with media education significantly elevated clinical breast examination and mammography rates among Vietnamese-American women (Nguyen et al., 2009). The role of social support is also emphasized among African American, Hispanic, and Native American populations, where community-based, social support interventions address barriers and facilitate screening (Gotay & Wilson, 1998). In these contexts, social networks not only disseminate information but also help in combating stigma and misinformation, thereby positively influencing screening behavior (Greene et al., 2000).

3.2. Sociocultural and Psychological Supports

Sociocultural factors, including social support, family encouragement, religious participation, and culturally tailored messaging, greatly influence breast cancer screening uptake. Studies among reproductive-age women in Kenya and women in various Arab Middle Eastern countries highlight how social determinants such as these affect screening behaviors (Abuhay et al., 2025; Abduraidi et al., 2024). Religious beliefs and involvement can serve as facilitators; for example, Benjamins (2006) found that frequency of religious service attendance was positively correlated with increased use of preventive services including self-breast exams and mammography among middle-aged women. Similarly, Barreau et al. (2008) found that social networks, family opinions, and health professional endorsements heavily influenced women's participation in mammography screening campaigns in France, illustrating the social and familial context as critical support structures.

Addressing psychosocial barriers such as fear, anxiety, and misinformation is key to improving screening behaviors. Berry et al. (2020) conducted a case-controlled study on whole-body MRI screening acceptance among high-risk cancer carriers, finding that although worry about cancer was prevalent, appropriate clinical support alleviated adverse psychosocial outcomes and fostered screening adherence. Similarly, Holmes-Rovner and Charles (2003) underscored the role of media framing in shaping public perceptions of mammography benefits and harms, affecting emotional responses and decision-making. Educational interventions that provide balanced and comprehensible information, dispelling myths and reducing cancer-related fears, have been shown to encourage screening uptake and reduce anxiety (Berry et al., 2020; Holmes-Rovner & Charles, 2003).

Culturally tailored education programs also improve screening behaviors by accounting for unique social and cognitive factors. For instance, church-based programs targeting low-aculturated Hispanic women in the U.S. demonstrated that combining culturally congruent messaging with social support mechanisms significantly improved not only knowledge but also clinical breast exam and mammography rates (Lopez & Castro, 2007). Interventions that include family and community engagement provide social reinforcement, which has proven essential in minority populations with strong relational ties (Abuhay et al., 2025; Barreau et al., 2008).

3.3. Healthcare System Supports

Organized invitation systems, reminder programs, and facilitation of healthcare access constitute vital structural supports for breast cancer screening participation. A large-scale randomized controlled trial in Chile demonstrated that mailed contacts, outreach by health promoters, and integration of community advisory boards resulted in significantly increased mammography screening rates that persisted over a decade in socioeconomically disadvantaged populations (Püschel et al., 2023). These proactive healthcare system strategies effectively close equity gaps by increasing uptake in populations typically exhibiting low screening adherence.

Insurance coverage and ease of access to healthcare services also influence screening behaviors robustly. Studies across multiple countries find insurance status to be a strong determinant of mammography use, including among Arab American women in Detroit (Schwartz et al., 2008), South Asian women in New York City (Islam et al., 2006), and low-income African American women in Baltimore (Kratzke et al., 2010). Policy initiatives that improve insurance access and reduce financial barriers have been correlated with higher screening utilization (Dunn et al., 2024; Abuhay et al., 2025).

Provider training and patient navigation programs improve screening by enhancing healthcare professionals' capacity to effectively communicate and support screening behaviors. Training family medicine residents in breast cancer screening guidelines improved knowledge but identified gaps still needing addressing to optimize screening delivery (Koc, 2021). In parallel, community health worker interventions have shown success in increasing mammography use by enabling tailored communication and addressing individual barriers (Kratzke et al., 2010). Risk-based screening programs incorporating personalized risk assessments and survivorship care models likewise highlight how healthcare system-based innovations can enhance screening adherence with improved patient-provider communication strategies (Yi et al., 2025; Liow et al., 2022).

Collectively, these healthcare system facilitators operate synergistically with communication strategies and sociocultural supports to drive higher breast cancer screening participation. Their success hinges on integrated approaches that address financial, logistical, educational, and psychosocial components of screening uptake.

4. Multimodal Communication Interventions

4.1. Digital and Social Media-Based Interventions

Digital and social media have emerged as pivotal tools in promoting breast cancer screening uptake, especially through tailored campaigns and interactive technologies. Sun, Reiter, Duncan, and Adam (2025) provide a comprehensive scoping review on the use of natural language processing (NLP) tools, such as chatbots, within cancer care interventions. Their findings suggest that chatbots can engage patients through improved communication and education, which are key for facilitating behavior change and self-management in cancer screening contexts. Although clinical evaluation of these tools is limited, their potential in enhancing knowledge and facilitating timely screening is promising.

Richardson-Parry et al. (2023) emphasize the importance of digital tools and social media as core pathways in developing interventions aimed at reducing cancer screening inequities. Their review highlights the necessity of leveraging social media platforms to disseminate culturally sensitive breast cancer screening messages and support engagement among diverse population groups. Through digital outreach, campaigns can reach marginalized and hard-to-access populations more effectively.

Specific studies such as Qtaishat et al. (2025) focus on the role of social media in regions such as the Middle East. They document that surveys distributed via social media platforms enabled data collection on breast cancer knowledge and practices among Arab women, underscoring social media's role in communication although specific intervention outcomes remain to be more rigorously evaluated.

Rajabi, Abedi, Araban, and Maraghi (2021) compared educational delivery of breast cancer screening information via WhatsApp, a social media messaging platform, versus a traditional compact disc (CD) method among middle-aged women. Both methods significantly improved health literacy and self-examination practices, although CD education showed a slightly greater effect. The use of WhatsApp underscores the role of digital communication in raising awareness and literacy in populations where internet-based messaging is common.

Welch et al. (2020) evaluated a chatbot tool, ItRunsInMyFamily.com, designed to collect hereditary cancer risk information to promote risk assessment and screening engagement. Their social media-driven campaign reached users across extensive geographic regions, showcasing how

such technologies can harness online marketing and social campaigns to increase population-level cancer risk awareness.

Beyond chatbots, culturally tailored online content and community engagement strategies have also been shown to affect screening knowledge positively. Padamsee et al. (2023) remark on the effectiveness of culturally relevant education and online community involvement in multilevel interventions targeting Black women, notably through social media and dedicated websites that provide personalized breast cancer risk information and promote engagement in screening programs.

Gao et al. (2024) compare breast cancer information quality across languages on online platforms, identifying disparities and limitations in Spanish and Chinese websites versus English content. They stress the importance of improving the quality and reliability of culturally tailored online breast cancer educational materials to effectively reach diverse communities.

Edmonds, Kim, Wells, Dahman, and Sheppard (2022) analyze the role of social media focus groups in understanding surveillance mammography experiences among Black and White breast cancer survivors. Social media platforms enabled patient sharing of knowledge and barriers, offering insights that can be leveraged to design culturally appropriate digital interventions promoting screening adherence.

4.2. Community-Based and Lay Health Worker Interventions

Community-based approaches and lay health worker programs have been integral in addressing sociocultural barriers that hinder breast cancer screening uptake. These interventions often involve culturally sensitive education, peer support, and navigation assistance tailored to specific populations.

Nguyen et al. (2009) conducted a randomized controlled trial among Vietnamese-American women involving lay health worker outreach combined with media education. Their approach resulted in significant improvements in mammography and clinical breast examination rates compared to media education alone, highlighting the effectiveness of trusted community members facilitating knowledge and access.

Guerrero-Preston et al. (2009) also underline the success of lay health workers in immigrant communities by utilizing existing social networks to promote breast health education and screening, emphasizing culturally matched interventions that consider language, beliefs, and acculturation factors.

Suarez, Nichols, and Brady (1993) demonstrated in minority women (Mexican-American and Black) how peer role models delivered through local media and community volunteering can influence breast cancer screening behaviors. These programs employ social reinforcement and shared storytelling to overcome barriers such as fear and misinformation. This model has been further supported by Kratzke, Garzon, Lombard, and Karlowicz (2010) who suggest that training community health workers to identify and address barriers is crucial to increasing mammography rates within underserved populations.

Church-based programs hold particular promise among immigrant and minority populations, as seen in the work by Lopez and Castro (2006) who evaluated a culturally tailored cancer prevention program for low-aculturated Hispanic women. The programs leverage faith-based settings to deliver education and support, utilizing church attendance and religious ties as facilitators for screening participation.

Islam et al. (2006) examined breast and cervical cancer screening behaviors among South Asian women in New York City, noting that community-focused education, such as through religious and cultural organizations, improved screening uptake. They emphasize that overcoming linguistic and cultural barriers through community engagement is critical to screening adherence.

Barreau, Hubert, Dilhuydy, and Séradour (2008) analyzed motivational and biocultural factors influencing screening participation, highlighting the role of invitations from organized campaigns and reminders, which leverage community awareness and familial influence to improve uptake. The

impact of general practitioners and trusted health professionals within communities also featured prominently in facilitating screening participation.

4.3. Provider-Focused and Health System Interventions

The role of healthcare providers and system-level strategies significantly influences breast cancer screening uptake through improved communication, personalized risk assessment, and service delivery optimizations.

Koc (2021) found knowledge deficits among family medicine residents relating to breast cancer screening programs, underscoring the need for enhanced training in clinical guidelines and communication strategies to ensure providers effectively recommend and support screening.

Liow et al. (2022) emphasize training healthcare providers not only in general communication but also in risk-based screening approaches. Their study on women's attitudes towards personalized breast screening highlights a positive reception for such strategies when accompanied by appropriate provider support, particularly for high-risk populations.

Brown et al. (2020) reveal challenges faced by sexual minority women regarding breast cancer screening due to poor patient-provider communication and health system barriers, highlighting a critical area for provider education to enhance inclusivity and patient-centered care.

The integration of personalized risk assessment into breast cancer screening programs is a growing trend, as suggested by Yi et al. (2025). Their INSPIRE program incorporates telehealth and digital platforms that connect adolescent and young adult cancer survivors with personalized care and screening adherence support. Clinical implementation of such programs requires provider engagement and competence in delivering tailored screening recommendations.

Püschel et al. (2022) demonstrate that mailed contact, outreach, and community health promoter engagement within low socioeconomic status settings can maintain increased long-term mammography screening rates. These healthcare system adaptations underline the value of organized reminder systems and supportive infrastructure in facilitating screening access.

Mottram et al. (2021) support the use of patient reminders and modifications in service delivery to overcome attendance barriers within screening programs. They emphasize that incorporating multifaceted approaches involving both healthcare professionals' roles and system-level reminders yields improved outcomes.

Collectively, these studies affirm that provider-focused interventions, bolstered by health system support like reminder systems, tailored communication, and personalized risk assessments, play a critical role in improving screening behavior and reducing disparities.

5. Outcomes of Communication and Sociocultural Interventions

5.1. Screening Uptake and Adherence

Communication and sociocultural interventions have demonstrated a significant impact in enhancing breast cancer screening uptake and adherence, particularly through tailored educational strategies and culturally appropriate outreach. Several studies document improved screening rates following multifaceted educational efforts. Padamsee et al. (2023) evaluated a video-based intervention among rural women in Bihar, India, utilizing validated YouTube videos delivered in Hindi through social media channels. This intervention led to a significant improvement in knowledge, attitudes, and breast self-examination (BSE) practices, reinforcing the value of linguistically and culturally relevant digital content in resource-limited settings. Furthermore, Nguyen et al. (2009) conducted a randomized controlled trial among Vietnamese-American women, where a combination of lay health worker (LHW) outreach plus media education substantially increased mammography and clinical breast examination rates compared to media education alone, suggesting that personal, community-based interventions complement mass media strategies effectively.

Richardson-Parry et al. (2023) synthesized evidence emphasizing that individually tailored interventions integrating digital tools and social media could address inequities in cancer screening. Such approaches are especially pertinent for reaching ethnically diverse and socioeconomically disadvantaged populations. This is echoed in the work of Abuhay et al. (2025), who analyzed factors affecting clinical breast cancer screening uptake in Kenya, noting persistent low rates influenced by media exposure and socioeconomic variables. Importantly, exposure to community media increased screening uptake, highlighting community-level communication strategies as facilitators to adherence among reproductive-age women. Similarly, Greene et al. (2020) highlighted that Black sexual minority women's mammography surveillance was positively impacted by enhanced patient-provider communication and health insurance coverage, with communication gaps correlating with decreased adherence.

Ethnic and socioeconomic disparities in screening adherence remain a focus of intervention efforts. Padamsee et al. (2023) report on TPBC, a multilevel intervention tailored to Black women in Ohio, which included culturally relevant education, personalized risk information dissemination, and community engagement via social media and events. The program yielded improvements in screening participation and follow-up, demonstrating that culturally congruent and multichannel communication can effectively bridge disparities. Greene et al. (2020) further emphasize the intersectionality of race and sexual orientation in influencing screening continuity, where improved communication and health system navigation were critical facilitators for Black sexual minority women's mammography adherence.

Community health worker-led and peer role model interventions have also shown efficacy in enhancing screening uptake in minority populations. Kratzke et al. (2010) demonstrated that training community health workers to recognize and address barriers improved mammography utilization, highlighting physician recommendation and social support as significant reinforcing factors. Suarez et al. (1993, 1997) used peer role models in media and volunteer settings targeting Mexican-American and Black women, reporting mammography screening increases of up to 57% among Mexican-American women, reinforcing the utility of community-driven communication strategies.

Increasingly, integration of technology has become a pivotal strategy. Sun et al. (2025) summarize the promising application of natural language processing (NLP) tools and chatbots for patient education and self-management support, though noting limited clinical evaluation and implementation challenges. Rajabi et al. (2021) compared WhatsApp-based versus compact disc interventions for middle-aged women, finding both improved health literacy and BSE behavior, with the digital, social media-based method offering scalable, interactive communication advantages.

Moreover, Plackett et al. (2020) review national social media campaigns for cancer screening awareness, finding evidence for improved engagement and possibly behavior change, though digital disparity remains a concern. They noted that behavior change techniques, such as providing social support and emphasizing cancer consequences, were integral components fostering user engagement. Qtaishat et al. (2025), in a survey among Arab women in the MENA region, emphasized that social media served as the primary information source, though barriers related to lack of knowledge and fear persisted, underscoring that communication alone is insufficient without accompanying supportive interventions.

5.2. Psychosocial Impact and Patient Experience

Communication strategies also influence the psychosocial dimensions of breast cancer screening, mediating anxiety, empowerment, and adherence behaviors. Berry et al. (2020) evaluated psychosocial effects of whole-body MRI screening for high-risk TP53 mutation carriers, reporting high levels of satisfaction and no adverse psychological outcomes, while noting cancer worry and intrusive thoughts at variable time points. This supports integrating psychological support within screening programs to sustain adherence.

Holmes-Rovner and Charles (2003) analyzed UK media coverage of mammography screening, revealing polarized debate coverage that may influence public understanding and anxiety,

emphasizing the need for balanced communication to ensure informed choice without undue distress. Edmonds et al. (2022) explored surveillance mammography experiences among Black and White breast cancer survivors, identifying that patient-provider communication quality significantly affected continuity of screening and perception of care. Women with inadequate provider communication reported feelings of being ignored and mistrust, which served as barriers to adherence. Greene et al. (2020) similarly highlighted the importance of positive provider-patient relationships, particularly among racial and sexual minority groups, where shared identities improved comfort and participation in follow-up care.

Psychosocial barriers such as fear, stigma, and misinformation continue to affect screening behaviors. Hosseini et al. (2020) accounted for limited knowledge, fatalistic beliefs, and social misinformation among Iranian women as contributors to delayed detection. Kamila et al. (2025) discussed spousal support and communication gaps impacting screening, where limited health-related dialogue reduces spousal influence, reflecting the need for family-inclusive communication interventions.

Interventions addressing psychosocial needs often incorporate educational counseling and supportive strategies. Basch et al. (2019) demonstrate that social media platforms facilitate peer emotional support and community connection, offering spaces where women share experiences and reduce screening-related anxiety. Berry et al. (2020) recommend clinical support integrated within screening protocols to aid coping and mental health among high-risk patients. Such integrated communication strategies are essential to improve patient experience and screening adherence.

5.3. Evaluation of Communication Strategies

Evaluations of communication strategies in breast cancer screening demonstrate both successes and challenges. Plackett et al. (2020) systematically reviewed social media interventions, observing varying levels of exposure, reach, and engagement, with ethnic minorities often exhibiting lower participation rates. Their analysis showed that embedding behavior change techniques into messaging improved effectiveness, but sustained behavior change requires ongoing, multi-level engagement.

Qtaishat et al. (2025) highlighted that increased social media use improved breast cancer knowledge but did not always translate to better screening behavior, suggesting knowledge alone is insufficient to change action without supportive contextual factors. Similarly, Gao et al. (2025) identified that the quality of online mammography videos was generally moderate, noting that professionals' involvement (e.g., radiologists) increases quality but that overall content needs improvement to optimize communication impact.

Misinformation and conflicting messages pose significant impediments. Wegwarth and Gigerenzer (2018) critique widespread statistical illiteracy among physicians and patients, compounded by biased media reports that overstate benefits of screening while minimizing harms, thereby undermining informed decision-making. Edmonds et al. (2022) emphasize that miscommunication or omission in provider interactions reduces screening adherence, particularly among vulnerable groups where mistrust or lack of clarity prevails.

Digital literacy also influences communication strategy outcomes. Richardson-Parry et al. (2023) stress that digital divide issues limit the potential of social media and digital interventions to reduce screening inequities unless complemented by community and provider-based approaches. Rajabi et al. (2021) similarly indicate that social media-delivered education can improve health literacy and behaviors but recommend combining it with traditional methods for maximal reach.

Other studies, such as Robinson et al. (2015), explore digital support networks as a resource for patient empowerment, emphasizing the importance of moderated, trustworthy communication to combat misinformation and address privacy concerns related to sensitive health topics. These interventions have been proposed as future directions to enhance communication quality and patient engagement.

Overall, communication strategies in breast cancer screening require careful design, combining mass and social media, community-based outreach, healthcare provider involvement, and technological tools, all underpinned by cultural sensitivity and evidence-based messaging. Continual evaluation using both engagement metrics and behavioral outcomes is critical to refine approaches, address disparities, and ultimately increase equitable screening adherence.

6. Discussion

6.1. Integration of Multimodal Strategies

The integration of multimodal communication strategies is increasingly recognized as a crucial approach to enhancing breast cancer screening uptake globally. Diverse channels and intervention modalities complement each other, addressing heterogeneous populations' needs and overcoming individual barriers.

Richardson-Parry et al. (2023) emphasize the importance of combining digital tools, social media, patient advocacy, and community engagement to create bespoke interventions that accommodate the diverse psychosocial, cultural, and socioeconomic factors influencing screening behaviors. This comprehensive approach is posited as superior to singular intervention modes which may neglect critical determinants of health-seeking behavior.

Digital interventions show promise in increasing accessibility and engagement, particularly through social media platforms, mobile applications, and interactive web-based tools. Sun et al. (2025) illustrate the emerging role of natural language processing (NLP) tools, such as chatbots, in improving patient education, self-management, and provider-patient communication. Although these NLP tools are not yet widely implemented or formally evaluated in clinical settings, they exemplify a future direction for multimodal synergistic strategies leveraging technological innovation.

Further, Padamsee et al. (2023) demonstrate the effectiveness of a culturally tailored, multilevel intervention – the “Turning the Page on Breast Cancer” program – that includes enhancements in healthcare facility capacity, patient navigation, social media engagement, and educational community events to improve screening rates among Black women. This model illustrates how healthcare delivery, community involvement, and digital outreach can fully integrate to impact screening outcomes.

Community-based interventions using lay health workers or peer groups further complement digital and clinical approaches. Nguyen et al. (2009) report a randomized controlled trial where lay health worker outreach combined with media education significantly increased mammography uptake among Vietnamese-American women compared to media education alone, indicating that personal, community-linked channels supplement mass media effectively.

Edmonds et al. (2022) highlight the indispensable role of patient-provider communication within this integrated framework, as communication gaps can significantly reduce adherence even when other modalities are employed. Their study shows that Black breast cancer survivors lacking provider communication about surveillance care have substantially decreased mammography follow-up, underscoring that multimodal strategies must maintain strong healthcare communication to realize full benefits.

Moreover, emerging mobile health (mHealth) programs such as INSPIRE, as detailed by Yi et al. (2025), employ stepped-care telehealth alongside digital platforms to provide survivorship resources and personalized follow-up for adolescent and young adult cancer survivors. This approach epitomizes multi-tiered, technology-enabled care that can be adapted for screening promotion and follow-up in broader populations.

Collectively, these studies advocate for multimodal interventions that combine digital engagement, community-level outreach, and clinical communication to holistically address barriers and optimize breast cancer screening uptake across diverse populations.

6.2. Addressing Sociocultural Diversity

Effective breast cancer screening programs require culturally sensitive and tailored messaging that resonates with diverse populations' unique sociocultural contexts. Sociodemographic variables such as age, ethnicity, religion, language proficiency, and acculturation status critically influence screening practices and receptivity to interventions.

Hasi et al. (2025) illustrate the impact of socioeconomic status, rural-urban residence, and income on breast cancer knowledge and screening practices among university female students in Bangladesh, underscoring socioeconomic disparities in awareness even within educated subpopulations. Their findings identify social media as the primary information source but also recognize persistent knowledge deficits and privacy concerns affecting self-examination and mammography uptake.

Similarly, Kamila et al. (2025) elucidate communication barriers and psychosocial influences in Tanzania, where breast cancer screening messages triggered negative perceptions due to cultural dissonance and inadequate tailoring. Women expressed mistrust and limited understanding of screening benefits, highlighting the imperative for participatory message development involving the target audience to enhance relevance and acceptance.

In the Middle East, Abduraidi et al. (2024) report variable awareness with low screening practices among Arab women, linking fear of abnormal results and inadequate provider engagement as primary barriers. These psychosocial factors intermingle with cultural and religious norms that influence willingness to undergo screening. The prominence of social media and internet communication as breast cancer information sources in this region indicates a channel but also a challenge for quality and culturally congruent content.

Moreover, acculturation emerges as a key determinant for immigrant populations in Western countries. Abdi et al. (2025) show that among Hispanic/Latina women in the USA, lower acculturation and breast cancer knowledge correlate with reduced mammography adherence. This pattern is echoed in other immigrant groups such as Korean Americans (Lee et al., 2021) and Asian Indian women (Boxwala et al., 2010), where duration of U.S. residence, language fluency, and cultural integration positively affect screening rates.

Religious affiliation and social norms further shape screening behaviors. Benjamins (2006) finds increased engagement in preventive health services linked to religious participation and salience, with differential effects by denomination. Barreau et al. (2008) note social and family restrictions, as well as media influence, as factors either facilitating or deterring participation within specific cultural milieus in France.

Social support emanating from familial and community networks bolsters screening motivation, especially in minority or underserved groups (Suarez et al., 1994; Guerrero-Preston et al., 2009). Greene et al. (2022) highlight the intersectional identities of Black sexual minority women, revealing provider biases and communication difficulties that hinder engagement, underscoring the necessity for culturally congruent provider-patient interactions.

Acculturation, language, cultural beliefs, and sociocultural norms intersect to influence screening behaviors profoundly. Tailored messages and interventions addressing these factors are essential, including language-specific campaigns, community engagement that respects cultural paradigms, and provider training in cultural competence.

6.3. Healthcare System and Policy Implications

Healthcare system factors significantly impact breast cancer screening accessibility, utilization, and adherence. Beyond individual-level considerations, systemic barriers like insurance coverage, provider availability, geographical accessibility, and healthcare provider communication quality determine screening engagement.

Dunn et al. (2024) delineate healthcare access disparities affecting breast cancer care timeliness in racial minorities and low socioeconomic groups. They show that delayed diagnosis and treatment

initiation are associated with lower SES and increased barriers such as travel distance, emphasizing system-level inequities.

Provider recommendation consistently emerges as a powerful facilitator of screening uptake. Kratzke et al. (2010) report physician advice as a significant reinforcing factor influencing mammography adherence among African American women. Correspondingly, Schwartz et al. (2008) observe that healthcare providers' recommendation increases breast cancer screening rates among Arab American women, illustrating the pivotal role clinicians play across diverse populations.

However, gaps in provider knowledge and training pose challenges. Koc (2021) reveals low knowledge levels among family medicine residents regarding breast cancer screening guidelines, indicating a need for enhanced educational initiatives within medical training programs. Liow et al. (2022) further support the utility of provider-focused interventions, advocating for training in risk assessment and communication to improve screening delivery.

Systemic innovations such as organized invitation and reminder systems improve screening adherence. Püschel et al. (2022) demonstrate sustained mammography utilization rates among underserved Chilean women after implementing mailed contacts, outreach, and health promoters. These strategies enable overcoming logistical and psychosocial barriers by proactively engaging eligible women and delivering consistent cues for screening.

Health insurance status remains a critical determinant, with uninsured or underinsured women less likely to participate in screening (Abudahlan et al., 2025; Islam et al., 2006). Expansion of insurance coverage and policies facilitating access to affordable screening services are fundamental to equitable outreach.

Additionally, healthcare providers' communication practices directly influence screening experience and adherence. Edmonds et al. (2022) highlight that inadequate communication about surveillance mammography reduces follow-up among Black breast cancer survivors, indicating the need for system-level protocols emphasizing patient-provider dialogue continuity.

Lastly, the integration of personalized risk assessments into screening pathways, as promoted by Yi et al. (2025) and Liow et al. (2022), requires healthcare system readiness and policy frameworks to ensure equitable implantation without exacerbating disparities.

6.4. Research Gaps and Future Directions

Despite advances in multimodal communication and sociocultural interventions, multiple research gaps impede optimal breast cancer screening improvement.

Richardson-Parry et al. (2023) stress the scarcity of rigorous outcome evaluations of communication interventions, particularly those employing digital media or community-based strategies targeting underserved populations. Most studies measure engagement or knowledge rather than direct screening uptake or long-term adherence, limiting evidence of efficacy.

Plackett et al. (2020) underscore disparities in social media intervention reach, particularly low engagement among ethnic minorities and socioeconomically disadvantaged groups. Addressing the digital divide—access to technology, digital health literacy, and culturally appropriate content—is paramount to prevent widening existing inequalities.

Emerging technologies, such as artificial intelligence-driven NLP chatbots (Sun et al., 2025), present opportunities for scalable, personalized education and support. However, clinical integration, evaluation of clinical outcomes, and user acceptability remain underexplored.

Similarly, mobile health interventions like the INSPIRE program (Yi et al., 2025) offer individualized telehealth support, yet require adaptation for screening populations and testing in diverse settings.

Additionally, most research remains concentrated in high-income settings; there is a need for expanded studies in low- and middle-income countries, where sociocultural and healthcare system barriers diverge substantially (Kamila et al., 2025; Abuhay et al., 2025).

Future research should pursue methodologically rigorous, multiphase mixed-methods designs evaluating complex interventions, incorporate community participatory approaches to intervention

development, and extend measurement to behavioral outcomes and health equity impacts. Translational research bridging technological innovation with cultural adaptation holds promise.

In sum, advancing breast cancer screening uptake demands a multi-dimensional research agenda pairing sophisticated, multimodal communication investigations with nuanced understanding of sociocultural and system-level determinants to achieve equitable population health improvements.

7. Conclusions

This comprehensive review elucidates the multifaceted barriers and facilitators influencing breast cancer screening uptake, highlighting the critical role of integrating multimodal communication strategies with sociocultural interventions. The evidence indicates that tailored approaches combining digital technologies, community outreach, and provider engagement effectively address diverse population needs and improve screening adherence. However, challenges such as persistent health disparities, misinformation, and digital literacy gaps remain significant obstacles. To sustain and enhance screening outcomes, it is imperative to implement culturally sensitive, system-level interventions that ensure equitable access and supportive healthcare environments. Future research should focus on rigorous evaluation of communication interventions, exploration of emerging technologies, and development of personalized risk communication frameworks to advance breast cancer screening uptake and reduce disparities.

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