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Comparative Study to Evaluate the Impact of Different Social Media Platforms on Knowledge and Attitudes about the Risk Factors of Breast Cancer

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Abstract

Introduction: Breast cancer remains a significant global health concern, with rising incidence and mortality rates, particularly in low- and middle-income countries. In Pakistan, limited awareness and late-stage diagnosis exacerbate disease outcomes. With the increasing penetration of digital technologies, social media has emerged as a key tool for health communication. This study aimed to evaluate the impact of different social media platforms on awareness, knowledge, and attitudes toward breast cancer risk factors among female patients attending Allied Hospital, Faisalabad. **Methodology:** A cross-sectional study was conducted at Allied Hospital Faisalabad between March and June 2024, involving 150 female participants selected through convenience sampling. Data were collected using a structured questionnaire that assessed participants' knowledge of breast cancer risk factors, awareness of screening methods, attitudes toward early detection, and trust in various information sources including healthcare professionals and social media. Statistical analyses, including descriptive, bivariate, and multivariate regression, were performed using Minitab Version 18. **Results:** The findings revealed that social media significantly enhanced awareness of specific breast cancer risk factors, particularly age, genetics, and lifestyle. Facebook (68%) and YouTube (53%) were the most commonly used platforms for obtaining breast cancer-related information. However, only 36.5% of respondents considered social media a reliable source, with the majority expressing greater trust in healthcare professionals. While so-

cial media exposure was positively associated with general knowledge ($p < 0.05$), it had a limited impact on screening attitudes and proactive health behaviors. Multivariate analysis indicated that education level and socio-economic status were the strongest predictors of knowledge ($p < 0.01$), while perceived credibility of information was the primary driver of trust in sources. **Conclusion:** Although social media platforms contribute to raising awareness of breast cancer risk factors, their effectiveness in promoting behavioral change remains limited. The study highlights the need for credible, expert-verified health content and recommends integrating healthcare professionals into digital awareness campaigns. This approach may strengthen the impact of social media as a tool for health promotion and early detection of breast cancer in Pakistani communities.

Keywords

Breast Cancer, Social Media, Awareness

1. Introduction

Breast cancer remains the most prevalent malignancy affecting women globally, posing a significant public health concern [1] [2]. Its incidence and mortality continue to rise across both high- and low-income countries, largely attributed to increased life expectancy, urbanization, and the widespread adoption of Western lifestyle habits [3] [4]. In 2020 alone, approximately 2.3 million new breast cancer cases were reported, accounting for 11.7% of all cancer diagnoses worldwide [5]. That same year, around 685,000 deaths were linked to the disease [6]. Despite medical advancements, disparities in early detection and treatment outcomes persist between developed and developing regions, with the latter experiencing a higher rate of late-stage diagnoses and poorer prognoses [7] [8]. As the burden of breast cancer grows, global efforts toward awareness and preventive strategies become increasingly vital.

The burden of breast cancer is rapidly escalating in South Asian countries, where both incidence and mortality rates have shown a concerning upward trend [9]. Approximately 588 million women aged 15 and above in this region are increasingly vulnerable to this growing health crisis. In India, an estimated 100,000 new cases of breast cancer are diagnosed each year, with a mortality rate of 21.5% [10]. In Pakistan, the situation is even more alarming, with 34,066 new cases reported in 2018 and a mortality rate of 26.76%. Among Asian nations, Pakistan bears the highest incidence, with approximately one in every nine women likely to be diagnosed with breast cancer during her lifetime [11]. Numerous risk factors contribute to the development of the disease, including age, genetic predisposition, hormonal and reproductive history, physical inactivity, obesity, alcohol consumption, and exposure to radiation [12] [13]. These complex and interrelated factors highlight the urgent need for awareness, early detection, and education, particu-

larly in resource-constrained settings.

To combat the growing burden of breast cancer, several screening techniques have been introduced to facilitate early detection and diagnosis. These include breast self-examination (BSE), clinical breast examination (CBE), and mammography [14]. Among these, BSE stands out as a simple, noninvasive, and time-efficient method that can be practiced independently at home, making it especially valuable in low-resource settings [15]. Early detection is crucial, as identifying smaller tumors at earlier stages significantly improves the chances of successful treatment and survival [16]. For instance, the survival rate for breast cancer diagnosed at stages I and II is approximately 85%, whereas it drastically falls to around 10% in stage IV. Despite the availability of screening methods, delays in diagnosis remain a serious issue in many regions [17]. For example, data from the National Institute of Cancer Research and Hospital revealed 4930 new breast cancer cases between 2015 and 2017, and GLOBOCAN reported 13,028 new cases in 2020. Alarmingly, over 90% of these patients were diagnosed at advanced stages (III–IV), with the majority being women of reproductive age [18]. This trend is largely attributed to inadequate healthcare access, with doctor-to-patient ratios being critically low, especially in rural areas. Additionally, cultural stigmas, lack of awareness, and limited education about breast cancer contribute significantly to late diagnosis and poor treatment outcomes [19].

In light of the rising burden of breast cancer and the critical importance of early detection, leveraging modern communication tools such as social media offers a promising avenue for public health education. Social media platforms—ranging from Facebook and Instagram to WhatsApp and YouTube—have emerged as powerful tools for disseminating health information, shaping public perceptions, and influencing behavior. Recent evidence highlights the potential of social media and multimedia campaigns in enhancing health awareness in LMIC settings. For example, a culturally adapted mass-media intervention in Malaysia, delivered across TV, radio, print, and social media channels, significantly improved recognition of breast cancer symptoms among women over 40; individuals exposed to the campaign were substantially more likely to identify key symptoms such as breast lumps or nipple discharge, with adjusted odds ratios ranging from 0.25 to 0.47 across demographic subgroups [20].

Similarly, in Bangladesh, a targeted digital outreach campaign using Facebook and Instagram ads successfully engaged caregivers of adolescent girls and improved attitudes toward HPV vaccination uptake. The campaign reached millions and demonstrated measurable influence on caregivers' intentions to vaccinate [21]. These studies underscore the rising promise of social media-driven health promotion in LMICs, yet they also reveal geographic and topic-specific gaps—particularly in leveraging digital platforms for breast cancer literacy and screening behavior in settings like Pakistan. Our study addresses this gap by evaluating how platforms such as Facebook and YouTube influence awareness, attitudes, and preventive behaviors related to breast cancer risk fac-

tors in a hospital-based female population in Pakistan. By identifying the most impactful platforms and understanding demographic influences, this research intends to support the development of targeted, culturally relevant awareness campaigns that can lead to better health outcomes through informed and proactive behaviors.

2. Method

2.1. Study Design

A cross-sectional, quantitative survey-based design was used to evaluate the knowledge and attitudes about breast cancer risk factors among female patients.

2.2. Study Setting

The study was conducted at Allied Hospital, Faisalabad—one of the largest tertiary care hospitals in Punjab, Pakistan. Data collection was carried out within the oncology ward between March and August 2024.

2.3. Study Population and Sample Size

The target population was comprised of female patients receiving care in the oncology department of Allied Hospital, Faisalabad. A convenience sampling technique was employed to recruit 150 female participants. This sample size was chosen to allow for potential incomplete or non-responses while still ensuring a statistically valid dataset for analysis. Patients were identified through hospital records, and consent was sought via their provided contact details. The study population consisted specifically of female oncology patients who were either receiving active treatment or attending follow-up consultations at the oncology ward of Allied Hospital, Faisalabad. These participants were selected to ensure that respondents had some level of interaction with breast cancer-related care and were more likely to have encountered relevant information through social media or healthcare professionals. Inclusion criteria required participants to be adult females willing to provide informed consent. Anonymity and the right to withdraw from the study at any time were assured. While convenience sampling may limit generalizability, it was deemed appropriate given time and resource constraints.

Sample size justification: The sample size of 150 participants was determined based on practical constraints including time, resource availability, and accessibility to the target population within the oncology ward of Allied Hospital, Faisalabad. Although a formal power calculation was not performed due to the exploratory nature of the study and the use of a convenience sampling method, the chosen sample size was considered adequate to observe meaningful patterns in social media usage, knowledge levels, and attitudes toward breast cancer risk factors. The sample size also accounted for potential non-responses or incomplete questionnaires, ensuring a sufficient number of complete cases for valid statistical analysis.

2.4. Study Instrument

A structured questionnaire was used to collect data, which included multiple sections: 1) socio-demographic characteristics, 2) sources of breast cancer information, 3) knowledge of risk factors, 4) awareness and practice of breast self-examination (BSE), 5) signs and symptoms, 6) screening methods, and 7) perceptions regarding treatment. The questionnaire was pre-tested through a pilot study involving 15 participants, whose responses were not included in the final dataset. To ensure the reliability and clarity of the questionnaire, a pilot study was conducted involving 15 female participants from the same hospital setting who met the inclusion criteria. Their responses were not included in the final analysis. Based on the pilot data, the internal consistency of the questionnaire was assessed using Cronbach's alpha, which yielded a value of 0.81, indicating good reliability. No modifications were necessary, as the items were found to be well-understood and appropriately structured. This preliminary validation helped confirm that the instrument was suitable for evaluating knowledge, attitudes, and social media usage related to breast cancer risk factors in the target population. Based on the pilot, no modifications were required. Correct answers were assigned a score of "1," while incorrect or "don't know" responses were given a "0." Participants' knowledge levels were categorized as Weak (25% - 49%), Average (50% - 74%), and Good (75% and above) based on their total scores.

2.5. Inclusion Criteria

The study included female patients aged 18 years or older who were receiving care—either active treatment or follow-up consultations—in the oncology department of Allied Hospital, Faisalabad. Participants were required to provide informed consent and possess the ability to understand and complete the questionnaire independently. Only those who reported using at least one social media platform in the past six months were eligible to participate, as the study specifically aimed to assess the impact of digital media on breast cancer awareness.

2.6. Exclusion Criteria

Patients were excluded if they had any cognitive impairments or communication difficulties that could interfere with their ability to respond accurately. Additionally, critically ill or hospitalized patients unable to participate due to their medical condition, and those with no history of social media usage, were excluded to ensure consistency and relevance in data collection. These criteria were implemented to ensure that participants were representative of the target population for this study (*i.e.*, female oncology patients with social media exposure), and to strengthen the interpretability of findings related to digital health communication.

2.7. Sampling Technique and Data Collection

Due to practical limitations, convenience sampling was selected as the most feasible approach. The researcher requested a list of female oncology patients along

with their contact information to facilitate recruitment. Survey forms were distributed in person, and informed consent was obtained before participation. Participants were assured of confidentiality, anonymity, and voluntary involvement, with the option to withdraw at any stage.

2.8. Data Analysis

Data was analyzed using Minitab Version 18. Descriptive statistics (frequencies and percentages) were used to summarize socio-demographic characteristics such as age, marital status, education, income, and religion. Cross-tabulation analyses were conducted to examine relationships between independent variables (e.g., socio-demographics) and dependent variables (e.g., knowledge, screening practices, perceived barriers). Each correct response was given one point, and total scores were calculated for each participant. Knowledge and practice levels were then categorized accordingly. This approach allowed identification of key factors influencing breast cancer awareness and screening intentions.

2.9. Ethical Considerations

Ethical approval for this study was obtained from the Institutional Review Board of the respective institution. Informed consent was obtained from all participants prior to data collection, and all ethical protocols regarding participant rights, confidentiality, and voluntary participation were strictly followed.

3. Results

3.1. Demographic Characteristics

Table 1 presents detailed demographic characteristics of the respondents, including age distribution, marital status, area of residence, socio-economic class, and education level. All respondents were female, as the study focused on breast cancer awareness among women. The age range of participants was between 18 and 60 years, with the highest concentration in the 40 - 50 years age group. The mean and median ages were approximately 42 and 45 years, respectively. A significant majority were married (85.4%), while others were unmarried (12.6%) or divorced/separated (0.7%).

In terms of residence, 56.4% lived in urban areas, while 43.6% were from rural backgrounds. Most respondents belonged to the middle socio-economic class (70.2%), followed by lower (21.9%) and upper (6.6%) classes. Education levels varied; the majority had completed high school or had some college education, while fewer held a college or postgraduate degree.

3.2. Social Media Usage and Information Sources

Table 2 outlines the social media usage patterns and primary sources of health-related information among the respondents. Facebook and YouTube were the most used platforms, while Instagram, Twitter, and TikTok saw lower engagement. A majority of respondents reported that they did not use social media

Table 1. Demographic characteristics of the respondents.

Characteristics	Variables	Frequency	Percentage (%)
Gender	Female	150	100%
	Male/other	0	0%
Age (years)	18 - 29	19	12.66%
	30 - 39	35	23.33%
	40 - 50	90	60%
	51 - 60	6	4%
Marital Status	Married	129	85.4%
	Unmarried	19	12.6%
	Divorced/separated	1	0.7%
Residence	Urban	84	56.4%
	Rural	65	43.6%
Socio-economic Class	Upper	10	6.6%
	Middle	106	70.2%
	Lower	33	21.9%
Education	High school/some college	127	84.66%
	Graduate/postgraduate	23	15.33%

Table 2. Social media usage and sources of information.

Characteristics	Variables	Frequency	Percentage (%)
Daily Use of Social Media	0 - 2 hours	128	(85.33%) Majority
	>2 hours	22	(14.66%) Fewer
Most Used Platforms	Facebook, YouTube	31	Highest usage
	Instagram, TikTok, Twitter	4	Lower usage
	Not used	115	
Primary Information Sources	Doctors	108	72.5%
	Social media	4	2.66%
	Healthcare websites	9	6%
	Family/friends	7	4.66

regularly, and most spent between 0 - 2 hours on these platforms daily.

When asked about information sources regarding breast cancer, doctors were the most trusted and frequently used (72.5%), followed by social media, healthcare websites, and family or friends.

3.3. Knowledge about Breast Cancer Risk Factors

Respondents were asked about their knowledge of various risk factors for breast

cancer. As presented in Table 3, a large number of participants (79.2%) were not knowledgeable about age as a risk factor. Knowledge regarding family history, genetics, lifestyle, and dense breast tissue was moderate, with most respondents describing themselves as "not knowledgeable".

Table 3. Knowledge about breast cancer risk factors.

Risk Factor	Very Knowledgeable	Somewhat Knowledgeable	Not Knowledgeable
Age	24 (16.1%)	8 (5.3%)	118 (79.2%)
Family History	58	10	82
Genetic Factors	38	8	104
Lifestyle	73	13	63
Dense Breast Tissue	16	4	130

Table 4 highlights respondents' perceptions of social media's role in raising breast cancer awareness. While many participants had encountered breast cancer-related content on social media, 65.8% viewed this information as not reliable, with only 3.4% considering it very reliable. Despite skepticism about credibility, most reported a slight increase in awareness due to exposure.

Furthermore, many respondents indicated that social media positively influenced their likelihood of undergoing breast cancer screening. However, healthcare professionals remained the most trusted source of breast cancer-related information.

Table 4. Perceived impact and trust in social media.

Characteristics	Variables	Frequency	Percentage (%)
Reliability of Social Media Info	Not reliable	98	65.8%
	Somewhat reliable	47	31.5%
	Very reliable	5	3.4%
Impact on Knowledge	Slightly increased	–	Majority
Impact on Screening Behavior	More likely to screen	–	Majority
Most Trusted Source	Healthcare professionals	–	Highest trust
	Social media influencers	–	Low trust

3.4. Bivariate Analysis

Comparative Analysis between Social Media Platforms

The chi-square tests were conducted to examine the association between the type of social media platform used and knowledge about various breast cancer risk factors. The results varied across the factors analyzed, as shown in Table 5.

The chi-square test showed a significant association between social media usage and knowledge of age-related risk factors for breast cancer. The Pearson

Table 5. Chi-square test for comparative analysis between social media platforms.

S. No.	Variable pair	Pearson chi-square	P-value	Association significant?
1	Social Media Platform × Knowledge: Age	4.642	0.031	Yes
2	Social Media Platform × Knowledge: Family History	3.231	0.072	No
3	Social Media Platform × Knowledge: Genetics	6.001	0.014	Yes
4	Social Media Platform × Knowledge: Lifestyle Factors	6.594	0.010	Yes
5	Social Media Platform × Knowledge: Dense Breast Tissue	5.899	0.015	Yes
6	Social Media Platform × Exposure to Information	7.673	0.006	Yes
7	Social Media Platform × Perceived Reliability of Information	11.909	0.003	Yes
8	Social Media Platform × Impact on Knowledge	0.651	0.420	No
9	Social Media Platform × Screening Attitude	0.302	0.583	No
10	Social Media Platform × Trust in Information Source	3.762	0.152	No
11	Seen Info on social media × Perceived Reliability	13.442	0.001	Yes

chi-square value was 4.642 with a p-value = 0.031, indicating that social media users are more likely to be aware of age as a risk factor compared to non-users. No significant association was found between social media use and awareness of family history as a breast cancer risk factor. The Pearson chi-square value was 3.231 with a p-value = 0.072. A significant association was found between social media platform and knowledge of genetic risk factors. The Pearson chi-square was 6.001, p-value = 0.014. The chi-square value was 6.594 (p = 0.010), indicating a statistically significant association. Social media users demonstrated greater awareness of lifestyle factors such as diet and exercise affecting breast cancer risk. A statistically significant relationship was also found for awareness of dense breast tissue as a risk factor, with chi-square = 5.899, p = 0.015. There was a strong association between social media platform and whether the respondent had seen information related to breast cancer. Chi-square = 7.673, p = 0.006. Significant differences were observed in perceived reliability across platforms. Chi-square = 11.909, p = 0.003. No significant association was found between platform used and perceived impact on knowledge. Chi-square = 0.651, p = 0.420. No significant relationship was observed. Chi-square = 0.302, p = 0.583. No significant difference in trust across platforms. Chi-square = 3.762, p = 0.152.

3.5. Multivariate Analysis

Multiple linear regression analysis was conducted to identify significant predictors of breast cancer knowledge and attitudes toward screening. Independent variables included education level, socio-economic status, residential area, family history, and perceived social media reliability. The models explained between 4.33% and 13.21% of the variance in knowledge-related outcomes (R^2), with adjusted R^2 values ranging from 0.64% to 7.63%, indicating modest model fit. Significant predictors varied across outcomes; for example, education level significantly predicted

knowledge about age-related and genetic risk factors ($p < 0.05$) with 95% confidence interval level, while socio-economic status influenced awareness of lifestyle and breast density-related risks. Social media reliability and information sources significantly impacted overall knowledge improvement and screening attitudes ($p = 0.036$ and $p = 0.028$, respectively). All regression assumptions were checked and met, and the analysis was performed using Minitab version.

The overall regression models were not statistically significant for most dependent variables, except for Knowledge: Dense Breast Tissue ($p = 0.016$). This suggests that the independent variables, as a group, did not significantly predict knowledge of breast cancer risk factors in most cases. For Knowledge: Dense Breast Tissue, the F-value was 2.37 ($p = 0.016$), indicating that the model was statistically significant.

Age: Age was not a significant predictor of knowledge for any of the dependent variables (p-values ranged from 0.191 to 0.843). Marital Status: Marital status did not significantly influence knowledge of breast cancer risk factors (p-values ranged from 0.356 to 0.921). Residential Area: Residential area was a significant predictor only for Knowledge: Dense Breast Tissue ($p = 0.018$). Participants from urban areas had slightly lower knowledge compared to those from rural areas. Socio-Economic Status: Socio-economic status was a significant predictor for Knowledge: Lifestyle Factors ($p = 0.013$) and Knowledge: Dense Breast Tissue ($p = 0.008$). Participants from lower socio-economic backgrounds had lower knowledge compared to those from upper socio-economic backgrounds. Education Level: Education level was a significant predictor for Knowledge: Age ($p = 0.016$), Knowledge: Family History ($p = 0.011$), and Knowledge: Genetics ($p = 0.025$). Participants with higher education levels (college degree or postgraduate degree) had significantly higher knowledge compared to those with only a high school diploma. Several observations had large residuals (marked as "R"), indicating that the model did not fit these data points well. Observation 111 was flagged as an unusual X-value (marked as "X"), suggesting it may be an outlier or influential point.

The multiple linear regression analysis was performed to assess the impact of various independent variables on the dependent variable, "Impact on Knowledge". The results indicate that the overall regression model is statistically significant ($F = 1.76$, $p = 0.036$), suggesting that the included independent variables collectively explain a significant proportion of the variance in knowledge impact. However, the adjusted R-squared value is 9.65%, indicating that only a small percentage of the variance in the dependent variable is accounted for by the model.

Among the independent variables, the reliability of social media information ($p = 0.025$) and sources of information ($p = 0.038$) were found to have a statistically significant impact on knowledge. The coefficient for the reliability of social media information (category 2) was 0.363, indicating a positive association with knowledge impact. Similarly, sources of information category 5 had a coefficient of 0.750, suggesting that respondents relying on certain sources experienced a greater im-

pact on knowledge. Other variables, including age, daily hours spent on social media, marital status, residential area, socio-economic status, and education level, did not show statistically significant effects ($p > 0.05$).

The model summary statistics reveal that the standard error of the regression ($S = 0.7503$) is relatively high, indicating some degree of dispersion in the residuals. The lack-of-fit test ($p = 0.586$) suggests that the model does not suffer from a significant misfit. However, certain observations exhibited large residuals, as indicated in the diagnostics for unusual observations. These residuals highlight the presence of individual responses that deviated considerably from the model's predictions.

The multiple linear regression analysis was conducted to examine the impact of various predictors on the "Impact on Screening Attitude". The model included 19 predictors, and the results indicate that the overall regression model is statistically significant (F-value = 1.82, p-value = 0.028), as shown in Table 6. However, the adjusted R-squared value is 10.33%, suggesting that only 10.33% of the variance in the dependent variable is explained by the predictors in the model. This indicates that while the model is significant, it has limited explanatory power. The ANOVA in 6 shows that the regression model is significant (p-value = 0.028), but most individual predictors are not statistically significant. The only significant predictor is "Sources of Information" (p-value = 0.003), which has a strong impact on the screening attitude. Specifically, the coefficients for "Sources of Information" YouTube and others are significant (p-values = 0.002 and 0.004, respectively), indicating that these sources have a positive and significant influence on screening attitudes. Other predictors, such as age, daily hours on social media, marital status, residential area, socio-economic status, education level, social media platforms, and reliability of social media information, do not show. The coefficients table in Table 6 provides insights into the direction and magnitude

Table 6. Summary of multivariate regression analyses.

Outcome Variable	Significant Predictors	B-coefficient (95% CI)	P-value	Model R^2/Adj. R^2	Model Significance
Knowledge: Age	Education (College/Postgraduate)	0.330/0.249	0.016/0.046	10.31%/4.55%	Not Significant
Knowledge: Family History	Education (College/Postgraduate)	0.391/0.422	0.010/0.011	10.27%/4.50%	Not Significant
Knowledge: Genetics	Education (College/Postgraduate)	0.342/0.341	0.015/0.025	10.11%/4.33%	Not Significant
Knowledge: Lifestyle Factors	Socio-Economic Status (Lower)	0.448	0.013	6.64%/0.64%	Not Significant
Knowledge: Dense Breast Tissue	Residential Area (Urban), SES (Lower), Education	−0.1398, −0.081, 0.233	0.018, 0.008, 0.020	13.21%/7.63%	Significant ($p = 0.016$)
Impact on Knowledge	Social Media Reliability (Moderate), Info Source (Cat 5)	0.363/0.750	0.025/0.038	9.65% (Adj. R^2)	Significant ($p = 0.036$)
Impact on Screening Attitude	Sources of Information (YouTube/Others)	Not specified	0.002/0.004	10.33% (Adj. R^2)	Significant ($p = 0.028$)

of the relationship between each predictor and the dependent variable. For example: Sources of Information" YouTube has a coefficient of 0.557, indicating a strong positive impact on screening attitude. Sources of Information" Others has a coefficient of 0.378, also showing a positive but slightly weaker impact. Other predictors, such as age and daily hours on social media, have very small coefficients and are not statistically significant. The model summary shows that the standard error of the estimate (S) is 0.288816, indicating the average distance that the observed values fall from the regression line. The R-squared value of 22.95% suggests that the model explains 22.95% of the variance in the dependent variable, but the adjusted R-squared value of 10.33% indicates that the model's explanatory power is limited after adjusting for the number of predictors.

4. Discussion

The univariate analysis revealed that demographic factors such as age, gender, marital status, and residential area significantly influence breast cancer awareness. A predominance of middle-aged female respondents, who are at higher risk for breast cancer, reinforces the relevance of this demographic for awareness campaigns. Urban respondents, likely due to better access to healthcare services and information, exhibited relatively higher awareness levels compared to rural populations. Socio-economic and educational backgrounds also played critical roles; middle-class participants with at least a high school education were more knowledgeable about breast cancer, indicating that affordability and health literacy affect awareness levels. Social media platforms, particularly Facebook and YouTube, emerged as the most frequently used sources of information, underlining their importance in future awareness strategies. However, since most respondents engaged with social media for limited durations, awareness content should be concise and impactful. Moderate awareness of risk factors such as age, lifestyle, family history, and dense breast tissue indicates some success of existing educational efforts, although gaps persist—especially concerning genetics and dense breast tissue. While social media contributed modestly to knowledge gains and attitudes toward screening, skepticism about its reliability remained. Respondents primarily trusted healthcare professionals, highlighting the need for collaboration between credible medical sources and social media campaigns to enhance both trust and effectiveness. The limited number of additional comments from participants suggested a general satisfaction with available information or a lack of awareness about existing knowledge gaps, emphasizing the importance of structured, targeted educational interventions.

The bivariate analysis confirmed that social media is a significant channel for disseminating information on specific breast cancer risk factors such as age, genetics, lifestyle, and dense breast tissue. Interestingly, family history did not show a statistically significant relationship with social media use, likely due to its personal nature and the tendency for such information to be shared within families or by healthcare professionals. Platform-specific patterns revealed that Facebook

users reported higher exposure to breast cancer information, which could be due to the platform's content algorithms and demographic reach. Furthermore, the platform used influenced perceived information reliability, although it did not significantly affect overall knowledge, screening attitudes, or trust in information sources. This finding suggests that while social media platforms differ in how users perceive and encounter content, they are not inherently more effective in changing health behavior or trust levels. Exposure to information on social media was significantly associated with perceived credibility and increased knowledge; however, it did not lead to significant changes in screening behavior or trust in information sources. This points to a gap between awareness and actionable health behavior, likely influenced by external barriers such as healthcare access, personal beliefs, or content quality. Overall, while social media proves effective in information dissemination, its influence on behavioral change remains limited and warrants further investigation into factors like content quality, user engagement, and trust-building mechanisms.

In the multivariate analysis, multiple linear regression showed that education level and socio-economic status were the strongest predictors of knowledge about breast cancer risk factors. Participants with higher education and from upper socio-economic backgrounds had significantly better awareness of factors such as age, genetics, family history, and dense breast tissue, consistent with literature on health literacy. However, the models had low explanatory power (low R^2), suggesting that additional factors such as access to healthcare, cultural influences, or personal experiences with breast cancer also significantly contribute to knowledge levels. Notably, residential area was a significant predictor of knowledge related to dense breast tissue, with rural participants showing higher awareness—a surprising result that may reflect targeted campaigns or differential healthcare interactions. Age and marital status were not significant predictors, diverging from prior studies and perhaps reflecting sample-specific dynamics. Regarding knowledge impact, trust in the reliability of social media content and the credibility of information sources were the most important predictors, while demographic factors and time spent on social media were not significant. This underscores the importance of content quality over mere exposure. The model's low adjusted R^2 and the presence of large residuals suggest that variables like cognitive engagement or fact-checking behavior should be explored in future research. When analyzing screening attitudes, the only significant predictor was the information source, with platforms like YouTube showing some positive influence. Nonetheless, other demographic variables were not significant, and the model explained just 10.33% of the variance, suggesting that attitudes toward screening are influenced by complex, unmeasured factors such as psychological readiness or cultural norms. Lastly, trust in information sources was significantly predicted only by the perceived reliability of social media content. Again, the model's explanatory power was low, indicating that trust is shaped by broader societal and personal factors beyond those measured. These findings collectively highlight the nuanced and multifactorial

nature of breast cancer awareness, emphasizing the need for high-quality, credible content and a deeper exploration of the psychological and cultural underpinnings of health behaviors.

5. Conclusions

This study provides a comprehensive analysis of the role of social media in spreading awareness and shaping attitudes toward breast cancer risk factors. While social media platforms have significantly enhanced the accessibility of health-related content, their effectiveness in promoting preventive actions and behavioral change remains limited. The study found that while many participants encountered breast cancer-related information on social media, they continued to rely primarily on healthcare professionals for accurate and trustworthy guidance. This reflects a persistent gap in trust between social media-generated content and professional medical advice. The results also indicate that social media exposure increases awareness of some key risk factors, such as age, genetic predisposition, and lifestyle influences. However, there were still notable knowledge gaps, particularly in understanding the role of dense breast tissue and hereditary factors in breast cancer development. While participants acknowledged the importance of breast cancer screening, their engagement in self-examinations, mammography, and clinical checkups remained inconsistent. This suggests that although social media provides useful educational content, it does not necessarily translate into a significant increase in preventive health behaviors.

The study further highlights that Facebook and YouTube were the most effective platforms in spreading awareness, while platforms like Instagram and Twitter had a comparatively lower impact. The analysis of statistical correlations demonstrated that individuals actively engaging with health-related content on social media had better knowledge of certain risk factors, but their screening practices were not significantly influenced. This suggests that mere exposure to digital health campaigns is insufficient for changing health behaviors; additional intervention strategies are required. Given these findings, the study emphasizes the need for healthcare institutions to collaborate with social media platforms to ensure that the information being disseminated is accurate and impactful. Public health campaigns should integrate expert-verified content and interactive engagement strategies to bridge the gap between awareness and action. Future research should explore the psychological and socio-economic factors that hinder individuals from adopting preventive healthcare behaviors despite their exposure to health awareness campaigns.

Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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