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FACTORS ASSOCIATED WITH BREAST CANCER SCREENING SERVICES AMONG WOMEN ATTENDING THREE DISTRICT HOSPITALS IN KIGALI CITY, RWANDA

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Abstract: **Breast cancer remains a global health problem causing the death among female cancers worldwide, responsible for about 1 in 6 cancer deaths and 2.3 million new cases each year. According to Globocan 2021, the rate of breast cancer in Rwanda is approximately 40.7 cases per 100 thousand women, and the rate of mortality is 20 per 100 thousand. Therefore, this study aims to investigate the factors having an influence on the utilization of the services related to breast cancer screening services among women. It is a cross-sectional study targeting women between 18 to 65 years attending three District Hospitals (Masaka, Nyarugenge, and Muhima) in Kigali city. A sample size of 387was used from Cochrane sample size formula. Univariate, bivariate and multivariate analyses were conducted to assess significant factors related to breast cancer, employing logistic regression to adjust for confounders. The findings indicated that only 4.4% of respondents had ever undergone a breast cancer screening test. In addition, individuals who were exposed to greater awareness through educational campaigns and media were significantly more likely to utilize breast cancer services (AoR) of 8.265 (p = 0.001). Those who had access to services that were convenient and accessible were 11.628 times more likely to use breast cancer services (p < 0.001). Similarly, those who had access to free or subsidized screenings were 7.168 times more likely to seek out these services (p = 0.03). On the other hand, family history of breast cancer and personal risk perception did not show significant associations with the use of breast cancer services. At the end of this study, the researcher recommends enhancing public awareness campaigns, improving accessibility and convenience of screening services, expanding free or subsidized screening programs and investigating the role of family history and risk perception.**

Keywords: **Factors, Breast Cancer, Screening Services, Kigali City, Rwanda.**

1. INTRODUCTION

Breast cancer is the most commonly diagnosed cancer among women worldwide, with around 2.3 million new cases observed in 2021, representing roughly 11.8% of all cancer detected (Sung, 2022). This high incidence makes breast cancer a serious public health concern globally. In high-income countries, structured screening programs like mammography have facilitated earlier detection of breast cancer and improved survival rates, with five-year survival rates exceeding 90% in some regions (Allemani et al., 2018). Though, in developing countries, where organized screening is less common, survival rates are much lower, often due to late-stage diagnosis.

Despite the proven impact of screening in reducing the mortality related to breast cancer, global disparities in screening uptake remain a challenge. In high-income countries, screening coverage can be as high as 70-80%, while in many low-income regions, it remains below 10% (Bray et al., 2018). Factors such as socioeconomic status, education level, and healthcare access play significant roles in these disparities. Additionally, cultural beliefs and stigma associated with cancer can further limit participation in screening programs, particularly in regions where there has little information regarding the meaning of detecting earlier the disease (WHO, 2024).

In Africa, breast cancer is the 2nd most widespread cancer among women, following cervical cancer, with approximately 187,127 new cases identified in 2019 (Ferlay et al., 2020). The region faces an alarmingly high mortality rate for breast cancer, with five-year survival rates in some sub-Saharan African countries dropping as low as 41% (Jedy-Agba et al., 2016). This high mortality is largely due to late diagnoses, which are prevalent because of the scarcity of widespread screening programs and the limited availability of diagnostic and treatment services (Bleyer & Welch, 2022). Consequently, many women in Africa receive their diagnosis at advanced stages of the disease, where treatment options are more limited and less effective (Fadare, Akinsulie & Ojo, 2021).

In Rwanda, this disease is the main prevalent cancer among women, with approximately 1,268 new cases of the disease and 607 deaths in 2019 (GLOBOCAN, 2020). The survival rate of 5 years for breast cancer in Rwanda is relatively low compared to global standards, largely due to the late stage at which most women are diagnosed. The country has made commendable progress in improving access to healthcare services, yet the use of services of breast cancer screening is still limited. In Rwanda, most of women diagnosed for breast cancer were at advanced stages of the cancer, reflecting the need for improved early detection and screening efforts (Uwimana et al., 2023). Study done in three districts of Rwanda with around 1.3 million population, only around 9700 were screened (Pace et al., 2023).

In Kigali City, for which access to healthcare services is better compared to rural areas, the uptake of breast cancer screening services is still far from optimal. Several factors contribute to this, including financial barriers, lack of awareness, and cultural beliefs that prevent women from seeking screening services. Although the Rwandan government, in collaboration with various international and local partners, has launched initiatives to promote breast cancer awareness and screening, challenges such as insufficient trained personnel, limited mammography equipment, and high out-of-pocket costs for screening persist (Rwanda Ministry of Health, 2022).

The study focused on Masaka, Muhimaand Nyarugenge, hospitals where the utilization of breast cancer screening services remains suboptimal. Despite these facilities being relatively well-equipped, the low uptake of screening services reflects broader systemic challenges and a gap in understanding the factors influencing women's involvement in regular screening (Uwimana et al., 2023). Therefore, there is a pressing need to analyze the factors associated with the screening of breast cancer among women attending screening at hospitals, in order to improve the overall effectiveness of its detection and treatment.

2. MATERIALS AND METHODS

Research design

In this study, the researcher used a cross-sectional research design with quantitative research approach.

Study population

The study targets women aged 18 to 65 years old attending three district hospitals: Masaka, Nyarugenge and Muhima hospitals.

Sample size

The sample size of 387 respondents was obtained using the Cochran’s formula.

Research instruments

This study employed structured a questionnaire. It has 5 parts: Part 1 comprises socioeconomic characteristics of respondents. Part 2 comprises information related to awareness of the women on the factors linked to breast, factors linked to screening, and the methods that were used in screening breast cancer; Part 3 is related to perception of breast cancer risk and severity which used Likert scale measurement: 2=D: Disagree, 1=SD: Strongly Disagree, 4= A: Agree, 3: N: Neutral, 5=SA: Strongly Agree; Part 4 is related to the influence of health facilities on breast screening while Part 5 comprises socioeconomic factors preventing women from conducting breast screening

3. DATA ANALYSIS PROCEDURE

Descriptive analysis was performed on quantitative data to report frequencies and percentages. To assess the level of the use of screening service (Breast cancer examen, ultrasound and mammograms) among women who were recorded among those attending the three hospitals in The City of Kigali. The breast cancer screening service use and nonuse were based on to measure the prevalence of breast cancer screening service use. Univariate analysis was used for descriptive purposes. To

analyze factors linked to the utilization of the services of its screening among women in the three hospitals, both bivariate and multivariate analyses were conducted. Bivariate analysis employed Chi-square tests. Significant variables were further examined using logistic regression. The significance was <0.05 of p and 95% of CI.

Ethical consideration

Ethical approval for the study was obtained from Mount Kenya University (MKU). Authorization for data collection was secured from the directors of Masaka, Nyarugenge, and Muhima District Hospitals. Participation was voluntary, with informed consent obtained after a thorough explanation of the study's purpose and procedures. Participant privacy, dignity, and confidentiality were upheld throughout. Data were anonymized using unique ID codes, securely stored, and managed in a protected database. No personal identifiers appeared on questionnaires or reports. A separate consent-linking document was destroyed after data cleaning. Participants were informed there were no direct risks or benefits, but the study aims to contribute to future policy development.

4. FINDINGS

Table 1. Breast cancer services among women attending three district hospitals in Kigali city

Variable	Frequency	Percentage
Have you ever undergone a breast cancer screening test?		
Yes	17	4.4
No	370	95.6
Total	387	100.0
Clinical breast examination		
Yes	17	4.4
No	370	95.6
Total	387	100.0
Self-breast examination		
Yes	1	0.3
No	386	99.7
Total	387	100.0
Mammography		
Yes	2	0.5
No	385	99.5
Total	387	100.0
Ultrasound		
Yes	3	0.8
No	384	99.2
Total	387	100.0
Past cancer diagnosis		
Yes	0	0.0
No	387	100.0
Total	387	100.0
How frequently do you get screened for breast cancer?		
Annually	16	4.1
Every 3 years	1	0.3
Only When symptoms are present	119	30.7
None	251	64.9
Total	387	100.0

Source: Researcher, 2025

Table 4.2 presents data on the utilization of breast cancer screening. The findings indicate that only 4.4% of respondents had ever undergone a breast cancer screening test, while the majority (95.6%) had never been screened. Similarly, only 4.4% of participants reported having undergone a clinical breast examination, whereas 95.6% had not.

Regarding self-breast examination, an overwhelming 99.7% of respondents reported never performing it, with only 0.3% indicating they had done so. The utilization of mammography was also notably low, with just 0.5% of participants having undergone the procedure, while 99.5% had never had a mammogram. Ultrasound screening for breast cancer was reported by 0.8% of respondents, whereas 99.2% had not undergone this diagnostic procedure.

None of the study participants had been diagnosed with breast cancer in the past. When asked about the frequency of breast cancer screening, 4.1% of respondents stated they get screened annually, and 0.3% reported screening every three years. A considerable proportion (30.7%) indicated they only seek screening when symptoms are present, while the majority (64.9%) had never undergone any screening.

The overall screening service use was presented in Figure 1. This item was based on the breast cancer services including clinical checking and complementary tests as listed above done by doctor or other health professional. It is the result on the following question: Have you ever had a breast exam done by a doctor or other health professional to check for lumps or other signs of breast cancer?

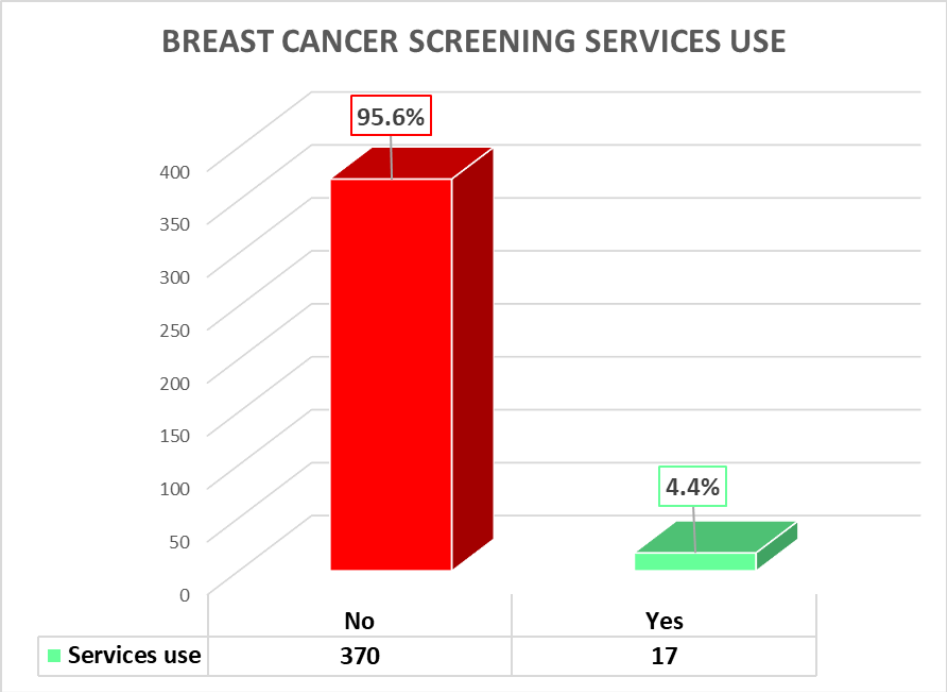

Figure 1. Breast cancer services use

The findings in Figure 1 indicate that only 4.4% of respondents had undergone a breast cancer screening test, while the majority (95.6%) had never been screened.

Table 2. Multivariate analysis of factors associated with breast cancer service use

Variables	Breast cancer service use. (n=387)		P-value
	AoR	95%CI	
Increased awareness/Mass media and education			
No	Ref		
Yes	8.265	3.403-16.725	**0.001**
Family History			
No	Ref		
Yes	0.107	0.004-3.066	0.1

Breast cancer personal risk perception			
No	Ref		
Yes	4.318	0.652-14.581	0.1
Aware that mammogram is breast cancer screening test			
No			
Yes	0.007	0.001-0.084	**0.001**
Improved accessibility and convenience			
No	Ref		
Yes	11.628	5.071-23.657	**<0.001**
Free subsidized screening			
No	Ref		
Yes	7.168	1.176-18.684	**0.03**

Source: Researcher, 2025

The multivariate analysis in Table 4.12 identifies several significant factors influencing the use of breast cancer services. Among these, increased awareness through mass media and education emerged as a key determinant. Individuals who were exposed to greater awareness through educational campaigns and media were significantly more likely to utilize breast cancer services, with an odds ratio (AoR) of 8.265 ($p = 0.001$).

Another important factor was knowledge about mammograms as a breast cancer screening test. Individuals who were aware that mammograms are used for breast cancer screening were significantly more likely to engage with breast cancer services. With an AoR of 0.007 ($p = 0.001$). Improved accessibility and convenience were also strongly associated with increased service use. Those who had access to services that were convenient and accessible were 11.628 times more likely to use breast cancer services than those without such accessibility ($p < 0.001$).

Similarly, free or subsidized screening was a major motivator for individuals to use breast cancer services. Those who had access to free or subsidized screenings were 7.168 times more likely to seek out these services compared to those who did not ($p = 0.03$).

On the other hand, family history of breast cancer and personal risk perception did not show significant associations with the use of breast cancer services. While individuals with a family history of breast cancer or those who perceive themselves as at higher risk for the disease might be expected to utilize services more, the multivariate analysis found no statistically significant effect. The AoR for family history was 0.107 ($p = 0.1$), and for personal risk perception, it was 4.318 ($p = 0.1$), both of which did not reach the level of statistical significance.

5. DISCUSSION

The findings from Figure 1 revealed a strikingly low uptake of breast cancer screening, with only 4.4% of respondents having ever undergone a screening test, while a substantial 95.6% had never been screened. The finding of only 4.4% of respondents having undergone a breast cancer screening aligns with reports from other regions with similar socio-economic conditions. For instance, a study done in Uganda by Kigozi et al. (2021) also found that breast cancer screening uptake remained low, with only 5% of women engaging in regular screening practices (Kigozi et al., 2021). Similarly, studies in Kenya and Tanzania, such as those by Nguena et al. (2021), have shown that cultural factors, lack of awareness, and limited access to healthcare facilities significantly reduce the likelihood of women seeking breast cancer screening (Nguena et al., 2021). These findings underscore a common challenge in Sub-Saharan Africa, where breast cancer awareness remains low, and preventive health services, such as mammography, are not widely available or accessible.

The multivariate analysis in Table 2 highlighted several significant factors that influence the utilization of breast cancer services, providing valuable insights into the determinants of service use. The strong association between increased awareness through mass media and education and the likelihood of using breast cancer services is a key finding. Individuals who had been exposed to educational campaigns and media were significantly more likely to engage with breast cancer services, with an odds ratio (AoR) of 8.265 ($p = 0.001$). This finding is consistent with other studies that emphasize the importance of awareness campaigns in improving health-seeking behavior. On that issue, a study in Nigeria by Akinboro et al. (2021) found that women who received information about breast cancer from various media outlets were more likely to undergo breast cancer screening (Akinboro et al., 2021). Similarly, Kimmick et al. (2021) in the United States noted that

mass media campaigns can significantly increase knowledge and awareness about breast cancer, thereby encouraging women to utilize screening services. Thus, enhancing public awareness through mass media and educational initiatives is an effective strategy to improve the uptake of breast cancer services.

Knowledge of mammograms as a screening tool for breast cancer also played a significant role in increasing service use. Those who knew that mammograms were used for breast cancer screening were significantly more likely to use breast cancer services, with an AoR of 0.007 ($p = 0.001$). This finding aligns with research conducted in other countries, such as Uganda, where increased knowledge about the availability and purpose of mammography was associated with a higher likelihood of screening uptake (Kigozi et al., 2021). Similarly, a study in Kenya by Nguena et al. (2021) showed that knowledge about breast cancer and its screening methods directly influenced women's decisions to participate in screening programs. These findings highlight the critical role that education plays in empowering individuals to take preventive health measures.

Another key determinant of service utilization was the accessibility and convenience of breast cancer services. Individuals who had access to services that were easier to reach and more convenient were found to be 11.628 times more likely to use breast cancer services compared to those who did not have such access ($p < 0.001$). This finding is supported by a study conducted in India, where researchers found that the lack of accessible and convenient healthcare facilities was one of the major barriers to breast cancer screening (Gupta et al., 2020). Accessibility challenges, including long travel distances to health facilities, long waiting times, and inconvenient service hours, are common barriers in many low- and middle-income countries. Therefore, improving the infrastructure and logistics of healthcare services to make them more accessible is a critical factor in increasing breast cancer service utilization.

The availability of free or subsidized breast cancer screening was another strong motivator for individuals to seek breast cancer services, with those having access to such services being 7.168 times more likely to utilize them ($p = 0.03$). This finding is consistent with studies from other countries where financial barriers were found to be a major determinant of healthcare access. In a study conducted by Li et al. (2022) in China, providing free or low-cost breast cancer screening services significantly increased participation rates, especially among women from low-income backgrounds (Li et al., 2022). Similarly, a study by Akinboro et al. (2021) in Nigeria showed that subsidized screening programs could alleviate the financial burden on women and encourage more frequent engagement with breast cancer screening services. In resource-limited settings, removing the financial barrier to screening is crucial in improving access to essential health services.

Surprisingly, family history of breast cancer and personal risk perception did not significantly influence the use of breast cancer services in this study. The odds ratios for family history (0.107, $p = 0.1$) and personal risk perception (4.318, $p = 0.1$) were both not statistically significant. This contrasts with findings from other studies, which suggest that individuals with a family history of breast cancer or those who perceive themselves to be at higher risk are more likely to seek screening services. For instance, a study by Gupta et al. (2020) in India found that women with a family history of breast cancer were more likely to participate in screening programs. Similarly, Nguena et al. (2021) reported that individuals who believed they were at higher risk for breast cancer showed a greater tendency to utilize screening services. The lack of significant findings in this study may be attributed to cultural factors, limited knowledge of the genetic component of breast cancer, or a general lack of awareness regarding personal risk factors in the study population.

This study has several limitations, including its cross-sectional design, which prevents establishing causality, and the reliance on self-reported data, which may introduce recall bias. The geographic focus limits generalizability, and psychological or cultural barriers were not explored in depth. Despite these limitations, the findings highlight the need for targeted public health strategies to raise awareness, reduce financial barriers, and improve access to breast cancer services. Future research should investigate personal risk perception and family history as potential influencers of service use.

6. CONCLUSION

The study found that breast cancer screening uptake was very low, with fewer than one in twenty respondents having ever been screened. Key factors influencing service use included education, awareness, accessibility, and affordability, while family history and personal risk perception appeared less influential. The findings underscore the importance of public health education and reducing financial and logistical barriers to improve screening rates.

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Availability of data and materials

Dataset was shared.

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