Original Research Article

Factors influencing the uptake of breast cancer screening services among women of reproductive age: A case study of Turbo sub-county, Kenya

ABSTRACT

Aim: To determine the prevalence, socio-demographic, and health system factors influencing the uptake of breast cancer screening (BCS) services among women of reproductive age (WRA).

Methods: An analytical cross-sectional research design was used which employed mixed-methods approach. Multi-stage and purposive sampling techniques were used to select the study location and to recruit study participants. A semi-structured questionnaire was administered to WRA participants. A subset of respondents took part in the qualitative study.

Results: The study sample was 317 WRA. The prevalence of uptake of breast cancer screening services was 10.2%. Being employed (OR=5.6, 95% CI: 1.81-17.47) and earning a high income (OR=4.9, 95% CI: 1.22-19.47) increased the likelihood of uptake of BCS services. The presence of outreach programs (OR=3.8, 95% CI: 0.07-0.97), reduced screening charges (OR=1.1, 95% CI: 2.22-4.30), reduced distance to the health facilities (OR=3.2, 95% CI: 1.07-9.51), and reduced waiting time (OR=3.3, 95% CI: 0.10-0.96) augmented the odds of uptake of BCS services.

Conclusion: The uptake of breast cancer screening services was low (10.2%). Based on these findings, the government should subsidize screening services for low-income earners and the unemployed. The ministry of health should improve access to breast cancer screening services and reduce waiting period.

Keywords: Breast cancer, screening, uptake, prevalence, women of reproductive age

1. INTRODUCTION

Breast cancer (BC) is a significant public health problem. It is the most prevalent cancer diagnosed among women and the leading cause of cancer mortality in the world (1). It accounts for 1 in 4 cancer cases and 1 for 6 cancer deaths among women positioning it 1st for incidence and 5th for mortality in 159 of 185 countries (2). Additionally, it globally accounted for 17.42 million years of disability-adjusted life years (DALYs) for all ages in 2017, with the highest number of 694.23 being from Sub-Saharan Africa (SSA) (3). In Africa, breast cancer screening rates has remained low. In South Africa for example, the prevalence of mammography screening among women aged ≥30 years was 13.4% compared to the Papanicolaou smear test which was 52% (4). The low mammography screening rates were ascribed to high screening charges and decreased accessibility of breast cancer screening services (5).

In 2020, Kenya had a 5-year prevalence of BC of 57.28 per 100 000 (15,496) leading to 23% of all cancer cases (1). In the same year, 6,799 (16.1%) new cases of BC were diagnosed and 3,107 (11.5%) deaths due to BC recorded (6). In a recent study conducted at Kenyatta National Hospital (KNH), 7.4% of women were diagnosed with BC in stage I, 33.7% in stage II, and 50.7% in stage III and IV (7). Uasin Gishu county of Kenya has been ranked among the top western counties with a high prevalence of breast cancer at 13.6% (8). Breast cancer is 2nd most prevalent cancer among women in the county (8). Statistics from medical records have shown most of these cases are from Turbo sub-county. Furthermore, out of 10 breast cancer patients, 7 are diagnosed at a late stage (9).

Breast cancer screening rates for women have remained low in Kenya despite the national-level programs advocating for educational and mass screening activities in both national and community settings (10). Early screening improves survival rates, preserves the quality of life (QOL), and reduces the financial burden related to treatment (11). It is reported that 88% of the women in Kenya have not undergone any BC screening (12). This recent research aimed to elucidate the socio-demographic and health system factors influencing the uptake of breast cancer screening services among women of reproductive age (WRA) in Turbo Sub-County in Kenya.

2. METHODOLOGY

2.1 Research design

An analytical cross-sectional research design that employed both quantitative and qualitative approaches was used for triangulation purposes. The research design was effective since it tested and quantified the association between independent variables and uptake of breast cancer screening services.

2.2 Study location

The research was carried out in Turbo sub-county of Uasin Gishu county which is located in the North West of Eldoret Town and it constitutes the largest population of Uasin Gishu County of 267,273 of which 133,682 are female (13).

2.3 Sample size

A total of 317 WRA respondents were interviewed for quantitative data. For qualitative research, six interviews comprising 26 respondents were conducted. It entailed four focus group discussions (FGDs) and two key informant interviews (KIIs).

2.4 Target population

All WRA in Turbo sub-county were targeted because the increased risk of BC has been associated with changes in reproductive patterns including a shorter period of breastfeeding and low parity (14). Additionally, Sayed *et al,* found out that among the diagnosed cases of BC in Kenya, almost 16 were aged below 25 years indicating the need for further research in this understudied age category (15).

2.5 Sampling strategy

Women of reproductive age who were from eight randomly selected villages in Turbo Sub-County were recruited into this study. Multistage sampling was used to recruit eligible respondents. A list of households having WRA was obtained from the chief, where a systematic method of sampling was used to select households. The sampling interval was determined by dividing the total number of households consisting of WRA by the calculated sample size. At the household level, in circumstances where more than one WRA was found, simple random sampling by lottery method was used to recruit one.

2.6 Data collection methods and procedures

A pre-tested semi-structured questionnaire was used to collect quantitative data. The tool focused on establishing the prevalence of uptake of BC screening services. The respondents were required to recall and report if they have ever been screened by a health care provider for the past three years. Furthermore, the tool explored socio-demographic and health system factors influencing the uptake of BC screening services. A validated FGD guide and KII guide was used to collect qualitative data. The FGDs were done with WRA who voluntarily availed themselves for the scheduled discussions. The KIIs were carried out with the clinical officer and nursing officer in-charge who were specialists in this subject matter. Both the discussions and the interviews focused on understanding the uptake of BC screening services, socio-demographic and health system factors.

2.7 Data analysis and presentation

Quantitative data was analyzed using Statistical Package for Social Sciences (SPSS) version 26. Cleaned data was imported from excel to SPSS version 26 for analysis. Breast cancer prevention modalities including clinical breast examination, mammography, ultrasound, and biopsy were considered as binary dependent variables. Independent variables were socio-demographic and health system factors. The data were analyzed in univariate, bivariate, and multivariate. Variables that had a p-value of < 0.05 at bivariate analysis were considered for multivariable analysis. Indicators with a p-value of < 0.05 at multivariable analysis were statistically significant. These data were presented using tables and charts.

Regarding qualitative data, a thematic content analysis approach was used. Audio recorded data was transcribed into textual format. Transcripts were uploaded into NVIVO version 11 for analysis. Auto coding was done based on research questions. Similar responses under each sub-theme were identified and coded as grandchild code. Data were presented verbatim.

3. RESULTS

3.1 Prevalence of utilization of breast cancer screening services

Out of 317 interviewed participants, 284 fully responded to the posed questions translating to a response rate of 90%. As shown in table 1, only 29/284 (10.2%) of the participants responded to having ever screened for BC over the past three years. Of the screened participants, majority (69%) were screened by clinical breast examination. On the follow-up question, as indicated in the same table, early detection (38.7%) was the most popular reason for the uptake of BC screening services. Corroborating quantitative results, the majority of the participants in qualitative research indicated that most women were not screened for BC. The nursing officer in charge cited that:

"The uptake of breast cancer screening services is low. It's very low because of knowledge, women are not so much knowledgeable" (Nursing officer In-charge, KII1).

Table 1. Prevalence of uptake of breast cancer screening services

Dependent variable	Categories	Frequency	Percentage%
Ever screened for breast cancer	Yes	29	10.2
	No	255	89.8
Screening methods	Clinical breast examination	20	69
	Mammography	8	27.6
	Biopsy	1	0.4
Reason for screening	Early detection	12	38.7
	Changes in the breast	14	14.2
	History of breast cancer	5	16.1

3.2 Frequency distribution table on socio-demographic factors and uptake of breast cancer screening services

As illustrated in table 2, the age group sampled was between 15-49 years. The mean age of the participants was 30.14±9.64. The majority of them were between 20-29 years (35.9%). More than half of the participants were married (57.7%), and the rest were either single, divorced, widowed, or separated. Similarly, more than half of the respondents had more than one child (57.7%). Only 21.5% were in formal employment and most (62.7%) earned below Ksh. 6,000 per month. Close to half of the respondents (46.5%) had attained secondary school education, with most of them (76.4%) reporting no history of BC in their families.

Table 2. Univariate analysis on socio-demographic factors

Independent variable	Categories	Frequency	Valid percentage %

Age	15-19	44	15.5
	20-29	102	35.9
	30-39	77	27.1
	40-49	61	21.5
Marital status	Married	164	57.7
	Single	92	32.4
	Divorced	15	5.3
	Widowed	7	2.5
	Separated	6	2.1
Parity status	Nulliparous	69	24.3
	Uniparous	51	18.0
	Multiparous	164	57.7
Education level	None	12	4.2
	Primary	80	28.2
	Secondary	132	46.5
	Tertiary	60	21.1
Employment status	Employed	61	21.5
	Self-employed	109	38.4
	Unemployed	97	34.2
	Retired	1	0.4
	Student	16	5.6
Income	≤ Ksh 6,000	178	62.7
	> Ksh 6,000	106	37.3
Family history of BC	Yes	67	23.6
	No	217	76.4

3.3 Bivariate and multivariable analysis on socio-demographic factors

According to table 3, the following socio-demographic variables run on chi-square test of independence revealed a significant relationship: Age (X^2 =14.43, *df* =3, *p*<0.001), Marital Status (X^2 =13.85, *df* =4, *p*=0.01), Parity Status (X^2 =6.94, *df*=2, *p*=0.03), Level of education (X^2 =13.76, *df* =3, *p*<0.001), Employment Status (X^2 =25.73, df=4, *p*<0.001, and Income (X^2 =24.34, *df* =4, *p*<0.001).

Variables that were found to have a significant relationship with the dependent variable were modeled into a binary logistic regression analysis to develop a prediction model as illustrated in the same table. The Wald criterion showed that monthly income (p=0.03) and employment status (p<0.001) contributed significantly to the prediction model. Individuals with high monthly income were 4.9 times more likely to seek BC screening services compared to individuals with a low monthly income. Correspondingly, most of the women in the FGDs were of the opinion that income plays a critical role in the uptake of breast cancer screening services. They expressed that high income augments the usage of BC screening services. One respondent narrated: *"Then another factor is income. Women whose income is low will budget that money on food. The money is not enough to cater for breast cancer screening services" (R2, 20-29, FGD2).*

Concerning employment, those in formal employment were 5.6 times more likely to seek screening services compared with students. There was no significant difference between the self-employed, unemployed, and the retired compared to students. In the same way, in all the FGDs, women associated employment with more financial power in catering to BC screening services. A participant opined that; *"Another reason is employment. Unemployed women, like us who wash clothes for others, do business of selling vegetables, it is difficult to get enough money to cater for breast cancer screening services expenses" (R2, 15-19, FGD1).*

Table 3. Bivariate and multivariate logistic regression analysis on socio-demographic factors influencing uptake of breast cancer screening services

Independent variable	**Chi-square test for independence**	**Binary logistic regression OR 95% CI**	**p-value for binary logistic regression**
Age	X^2=14.43		
	df=3		0.39
15-49	p*<0.001	17 (0.00)	1.00
20-29		2.25(0.58, 8.80)	0.24
30-39		0.73(0.23, 2.26)	0.58
40-49		Reference	
Marital status	X^2= 13.85		
	df=4	0.00 (0.00)	0.23
Married	p=0.01	0.00 (0.00)	1.00
Single		0.00 (0.00)	1.00
Divorced		0.00 (0.00)	1.00
Widowed		0.00 (0.00)	1.00
Separated		Reference	
Parity status	X^2=6.94		0.63
	df=2		
Nulliparous	p=0.03	2.31 (0.41, 12.97)	0.34

Uniparous		1.21 (0.29, 4.93)	0.80
Multiparous		Reference	
Level of education	X^2=13.76		
	df=3		0.34
None	p*<0.001	1.42 (0.10, 19.40)	0.79
Primary		7.11 (0.63, 80.83)	0.11
Secondary		0.88 (0.29, 2.69)	0.83
Tertiary		Reference	
Employment status	X^2=25.73		0.01
	df=4		
Employed	P*<0.001	5.62 (1.81, 17.47)	<0.001
Self-employed		1.21 (0.23, 6.45)	0.82
Unemployed		53 (0.00)	1.00
Retired		0.04 (0.00, 1.57)	0.09
Student		Reference	
Income	X^2=24.34		
≤ 6,000	Df=1	4.91 (1.22, 19.81)	0.03
>6,000	P<0.001		
Family history	X^2=0.01	-	-
	Df=1		
Yes	P=0.94	-	-
No		-	-

3.4 Frequency distribution table on health system factors and uptake of breast cancer screening services

As demonstrated in table 4, radio was the most popular source of information 27.9%. Only 12% responded having had an outreach program targeted to BC screening, with 17.6% of the respondents affirming having ever received social support from a healthcare provider on how to conduct a self-breast examination (SBE). When asked about their perception of the distance to health facilities, close to half of the participants (46.1%) felt that the health facilities were near. Most of the respondents (62.3%) were not aware whether BC screening services were charged or free. One-third of the respondents (33.8%) had health insurance covers. A section (19.4%) mentioned that facilities near their residence offered BC screening services. On waiting time, 66.2% of the respondents reported they normally had to wait for more than an hour to be attended to.

Table 4. Health system factors and uptake of BC screening services

Independent variable	Categories	Frequency (N)	Valid percentage %
Source of information	Television	75	25.2
	Radio	83	27.9
	Internet	14	4.7
	Hospital	39	13.1
	Family/Relatives	46	15.4
	Schools	12	4.1
	Friends	13	4
	Church	8	2.7
	I have never heard	8	2.7
Outreach programs	Yes	34	12
	No	250	88
Frequency of outreach programs	Monthly	2	5.9
	Yearly	14	17.6
	Once in a while	26	76.5
Social support for SBE	Yes	50	17.6
	No	234	82.4
Distance to the nearest hospital that offers BC screening services	Near	117	46.1
	Far	137	53.9
Breast cancer screening charges	Yes	41	14.4
	No	66	23.2
	I don't know	177	62.3
Insurance cover	Yes	96	33.8
	No	188	66.2
Presence of specialized BC screening services in the nearby hospital	Yes	55	19.4
	No	174	61.3
	I don't know	55	19.4
Waiting time	0-30 minutes	69	24.3

31-60 minutes	27	9.5
>1 hour	188	66.2

3.5 Bivariate and multivariable analysis on health system factors

As indicated in table 5, when the various health system factors were analyzed with the chi-square test for independence, it revealed a significant relationship between the dependent variable and the following independent variables: outreach programs (X^2 =11.14, *df* =1, *p*<0.001), social support by healthcare providers on how to conduct a SBE (X^2 =44.02, *df* =1, *p*<0.001), distance to the health facility (X^2 =5.62, *df* =1, *p*=0.02), BC screening services charges (X^2 =43.44, *df* =2, *p*<.001), health insurance covers (X^2 =17.85, *df* =1, *p*<0.001), availability of specialized BC screening services (X^2 =7.16, *df* =2, *p* =0.03) and waiting time (X^2 =9.73, *df* =2, *p* =0.01). After adjusting for confounders as shown in the same table, availability of outreach programs (p=0.04), social support on how to conduct SBE by healthcare providers (*p*<0.001), distance to the hospital (*p* =.04), and screening charges (*p* =0.01), waiting time (*p* =0.01), contributed significantly to the prediction model

In line with bivariate analysis, the availability of outreaches increased the odds of seeking BC screening services by 3.8 in reference to the unavailability of outreach programs. Consistently, most of the participants cited that inadequate outreach programs hindered women from seeking BC screening services. One of the KII participants cited: *"For now, we don't have outreach programs making most of the women to lack knowledge. This is attributed to insufficient funds. It is good if the health management consider adding outreach services" (Clinical officer, KII2)*

In reference to social support, its presence regarding SBE increased the odds of seeking BC screening services by 7.14 times. In keeping with quantitative findings, there was a prevailing notion among the FGDs participants on low levels of uptake of BC screening services due to a lack of adequate support by health care providers on how to conduct an SBE. One of the in-depth participants stressed: *"Lack of information. If doctors and nurses could educate us on what we are supposed to do as mothers, where to get these services, the importance of seeking them, how to do a SBE, general knowledge on breast cancer and screening services, it will assist greatly" (R2,20-29, FGD2).*

Besides, short distances to health facilities also increased the odds of uptake of BC screening services by 3.19 in comparison to long distances which was the reference category. Similarly, a larger percentage of the participants cited that BC screening services were not offered in their vicinity, hence contributing to the low screening rates. One of the discussants narrated: *"The distance of Ziwa hospital from town is far, it is relatively 800 shillings. That is where the county mammography machine is located. The distance is a challenge to most of the women, as the majority are of low socioeconomic status". (Nursing officer-in-charge, KII1)*

Regarding BC screening charges, free BC screening services increased the uptake odds by 7.14 in reference to charged screening services. These results agreed with qualitative findings as opined by most participants in both KII and FGDs. The nursing officer-in-charge cited that: *"Mammography in Ziwa hospital is around 800 shillings plus transport which adds up to roughly 1500. That is a bit cheap compared to other hospitals" (Nursing officer-in-charge, KII1)*

Pertaining to the waiting period, a short waiting time (0-30 minutes) increased the odds of uptake of BC screening services by 3.23 times compared to the long waiting period. in concordance with quantitative results, participants cited long waiting hours in the hospital before they are attended for BC screening services. They further stressed that this contributed greatly to the low screening rates among women. A discussant perceived that: *"Another thing that discourages women is waiting period. Majority of women have many activities to do, waiting for hours before being attended, is purely wasting time" (R5, 20-29, FGD2).*

Table 5. Bivariate and Multivariate logistic regression analysis on health system factors influencing uptake of breast cancer screening services

Independent variable	Chi-square test for independence	Binary logistic regression OR 95% CI	p-value for binary logistic regression
Outreach programs	X^2=11.14		0.04
	df=1		
Yes	p*<0.001	3.84 (0.07, 0.97)	0.04
No		Reference	
Source of information	X^2=9.40	-	-
	df=6		
Television	p*=0.15	-	-
Radio		-	-
Hospital		-	-
Relatives and friends		-	-
Church		-	-
Schools		-	-
I have never heard		-	-
Social support on SBE	X^2=44.02		
	df=1		< 0.001
Yes	p<0.001	7.14 (0.04, 0.42)	< 0.001
No		Reference	
Distance to the nearest health	X^2=5.62		
facility	df=1		0.04
Near	P=0.02	3.19 (1.07, 9.51)	0.04
Far		Reference	
Breast cancer screening	X^2=43.44		
services charges	df=2		0.01
I don't know	p*<0.001	1.12 (2.22, 4.30)	< 0.001
Yes		7.14 (0.29, 0.51)	< 0.001

No		Reference	
Health insurance cover	X^2=17.85		0.09
	df=1		
Yes	p<0.001	0.40 (0.14, 1.15)	0.09
No		Reference	
Presence of specialized breast	X^2= 7.16		
cancer screening services	df=2		0.69
I don't know	p=0.03	2.05 (0.36, 11.74)	0.42
Yes		1.26 (0.29, 5.46)	0.76
No		Reference	
Waiting time	X^2=9.73		
	df=2		0.01
0-30 minutes	P*=0.01	3.23 (0.10, 0.96)	0.04
31-60 minutes		0.12 (0.03, 0.58)	0.01
>1 hour		Reference	

4. DISCUSSION

The mean age of the sampled participants was nearly in line with Kenya National Cancer Screening Guidelines (KNCSG), which recommend screening among average-risk women to start at 25 years (10). The general prevalence of BC screening was 10.2%. The low uptake of BC screening services was not astounding as the results were in consonance with the 12% from Ba *et al* analysis on the prevalence of BC screening services in four selected African countries (16). In contrast, uptake of BC screening services was much lower than those of studies done in Australia (88%) and Germany (84.9%) (17,18). The discrepancies in the reported findings could be attributed to BC screening charges, inadequate human resources, poor physical resources, socio-demographic and socio-economic variations between our set-up and the referenced studies(16).

The multivariable analysis for socio-demographic factors indicated that employment and income influenced the uptake of BC screening services. The positive association between employment and increased rates of BC screening could be explained by employed women having the financial capacity to pay for screening expenses. These findings were in agreement with the previous works from Antabe and Ampofo *et.al* (12,19). Elsewhere, a non-significant relationship was discovered in both variables (20). As expected, earning a high income was positively associated with increased usage of BC screening services. Women earning high income have more financial power to pay for preventive services. Similarly, Antabe, (2020) had found that women in the highest wealth quantile were 1.33 times more likely to undergo BC screening services compared to those in the lowest wealth quantile. However, research carried out in France and Nigeria found no difference between women with high income and those with low income in regard to uptake of BC screening services (21,22).

Our study found that the availability of outreach programs was associated with increased screening rates. The study findings were consistent with results from previous studies which found that the availability of outreach programs increased the likelihood of women seeking BC screening services (23–25). However, this study was divergent from a study done by Olasehinde *et al.* (26).

We also found that social support for SBE by health care providers increased the odds of seeking BC screening services. These steady results can be accredited to the adequate number of health care providers. Social support has been observed in many studies to increase the frequent uptake of BC screening services (27–29). These results however contrasted with an earlier study (30). The dissimilarities could be explained by the divergencies in the availability of social support on SBE by health care professionals in the geographical settings where the studies were carried out.

Additionally, our findings indicated short distances to health facilities increased the odds of BC screening by 3.2. Consistently, these findings concur with Salama (2020), Diab, *et al* (2018), and Ondimu (2016) who established uptake of BC screening services was higher in women who accessed BC screening services when compared to those who did not. This was attributed to expenses influenced by the distance between the residence and the screening unit. On the contrary, research carried out in Brazil, Canada and Denmark reported a non-significant association between distance and uptake of BC screening services (31–33).

In keeping with earlier studies (22,25), we also found free BC screening services increased the uptake odds. One possible explanation for the above findings is that screenings charges limit socio-economically disadvantaged women hence providing higher economic power and better access to these services to those with high income. However, this contrasted an earlier study (34). Since the aforementioned study applied a qualitative approach that was based on perceptions, it could account for the discrepancies.

Lastly, on health system factors we established that a short waiting time increased the odds of the uptake of BC screening services by 3.3 times compared to a long waiting period. Other authors who have similarly reported that waiting time influence the uptake of BC screening services (35,36). Nevertheless, these results contrasted with an earlier study (37) which found no association between waiting time and uptake of screening services. The agreement and divergence between this study and previous works could be explicated by differences in the number of patients served in hospitals,

number of health facilities offering these services, number of healthcare professionals providing these services, and time of visit to the health facility.

CONCLUSION

This study concluded that uptake of BC screening services in Turbo Sub-County was low at 10.2%. To improve the low screening rates, the government should subsidize screening services for low-income earners and unemployed women. The county government should improve access to BC screening services by making more health facilities near the residence of women. The ministry of health should consider revising the working service charter by reducing the waiting period.

Ethical Approval And Consent

The study was approved by Mount Kenya (MKU) Institutional Research Ethics and Review Committee (IREC) of reference number MKU/ERC/1890. Permit to carry out the study was provided by National Commission for Science, Technology, and Innovation (NACOSTI) of license number NACOSTI/P/21/12804. Legal documents required to conduct the research were sought from the county government of Uasin Gishu. Discretion of the respondent's information was vastly upheld by conducting the study in a private set-up. Respondents' participation was purely voluntary and the investigator requested participants (adult partakers and emancipated minors) to sign informed written consent. The anonymity of the participants was maintained as only identification numbers and no identifiers were used.

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COMPETING INTEREST

We declare that there are no competing interests.

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ABBREVIATIONS

BC; Breast cancer; BCS; Breast Cancer Screening; CBE; Clinical Breast Examination, MMG; Mammography, SBE; Self Breast Examination, WRA; Women of Reproductive Age, FGD; Focus group discussions