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Knowledge Levels of Breast Cancer Among Women of Reproductive Age in Kenya, a Case Study of Kitui County

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Abstract: Background: Breast cancer is one of the leading causes of mortality among women in the world today. Therefore there is need for concerted efforts to advance interventions that seek to mitigate challenges associated with its screening. In Kenya, breast cancer accounts for 23% of cancerous diseases that affect women. The purpose of this study was to determine the knowledge levels on breast cancer among women of reproductive age in Kitui County, roll out community based health education intervention (CBHI) targeted at enhancing breast cancer knowledge, and finally to assess the effect of the CBHI on knowledge levels. Methods: The study design adopted was quasi-experimental. This was adopted because it enables researchers to evaluate causal relationships when interventions or agents of causation are induced. This study was undertaken with the causal mechanism being the rollout of CBHI and the impact in knowledge of breast cancer. Two groups were evaluated; intervention and control groups. The knowledge among these groups was evaluated between two time intervals; end line and at baseline. Data was collected using questionnaire instruments, analyzed using SPSS v23 and presented in form of tables and frequencies. Inferential analysis was achieved through binary logistic regression and Difference in Difference scores. Results: The individual score analysis on different aspect of breast cancer knowledge and awareness indicated that there was a direct positive impact of the CBHI on the knowledge on breast cancer among the respondents. Significant changes observed upon the implementation of CBHI on breast cancer included; respondents in the intervention group who knew at least two danger signs for breast cancer increased to 3.8 (Adj. OR=3.895, P<0.05, 95%CI: 2.538-5.979), those who knew the age related risks associated with breast cancer increased by 4.1 (Adj. OR=4.128, P<0.05, 95%CI: 2.940-5.797), and finally, those who knew at least one Breast cancer screening method increased 7 fold among the intervention group after the rollout of CBHI (Adj. OR=7.011, P<0.05, 95%CI: 4.138-11.880). Conclusion: The impact of CBHI on knowledge of breast cancer was significant. As a result, more people in the intervention group were cognizant of different warning signs of breast cancer, breast cancer screening methods, and that these opportunities facilitate early detection of breast cancer. The actionable strategies recommended by this study is implementation of community based strategies to enhance knowledge levels on breast cancer in order to improve screening uptake and therefore early detection of breast cancer.

Keywords: Breast Cancer Knowledge, Mammogram, Screening, Danger Signs, Community Based Health Intervention

1. Introduction

Critical health infrastructure in developing countries remains a cause for concern especially regarding female sexual reproductive health and health matters in general. Consequently, there are inherent challenges relating to the detection mechanisms associated with the various cancerous diseases. Breast and cervical cancer are two among many other types of cancer diseases that affect women globally. Prolla, Silva, Netto, Goldim, & Ashton-Prolla [1] noted that breast cancer is one of the leading causes of mortality for

women in the world over. Further, the epidemiological excerpts reviewed indicate that proportion of breast cancer to the total cancerous diseases associated with women in Kenya was at 23% [2]. In addition to this finding, [2] it was established that one of the inhibiting factor to treatment for breast cancer patients in Kenya is delayed access to diagnostic services or lack thereof. Much as such burdens are visibly heavy on low-income countries, the USA, for instance, has approximately 200,000 women diagnosed with breast cancer annually [3]. The report further noted that the number of deaths recorded every year as reported in 2014 was estimated at 40,000 deaths every year.

The incidence of the disease is geographically diverse and other factors exist that determine these occurrences. Prolla, Silva, Netto, Goldim, & Ashton-Prolla [1] noted that the incidence rates observed for Brazil were estimated at 52 cases per hundred thousand. Kenya was estimated to have an incidence of 44 infections per 100,000 people. Much as Brazil had an incidence of 52 per 100,000, other developed regions such as Northern Europe had a higher incidence of about 84 per 100,000 of the population of interest [4]. A sharp contrast is depicted by the statistics since the trio reported that 60% of all mortalities associated with breast cancer are from developing countries like Brazil and Kenya among others. One of the reasons attributed to this is because of low uptake of breast cancer screening. Further, low knowledge levels and inadequate access to diagnostic services also contribute to this.

Several barriers exist especially in rural populations because of lack of adequate knowledge. In Nebraska, it was established that despite the relatively high uptake of mammogram test, instances of late diagnosis and treatment was more in the rural areas than in the urban settings [2]. There are several breast cancer diagnostic approaches that cover both clinical and non-clinical diagnostic procedures. According to Sayed, et al [2], people residing in rural area have minimal knowledge with regard to the screening and diagnostic approaches. Breast self-examination (BSE) for instance was the least used screening method as people did not have information on how to conduct BSE. Further, early detection of cancer was found to be lacking in most of the areas included in their research. One of the reasons cited for this shortcoming is that most of the women did not have access to formal education. Further, the referral infrastructure tracking individuals requiring mammography or further treatment after identification was found to be lacking [2]. This paper seeks to evaluate the knowledge of breast cancer, screening approaches employed in its identification and further determine the effect that a Community Based Health Education Intervention (CBHI) would have on the knowledge levels.

2. Methods

2.1. Study Location

This study was conducted in Kitui County between March 2018 and April 2019. It was undertaken in the two sub-counties of Kitui East and Mwingi West. Kitui East formed the intervention group while Mwingi West was the Control group.

Table 1. *Demographic Characteristics of the respondents.*

Variable	Categories	Baseline Survey				End term Survey (8 months)			
		Control		Intervention		Control		Intervention	
		F	%	F	%	F	%	F	%
Age	16-20 years	12	3.0	0	0	20	4.9	21	5.1
	21-25 years	63	15.7	31	7.7	76	18.8	64	15.6
	26-30 years	134	33.3	106	26.2	117	28.9	112	27.4
	31-35 years	139	34.6	149	36.9	138	34.1	132	32.3
	36-40 years	50	12.4	113	28.0	54	13.3	80	19.6
	41-45 years	4	1.0	5	1.2	0	0	0	0
	Total	402	100	404	100	405	100	409	100
Parity	1 Child	23	5.7	12	3.0	30	7.4	13	3.2
	2 children	22	5.5	15	3.7	13	3.2	19	4.6
	3 children	58	14.4	60	14.9	67	16.5	64	15.6
	4 children	124	30.8	105	26.0	89	22.0	122	29.8
	5 children	89	22.1	93	23.0	99	24.4	99	24.2
	6 children	70	17.4	63	15.6	82	20.2	65	15.9
	7 and above	16	4.0	56	13.9	25	6.2	27	6.6
	Total	402	100	404	100	405	100	409	100
Education Level	No education	10	2.5	33	8.2	5	1.2	27	6.6
	Primary level	80	19.9	138	34.2	112	27.7	96	23.5
	Secondary level	227	56.5	143	35.4	167	41.2	206	50.4
	College/ University	85	21.1	90	22.3	121	29.9	80	19.6
	Total	402	100	404	100	405	100	409	100
Occupation	Not working	10	2.5	7	1.7	15	3.7	29	7.1
	Peasant Farmer	227	56.5	201	49.8	222	54.8	223	54.5
	Business	114	28.4	102	25.2	101	24.9	99	24.2
	employment	51	12.7	94	23.3	67	16.5	58	14.2
	Total	402	100	404	100	405	100	409	100

Variable	Categories	Baseline Survey				End term Survey (8 months)			
		Control		Intervention		Control		Intervention	
		F	%	F	%	F	%	F	%
Marital Status	Single	31	7.7	18	4.5	34	8.4	33	8.1
	Married	344	85.6	297	73.5	327	80.7	310	75.8
	Widowed	17	4.2	65	16.1	26	6.4	48	11.7
	Separated/ Divorced	10	2.5	24	5.9	18	4.4	18	4.4
	Total	402	100	404	100	405	100	409	100

Table 2. *Monthly Income.*

Total monthly household income (Baseline)		
Control	N	402
	Mean	4267.41
	Median	2500.00
	Mode	2000
	Std. Deviation	4691.081
	Minimum	500
	Maximum	25000
Intervention	N	404
	Mean	5875.00
	Median	4000.00
	Mode	2500
	Std. Deviation	4274.669
	Minimum	1000
	Maximum	22000
Total monthly household income (End line)		
Control	N	405
	Mean	4343.21
	Median	2500.00
	Mode	2000
	Std. Deviation	4665.227
	Minimum	500
	Maximum	24000
Intervention	N	409
	Mean	5374.08
	Median	3500.00
	Mode	3000
	Std. Deviation	5235.687
	Minimum	0
	Maximum	26000

2.2. Study Design and Study Population

The study adopted a quasi-experimental design. The design was deemed appropriate because of its dichotomous approach of evaluating more than one group of respondents on a phenomenon. It is particularly important in defining the causal relationships between certain health issues by comparing how impactful interventions employed in controlled trials are [5]. In this particular case, the study sought to evaluate the knowledge levels of breast cancer at baseline and at end line after implementation of the CBHI. The classification of the response set was done such that there was a control and study or intervention group. The instances of measurement was done at two different intervals with a selection of the two groups done at the onset of the study. The study was designed to have a pre-intervention survey and a post intervention survey. A number of select variables were studied and changes in the variables recorded on the underpinnings of time and variations in the variables that were of interest to the researcher. In order to gravitate towards a more impactful assessment of the intervention, two sub-counties were selected in order to ensure that there was a buffer zone between them. The zoning helped eliminate biases accounted for by inter-sub-county migration.

3. Results

3.1. Demographic Characteristics of the Sample

An analysis on the level of income revealed that the mean monthly household income was relatively low among the control group (M=4267.62, SD=4692.08) compared to the intervention group respondents (M=5875.00, SD=4274.67). The high standard deviation from the mean indicates that there was a huge variation in the levels of income reported by different respondents within the study cohorts. The minimum amount in the level of income reported in the control group was 500 Kenyan Shillings while the highest income reported in the same category was 25,000 Kenyan Shillings. The intervention group minimum income was 1,000 Kenyan Shillings while the maximum was 22,000 Kenyan shillings. Both groups exhibited a wide range in terms of the levels of income and hence the high degree of dispersion from the means attributed to both groups. See Table 2.

At end line, the distribution of mean monthly household income was found to be higher in the intervention group (M=5374.08, SD=5235.687) than in the control group (M=4343.21, SD=4665.227). The minimum income reported for the control group was KSh. 500 with the intervention reporting a minimum of zero income. However, the maximum income differed slightly for both groups with the reported maximum for control being KSh. 24,000 while the intervention group was KSh. 26,000. See Table 2.

Besides the distribution of income, other defining characteristics of the population were analyzed. They included the age distribution of the respondents, marital status, parity, occupation, and the level of education. In terms of age distribution for the intervention and control groups, a general deduction made was that majority of the respondents were aged between 26 and 40 years of age. However, the age-group with the greatest proportion of respondents were aged 31-35 years. This observation was made across intervention and control group respondents for both baseline and end line evaluation respectively. Majority of the respondents reported their parity to be between 4 and 5 children. Most respondents reported their highest level of education as secondary. However, it was noted as presented in Table 1 that there were more people also recording lower levels of education. This seemed to influence the occupation of the individuals. At baseline, most of the respondents reported their occupation as peasant farmers at 56% and 49.8% among the control and

intervention groups respectively. During the end term survey, 54.8% of respondents in the control arm and 54.5% in the intervention group reported that they were peasant farmers. Finally, over 70% of the respondents sampled indicated that they were married as shown in Table 1.

3.2. Level of Breast Cancer Knowledge Among Women of Reproductive Age

Table 3 shows the results on the evaluation of danger signs of breast cancer knowledge among women of reproductive age. The level of knowledge on danger signs of breast cancer was deduced based on whether they knew at least two danger signs of breast cancer. The proportion of respondents who knew at least two danger signs of breast cancer was found to be near equal in proportion for both control and intervention groups at 59.5% (239) and 59.2% (239) respectively. Therefore, at baseline, there was minimal differences in breast cancer knowledge between the intervention and control groups. This is partly informed by the fact that no intervention had been initiated and that both groups had similar characteristics. An adjustment against various demographic indicators and probable determinants of the levels of knowledge on breast cancer was done using the binary logistic regression. This was preceded by a crude odds ratio analysis.

Table 3. *Knowledge of breast cancer danger signs (Baseline).*

Site	Baseline Survey	
	Mothers Knows at least 2 danger signs of Breast cancer	
	Frequency	%
Intervention site	239/404	59.2
Control Site	239/402	59.5

No significant differences were established from the binary logistic regression between the intervention and control group respondents at baseline (Crude OR=0.988, P>0.05, 95%CI of OR: 0.746-1.308). After adjusting for sociodemographic characteristics (Age, Number of children, Level of education, Primary Occupation, Marital status and total monthly household income) as potential confounders, it was established that there was no significant difference in the odds of respondents who knew at least two danger signs of breast cancer between intervention and control (Adj. OR=1.008, P>0.05, 95%CI of OR: 0.699-1.455). See Table 4.

Table 4. *Danger signs of breast cancer at Baseline survey in Intervention Vs Control.*

Baseline Survey	Crude vs Adj.	Sig.	OR	95% CI
Intervention Vs Control (Kitui East Vs Mwingi West)	Crude OR	0.932	0.988	0.746-1.308
	Adjusted OR	0.965	1.008	0.699-1.455

3.3. Knowledge on Age at Risk of Developing Breast Cancer

Table 5 presents results on the knowledge of age-related risk of developing breast cancer among respondents in both the intervention and control groups at baseline. Respondents were assessed on their knowledge of the age that is at risk of developing breast cancer. It was established that more respondents in the control group (211, 52.2%) had knowledge of the age at risk of developing breast cancer compared to 193 (47.8%) in the intervention group.

Table 5. *Knowledge on age at Risk of Developing Breast Cancer.*

Site	Baseline survey Mother Knows the age at risk of developing Breast cancer	
	Frequency	%
Intervention site	193/404	47.8
Control site	211/402	52.5

Binary logistic regression was undertaken that sought to achieve two measures. One was to evaluate the difference between the comparison groups based on crude odds ratio, while the second was made on the basis of adjusted odds ratio. The adjustment was made on the basis of the various demographic components that the study presumed to have an effect on the knowledge of breast cancer. The odds of respondents who knew the age at risk of developing breast cancer between intervention and control were not statistically significant (Crude OR=0.828, P>0.05, 95%CI of OR: 0.628-1.092) at baseline. This means that there was no difference between the two groups because they had the same characteristics. The adjusted odds ratio on the other hand was also statistically non-significant meaning that there was no significance difference in the knowledge on age related risks of developing breast cancer between the two comparison groups (Adj. OR=0.782, P>0.05, 95%CI of OR: 0.565-1.084). See Table 6.

Table 6. *Odds of knowledge on age at Risk of Developing Breast Cancer at Baseline survey in Intervention Vs Control.*

Baseline Survey	Crude vs Adj.	Sig.	OR	95% CI
Intervention Vs Control (Kitui East Vs Mwingi West)	Crude OR	0.181	0.828	0.628-1.092
	Adjusted OR	0.140	0.782	0.565-1.084

3.4. Knowledge of at Least one Breast Cancer Screening Method

Table 7 presents the results of respondents who were aware of at least one breast cancer screening method. At baseline, an evaluation was made on the respondents' knowledge of at least one breast cancer screening method. Majority of respondents in both the control group (62.2%, 253) and intervention group (62.9%, 386) indicated that they were aware of at least one method of breast cancer screening.

Table 7. *Mother Knows one breast cancer screening method.*

Site	Baseline survey	
	Mother knows one Breast cancer screening method	
	Frequency	%
Intervention site	253/404	62.6
Control site	253/402	62.9

The binary logistic regression undertaken showed no significant statistical relationship between the intervention and control group respondents at baseline on the knowledge of at least one breast cancer screening method. An analysis of the crudes odds ratio between the two groups was found to be statistically non-significant (Crude OR=0.987, P>0.05, 95%CI of OR: 0.742-1.313). The adjusted odds also did not reveal a statistically significant difference between the two comparison groups (Adj. OR=0.982, P>0.05, 95%CI of OR: 0.686-1.406). See Table 8.

Table 8. *Odds of knowledge on at least one Breast cancer screening method (Baseline).*

Baseline Survey	Crude vs Adj.	Sig.	OR	95% CI
Intervention Vs Control	Crude OR	0.927	0.987	0.742-1.313
(Kitui East Vs Mwingi West)	Adjusted OR	0.921	0.982	0.686-1.406

3.5. Effect of Community Based Health Intervention on Breast Cancer Knowledge

To determine whether there was a difference in knowledge between the control and intervention groups at baseline and end line respectively, a binary logistic regression model was used that provided for both crude and adjusted ODDS ratio. The adjusted ODDS ratio was done for Age, Number of children, and Level of education, Primary Occupation, Marital status and total monthly household income as potential confounders.

Null hypothesis: There is no significant difference in the odds of respondents who have knowledge on breast cancer in the intervention arm at end-term survey compared to baseline survey.

3.5.1. Effect of the CBHI on Knowledge on Danger Signs of Breast Cancer

The proportion of respondents who knew at least two danger signs of breast cancer were found to be near equal in proportion for both control and intervention groups at 59.5% (239) and 59.2% (239) respectively at baseline. During the end line evaluation, there were more respondents in the intervention group (358, 87.5%) that were aware of at least two danger signs of breast cancer than there were in the control group (298, 73.6%). See Table 9.

Table 9. *Comparison of Knowledge of at least 2 Danger Signs of Breast Cancer (Baseline and end term) for intervention and control groups.*

Survey	Intervention site		Control Site	
	Mothers Knows at least 2 danger signs of Breast cancer			
	Frequency	%	Frequency	%
Baseline	239/404	59.2	239/402	59.5
End-Term (8 months)	358/409	87.5	298/405	73.6

A binary logistic regression analysis conducted at end line after the Community Based Health Education Intervention was rolled out, indicated a significant difference in the odds of knowledge on danger signs for breast cancer between the intervention and control. The intervention group respondents were 2.520 times more likely to know at least two danger signs of breast cancer than the control group respondents. (Crude OR=2.520, P<0.05, 95%CI of OR: 1.746-3.639)

After adjusting for sociodemographic characteristics (Age, Number of children, Level of education, Primary Occupation, Marital status and total monthly household income) as potential confounders, the odds of respondents in the intervention group who knew at least two danger signs for breast cancer increased to 3.8 (Adj. OR=3.895, P<0.05, 95%CI: 2.538-5.979).

Table 10. *Comparison of Odds of knowledge on danger signs of breast cancer.*

Surveys	Crude & Adj.	Sig	OR	95%CI
Baseline Survey	Crude	0.932	0.988	0.746-1.308
	Adjusted	0.965	1.008	0.699-1.455

Surveys	Crude & Adj.	Sig	OR	95%CI
End term Vs Baseline (Hypothesis test)	Crude	0.000*	2.520	1.746-3.639
	Adjusted	0.000*	3.895	2.538-5.979

Table legend: * means test statistic is significant at P<0.05.

3.5.2. Effect of the CBHI on Knowledge on Age at Risk of Developing Breast Cancer

Regarding knowledge of the age that is at risk of developing breast cancer, it was established that more respondents in the control group (211, 52.2%) had knowledge of the age at risk of developing breast cancer compared to 193 (47.8%) in the intervention group as indicated in Table 11. Knowledge on the age at risk of developing breast cancer was found to have increased in proportion at end line compared to baseline. At end line, those who reported to have knowledge on age at risk of developing breast cancer was 306 (74.8%) compared to 193 (47.8%) in the intervention group at end line and baseline respectively. The proportion of the control group respondents reporting to have knowledge of age at risk of developing breast cancer was 194 (47.9%).

Table 11. *Comparison of knowledge on age at Risk of Developing Breast Cancer between baseline and end term survey among intervention and control.*

Survey	Intervention site		Control Site	
	Mother Knows the age at risk of developing Breast cancer			
	Frequency	%	Frequency	%
Baseline	193/404	47.8	211/402	52.5
End-Term (8 months)	306/409	74.8	194/405	47.9

Binary logistic regression analysis conducted at end line indicated a significant difference in the odds of knowledge on age at risk of developing breast cancer between the intervention and control. The intervention group respondents were 3.2 times more likely to know the age at Risk of Developing Breast Cancer than the control group respondents. (Crude OR=3.231, P<0.05, 95%CI of OR: 2.402-4.346) After adjusting for sociodemographic characteristics (Age, Number of children, Level of education, Primary Occupation, Marital status and total monthly household income) as potential confounders, the odds of respondents in the intervention group who knew age at risk of developing breast cancer increased to 4.1 (Adj. OR=4.128, P<0.05, 95%CI: 2.940-5.797).

The following table (Table 12) shows a comparative summary of the odds of knowledge on age at risk of developing breast cancer between baseline survey and end-term surveys in both intervention and control sites. The hypothesis test statistic is in bold.

Table 12. *Comparison of the Odds of knowledge on age at risk of developing breast cancer between baseline and end line.*

Surveys	Crude & Adj.	Sig	OR	95%CI
Baseline Survey	Crude	0.181	0.828	0.628-1.092
	Adjusted	0.140	0.782	0.565-1.084
End term Vs Baseline (Hypothesis test)	Crude	0.000*	3.231	2.402-4.346
	Adjusted	0.000*	4.128	2.940-5.797

Table legend: * means test statistic is significant at P<0.05.

3.5.3. Effect of the CBHI on Mothers' Knowledge of at Least One Breast cancer Screening Method

At baseline, majority of the respondents in both the control group (76.8%, 311) and intervention group (94.4%, 386) indicated that they were aware of at least one method of breast cancer screening. At end line, almost all the respondents in the intervention group were aware of at least one breast cancer screening method (386, 94.4%). The control arm had 311 (76.8%) of its respondents reporting to be aware of at least one method of breast cancer screening. See *Table 13.*

Table 13. *Comparison on knowledge of at least one Breast Cancer Screening method between baseline and end line survey for both intervention and control.*

Survey	Intervention site		Control Site	
	Mother knows one Breast cancer screening method			
	Frequency	%	Frequency	%
Baseline	253/404	62.6	253/402	62.9
End-Term (8 months)	386/409	94.4	311/405	76.8

Table legend: * means test statistic is significant at P<0.05.

A binary logistic regression analysis at end line indicated a significant difference in the odds of knowledge on at least one breast cancer screening method between the intervention and control. Therefore the intervention group respondents were 5.0 times more likely to know at least one Breast cancer screening method than the control group respondents (Crude OR=5.073, P<0.05, 95%CI of OR: 3.139-8.196).

After adjusting for sociodemographic characteristics (Age, Number of children, Level of education, Primary Occupation, Marital status and total monthly household income) as

potential confounders, the odds of respondents in the intervention group who knew at least one Breast cancer screening method increased to 7.0 (Adj. OR=7.011, P<0.05, 95%CI: 4.138-11.880). The following table (*Table 14*) shows a comparative summary of the odds of knowledge of at least one Breast cancer screening method between baseline survey and end-term surveys in both intervention and control sites. The hypothesis test statistic is in bold.

Table 14. *Comparison of the Odds of knowledge on at least one Breast cancer screening method between baseline and end line.*

Surveys	Crude & Adj.	Sig	OR	95%CI
Baseline Survey	Crude	0.927	0.987	0.742-1.313
	Adjusted	0.921	0.982	0.686-1.406
End term Vs Baseline (Hypothesis test)	Crude	0.000*	5.073	3.139-8.196
	Adjusted	0.000*	7.011	4.138-11.880

Table legend: * means test statistic is significant at P<0.05.

Hypothesis Testing: Based on the results of the above three domains, the null hypothesis was rejected and the alternative hypothesis (In the intervention arm, there was a significant difference in the odds of respondents who have knowledge on breast cancer at end-term survey compared to baseline survey) was accepted.

3.5.4. Screening Services Provided in the County for Breast Cancer

The study further sought to establish the capacity of health care facilities in the provision of breast cancer screening services. The Kitui County Referral hospital was the main reference point, as it is the main facility that most patients are referred in case of screening for breast and / or cervical cancer. Through information obtained from the health care workers it was indicated that the following services were available for breast cancer screening: Breast exam, Breast ultra sound and removal of biopsy for testing.

One of the main challenges that the study established with regard to breast cancer services was the lack of sufficient technologies to facilitate proper diagnosis and treatment. In the case of Kitui County, services such as mammography which is instrumental in diagnosing breast cancer were not available. These services serve a big role in complementing the traditionally acclaimed methods of breast cancer screening.

Past records in the hospital, as reported by one of the healthcare givers, indicated that the level of uptake of breast cancer services was considerably low. For instance, records covering the past four months at baseline study showed that only 151 clients had been screened for breast cancer. Even though this number was considerably high as per the hospital records, it did not match up the population dynamics within the county.

Even though the diagnostic technologies remains a persistent challenge, low awareness and knowledge levels on cervical and breast cancer were the main impediments to the uptake of the services. Besides being unaware of the availability of these services in the Referral Hospital, most of the women had low risk perceptions associated with breast cancer. This implies that most women do not attempt to seek screening for breast cancer and therefore a delay in early detection. It is imperative that women of reproductive age undertake regular checks to improve the chances of early detection of precancerous lesions, which can be managed early before progressing to late stages of the disease whose prognosis is poor.

The study therefore proposed that there is need to sensitize the community on the available services for screening of breast cancer to enhance uptake. Community Health Extension workers (CHEWs) and Community Health Volunteers (CHVs) were proposed as the best resource persons for sensitizing the community. The modes of sensitization proposed ranged from outreaches, one on one facilitation, use of IEC materials, health education in the health care facilities, social media, and use of mainstream media.

4. Discussions and Findings

The primary objective of this extract is to determine the knowledge levels of breast cancer among women of reproductive age. To assess the levels of knowledge, a baseline study was done. Two groups of respondents were selected to participate in the study with two study timelines drawn to facilitate ease of comparison. At baseline, two groups were defined: a control group and an intervention group with the intention of introducing the CBHI (Community Based Health Education Intervention). A determination was made on the basis of knowledge levels obtained from the baseline study in order to deduce the extent to which the intervention would influence the levels of knowledge on breast cancer at end line.

The CHBI was developed as informed by the baseline findings and further informed by a validated United Kingdom breast cancer awareness module developed specifically to enhance breast cancer awareness. The knowledge level for breast cancer was determined in reference to the following indicators: knowledge on danger signs of breast cancer, age related risk of developing breast cancer and knowledge of at least two breast cancer screening methods

At baseline, the level of knowledge of the respondents was significantly low. Results indicated that the levels of knowledge on danger signs of breast cancer stood at 59.2% among the intervention group at baseline. Further, there was no difference between the intervention and the control group respondents when asked on whether they knew at least two danger signs of breast cancer [(Crude OR=0.988, P>0.05, 95%CI of OR: 0.746-1.308) (*Adj.* OR=1.008, P>0.05, 95%CI of OR: 0.699-1.455)]. The introduction of CBHI programmes

increased the levels of awareness of breast cancer by 38% in the intervention site with a Z score test indicating that this change in proportions was significant (Z score=10.8466, $P<0.05$).

At baseline, knowledge level on at least two danger signs of breast cancer was found to be average at 59% and near equal in proportion for both control and intervention groups. With regard to knowledge on age related risk of developing breast cancer, this was found to be slightly higher among the control compared to intervention at 52.5% and 47.8% respectively. Respondents in both arms were found to have above average (62%) knowledge on at least one breast cancer screening method. For the three domains, there was no difference in the odds of knowledge among the intervention and control groups at baseline. These findings are consistent with those of a cross-sectional study conducted in Southern and Northern geopolitical zones of Nigeria to determine awareness of Breast and Cervical Cancer among Women in the Informal Sector in Nigeria which established that while women are familiar with breast cancer, little is known about cervical cancer, and the awareness of the former is not correlated with participation in screening [6].

After the roll out of the CBHI program, the levels of knowledge on the said indicators increased for both the control and intervention groups. It was however observed that the intervention group proportions had a significant increase in knowledge levels compared to the control (those that were not offered CHBI). Whereas the odds of knowledge on danger signs of breast cancer between the control and the intervention groups were not statistically significant at baseline, the intervention group was 3.8 times more likely to understand at least two danger signs of breast cancer compared to the control group respondents at end line.

Similarly, the CBHI was found to increase knowledge levels on age related risk associated with breast cancer development and knowledge of breast cancer screening methods. At baseline, there was no significant difference in knowledge levels on age related risk for breast cancer among the intervention and control groups. However, at end line, there was an increase in knowledge on age related risk with respondents in the intervention group having increased knowledge by an odds of 4.00 compared to the control group that did not receive any intervention. Knowledge on at least one breast cancer screening method increased by 7.00 fold among the intervention compared to the control group at end line. This is a clear indication that the Community based intervention increased the knowledge levels on breast cancer among women of reproductive age in Kitui County.

These findings are consistent with those of a study conducted in South Korea which established that a community-based intervention improved knowledge on breast cancer and increased uptake of breast cancer screening services [7]. A recent systematic review published in the European journal of public health in which evidence from 22 studies was reviewed also established that community based health promotion interventions helped in improving breast cancer knowledge and increasing uptake of breast cancer screening services [8].

Access to primary screening services for breast cancer remains a challenge to advancing maternal health in Africa and in Kenya. According to a research conducted by CDC [3], knowledge on breast cancer screening methods reduced the fatalities associated with it. This is because early detection using tests such as the mammogram tests and other tests have drastically reduced deaths attributed to the disease by facilitating early detection and treatment.

These findings also concur with a study to determine the impact of breast cancer knowledge on service uptake among women in the UK [7]. There was a strong association between breast cancer knowledge and access to breast cancer screening. It is on the basis of this that the number of individuals that accessed breast cancer services increased with the rollout of the CBHI program.

The effect of the CBHI compares with those of studies conducted in over 10 countries where the CHWs and CHVs were involved in rolling out Maternal and Child Health (MCH) programs. Home visitations by the two groups of care providers were found to have increased MCH in the countries where the community programs were rolled out [9].

Further, a study conducted in rural Bangladesh to establish whether community level interventions have an impact on utilization of maternal health care established that the intervention increased utilization of antenatal care. This study concluded that in order to sustain increased utilization of these services, there was need to have a continuous provision of free home based services in the communities living in Rural Bangladesh [10].

A similar study conducted in Bangladesh to assess a Community Health Worker innovation aimed at achieving universal health coverage demonstrated that it was possible to achieve exceptional MCH outcomes despite economic poverty by using a Community Health Worker led program to provide MCH services such as; family planning, immunization, oral rehydration therapy, vitamin A supplementation and other services [10].

The study established that Kitui County Referral hospital was the main reference point, as most patients are referred in case of screening for either breast and / or cervical cancer. It was established that the main services offered for breast cancer screening included Clinical Breast examination, Breast ultra sound and removal of biopsy for testing.

However, the facility did not have modern screening equipment for breast cancer. It was further established that only few staff have knowledge and expertise on screening for breast cancer. This further served as a hindrance to patients seeking breast cancer screening, treatment and care services. Therefore, patients who required advanced treatment were usually referred to facilities outside the County for further treatment and management.

In Kenya, a study conducted on Prevalence and Capacity of Cancer Diagnostics and Treatment: A Demand and Supply Survey of Health-Care Facilities in Kenya targeting 10 counties, indicated that 80% of reported cancer cases were diagnosed at advanced stages. This was mainly attributed to

low awareness of cancer signs and symptoms, inadequate screening services, inadequate diagnostic facilities, and a poorly structured referral system. It further indicated that the country had few cancer specialists concentrated in a few health facilities in Nairobi resulting in long waiting times and thus causing some previously curable tumors to progress to incurable stages. It also indicated that preventive services were very limited at the respective facilities with only preventive vaccinations, breast self-examination, and Pap smear being provided [11].

Similarly, a study on breast and cervical cancer screening: Investing in Health care systems established that the likelihood of breast cancer development in developing countries was found to have a huge variation that is occasioned by the lean infrastructural capacity for the diseases to be diagnosed and treated. Further, the knowledge deficit associated with these services has undermined efforts to detect early, diagnose and treat these diseases [12].

Access to primary screening services for breast cancer remains a challenge to advancing maternal health in Africa and in Kenya. According to a research conducted by CDC [3], knowledge on cervical and breast cancer screening methods reduced the fatalities associated with it.

5. Conclusion

Breast cancer remains one of the major causes of morbidity and mortality among women in the world compared to other cancerous diseases affecting them. Several strategies have been implemented aimed at promoting screening uptake and subsequent management of the same. However challenges still abound both behavioral and infrastructural. In most developing countries, and specifically in Kenya, one of the challenges associated with poor management of these diseases stems from the fact that most people remain uneducated or unaware of these diseases [13]. It was therefore elemental for this study to seek and understand the breast cancer awareness levels to determine the specific packages that would address the various aspects of knowledge of respondents on the disease. Once this was determined, a CBHI program was rolled out and comparison made in terms of knowledge in breast cancer for both control and intervention group respondents at baseline and at end line.

The implementation of CBHI programs yielded quite positive results in terms of educating people about the potential signs and risks associated with the disease. This led to an increase in knowledge on breast cancer as evidenced in the results. The study therefore recommended that in order to promote the uptake of breast cancer services, there is need to equip people with the necessary knowledge. Further, there is need to enhance specific knowledge domains defined within the healthcare curriculum by international bodies such as WHO or that which was adopted for this study. There is also need to consider scale up of community based awareness programs as they have been found to be effective in enhancing knowledge on health matters. This is achieved by identifying the specific grey areas through conducting regular surveys and rolling out targeted interventions. There is therefore need to equip the existing health care facilities with up-to date equipment to facilitate screening and care services.

Finally, it has been established that among the people residing in rural areas, the low level of uptake of breast cancer services was because most people had little faith in conventional medicine [2]. Besides this, the other barrier noted is the financial burden associated with the disease. Rural areas are defined by an overwhelming under-coverage of health insurance among poor patient populations which in turn reduces their ability to seek medical treatment and diagnostic services [14]. The findings of this study indicated that the overall or level of income was significantly low. However, Subramanian et al. [15] reaffirmed that Kenya has underutilized health insurance coverage. It is therefore apparent that such constraining factors associated with health insurance coverage must be addressed to enhance access to breast cancer services.

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