Impact of an Educational Intervention on Breast Cancer Knowledge in Western Kenya

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Key Words
Breast cancer awareness, Health Education, Community engagement, Cancer prevention

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This is the author's manuscript of the article published in final edited form as:

Kisuya, J., Wachira, J., Busakhala, N., Naanyu, V., Chite, A. F., Omenge, O., … Inui, T. (2015). Impact of an educational intervention on breast cancer knowledge in western Kenya. *Health Education Research, 30*(5), 786–796. http://doi.org/10.1093/her/cyv043

Abstract

Our objective was to assess the effectiveness of educational sessions that accompanied breast cancer screening events in three communities in western Kenya between October and November, 2013. 532 women were recruited to complete a test of breast cancer-relevant knowledge and randomly allocated to "pre-test" or "post-test" groups that immediately preceded or followed participation in the educational sessions. The education was organized as a presentation by health professionals and focused mainly on causes of breast cancer, early and late cancer presentation signs, high-risk groups, screening methods to find early-stage breast cancer, self-breast exam procedures and treatment options for this disease. Participants were invited to ask questions and practice finding nodules in silicone breast models. The median age was 35 years (IQR: 28-45), and 86% had not undergone breast cancer screening previously. Many individual items in our test of knowledge showed statistically significant shifts to better-informed responses. When all items in the assessment questionnaire were scored as a "test," on average there was a 2.80 point (95% CI: 2.38, 3.22) significant improvement in knowledge about breast cancer after the educational session. Our study provides evidence for the effectiveness of an educational strategy carefully tailored for women in these communities in Kenya.

Introduction

Globally, the incidence of breast cancer continues to increase with high mortality rates reported among women diagnosed with this form of cancer [1, 2]. While previously the burden of breast cancers has been predominantly reported in developed countries, low-and-middle-income (LMIC) developing countries are now experiencing an increase in breast cancer cases [1, 2]. In 2008, breast cancer accounted for 23% (1.38 million) of the total new cancer cases and 14% (458,400) of the total cancer deaths globally. About half of the breast cancer cases and 60% of the associated deaths occurred in developing countries [1, 2].

Early detection and treatment of breast cancer has been widely advocated as a strategy to mitigate breast cancer-related morbidity and mortality rates in developing countries [1-4]. Unfortunately, most patients in developing countries present to care with advanced-stage breast cancer [5, 6]. Late presentation in these settings has been mainly associated with lower education levels and low-income status [6]. In addition, low-level knowledge of early signs and symptoms of breast cancer continues to pose a challenge on efforts to promote timely uptake of breast cancer screening and treatment [7, 8]. This unfortunate situation is compounded by inadequate health system infrastructure (personnel, equipment and referral systems) that is needed to provide a full array of breast cancer prevention and treatment services [4].

Despite these many challenges, community breast cancer awareness through education and screening approaches continues to be seen as critical to advancing detection and care[2, 3]. Unfortunately, there are very few studies in sub-Saharan Africa that have assessed the impact of breast cancer awareness intervention programs. The only study we found was conducted in Ghana and reported an increase in breast cancer knowledge and screening uptake following a breast cancer awareness program [7]. The majority of studies have been conducted in

developed countries [9]. This state of the research literature has limited our knowledge about effective community-based approaches to promote breast cancer awareness in sub-Saharan Africa. Further studies that describe effective interventions and how to improve educational strategies to enhance early detection of breast cancer in this region are warranted.

Kenya is one of the LMIC countries in need of such studies. In Kenya the incidence of breast cancer is 34 per 100,000 women, higher than the incidence in the East Africa region of 19 per 100 000 women [2, 10]. Late presentation of breast cancer remains high with at least 90% of cases presenting with stage 3 or 4 disease at Moi Teaching and Referral Hospital, one of the largest referral hospitals in Kenya (Eldoret Cancer Registry). To date there are no studies conducted in Kenya to assess the impact of a community or special target population awareness program on the knowledge about breast cancer. We therefore designed a community breast cancer education program and assessed the impact of the program on the knowledge of breast cancer among women in three sites in western Kenya who had volunteered for clinical breast screening exams at special events.

Method

Study sites: Based in Western Kenya, the Academic Model for Providing Access to Healthcare (AMPATH) is a collaboration among Moi University School of Medicine (MUSoM), Moi Teaching and Referral Hospital (MTRH) and a consortium of North American Universities led by Indiana University [11]. At first focused on delivering HIV care, over the past several years, AMPATH has broadened its services to include primary health care and chronic disease management, including prevention and treatment services for cancer. Within AMPATH, the AMPATH-Oncology Institute (AOI) was initiated to organize and offer care to cancer patients, as

access to treatment options were otherwise limited [12]. The "Walther project," in which the current study was nested, was initiated in 2011 under the auspices of AOI with a grant from the Walther Cancer Foundation of Indianapolis, Indiana. The Walther project has focused primarily on cancer prevention activities through provision of free annual breast screening services to selected communities in western Kenya.

Study design: The current report focuses on breast cancer education services that were designed to accompany clinician breast examination screening and includes data from a before-and-after assessment of educational effectiveness. The study was conducted between October and November, 2013 during community breast screening events in Turbo, Mosoriot and Kapsokwony. We targeted community women (18 years and older) who attended the breast cancer screening events in the respective sites. Ethical approval for the study was obtained from the Moi University Institutional Research and Ethics Committee (IREC) as well as the Indiana University Institutional Review Board (IRB). A written consent was sought from all participants prior to their enrolment into the study.

Sampling: We sought to enroll a total sample of 550 women attendees to achieve a power of 90 % to detect a difference of 5% in rates of correct responses to the various items in a questionnaire-based test of knowledge [13]. Of this projected recruitment sample, equal numbers of women were randomly assigned to the pre- and post-test groups.

Educational session: The 'blueprint' for the content of the teaching session was based on previous survey findings assessing women's knowledge and domains of ignorance about breast cancer in the same community [14] using the Breast Cancer Awareness Module (BCAM) [15]. The teaching script focused mainly on causes of breast cancer, early and late signs, high-risk

groups, screening for breast cancer, self-breast exam procedures and treatment options (appendix 1). A single teaching session took an average of 30 minutes and was conducted in either of the two preferred languages; Swahili or English. In each teaching session, participants were given an opportunity to try to find the small breast masses present in a silicone breast cancer examination training model, so they would understand what the clinicians were trying to find in clinical exams. In each community, we used different teaching instructors with expertise in breast cancer. In Kaspokwony, we had a physician, nurse, and behavioral scientist conduct the educational sessions. In Turbo, a physician and a nurse facilitated the educational sessions while in Mosoriot a nurse taught alone. At the end of each session participants were given the opportunity to ask questions. Appendix 2 includes some of the commonly asked questions.

Study Instrument: To assess the impact of the teaching session, we used a structured questionnaire (see appendix 3) adapted from the BCAM. The validity and reliability of the BCAM in this population was assessed in a previous study. Study findings were used to improve the face validity and understandability of items for this Kenyan population[16]. For this study the questionnaire included questions on: 1) socio-demographic characteristics; 2) knowledge of early or late signs of breast cancer and women who are at greatest risk; 3) true or false questions about breast cancer cure, cause, gender relative risk, and screening. Finally, the questionnaire asked whether a participant had been previously trained to do breast self-examination or had undergone [14] previous screening.

To assess general improvement in participant knowledge after the educational session responses to the questionnaire item variables were scored and compared. Scoring was done as Early=0, Late=1, Don't know=0 for the following variables: *A large lump in the breast, A wound*

in the breast that would not heal, Pain in the breast, A bloody discharge from the breast, A lump in the armpit (questionnaire items 5-8 and 10). The treatment was different for "*A small painless lump in the breast*" (item 9) that was scored as follows: Early=1, Late=0, Don't know=0. The item concerning which women are most likely to get breast cancer (item 11) was scored as: 30 year old=0, 50 year old=0, 70 year old=1, Don't know=0. The scoring system for the following items – *Breast cancer can be cured if found early* (item 12), *major cause of breast cancer is family inheritance* (item 14), *breastfeeding lowers the risk of breast cancer* (item 17), and *the best time to check for breast cancer is after the menstrual period* (item 20) – was True=1, False=0, Don't know=0. Finally, the scoring system was True=0, False=1, Don't know=0 for the following variables: *Men and women are equally affected by breast cancer* (item 13), *major cause of breast cancer is witchcraft* (item 15), *major cause of breast cancer is eating wrong foods* (item 16), *breast cancer can be cured by herbs* (item 18, and *surgery spreads breast cancer and makes it worse* (item 19). The highest possible total score of correct responses for items #5-20 was 16 points.

Study procedure: Community mobilization for these special screening events was done through public announcements on local radio stations in Kapsokwony, Turbo, and Mosoriot. Screening events were held at the local health centers. Women attendees who volunteered for the clinical breast exams were randomly assigned to complete the test of knowledge as members of a pre- or post-test group. The survey was administered to the "pre-test" group prior to the teaching session and clinical breast exam, while the "post-test" group completed the survey after the teaching session and before the clinical breast exam. All these activities were carried out on the same day. Figure 1 shows the study procedures.

Data Analysis: Statistical analyses were performed using STATA Version 12 special edition ((http://www.stata.com/). Categorical variables were summarized using item response frequencies. Continuous variables that assumed the Gaussian distribution were described as a mean with the corresponding standard deviation (SD) while those that were skewed were summarized as median with the corresponding interquartile range (IQR). Normality assumptions for the continuous variables were assessed using empirical Shapiro-Wilk test and graphical approaches. The test for association between the continuous outcome variables and categorical (binary) explanatory variables was done using Wilcoxon two-sample test, while the test for association between categorical variables was done using Pearson's Chi Square test. We reported the Fisher's exact P whenever the expected cell count was less than 5 in at least one of the cells.

To assess the impact of the educational session on particular points of knowledge, comparisons of the distribution of pre-test and post-test responses to individual questions items were completed and are presented in Tables 2 and 3. The scores for each item response were summed to develop a summary score for each participant. Summary scores for pre-test and post-test groups were compared, using the two-sample t-test.

Results

A total of 532 women participated in the study, with 269 women in the pre-test vs. 263 in the post-test group. The median age was 35 (IQR: 28-45) years. There were no statistically significant differences between the pre- and post-test groups in terms of age, marital status, educational level and having previously undergone screening. The majority of participants were married (76%) and had received at least a primary level of education (95%). Similarly, a

most (86%) of them had not previously undergone screening for breast cancer. On the other hand, compared to the pre-test group, a larger percent of the post-test group reported having been previously "trained" to check their breasts for lumps (20% vs. 43%, p=0.001) (Table 1). This was a surprising difference to find since the women had been randomized to pre- and post-test groups, and all questionnaires were completed before they experienced clinical breast examination screening. We speculate that some women in the post-test group, when responding to this question, were considering the educational experience to which they had just been exposed – including practice with the silicone models – as 'training,' rather than to any other specific training in breast self-exam on another occasion.

As shown in Table 2, the one item that directly assessed knowledge of an early-stage manifestation of breast cancer was the item that asked participants about *a small painless lump*. The remaining four items were designed to detect misunderstandings about early- versus late-stage breast cancer. Generally, a higher proportion of women in the post-test group had correct knowledge about the early and late signs of breast cancer. On the other hand, more than a quarter of the women in both groups believed that having a pain in the breast and a lump in the armpit were signs of early-stage breast cancer.

There were significant differences between the pre-test and the post-test assessments. Across all communities, the responses to all items changed after exposure to teaching, except for the item "*Breast cancer can be cured if found at an early stage*," which was subject to a "ceiling effect" that obscured any possible change. The total mean knowledge score was 8.47 (SD: 2.82). The pre-test group average knowledge score was 7.09 (SD: 2.52) while the average

knowledge score for the post-test group was 9.89 (SD: 2.38). There was a statistically significant difference in the average knowledge scores +2.80 (95% CI: 2.38 - 3.22).

Only in Kapsokwony was there a consistency in terms of a higher proportion of the post-test group obtaining correct responses across all the early and late warning signs items (Table 2). In Turbo, there were no significant differences between the groups on two items assessing knowledge of advanced breast cancer signs; *a bloody discharge from the breast* and *a lump in the armpit*. In general, a higher proportion of women in this site believed that a bloody discharge from the breast (56.3%) and a lump in the armpit were signs of late-stage breast cancer (38.8%). In Mosoriot there was no significant difference between the pre- and post-test groups in the item assessing knowledge of early warning signs of breast cancer, with the majority (69.4%) in both pre-test and post-test groups reporting that a small painless lump in the breast is a sign of early-stage breast cancer.

In each of these communities, nearly all women knew that breast cancer could be cured if found at an early stage. There was a significantly higher proportion of women in the post-test group compared to the pre-test group who reported correct responses in items assessing knowledge of risk, causes and treatment for breast cancer ($P<0.001$) (Table 3). Interestingly, a higher proportion of women in both the pre- (46%) and post- (55%) test groups believed that men and women are equally affected with breast cancer. When stratified by community, in Kapsokwony there was no pre-post group difference on responses about whether breast cancer could be cured if found early and if herbs could cure breast cancer. The majority of women in this site believed that breast cancer could be cured early (94.6%) and that herbs could not cure it (66.3%).

In Turbo, significantly higher proportions of the participants in the post-test arm compared to the pre-test arm reported correct responses on the following items: *the major cause of breast cancer is family inheritance, major cause of breast cancer is eating wrong foods, breast feeding lowers the risk of breast cancer, breast cancer cannot be cured by herbs* and *that surgery did not spread breast cancer and did not make it worse*. Almost half (49.7%) of women across the two groups in this site were of the opinion that breast cancer affected both men and women equally, and only 5.7% believed that witchcraft was the major cause of breast cancer. In addition, only 35% of women in both groups combined agreed that the best time to check for a lump is after the menstrual period.

In Mosoriot, there were no statistically significant pre-post differences on most of the items. There was a significant shift to correct responses, however, in the post-test group of women who submitted more correct responses to items on *major cause of breast cancer is family inheritance, breast cancer can't be cured by herbs* and *that the best time to check for lump is after menstrual period*. As was the case in the other communities, the majority (>97%) of the women in both pre- and post-test groups agreed that breast cancer could be cured if found early. Similarly, a small proportion (2%) of women in this site believed that breast cancer is caused by witchcraft. At least half (51%) knew that breast feeding lowers the risk of getting breast cancer and 45% believed that breast cancer surgery would spread the cancer and make it worse.

Discussion

Our findings show a significant improvement in the level of breast cancer knowledge following educational session held with community women during special breast cancer screening events in western Kenya. We believe that this impact was influenced by the teaching approach used, one in which participants were actively engaged in small groups. Short lecture sessions were facilitated by well-trained health professionals who utilized tailored content developed from a previous breast cancer knowledge assessment in the same population. In addition, providing participant opportunities for engaging in breast exam demonstrations using silicone breast models as well as preserving significant time for a question and answer session all may have been vital to address myths and clarify content.

Our findings may reveal that it is critical to carefully design breast cancer awareness programs that are situated in the socio-cultural environment of the targeted population. In this regard it resonates with other research that suggests tailored content enhances the information relevance and promotes breast cancer screening [17, 18]. We believe that breast cancer programs in Kenya could utilize our findings to promote the level of breast cancer awareness across its communities. This educational approach may have significant implications for the uptake of breast cancer screening and treatment programs in a wider region.

Despite the positive impact observed from our educational sessions, we note that some items failed to show a positive impact or any significant group differences. Specifically, the item that assessed knowledge of gender as a risk factor showed a negative change in direction, with a higher number of those in the post-test group believing that breast cancer affected men and women equally. One interpretation of this finding may be that the respondents were

reporting their belief that men and women who have developed breast cancer are equally affected by the disease, rather than responding to the question we intended to pose to them about the relative risk among men and women of getting the disease in the first place. Further cognitive interviewing to improve the clarity of the instrument itself is needed to better understand these findings. In the meantime, breast cancer awareness programs need to underscore the fact that women are disproportionately at a higher risk of breast cancer compared to men. This is critical in the efforts to promote early detection of breast cancer among the higher-risk gender group, especially in such a resource-scarce environment where the capacity to provide regular breast cancer screening may be limited. Items that did not show any significant group differences emerged when we stratified our findings by location of events. Our educational sessions had the least impact on women from the Mosoriot community where only one health care professional was present. On the other hand, the greatest positive impact was observed in the site (Kapsokwony) that had a more comprehensive team including a physician, nurse, and behavioral scientist. Ensuring that broad and inclusive team of trained health care professionals facilitates breast cancer awareness sessions may be fundamental to addressing knowledge gaps from both a clinical and socio-behavioral perspective.

It is noteworthy is that more than a quarter of women in both groups mistakenly believed that having a pain in the breast and a lump in the armpit were early signs of breast cancer. Even though the educational sessions had a positive impact on responses to these items, even after exposure to education something more than a trivial proportion of women still associated onset of breast cancer with pain and abnormal changes in their breasts, generally symptoms and signs of late-stage breast cancer. These findings support previous

evidence that women in Kenya generally seek treatment at advanced stage breast cancer [10, 19]. Unfortunately, late presentation to care has important implications on the effectiveness of breast cancer treatment. It was therefore not surprising that the majority of the women in the pre-test group believed that breast cancer surgery results promotes cancer metastasis. On the other hand, it was encouraging to note that the majority of community women coming to screening did not associate breast cancer with witchcraft. Continuous and effective breast cancer awareness programs that fully engage targeted communities should be fostered to demystify myths and promote correct breast cancer knowledge.

From our study it was evident that the majority of women had not previously undergone breast cancer screening, highlighting the need for decentralized screening programs that reach a wider population of women in Kenya. Integration of breast cancer screening into routine primary care may go a long way in promoting screening uptake. This could be coupled with training on self-breast exam as a measure to enhance breast health self-awareness as well as screening for early detection and treatment of breast cancer. Even though controversies over the value of breast self-examination persist, we believe that in a community challenged with low awareness level, inadequate programs, and an impoverished health infrastructure, a combination of self- and annual-clinical breast exams may be the best option for our environment in western Kenya. It has been shown that educational interventions and utilization of strategies such as breast self-examination and clinical breast examination are more likely to promote higher mammography screening [20-22], essentially the only screening modality that has been thought to reduce mortality from breast cancer. We eagerly await the availability of mammography for the women of Western Kenya.

As the Ministry of Health in Kenya gradually invests in breast cancer screening and treatment programs, annual mammography may become increasingly available to women across communities in Kenya. Strategies to raise community consciousness about breast cancer may utilize our study findings to develop tailored awareness programs for this region. In addition, health care professionals at the community level will require extensive training in order to provide breast cancer screening services. They will also need skills on effective community awareness approaches to accurately communicate breast cancer messages. Our study presents an educational approach that has demonstrated a positive impact on breast cancer knowledge and could be adopted to enhance the skills of these health care professionals. Finally, efforts to make breast cancer treatment accessible and affordable remain critical to ensure that women who screen positive for breast abnormalities receive timely treatment and care.

Our study has a number of strengths. This is the first study in Kenya that assesses the impact of an education tool on breast cancer knowledge. It provides a snapshot of specific knowledge gaps and approaches to enhancing breast cancer awareness. Our study is not without limitations. The educational sessions targeted community women who presented themselves for breast cancer screening. We believe that this group of women may be significantly different from those who did not attend the screening events and hence our findings may not be representative of community women in this region. Our test of knowledge questionnaire needs further cognitive interviewing to test understandability of the instrument before it is ready for general use and re-use in our populations to be certain that the two items that may have been misunderstood are revised to assure clarity.

In conclusion, our study provides evidence of effective educational strategies that were carefully tailored for communities in Kenya. Incorporating approaches that fully engage these women was critical to the success of our educational session. Our findings provide important insight on breast cancer knowledge gaps across different sites, some of which still persisted even after our awareness efforts. Breast cancer programs in Kenya could utilize our findings to promote the level of breast cancer awareness and promote timely breast cancer screening and treatment uptake.

Funding

This work was supported by the Walther Cancer Foundation of Indianapolis, Indiana USA

Acknowledgements

We would like to acknowledge the Walther Cancer Foundation and the AMPATH-Oncology Institute (AOI) for their support of this study as well as cancer research in Kenya.

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Table 1: Characteristics of women enrolled in the study

Characteristic	Pre (n=269,51%)	Post (n=263,49%)	P-Value
Age	35(28-45)	34(28-44)	0.940
Marital Status			
Married	205(76%)	200(76%)	
Single	41(15%)	41(16%)	
Separated	8(3%)	6(2%)	0.946
Divorced	1(0.4%)	0	
Widowed	14(5%)	16(6%)	
Education Level (n=532)			
None	16(6%)	13(5%)	
Primary	132(49%)	130(50%)	0.506
Secondary	81(30%)	89(34%)	
College or above	40(15%)	29(11%)	
Location			
Kapsokwony	91(49%)	93(51%)	
Turbo	119(52%)	108(48%)	
Mosoriot	59(49%)	62(51%)	
Trained to perform a self-breast exam	No 214(80%)	151(57%)	
	Yes 55(20%)	112(43%)	<0.001
Previously undergone breast cancer screening	No 236(88%)	223(85%)	
	Yes 33(12%)	40(15%)	0.324
How often should a woman check for a breast lump			
At least once in < 1 year	50(19%)	40(15%)	
Once in 2 or 3 years	184(68%)	202(77%)	0.113
Other	6(2%)	3(1%)	
Don't Know	29(11%)	17(6%)	

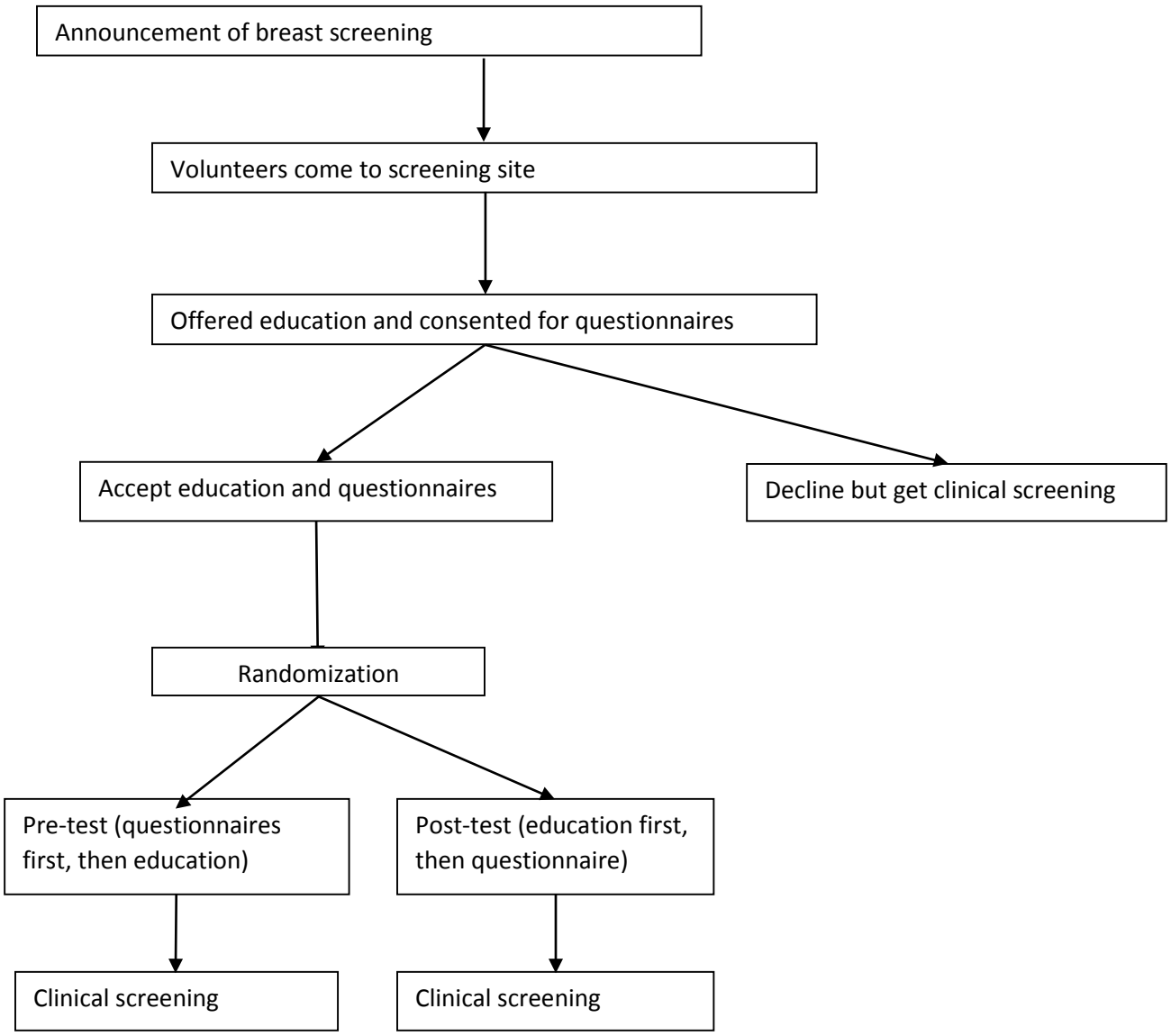
Table 2: Knowledge of early and late signs of breast cancer

Sign	TOTAL n=532 Pre, n (%)	Post, n (%)	P-Value	Kapsokwony, n=184			Turbo, n=227			Mosoriot, n=121		
				Pre, n (%)	Post, n (%)	P-value	Pre, n (%)	Post, n (%)	P-value	Pre , n (%)	Post , n (%)	P-value
	Early sign of breast Cancer											
A small painless lump in the breast												
Early stage	167(62)	215(82)		56(62)	82(88)		73(61)	87(81)		38(64)	46(74)	
Late Stage	33(12)	30(11)	<0.001	8(9)	8(9)	<0.001	18(15)	14(13)	0.001	7(12)	8(13)	0.302
Don't know	69(26)	18(7)		27(30)	3(3)		28(24)	7(6)		14(24)	8(13	
	Late signs of breast cancer											
A large lump in the breast												
Early stage												
Late Stage	93(35)	82(31)		3842	24(26)		36(30)	31(29)		19(32)	27(44)	
Don't know	92(34)	151(57)	<0.001	1719	63(68)	<0.001	53(45)	61(56)	0.097	22(37)	27(4)	0.059
	84(31)	30(11)		3640	6(6)		30(25)	16(15)		18(31)	8(13)	
A wound in the breast that will not heal												
Early stage	60(22)	35(13)		30(33)	15(16)		25(21)	10(9)		5(8)	10(16)	
Late Stage	150(56)	207(79)	<0.001	38(42)	74(80)	<0.001	72(61)	86(80)	0.006	40(68)	47(76)	0.040
Don't know	59(22)	21(8)		23(25)	4(4)		22(18)	12(11)		14(24)	5(8)	
Pain in the breast												
Early stage	151(56)	131(50)		55(61)	53(57)		64(54)	43(40)		32(54)	35(56)	
Late Stage	56(21)	112(43)	<0.001	10(11)	36(39)	<0.001	35(29)	54(50)	0.006	11(19)	22(35)	0.009
Don't know	61(23)	20(8)		25(28)	4(4)		20(17)	11(10)		16(27)	5(8)	
A blood discharge from the breast												
Early stage	60(22)	57(22)		32(36)	23(25)		20(17)	21(19)		8(14)	13(21)	
Late Stage	114(43)	161(61)	<0.001	22(24)	60(65)	<0.001	65(55)	63(58)	0.535	27(46)	38(61)	0.020
Don't know	94(35)	45(17)		36(40)	10(11)		34(29)	24(22)		24(41)	11(18)	
A lump in the armpit	108(40)	123(47)		38(42)	51(55)		53(45)	7(6)		17(29)	25(40)	
Early stage	67(25)	81(31)	<0.006	13(14)	28(30)	0.001	41(34)	47(44)	0.433	13(22)	22(35)	0.016
Late Stage	94(35)	59(22)		40(44)	14(15)		25(21)	31(29)		29(49)	15(24)	
Don't know												

Table 3: Knowledge of risk, causes and treatment for breast cancer

Knowledge statement	Pre, n (%)	Post, n (%)	P-Value	Kapsokwony, n=184			Turbo, n=227			Mosoriot, n=121		
				Pre, n (%)	Post, n (%)	P-Value	Pre, n (%)	Post, n (%)	P-Value	Pre, n (%)	Post n (%)	P-Value
Breast cancer can be cured if found early n=532.												
True	255(95)	256(98)		84(92)	90(98)		113(95)	106(98)		58(98)	60(97)	
False	3(1)	1(0.4)	0.253	1(1)	1(1)	0.091	2(2)	0	0.450	-	-	1.000
Don't Know	11(4)	5(2)		6(7)	1(1)		4(3)	2(2)		1(2)	2(3)	
Men and women are equally affected with breast cancer n=532												
True	123(46)	144(55)		37(41)	55(56)		57(48)	56(52)		29(49)	33(53)	
False	99(37)	102(39)	<0.001	30(33)	32(34)	0.001	45(38)	45(42)	0.175	24(41)	25(40)	0.734
Don't Know	47(11)	17(6)		24(26)	6(6)		17(14)	7(6)		6(10)	4(6)	
Major cause of breast cancer is family inheritance n=530												
True	117(43)	235(89)		40(44)	89(96)		56(47)	99(92)		21(36)	47(76)	
False	109(41)	20(8)	<0.001	35(38)	3(3)	<0.001	44(37)	6(6)	<0.001	30(51)	11(18)	<0.001
Don't Know	43(16)	8(3)		16(18)	1(1)		19(16)	3(3)		8(14)	4(6)	
Major cause of breast cancer is witchcraft n=530												
True	15(6)	9(3)		5(5)	4(4)		9(8)	4(4)		1(2)	1(2)	
False	232(87)	249(95)	<0.001	77(84)	88(96)		99(84)	101(94)	0.071	56(95)	60(97)	0.805
Don't Know	21(8)	4(2)		9(10)	0	0.005	10(8)	3(3)		2(3)	1(25)	
Major cause of breast cancer is eating wrong foods n=531												
True	122(46)	125(48)		34(38)	52(56)		61(51)	49(45)		27(46)	24(39)	
False	87(32)	112(43)	<0.001	32(36)	35(38)	0.001	32(27)	47(44)	0.012	23(39)	30(48)	0.581
Don't Know	59(22)	26(10)		24(27)	6(6)		26(22)	12(11)		9(15)	8(13)	
Breast feeding lowers the risk of breast cancer n=532												
True	129(48)	197(75)		35(38)	81(87)		64(54)	84(78)		30(51)	32(52)	
False	83(31)	51(17)	<0.001	29(32)	7(8)	<0.001	34(29)	20(19)	<0.001	20(34)	24(39)	0.621
Don't Know	57(21)	15(6)		27(30)	5(5)		21(18)	4(4)		9(15)	6(10)	
Breast cancer can be cured by herbs n=532												
True	89(33)	48(18)		13(14)	16(17)		54(45)	17(16)		22(37)	15(24)	
False	123(46)	194(74)	<0.001	56(62)	66(71)	0.092	41(34)	85(79)	<0.001	26(44)	43(69)	0.013
Don't Know	57(21)	21(8)		22(24)	11(12)		24(20)	6(6)		11(19)	4(6)	
Surgery spreads breast cancer and makes it worse n=532												
True	129(48)	83(32)		33(37)	26(28)		67(56)	33(31)		29(49)	24(39)	
False	100(37)	151(57)	<0.001	41(46)	63(68)	0.002	36(30)	56(52)	<0.001	23(39)	32(52)	0.378
Don't Know	39(15)	29(11)		16(18)	4(4)		16(13)	19(18)		7(12)	6(10)	
The best time to check for a lump is after menstrual period n=530												
True	100(37)	150(57)		32(36)	60(65)		42(35)	49(45)		26(44)	41(66)	
False	68(25)	51(19)	<0.001	19(21)	18(20)	<0.001	34(29)	24(22)	<0.254	15(25)	9(15)	0.050
Don't Know	100(37)	60(23)		39(43)	14(15)		43(36)	34(31)		18(31)	12(19)	
Refused				-	-		0	1(1)		-	-	

Figure 1: Study Procedure



APPENDIX 1: Teaching session script

Educational Presentation to Women about the Risks of Breast Cancer

Ladies, Thank you for coming to this special event today. For a few minutes, we are going to present some information to you about breast cancer and breast cancer prevention. Following this presentation and after you have completed your brief questionnaires **[post-test script]**, you will proceed to the next tent and be examined by doctors. *

You are all concerned about breast cancer or you would not be here today. Breast cancer is in fact a common condition. It affects women who are in their 40s or older. Almost no men get breast cancer and younger women are similarly not affected. The major cause of breast cancer is family inheritance. If your mother had the condition, your sisters, or your grandmother, you are at a greater risk. There is much said about the possibility that eating the wrong foods or having the breasts exposed to cold air or cold water, or having a baby who burps while being breastfed might cause breast cancer. Some people even think that breast cancer is caused by witchcraft or by a curse. To our knowledge, none of these things cause breast cancer; instead it comes to you with your family inheritance. There are some things that protect against breast cancer. For example, breastfeeding all of your babies for a long time may protect against breast cancer and avoiding smoking cigarettes similarly is protective.

Breast cancer is a dangerous disease. In fact it is a killer disease if found late. On the other hand, breast cancer can be *cured* it if it is found early. Some of you and others in the community associate breast cancer with a large swelling of the breast, pain, changes in the skin over the breast, or a wound that will not heal. In fact, all of these can be signs of breast cancer but when they appear the cancer is advanced and has been found late. Late breast cancer is very difficult to treat and almost never able to be cured. Early breast cancer causes no pain and makes its appearance as a tiny lump in the breast. This lump may be difficult to feel, but the clinicians who do screening examinations are experts in detecting the presence of these lumps. You may also be able to feel a small lump in your breast. If you want to know how to examine your breast, please watch the doctors in the next tent as they examine you and you will see how they conduct a very thorough examination of each breast. If you try to examine your own breasts to watch out for the appearance of lumps, please do so after your menstrual period is finished once a month. When I am done speaking, I would like to offer you an opportunity to come forward and use these breast models to feel for yourself what the small lump detection involves.

No matter what stage which it is detected, breast cancer can be treated. If it is found in an early stage when it is still a small lump, surgery may be able to remove it completely and by doing this cure the cancer. Later on this kind of surgery requires removal of the entire breast, but early in the history of the disease only a small part of the breast may need to be removed. Please know that surgery does not spread breast cancer, instead it takes it takes the cancer out of the body. Also you should know that breast cancer cannot be cured by herbs. Herbs may be helpful in controlling bad feelings but no herb has been shown to cure breast cancer. Let me pause at this point and see if there are questions. Thank you for your attention!

*** [pre-test script]** Ladies, Thank you for coming to this special event today. After you have completed your brief questionnaires we are going to present some information to you about breast cancer and breast cancer prevention. Following this presentation, you will proceed to the next tent and be examined by doctors.

APPENDIX 2: Commonly asked questions

- What is breast cancer and how does it differ from other cancers?
- Does breast cancer affect men?
- Why do men get breast cancer and yet they do not breast feed?
- How can one differentiate between pathological breast lumps and normal breast lumps that occur in adolescence?
- Why should people go to hospital when they have breast lumps and may die later?
- Why do women using family planning methods get breast cancer?
- Could other cancers in the body lead to breast cancer eventually - for example if one had throat cancer, could it spread and cause breast cancer?
- Why is there a rise in breast cancer rates?
- Why has breast cancer suddenly increased?
- Why do older women (women who have reached menopause) get breast cancer, yet they do not breast feed?

APPENDIX 3: Evaluation questionnaire

Let's begin with some easy questions for us to record some facts about you.

1. Gender: Female…….
2. How old are you? …….D.O.B……. Don't Know/Refused
3. Are you married/single/separated/divorced/ widowed? (circle one)
4. What is your highest level of education?
   - None
   - Primary/Elementary
   - Secondary
   - College and above

Now I want you to tell me whether the following are signs of early or late breast cancer?

Signs	Early	Late	Don't know
5. A large lump in the breast like a mango		**	
6. A wound in the breast that will not heal, like an ulcer		**	
7. Pain in the breast		**	
8. A bloody discharge from the breast		**	
9. A small painless lump in the breast	**		
10. A lump in the armpit		**	

11. Which of these women is most likely to get breast cancer in the next five years of her life?
    - 30 year old
    - 50 year old
    - 70 year old **
    - I don't know

Now I am going to make a series of statements that may either be true or false. Please choose one answer.

Statement	True	False	Don't know
12. Breast cancer can be cured if found at an early stage.	**		
13. Men and women are equally affected by breast cancer.		**	

14. The major cause of breast cancer is family inheritance.	**		
15. The major cause of breast cancer is witchcraft.		**	
16. The major cause of breast cancer is eating the wrong foods including fatty foods		**	
17. Breastfeeding your babies lowers the risk of breast cancer.	**		
18. Breast cancer can be cured by herbs.		**	
19. Surgery spreads breast cancer and makes it worse.		**	
20. The best time to check your breast for a lump is just after your menstrual cycle	**		

21. How often do you think a woman should be checked for breast cancer? Choose one:
    - Once in a lifetime
    - Once every ten years
    - Once every five years
    - Once a year

22. Have you ever been trained on how to feel your breasts for lumps or abnormalities? Yes/No

23. Have you ever undergone any breast cancer screening before? Yes/No

** Correct responses that are scored at '1.'