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A Theory-Based Intervention to Improve Breast Cancer Awareness and Screening in Jamaica

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Abstract

Despite declines in breast cancer mortality rates in developed countries, mortality rates remain high in Jamaica due to low levels of screening and lack of early detection. We hypothesized that a theory-based health educational intervention would increase awareness of breast cancer and intention to screen among women in Western Jamaica. Two hundred and forty six women attending hospitals or clinics were enrolled in an educational intervention consisting of a pretest, breast cancer presentation, and posttest if they had never been screened or had not been screened in 5 years or more. The questionnaires assessed attitudes and knowledge of risk factors and symptoms related to breast cancer. Participants were followed approximately 6 months after the intervention to determine whether they accessed breast cancer screening. There were statistically significant increases ($p < 0.0001$) in the percentage of correct knowledge responses and in participants' intention to screen from pretest to posttest. The greatest posttest improvements were among items measuring knowledge of breast cancer screening tests and risk factors. Of the 134 women who were reached by phone for post-intervention follow-up, 30 women (22.4 %) were screened for breast cancer and 104 women (77.6 %) had not been screened. The use of a theory-based educational intervention positively influenced knowledge of breast cancer risk factors, symptoms, and types of screening and increased screening rates in screening-naïve women. This theory-based educational intervention may be replicated to promote awareness of breast cancer and further increase screening rates in other areas of Jamaica and other developing countries.

Keywords

Early detection of cancer; Follow-up studies; Health behavior; Jamaica; Breast neoplasms

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Conflict of Interest The authors declare that they have no conflict of interest.

Breast cancer is the most common cancer affecting women worldwide, accounting for 23 % of all female cancers in 2008 (Ferlay et al. 2010). It is the leading cause of cancer mortality among Jamaican women, comprising 25.8 % of all female cancers in Jamaica (Ferlay et al. 2010). The age-standardized incidence rate of breast cancer in Jamaica between 2003 and 2007 was 43 per 100,000, a value that has remained relatively stable since 1993 (Gibson et al. 2010). This stable incidence rate is discordant with the expected rise in breast cancer incidence previously seen with the introduction of mammography screening in other countries (Garne et al. 1997; Richardson et al. 2005). This may be explained by the lack of a national breast cancer screening program (Gibson et al. 2010).

Compared to a 14.7 % mortality rate in the USA, the breast cancer mortality rate in Jamaica is 22.9 % (Ferlay et al. 2010). More favorable breast cancer survival rates in the USA and other developed countries have been attributed to early mammographic detection and treatment (Smith et al. 2004; Weir et al. 2003). However, its effectiveness is dependent on high levels of utilization. Less than 5 % of Jamaican women eligible for mammographic screening undergo screening (Soares et al. 2007).

A major deterrent to the successful implementation of a mammographic screening program is low motivation to participate. The breast pain associated with compression in mammography is a significant barrier to widespread participation (Dillum et al. 2000; Hafslund 2000). A study that surveyed women attending breast imaging units in Jamaica reported that 97 % of the participants found mammography painful. Other factors that affect the participation in a mammography screening program include fear, cost, perceived health status, educational level, lack of knowledge, indifference regarding personal health, and reliance on physician referrals (Clover et al. 1996; Segura et al. 2000; Soares et al. 2009).

There are several reproductive risk factors associated with breast cancer, including nulliparity, early menarche, late menopause, and late age at first childbirth, along with genetic background (Madigan et al. 1995). It has been predicted that the breast cancer burden will begin to rise in developing countries on the basis of increasing life expectancy and shifting reproductive and behavioral patterns. In the absence of a national screening program for breast cancer in Jamaica and with the threat of increasing breast cancer incidence, educational interventions are needed to increase public awareness (Anderson et al. 2008; Segura et al. 2000). The objective of this study is to evaluate the efficacy of a theory-based health educational intervention and examine post-intervention breast cancer screening rates among a sample of women in Western Jamaica. We hypothesized that this educational intervention would increase awareness of breast cancer and intention to screen.

Method

Procedure

This was a cross-sectional study with a pretest/posttest design conducted from June to August 2013 in the four parishes served by the Western Regional Health Authority (WRHA), specifically in the four WRHA hospitals, five non-randomized WRHA health centers, and five sites of community events. The WRHA provides free healthcare through a network of four hospitals and 84 health centers.

The educational intervention was developed using the transtheoretical model (TTM) and the health belief model (HBM) as a framework. TTM assesses an individual's readiness to act on a healthier behavior and uses consciousness raising and dramatic relief to guide individuals through the stages of change—precontemplation, contemplation, preparation, action, and maintenance (Prochaska and Velicer 1997). The HBM suggests that an individual's belief in a disease, combined with an individual's belief in the effectiveness of the recommended behavior, will predict the likelihood of adoption of that behavior (Rosenstock et al. 1988). Constructs from the HBM were used in the intervention to decrease participants' perceptions of barriers and emphasize the health benefits of screening. Public health practitioners have widely used the TTM and HBM to promote beneficial health behaviors including uptake of breast cancer screening (Gürsoy et al. 2011; McCree-Hale et al. 2012; Park et al. 2011).

Women ages 35 years and older were eligible to participate in the study if they gave informed consent. The minimum age required to participate was set according to the Jamaica Cancer Society recommendation that women have one mammogram between age 35 and 39 and one every year from age 40 and older. Our sample was limited to women who resided in the areas served by the WRHA, had no breast complaints, and had never had a mammogram or had not had one in the last 5 years. Two hundred and forty six women met our inclusion criteria and were enrolled in the study, with the aim of obtaining a sample of participants that reflected the proportion of the overall population of each parish served by WRHA. The study protocol was approved prior to its implementation by the Institutional Review Board of the University of Alabama at Birmingham, the Advisory Panel of Ethics and Medico-Legal Affairs in the Jamaican Ministry of Health, and the Western Regional Health Authority of Jamaica.

Participants completed a background questionnaire and pretest and observed a 17-slide PowerPoint® presentation immediately followed by a posttest. The questionnaires and presentation were developed for participants with a reading level below eighth grade and were pilot tested twice for comprehension with a sample of 20 Jamaican women. The background questionnaire contained questions pertaining to sociodemographic information including age, marital status, educational attainment, employment status, and barriers to screening. The pre- and posttest contained questions about participant attitudes, knowledge, perceptions, and behaviors regarding breast cancer risk factors, symptoms, and screenings. The PowerPoint® presentation contained culturally relevant images and general information about breast cancer etiology, symptoms, and risk and protective factors. It also contained images of normal breast anatomy and breast cancer at varying stages. Additionally, the presentation illustrated how to perform a monthly breast self-exam.

The intervention sessions were attended by groups of 1–30 women, with an average of eight attending a session. The pre- and posttest questionnaires were mostly self-administered, but interviewers were available to assist women who could not read by reading the questions and recording participant answers. Each intervention lasted approximately 30 min. At the end of the intervention, participants were given information about low-cost mammography services offered by the Jamaica Cancer Society. Participants were contacted 6 months after the completion of the educational intervention to determine the rate of breast cancer screening.

Study Measures

Previous breast cancer experiences were measured using five items. Participants were asked, “Have you ever heard about breast cancer screening?” Participants who had heard about breast cancer screening were then asked, “from whom have you heard about breast cancer screening.” Participants were asked, “Have you ever gotten a mammogram.” Participants were asked, “Do you know of any place where you can get screened for breast cancer?” Participants who checked “yes” were asked to specify the location. Participants were asked “Do you know of any place where you can get treatment for breast cancer?”

Participants’ attitudes about breast cancer screening were measured using three items. Patients that had never gotten a mammogram were asked, “Why have you not gotten a mammogram” and were given the option to select all the answer choices that may apply to them. The answer choices included “Don’t see a need to get screened,” “Do not know where to get screened,” “Afraid it would be painful,” “Afraid of bad results,” “Can’t make it to clinic or location is too far,” “Too expensive,” “Did not know about test,” and “Other.” Participants were asked whether they thought “getting screened for breast cancer would be embarrassing” or thought “getting my breast examined would be painful.”

Knowledge of breast cancer screening tests was measured using two items. Participants were asked to name a test used to check for breast cancer. Mammogram, breast ultrasound, or breast self-exam were considered correct responses. Participant knowledge of recommended frequency of breast cancer screening tests was assessed by asking, “how often should women get screened for breast cancer?”

Knowledge of risk factors was assessed by asking women to select “yes,” “no,” or “not sure” to whether the following items could protect them from getting breast cancer: “Being older in age,” “being obese after menopause,” “smoking,” “not exercising regularly,” “having family members with breast cancer,” “using deodorants and roll-on,” and “breastfeeding.”

Knowledge of how to reduce risk factors was assessed by asking women to select “yes,” “no,” or “not sure” to whether the following items could help them lower their risk of getting breast cancer—“get a mammogram screening for breast cancer,” “avoid smoking and limit the alcohol you drink,” “control your weight,” “breastfeed,” “limit amount of hormone therapy,” and “exercise.”

Knowledge of breast cancer signs was assessed by asking women if the following options would make them suspect that they may have breast cancer—“Lump in breast or underarm area,” “Breast pain,” “Change in breast texture,” “Discharge from nipple,” and “Nipple turned inward into the breast.”

Stage of change was measured using two items. Participants were asked, “have you ever thought about getting a mammography screening for breast cancer?” Participants answering “no” were assigned to the precontemplation stage of change. Participants answering “yes” were prompted to answer another question: “Are you planning on getting a mammography screening for breast cancer in the next 6 months?” “No” answers were assigned to the contemplation stage and “yes” answers were assigned to the preparation stage.

Statistical Analyses

Statistical analyses focused on assessment of differences in knowledge of breast cancer screening tests, risk factors, symptoms, and stage of change from pretest to posttest. Paired *t* tests and McNemar's tests for correlated proportions were conducted on pretest and posttest scores to determine if there was a significant increase in breast cancer knowledge and intention to screen due to the intervention. A summated index of correct responses to knowledge of breast cancer screening tests, causes of infection, symptoms, and risk factor questions was created. A paired *t* test with $\alpha=0.05$, $p<0.05$, and 95 % confidence intervals was used to assess differences between pretest and posttest index scores. McNemar's tests with $\alpha=0.05$ and $p<0.05$ were used to assess the significance of differences between pretest and posttest proportions for knowledge variables included in the summated index plus intention to screen variables. Missing values were excluded from the analysis. Data were analyzed using SAS software 9 (SAS Institute Inc., Cary, NC).

Results

The sociodemographic characteristics of the sample are presented in Table 1. Study participants ranged from 35 to 83 years with a mean of 50.2 years $\pm$ 10.6. The largest proportion of women was aged 40–49 (37 %), single (46.5 %), with a secondary level of education (49.2 %), and unemployed (45.8 %). Most participants lived 30 min or less from the nearest clinic (71.2 %) and could take time out of their day to visit a health center for breast cancer screening (98 %).

Information regarding the participants' previous breast cancer screening experiences is presented in Table 2. Although most participants (93.9 %) had previously heard about breast cancer screening prior to the educational intervention, only 11.4 % had a mammogram five or more years ago and 54.4 % were able to name a breast cancer screening location. Most participants reported that doctors and nurses were the source of their breast cancer screening knowledge (93 %), with media being the second most predominant source (59.8 %).

Information regarding the participant's attitudes about breast cancer screening is presented in Table 3. There was no significant difference in participant attitudes toward breast cancer screening between the pre- and posttest. The percentage of participants who thought that breast cancer screening would be embarrassing increased from 5.2 to 6.1 %. The percentage of participants who thought breast cancer screening would be painful decreased from 45.4 % in the pretest to 43.6 % in the posttest. "Don't see a need" was the most commonly cited reason for never getting a mammogram (32 %) with "afraid of pain" being the second most common (29.4 %). Approximately one fifth of the women (23.5 %) reported the mammogram was too expensive as their reason for never getting screened.

Information regarding the participants' knowledge of screening tests, risk factors, symptoms, and intention to screen is presented in Table 4. There was a significant increase in the proportion of correct answers to most knowledge items from pretest to posttest. In the pretest, knowledge of breast cancer screening tests and risk factors was relatively low compared to knowledge of breast cancer symptoms. Less than half of the sample (46.4 %) knew the recommended frequency of breast cancer screenings, and 60.5 % of participants

knew the name of a breast cancer screening test. Approximately one third of the participants (34.5 %) correctly identified using deodorant or roll-on as a non-risk factor for breast cancer, and 11 % of participants incorrectly answered that trauma to the breast was a risk factor for breast cancer. Over half of the women identified older age (57.8 %), obesity after menopause (51.1 %), and not exercising regularly (55.2 %) as breast cancer risk factors.

The most significant posttest improvements were among items measuring knowledge of breast cancer screening tests and risk factors. The percentage of participants who knew the recommended frequency of screening increased from 46.4 to 85.2 %, and the percentage of participants who knew the name of a breast cancer screening test increased from 60.5 to 94.6 % ($p<0.0001$). Knowledge that obesity after menopause and not exercising regularly are breast cancer risk factors increased by 40.3 and 37 percentage points, respectively ($p<0.0001$). Knowledge of breast cancer symptoms increased between 4.6 and 42.8 percentage points. Knowledge of how to reduce risk factors of breast cancer increased between 8 and 31.1 percentage points. The percentage of women who responded that controlling your weight, breastfeeding, and limiting hormone therapy could decrease the risk of breast cancer increased by 20.6, 20.9, and 31.1 percentage points, respectively ($p<0.0001$).

Paired t test results of the summated indexes of correctly answered knowledge items of the pre- and posttest are also presented in Table 4. The mean number of correct responses in the pretest was 12.8 ± 3.9 , while the mean number of correct responses in the posttest was 17.8 ± 2.6 . Mean test scores for pretest and posttest differed significantly according to the paired t test, $t(240)=21.1$, $p<0.0001$. The 95 % confidence interval for the difference in knowledge scores is between 4.6 and 5.5 score points.

Figure 1 shows the distribution of respondents by stages of change at pre- and posttest. There was a significant movement through the stages of change, from precontemplation and contemplation to preparation, signifying an increase in intention to screen. There was a significant decrease in the number of participants in the precontemplation stage in the posttest (5.9 %) compared to the pretest (41.4 %) ($p<0.0001$). There was also a significant decrease in the number of participants in the contemplation stage in the posttest (7.3 %) in comparison to the pretest (37.2 %) ($p<0.0001$). The number of participants in the preparation stage increased from 62.6 % in the pretest to 92.7 % in the posttest ($p<0.0001$).

Table 5 shows the post-intervention breast cancer screening rates among the study population. Of the 134 women (54.5 % of all participants) who were reached by phone for postintervention follow-up, 30 women (22.4 %) were screened for breast cancer, and 104 women (77.6 %) had not been screened.

Discussion

This was the first computer-based health educational intervention on breast cancer awareness conducted among Jamaican women. Prior to participating in the breast cancer educational intervention, most women had some knowledge of breast cancer. About 94 % of participants had previously heard about breast cancer screening, primarily from health care

providers and media. However, women were less likely to know specifics regarding the name of a breast cancer screening test and frequency of screening. Although approximately 50 % of the women had only a secondary education, the use of simple language and culturally appropriate images aided in the retention of information presented in the educational intervention. Our results are comparable to other interventions that employ similar educational methodologies and result in significantly improved breast cancer awareness and movement through the stages of change (Jenkins et al. 1999; Valdez et al. 2002).

While most women understood the symptoms of breast cancer, they possessed limited knowledge of breast cancer screening, the frequency of mammogram screening, and risk factors for breast cancer. Though primary prevention is difficult in terms of the reproductive risk factors for breast cancer, prevention may be possible for other risk factors such as alcohol consumption, postmenopausal obesity, physical inactivity, oral contraceptive use, and long-term hormone replacement (Danaei et al. 2005; Madigan et al. 1995). Pretest knowledge that obesity and physical inactivity are risk factors of breast cancer was approximately 50 %. Obesity is becoming more common in developing countries due to the wider adoption of the Western diet and lower exercise levels (Tfayli et al. 2010). Therefore, future efforts to increase breast cancer awareness in developing countries need to promote a healthy diet and exercise. Approximately 66 % of participants incorrectly stated that deodorants could increase the risk of breast cancer, and 11 % of participants reported that trauma to the breast may increase a woman's likelihood of getting breast cancer, with some women stating that breast compression during a mammogram could lead to breast cancer. Almost half of the participants reported that they believe a mammogram screening would be painful. As intention to screen increased with knowledge level, interventions to increase knowledge, dispel misconceptions, and reduce anxiety regarding screening methods may improve compliance with recommended mammographic guidelines.

Only 54.4 % women reported that they were aware of a location to get screened for breast cancer. Though many women were within 30 min of their nearest public health center, there are no public health centers that offer free mammography screening in the western region. Radiology West and MoBay Hope Medical Centre are private centers that have the only two mammography units serving the western parishes (Soares et al. 2007). Mammograms are accessible at these centers only if women have the funds or health insurance to cover the cost. Though only 23 % reported that cost was a reason why they had not participated in mammography screening, many women did not know the actual cost of a mammogram. Since 45.5 % of women were unemployed, it is likely that cost may be a greater barrier to screening than reported. Women were encouraged to seek information about the Jamaica Cancer Society mobile mammography unit, where they can obtain a mammogram at the minimal cost of JMD \$700 (US\$1=JMS\$110) with a health insurance card, or JMD \$3500 without a health insurance card, which can be cost-prohibitive.

Health care providers could play a pivotal role in reducing barriers to screen by dispelling misconceptions of screening and providing comprehensive education to keep women engaged in their health. Approximately 70 % of the participants lived within 30 min of their nearest public health center, and 93 % of women reported hearing about breast cancer from

doctors or nurses. This suggests that women may benefit from provider-administered education and subsequent mammography referral. Women in Jamaica use health services primarily during their childbearing years, e.g., prenatal care, family planning, and pediatric care. Even the smallest health units provide basic maternal and child health and family planning services. Given this situation, integration of a breast health program with existing programs, such as child and maternal health care services, would increase screening rates while optimizing resources.

Soares et al. (2007) found that a high proportion of women attending Radiology West were referred by their primary care physicians, indicating a reluctance to present for screening unless authorized by a referring physician. In contrast, University Hospital of West Indies (UHWI), a mammography screening center in eastern Jamaica, engages in patient outreach and educational programs, leading to larger proportion of self-referred women presenting for screening (Soares et al. 2007). To facilitate increased breast cancer screening in the absence of a national screening program for breast cancer, there needs to be an increase in public awareness, healthcare provider-led education, and mammography referral. While mammography screening is the only method shown to reduce breast cancer mortality (Smith et al. 2004), providers with a significant primary care component to their practice should also provide clinical breast exams and teach women to perform monthly breast selfexams, as some women cannot afford a mammogram (Robles and Galanis 2002).

Limitations

This study had a small sample size. In addition, issues with incomplete surveys and missing data further reduced our sample size. Most of the women interviewed were seen in hospital or clinic waiting rooms so they were not representative of the general population. Additionally, self-reported data might have been biased due to social desirability. Intentions to screen when screening tests were not immediately available may not have accurately reflected participants' intentions had they been given the opportunity to be screened. Budget constraints did not permit assessing long-term effect of intervention on participant cancer knowledge.

Conclusions

There were significant increases in breast cancer awareness, knowledge of screening tests, and intention to screen, and approximately one fifth of participants had a mammogram post-intervention. In light of these results, a theory-based educational intervention may be used to increase breast cancer awareness and promote mammography screening for breast cancer in other areas of Jamaica and other developing countries. Future interventions should also focus on methods to increase the health care provider's role in encouraging screening behaviors, including giving referrals to mammography centers.

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Fig. 1. Distribution of respondents by stages of change at pre- and posttest ($n=239$ for precontemplation; $n=137$ for contemplation and preparation). There was a significant movement through the stages of change, from precontemplation and contemplation in the pretest to preparation in the posttest. *Asterisk* denotes significance at 0.01 % level

Table 1Sociodemographic characteristics of participants ($n=246$)

	Number ^a	Percentage ^b
Parish		
Hanover	48	19.5
St. James	118	48.0
Trelawny	50	20.3
Westmoreland	30	12.2
Age (years) ^c		
35–39	37	15.0
40–49	91	37.0
50–59	74	30.1
60 and older	44	17.9
Highest education level		
No formal education	6	2.5
Primary (1–6 grade)	76	31.2
Secondary (7–11 grade)	120	49.2
College/technical/vocational	41	16.8
Graduate school	1	0.4
Marital status		
Single	113	46.5
Married	79	32.5
Living together	25	10.3
Divorced or separated	11	4.5
Widowed	15	6.2
Occupation		
Unemployed	109	45.8
Unskilled employment	67	28.2
Skilled laborer	16	6.7
Office work/professional	31	13.0
Business owner	15	6.3
Time to nearest clinic		
30 min or less	173	71.2
Over 30 min	70	28.8
Number of children (mean, SD)	3.6±2.3	

SD standard deviation^aTotals may not equal 246 due to missing values^bPercentage totals exclude participants who omitted the question^cMean age—50.2±10.6 years, range 35–83 years

Table 2

Previous breast cancer screening experience

	Number ^a	Percentage ^b
Participant's BCa screening background		
Previously heard about BCa screening	230	93.9
Previously had a mammogram	28	11.4
Participant has time for BCa screening	239	98.0
Aware of BCa screening location	131	54.4
Aware of BCa treatment location	138	58.2
Source of knowledge of BCa		
Doctor/nurse	224	93.0
Family members	62	25.7
Friends	77	32.0
Media	144	59.8
Other	25	10.4

BCa breast cancer

^aTotals may not equal 225 due to missing values

^bPercentage totals exclude participants who omitted the question

Table 3

Participants' attitudes about breast cancer screening

	Pretest		Posttest		Difference		p value
	n	%	n	%	n	%	
BCa screening is embarrassing	12	5.2	14	6.1	0.9		<i>p</i> =0.6547
BCa screening is painful	103	45.4	99	43.6	-1.8		<i>p</i> =0.6056
Reasons for never getting screened							
Afraid of pain	60	29.4					
Afraid of bad results	28	13.7					
Didn't know about mammograms	17	8.3					
Because it is too expensive	48	23.5					
Don't know where to get tested	27	13.2					
Don't see a need	65	32.0					
Clinic is too far	7	3.43					
Other	57	27.8					

Table 4

Knowledge of screening tests, risk factors, and symptoms and intention to screen

	Pretest		Posttest		Difference	p value
	n	%	n	%	%	
Knowledge of BCa screening tests						
Name of BCa screening test	133	60.5	208	94.6	34.1	<i>p</i> <0.0001**
Recommended frequency of screening	110	46.4	202	85.2	38.8	<i>p</i> <0.0001**
Knowledge of BCa risk factors ^a						
Older age	137	57.8	213	89.9	32.1	<i>p</i> <0.0001**
Obesity after menopause	119	51.1	213	91.4	40.3	<i>p</i> <0.0001**
Deodorant/roll-on usage	80	34.5	166	71.6	37.1	<i>p</i> =0.2012
Smoking	176	74.3	226	95.4	21.1	<i>p</i> <0.0001**
Not exercising regularly	127	55.2	212	92.2	37.0	<i>p</i> <0.0001**
Family members history of BCa	180	76.3	219	92.8	16.5	<i>p</i> <0.0001**
Breastfeeding	141	60.3	190	81.2	20.9	<i>p</i> <0.0001**
Knowledge of BCa symptoms						
Lump in breast or underarm area	215	89.6	226	94.2	4.6	<i>p</i> <=0.0411*
Breast pain	192	80.3	218	91.2	10.9	<i>p</i> =0.0002**
Change in breast texture	174	74.0	219	93.2	19.2	<i>p</i> <0.0001**
Discharge from nipple	185	77.7	232	97.5	19.8	<i>p</i> <0.0001**
Nipple turned inward into the breast	117	49.6	218	92.4	42.8	<i>p</i> <0.0001**
Knowledge of how to reduce risk of BCa						
Get a mammogram screening	193	81.1	221	92.9	11.8	<i>p</i> <0.0001**
Avoid smoking/limit alcohol	212	88.7	231	96.7	8	<i>p</i> =0.0004**
Control your weight	174	73.1	233	93.7	20.6	<i>p</i> <0.0001**
Breastfeed	144	60.3	190	81.2	20.9	<i>p</i> <0.0001**
Limit amount of hormone therapy	122	51.3	196	82.4	31.1	<i>p</i> <0.0001**
Exercise	177	75.3	220	93.6	18.3	<i>p</i> <0.0001**

	Pretest		Posttest		Difference	p value
	n	%	n	%	%	
Intention to screen						
Precontemplation	99	41.4	14	5.9	-35.5	<i>p</i> <0.0001 ^{**}
Contemplation	51	37.2	10	7.3	-29.9	<i>p</i> <0.0001 ^{**}
Preparation	86	62.8	127	92.7	29.9	<i>p</i> <0.0001 ^{**}
Pre- and posttest knowledge scores, mean±SD (range)	Pretest		Posttest			
	12.8±3.9 (0–20)		17.8±2.6 (2–20)			
	<i>n</i>		Mean		95 % CI	Significance
Difference in post-pretest knowledge index score	241	5.1	4.6, 5.5			<i>p</i> <0.0001 [*]

^a Participants correctly answered using deodorant/roll-on and breastfeeding are not risk factors of BCa

^{*} 5 % level of significance;

^{**} 1 % level of significance

Table 5

Breast cancer screening rates

Parish	Participants reached		Screened		Not screened	
	<i>n</i>	%	<i>n</i>	% ^a	<i>n</i>	% ^a
Hanover	16	29.2	4	25.0	12	75.0
St. James	71	60.1	19	26.8	52	73.2
Trelawny	31	62.0	3	9.6	28	90.3
Westmoreland	16	53.3	4	25.0	12	75.0
Cumulative	134	54.5	30	22.4	104	77.6

^aPercentage is out of women who were reached