A Study of Knowledge, Attitudes and Practices towards Breast Cancer Screening & Mammography Among Somali Refugee Women in Seattle

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Abstract

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Abstract: Background: Breast cancer awareness is low in Somalia and there is limited cancer diagnosis, modern treatment options, and the cases would present very late in stage when treatment may not be viable**.** Therefore, Somali women tend to have a fatalistic view about cancer in general and ominously call it an 'incurable big wound'. Knowledge, attitude, and practices have been hypothesized as one of the patient-centered screening determinant, but there is limited data available to conclude this for Somali women. This study's objective is therefore to investigate Knowledge, Attitude, and Practices (KAP) towards breast cancer, screening, and mammography among Somali women living in Seattle, Washington. **Methodology**: A cross-sectional survey was carried out in Seattle Washington between July and September 2014. There were 200 Somali women who were recruited into the study using a convenience sampling method. Data were collected using a close-ended questionnaire. Data were analyzed descriptively using statistical data analysis software, STATA version 12 and presented as frequency tables, texts and graphs. Scoring scheme and weighted average was used to create two models for logistic regression to compare effects of knowledge on attitudes towards mammography and health care practices respectively. **Result:** Of the 200 recruited, 175 (87.5%) respondents participated in the survey 52% (N=91) of the participants were 40 years or younger and slightly less than half, 48% (N=84) were 40 years or older. Participants were either married, 123(70.3%), divorced, 33(18.9) or widowed, 19(10.9). Median years in the United States are 9 years but ranges from a year to 28 years. 62% of respondents said breast cancer leads to death if untreated and 63% said it is curable if detected and treated in early stages. However, 51% said they would be afraid to test lest they get a positive result and only 4% will go for a mammogram without hesitation. High parity, about seven months of breastfeeding and earlier age of first childbirth are some of the beneficial outcomes. There were no differences in responses for mammography knowledge, attitudes towards mammogram and healthcare practices, which were all below 50% of correct scores. There were slight differences in responses based on age and education levels, but no significant difference by years lived in United States. Knowledge of breast cancer and its risk factors were also limited with correct answer scores <50%.**Conclusion:** Overall, there is limited knowledge, understanding, and poor and fatalistic perception about breast cancer, its risk factors as well as mammography as a screening tool among Somali women participants. This finding highlights the importance of public institutions and planners of carrying out intervention targeting behavior change and aimed at increasing knowledge of breast cancer among underserved women and train providers to take time to assess the breast cancer risks and prescribe screenings to increase early detection.

1. Introduction

Somali refugees represent one of fastest growing newcomers to the Puget Sound region and the country[1]. According to United States, office of refugee resettlement, 4,915 Somali refugees arrived in the country in 2012 alone and more have been arriving since early 1990s. These newly arriving immigrants face a daunting task of accessing needed healthcare services even though the offices of refugee resettlements provide some cash and medical assistance [1-3]. Somali refugees undergo health screening when they arrive in the country but these are mostly limited to infectious diseases such as Tuberculosis, Human Immunodeficiency Virus and other tropical diseases such as malaria in line with Center for Disease Control and Prevention guidelines[2]. United States Preventive Taskforce (USPTF) has optional guidelines for refugee health screenings including cancers but these are not routinely carried out on refugees[2, 4]. For example, USPTF recommends an optional all-type cancer screening including biannual mammogram for women aged 50-74 years[4] while the American Cancer Society recommends an annual mammogram starting at 40 years regardless of an individual's levels of breast cancer risks[4-6].

2. Literature review

Globally, breast cancer is the second most common cancer with an estimated 1.67 million new cases reported in 2012[7]. Most cases are reported in North America but most deaths happen in third world countries most likely due to lack of early detection and proper treatment [2, 7, 8]. In low resource settings especially among poor black women, refugees and immigrant populations have survival rates comparable to those of developing countries due to low screening participation [7, 9, 10].

More favorable breast cancer survival in higher income countries is due to screening, awareness, early detection, early diagnosis, and timely and adequate treatment as well as palliative care [7-10]. However, there is also breast cancer disparity in the developed countries between black ethnic groups, minorities and hard to reach vulnerable populations[11].

The current emphasis on breast cancer screening in the United States for black ethnic women and other minorities is a result of popular media highlights, research and advocacy group

reports debunking the myth that breast cancer is confined to Caucasian women only [11-13]. CDC reports noting high differential death due to breast cancer related health disparities also added more weights to the current literature and body of knowledge[5]. For example, in its report, the 2010 National Vital Statistics System, CDC notes that breast cancer deaths estimate for African American and White are 56.8 and 35.6 per 100,000 respectively[14]. The reports further notes that even though breast cancer incidences for white women were much higher than for black women, death rates for black women are twenty percent higher for white women[14].

Somali Refugees in the USA

Somali refugee women are coming to USA to face a disparate cancer-screening environment where black immigrant women have poorer cancer outcomes [5, 9, 11, 14] compared to all other demographics. The percentage of annual mammograms and the recommended biannual screening for immigrant women 40 years and older who lived in the US for less than 10 years are 27% and 37% respectively compared to US born women who were screened 52% and 67% respectively [6]. Black women are dying of breast cancer at a greater rate than any other demographic group in the US[6] and poor black women diagnosed with breast cancer are associated with poor adherence to chemotherapy [15] and therefore, have a shorter five-year survival rate. It's not all gloom, in the US, there has been reduction in breast cancer death, with the highest reduction in women younger than fifty years old [11, 21]. This could be attributable to the promise of early detection, diagnosis and prompt treatment as well as adherence to treatment.

Refugees are typically linked with a primary care provider for non-infectious and non-emergency medical conditions within the shortest time possible post-arrival but again the availability and access varies from place to place and depending on circumstances that are mostly out of the control of the refugee group [1, 2, 9]. Most of these refugees have never used modern healthcare services for routine preventive care, so their perception of healthcare, expectations and provider confidence to support such refugee poses tremendous challenges [8, 9, 11]. It is common for a Somali refugee to go to the doctor when they are very ill, at which time the disease might have progressed to a dangerous stage, and so difficult to treat. Their understanding of managed care, primary care and the western medicine itself is limited [8-10].

Somalis generally have a fatalistic view of any diseases that are without known cure to them. Similarly, studies in the United States shows African American women were found to harbor fear, a fatalistic view and misconception that breast cancer is only found in white women [9, 16-20]. Likewise, Somalis place their fate with God about cancers instead of seeking available medical care. Arriving Somali refugee, like all others, may not have had any cancer screening prior to coming to United States and are unlikely to get cancer screening immediately due to barriers such as illiteracy, language, cultural, transport and lack of modern health perspectives [8-10].

Immigrant Health Screening

Despite the existence of CDC programs that are dedicated to increase breast cancer screening among underserved populations, the National Breast and Cervical Cancer Early Detection Program (NBCCEDP) have no data on Somali refugee women or any breakdown by diverse black ethnic groups, which make it difficult to know the differential impacts of cancer screening and survival outcomes[5]. For example, NBCCEDP for screening in Washington States served 4.7% of black women out of the 56,030 women screened in the past few years.

Factors Associated with Screening

Studies on uptake of breast cancer screening by Somali refugee women in the UK has shown that the gender of providers performing the physical exam, clinical breast exams, and a mammogram determine whether the procedure is acceptable to Somali refugees [8]. Many barriers and personal factors such as knowledge, attitudes and practices predict more disparities in breast cancer [9]. It's also plausible to assume that the longer these refugees stay in the United States and use health care services, they would gain some beneficial knowledge and have favorable perception about modern screening and appreciate their important at diagnosing breast cancer.

As of now, there are limited data available for assessing knowledge, attitude and practices around breast cancer, screening and mammography among Somali refugee women, which makes it more challenging to engage them on the uptake of screening[9]. Therefore, we

believe, our findings will serve as a baseline for future research and may help guide planning for educational intervention cum research especially community-based participatory research. This study's aim is to assess knowledge, attitude and practices towards breast cancer, screening and mammography among Somali refugee women living in Seattle Washington. Study's specific aims are to-

1.Describe predictor variables—knowledge and attitude (K & A)

2. Describe outcome variable—healthcare practices (BSE, mammography & CBE acceptance)

3. Compare the association between KA and P 'good' scores (>50%)

3. Methods

Study design, participants and setting

A descriptive cross-sectional study was conducted between July and September 2014 in Seattle Washington, USA. The participants were women, 18 years and older residents of Seattle who self-identify as a Somali. The other eligibility criterion was being able to consent and agreeing to participate in the study. This population is very difficult to access because they live in scattered low-income public housing throughout Seattle. Therefore, surveys were conducted mainly at four Seattle preschools sites located within four Seattle public housings locations. Because our population of interest is not known to participate in research studies, it was presumed that other research methods might not be realistic for this study. This is in light of a recent Somali women focus group formed by Seattle based Fred Hutchison Cancer Research Center (FHCRC) that found the women to be unresponsive to questions regarding breast cancer, and that when probed further, told researchers they had nothing to say about the disease although they know it's a terminal illness[9]. To overcome potential silence encountered in the FHCRC study and none-response, this study adopted a closed-ended questionnaire to get as many responses as possible from the participants. A pilot study of 12 women surveyed on July 17, 2014 indicated the questions were understandable and useful for data collection. Subjects were approached at various summer health events, community centers as they picked up their children from preschool and through home visits.

The study PI carried out data collection, processing and analysis over the study period. The PI employed structured questionnaire to collect data. The data collected included demographics, as well as family and personal history of breast cancer. Participants were surveyed for knowledge of breast cancer, risks factors, knowledge of mammography, attitudes towards mammography, and healthcare practices and these responses recorded for analysis.

Outcome Variables

The study's primary outcome variable is knowledge, attitude, and health care practices scores ≥50%, indicating 'good' knowledge and breast health practices. The health care practice questions are frequency of center attendance, whether a person had a mammogram, whether she practices breast self-exam, whether she would ask for clinical breast exam, whether she would accepts a mammogram if a lump is found through a physical exam, and if offered a free mammogram, whether she would go for the procedure without hesitation. Study's predictor variables are correct scores ≥50% for questions regarding knowledge of breast cancer, knowledge of risk factors, knowledge of mammogram and attitude towards a mammogram.

Data Management and Analysis

The data was entered into MS Excel and then transferred to statistical data analysis software, STATA version 12 and descriptive statistics generated. The results were presented as frequency tables, graphs, and percentages.

As a secondary data analysis, we carried out logistic regression on two models to compare the effects of predictor variables (Model 1: knowledge, attitude and practices) scores on two outcomes variables (Model 2: attitude towards mammography and health care practices) controlling for age, level of education and times in the United States as confounders at a time.

For Model 1: Effects of **knowledge and attitude** on Healthcare practices, "good" knowledge and attitude is defined as weighted average >= 1/3, and "good" healthcare practices are defined as at least half of health care practices questions that were answered correctly. In addition, for Model 2: Effects of knowledge on attitudes towards mammography, "good"

knowledge is defined as weighted average >= 1/3, and "good" attitudes are defined as at least half of the knowledge questions that were answered correctly. The results of the two models will inform us on whether knowledge, attitude and practices are associated either positively or negatively when analyzed using logistic regression.

Ethical consideration

The study received exemption status from University of Washington's Division of Human Subject on July 16, 2014. An optional written consent was obtained from participants and the participants were assured that they would not face any discrimination health care services or any other public services for their involvement in this breast cancer study.

4. Results

Socio-demographic characteristics

Table 1 presents demographic characteristics. Of the 200 study subjects contacted, 175 responded to complete the survey. This represents an 87.5% response rate. All participants were foreign born and had immigrated to United States. More than half (52%, N=91) of the respondents were younger than 40 years old and only 7.4% (N=13) were older than 50 years old. Majority of the respondents (83.5%, N=76) were married, and 71.5% have below 8^{th} grade or equivalent level of education with only 9.1% (N=16) having some college education. All participants had at least one child, age at first birth and parity are, Mean (SD) 21.33 (4.30) and 21.33 (4.30) respectively. Majority, 98.3% (N=173) have breast fed for at least 7 months, mean (SD) 7.36 (1.79).

Table 1: Socio-demographic characteristics of Somali women, July 16, 2014-september 25th 2014(N=175).

a) socio-demographic characteristics

Socio-Demographic Characteristic	Age < 40 (N=91)	Age ≥ 40 (N=84)	All Ages (N=175)
BMI, mean (SD)	25.71(3.49)	26.84 (3.47)	26.25 (3.51)
Marital status, N (%)			
Single	0 (0%)	0 (0%)	0 (0%)
Married	76 (83.5%)	47 (56.0%)	123 (70.3%)
Divorced	13 (14.3%)	20 (23.8%)	33 (18.9%)
Widowed	2 (2.2%)	17 (20.2%)	19 (10.9%)
Parity, mean (SD)	2.89 (1.76)	4.99 (2.56)	3.90 (2.42)

Age at first birth, mean (SD)	21.54 (3.69)	21.10 (4.89)	21.33 (4.30)
Breast fed, N (%)	88 (96.7%)	84 (100%)	172 (98.3%)
How long breast fed (months), mean (SD)	7.19 (1.84)	7.54 (1.72)	7.36 (1.79)
Distance to health center (min.), mean (SD)	12.80 (8.11)	12.32 (7.08)	12.57 (7.61)
Educational level, N (%)			
Illiterate	24 (26.4%)	37 (44.0%)	61 (34.9%)
Primary	33 (36.3%)	31 (36.9%)	64 (36.6%)
Secondary	22 (24.2%)	12 (14.3%)	34 (19.4%)
Tertiary	12 (13.2%)	4 (4.8%)	16 (9.1%)
Paid job, N (%)	44 (48.4%)	17 (20.2%)	61 (34.9%)

Table 1b shows family history of breast cancer. 24.6% (N=43) of the participants reported some breast problems in their family while 13.1% (N=23) reported their own personal breast problems, majority (N=16) of the respondent in this category mentioned pain as their concerns and only 2.9% (N=6) reporting a 'lump' (table 1).

Table 1b: Family and personal History of breast cancer

Socio-Demographic Characteristic	**Age < 40 (N=91)**	**Age > 40 (N=84)**	**All Ages (N=175)**
Family history, N (%)	17 (18.7%)	26 (31.0%)	43 (24.6%)
Mother	4 (4.4%)	10 (11.9%)	14 (8.0%)
Sister	0 (0%)	7 (8.3%)	7 (4.0%)
Other close relative	5 (5.5%)	5 (6.0%)	10 (5.7%)
Distant relative	8 (8.8%)	4 (4.8%)	12 (6.9%)
Personal history, N (%)	4 (4.4%)	19 (22.6%)	23 (13.1%)
Lump	1 (1.1%)	4 (4.8%)	5 (2.9%)
Pain	3 (3.3%)	13 (15.5%)	16 (9.1%)
Nipple discharge	0 (0%)	2 (2.4%)	2 (1.1%)

Table 1c: When asked about their sources of information, 69% (N=58) of the respondent older than 40 years of age mentioned their doctor as their best most important source of breast cancer information compared to 61.5% (N=56) who are younger than 40 years who tend to have higher levels of education. The illiteracy rates between the two age groups 26.4% and 44% respectively.

Table 1c: Sources of Breast Cancer Information

Socio-Demographic Characteristic	Age < 40 (N=91)	Age > 40 (N=84)	All Ages (N=175)
Source of Br Ca information, N (%)			
TV/Radio	18 (19.8%)	18 (21.4%)	36 (20.6%)
Breast cancer patient	5 (5.5%)	2 (2.4%)	7 (4.0%)
Doctor	**56 (61.5%)**	**58 (69.0%)**	**114 (65.1%)**
Internet	12 (13.2%)	6 (7.1%)	18 (10.3%)

Table 2 shows the general breast cancer factual knowledge, signs, and symptoms. Majority (62.9%) of the respondents indicated that breast cancer is curable in early stages and most importantly, 61.7% responded correctly that it would result in high mortality if untreated. However, respondents scored poorly (<50% correct scores); when asked if breast cancer is painless in early stages, (36%), more common in women 50 years and older, (45.7%), nipple discharge is important, (46.3%), a lump is definitely a cancer, (46.3%), occurs in one breast only (no responses), 39.4%, and it's more common with obesity, 34.3% (**Table 2**). The younger respondents have better knowledge of the risk factors and seem to have better risk perception than older one as shown by higher response number among those younger than forty years of age. Moreover, all participants' Body Mass Index is in the range of 25.7-26.5 indicating overweight status.

Table 2: Breast cancer knowledge among Somali women in Seattle Washington, July 16th-September 25th, 2014

	Number (Percent) Correct Answers		
Breast Cancer Knowledge	**Age < 40 (N=91)**	**Age ≥ 40 (N=84)**	**All Ages (N=175)**
Curable in early stages (Yes)	58 (63.7%)	52 (61.9%)	110 (62.9%)
Commonly Diagnosed in black women in U.S (Yes)	41 (45.1%)	27 (32.1%)	68 (38.9%)
High mortality if untreated (Yes)	53 (58.2%)	55 (65.5%)	108 (61.7%)
Painless in early stages (Yes)	36 (39.6%)	27 (32.1%)	63 (36.0%)
More common in women over 50 (Yes)	40 (44.0%)	40 (47.6%)	80 (45.7%)
Occurs in one breast only (No)	37 (40.7%)	32 (38.1%)	69 (39.4%)
More common with obesity (Yes)	39 (42.9%)	21 (25.0%)	60 (34.3%)
Nipple discharge matters (Yes)	50 (54.9%)	31 (36.9%)	81 (46.3%)
A lump is definitely cancer (No)	51 (56.0%)	30 (35.7%)	81 (46.3%)

Table 3: Shows breast cancer knowledge, morbidity, and mortality awareness, which has been suggested as an important precursor to increase screening uptake by other studies [8, 23].

Overall, there is poor breast cancer risk factor knowledge as well (correct Reponses <50%). The participants indicated slightly better responses about radiation therapy on chest (49.7%), but overall responses shows limited knowledge about breast cancer risk factors with just 14.3% of the total respondents indicating aging, long menstrual period and lifestyle might be a risk factor (**Table 3**).

Table 3: Breast Cancer risk knowledge among Somali women in Seattle, July 16-September 25 2014

Only 19.4% (N=34) said they were at risk of breast cancer. The remaining, 80.6% who said no, 66.3% said only God knows if they were at risk or not. Half of the respondents in this category were unable to identify genetic, lifestyle, physical inactivity, long menstrual cycle, family history and aging as potential risk factors for breast cancer. However, younger women had a better knowledge than older one as shown by higher correct responses by younger women.

	Number (Percent) Correct Answers		
Breast Cancer Risk Knowledge	**Age < 40 (N=91)**	**Age ≥ 40 (N=84)**	**All Ages (N=175)**
No breast feeding (Yes)	22(24.2)	11 (13.1%)	33 (18.9%)
Obesity (Yes)	46(50.5)	33 (39.3%)	79 (45.1%)
Radiation therapy on chest (Yes)	52(57.1)	35 (41.7%)	87 (49.7%)
Fatty foods (Yes)	34(37.4)	21 (25.0%)	55 (31.4%)
Long oral contraceptive therapy (Yes)	31(34.1)	23 (27.4%)	54 (30.9%)
Family history (Yes)	20 (22.0%)	23 (27.4%)	43 (24.6%)
Previous breast cancer (Yes)	26 (28.6%)	27 (32.1%)	53 (30.3%)
Smoking (No)	38 (41.8%)	24 (28.6%)	62 (35.4%)
Alcohol (Yes)	32 (35.2%)	28 (33.3%)	60 (34.3%)
Increasing age (Yes)	13 (14.3%)	12 (14.3%)	25 (14.3%)
Low exercise (Yes)	27 (29.7%)	7 (8.3%)	34 (19.4%)
Long menstrual periods (8-55 years old) (Yes)	17 (18.7%)	8 (9.5%)	25 (14.3%)
Are you at risk? (Yes)	20 (22.0%)	14 (16.7%)	34 (19.4%)
If no, is it because of healthy lifestyle?	7 (7.7%)	18 (21.4%)	25 (14.3%)

With advance in science, an ultrasound, mammogram or a magnetic Resonance Imaging (MRI) can detect even a small lump and treatment initiated at an early stages of breast cancer[16]. Even though 66.9% of the respondent agreed that mammography could detect lumps that a doctor cannot detect by clinical breast exam (CBE), only 13.9% said a mammogram is an effective tool for early detection of breast cancer. There is a slightly better response regarding whether mammography is uncomfortable but painless (49.1%). However, these responses were

lower than our scoring cut-off for correct answers of 50% or better. When asked whether mammography is important, a majority of the women responded negatively, with only 8.6% saying it is important **(Table 4)**.

Table 4: Knowledge and attitude towards mammography among Somali women in Seattle, July 16-September 25 2014

Mammography Knowledge and Attitudes	Number (Percent) Correct Answers		
	Age < 40 (N=91)	**Age ≥ 40 (N=84)**	**All Ages (N=175)**
Effective for early detection	20 (22.0%)	4 (4.8%)	24 (13.7%)
Can detect lumps that doctor can't	63 (69.2%)	54 (64.3%)	117 (66.9%)
Should occur every 2 years	20 (22.0%)	20 (23.8%)	40 (22.9%)
Begins at age 45-54	34 (37.4%)	41 (48.8%)	75 (42.9%)
Female doctors are better (No)	40 (44.0%)	24 (28.6%)	64 (36.6%)
Uncomfortable but painless (Yes)	45 (49.5%)	41 (48.8%)	86 (49.1%)
Public centers better than private (No)	42 (46.2%)	28 (33.3%)	70 (40.0%)
More effective than clinician or self-exam	28 (30.8%)	12 (14.3%)	40 (22.9%)
Very important	9 (9.9%)	6 (7.1%)	15 (8.6%)

Regarding breast cancer related healthcare practices, 97.7% (N=171) regularly attend a health facility. This is not surprising because the majority of our participants are women of reproductive age who have children. Majority 78.3% (N=137) of the respondents indicated they would do a mammogram if a lump is present, but when asked about barriers to a mammogram only 2.3% would go without hesitation meaning that there are many barriers in their way to get to mammogram. There were differences in answers to the questions based on educational levels and age with those in slightly higher level of education having slightly more correct responses than older women who are mostly less literate **(Table 5).**

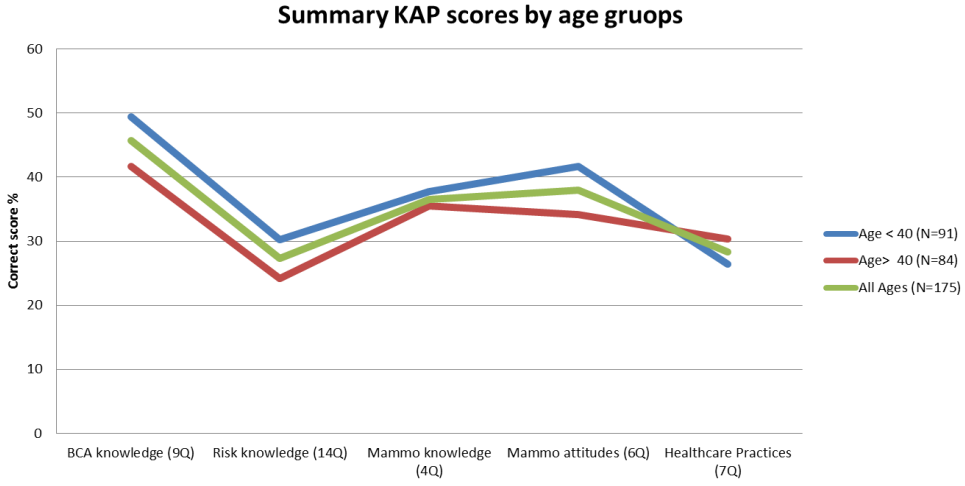
Our initial assumption was that the longer a person stays in the United States and interacts with healthcare system, the better the experience and therefore, has improved knowledge about health screenings such as mammography. Our respondents' Median time in the United States is 9 years but ranges from 1 to 28 years. We found no significant difference in response with number of years stayed in the USA even though a recent study in the United States and Canada among immigrants shows improvement in healthcare practices with the length of stay in the host country[24].

Table 5: Breast cancer related healthcare practices among Somali women in Seattle, July 16-September 25 2014

Health Care Practices	Number (Percent) Correct Answers		
	Age < 40 (N=91)	Age ≥ 40 (N=84)	All Ages (N=175)
Regular center attendance	88 (96.7%)	83 (98.8%)	171 (97.7%)
Has had a mammogram	3 (3.3%)	21 (25.0%)	24 (13.7%)
Has gone with a friend for a mammogram	0 (0%)	7 (8.3%)	7 (4.0%)
Practices SBE	0 (0%)	3 (3.6%)	3 (1.7%)
Physician practices routine CBE	82 (90.1%)	79 (94%)	161 (92%)
Would do mammogram if a lump was found	73 (80.2%)	64 (76.2%)	137 (78.3%)
Go without hesitation for mammogram	4 (4.4%)	0 (0%)	4 (2.3%)

Summary of correct scores of knowledge of breast cancer, risk factors, knowledge of a mammogram, attitude towards a mammogram and healthcare practices were below fifty percent. This implies that our respondent have less than optimal knowledge and poor attitudes both of which are critical in in improving early detection of breast cancer, acceptance of therapy and long-term survival. The graph of summary correct KAP scores suggests breast cancer knowledge does not mean better breast health practices(**Graph 1**).

Graph 1: Association between breast cancer KAP among Somali women in Seattle, July 16-September 25 2014



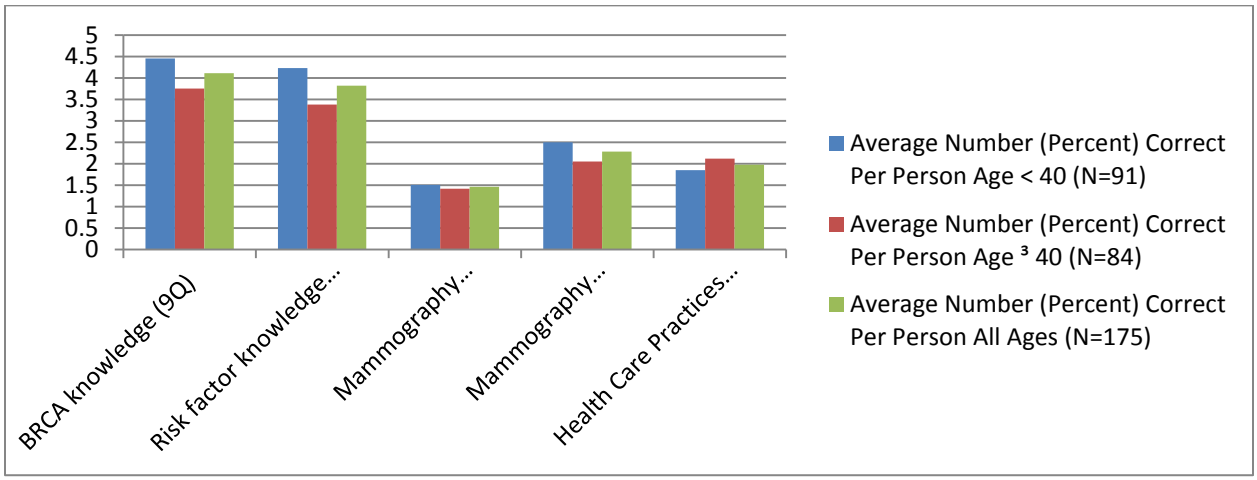
Overall, knowledge on breast cancer and risk factors show much higher scores compared to knowledge on mammography and healthcare practices (**Table 6 and Graph 2**)

Table 6 compares the summary correct scores to see any association between predictor variables and outcome variables graphically (**Table 6**).

Table 6: Summary of the scores

	Average Number (Percent) Correct Per Person		
	Age < 40 (N=91)	**Age ≥ 40 (N=84)**	**All Ages (N=175)**
BRCA knowledge (9Q)	4.45	3.75	4.11
Risk factor knowledge (14Q)	4.23	3.38	3.82
Mammography knowledge (4Q)	1.51	1.42	1.46
Mammography attitudes (6Q)	2.50	2.05	2.28
Health Care Practices (7Q)	1.85	2.12	1.98

Graph 1: Summary scores



Overall, the graph summary indicate better scores for knowledge of breast cancer and breast cancer risk factors even though these fall below our 50% threshold for 'good' scores cut offs. These scores are consistent with summary table results. The scores in the other categories fall below half of that of knowledge and risk factors, clearly showing participants lacked beyond rudimentary knowledge about breast health and about screening and other preventive practices. It may also suggest providers have been talking to their patients about basic facts about breasts cancer during opportunistic clinical breast exams which 92% of our study participants reportedly had (**Table 5**).

Model 1: Effects of knowledge and attitude on Healthcare practices

We estimate that, among women of the same age, educational level, and time in the US, the odds ratio for "good" healthcare practices comparing people with "good" KA scores and "poor" KA scores is 0.755. This result is not significant (p=0.57), and is consistent with 95%

Confidence Interval estimates between 0.286 and 1.99. ("Good" KA is defined as weighted average >= 1/3, and "good" healthcare practices are defined as at least half of the questions answered correctly.)

Model 1:

goodknow	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
goodka	.7546932	.3739595	-0.57	0.570	.2857524	1.9932
Q59	1.093966	.0410669	2.39	0.017	1.016366	1.177491
edu	1.111259	.2999456	0.39	0.696	.6547309	1.886112
age	1.092979	.0213782	4.55	0.000	1.051871	1.135693
_cons	.0011219	.0013587	-5.61	0.000	.0001045	.0120453

The model shows good knowledge does not necessarily means an improved healthcare practices among participants of the same age, time in the USA and level of education.

2. Model 2: Effects of knowledge on attitudes towards mammography

We estimate that, among women of the same age, educational level, and time in the US, the odds ratio for "good" attitudes towards a mammogram comparing people with "good" knowledge scores and "poor" knowledge scores is 3.24. This result is highly significant (p=0.001), and is consistent with estimated odds ratios between 1.67 and 6.30. ("Good" knowledge is defined as weighted average >= 1/3, and "good" attitudes are defined as at least half of the questions answered correctly.)

Model 2:

goodatt	Odds Ratio	Std. Err.	z	P>|z|	[95% Conf.	Interval]
goodk	3.239103	1.099574	3.46	0.001	1.665208	6.300587
Q59	1.01173	.0278128	0.42	0.671	.9586605	1.067737
edu	1.414464	.2594357	1.89	0.059	.9873425	2.026358
age	.9962179	.0133348	-0.28	0.777	.970422	1.0227
_cons	.2611628	.1805448	-1.94	0.052	.0673699	1.012411

The data indicates good knowledge does predict good attitudes towards mammography among people of the same age, time in the USA and level of education.

4 Discussion

A major gap that our study data identified is the need for patient navigation to increase uptake of breast cancer screening using mammography. Patient navigation is “the timely movement of an individual across the entire health care continuum from prevention, detection,

diagnosis, treatment, and supportive, to end-of-life care"[25, 26]. For minority immigrant population, patient navigation can be expanded further to included bicultural and bilingual navigators to empower them with breast cancer knowledge so that the patient can make an informed choices about whether to screen or not. Bicultural navigators can relate well to the patient and communicate better in their home languages [26].

In addition, it is important to identify factors reinforcing breast cancer screening such as medical providers' advice about health screening [23, 27]. Our study data concur with previous studies [8, 9] that participants were willing to go for screening if doctors prescribed one. Moreover, majority of the participants mentioned their doctors as their most important source of information regarding breast cancer and possibly other health related conditions.

Limited knowledge about basic facts about breast cancer, its risk factors, signs and symptoms inhibits breast cancer screening [5, 11] and this need to be improved through dissemination of information to the community in multiple languages and media. Our study results show a huge gap in knowledge that must be overcome in order to promote ideal breast health practices and better prognosis.

Wu and colleagues found intrinsic factors such as fear of the results and fatalism as some patient-controlled delays exacerbating low screening uptake among immigrant Korean women and while other studies among black ethnic women suggest such intrinsic factors impede critical to individual decision-making regarding screening [28, 29]. Our study highlights a huge knowledge gap regarding breast health and means of diagnosis is likely due to limited access to information in this community. Behavior change communication is the current best practices with a promise to increase both knowledge and possibly influence positive healthcare practices [23, 27, 30, 31] even among our participants and should be pursued as an option to improve breast cancer screening uptake[32].

5. Limitations

Our study's use of convenient sampling to study knowledge, attitudes and practices among Somali women living in Seattle Washington limits the generalizability of the results to all Somali women as well as refugee or black ethnic groups. In addition, it is plausible to think that

social desirability bias might be a concern due to sensitive nature of breast health among conservative women with low literacy levels. However, some important conclusion can be drawn from this study results.

6. Conclusion

The results of this study concurs with the conclusion from a systematic literature review carried out by Mendoza and colleagues, that black immigrants have the worse cancer outcomes due to limited knowledge, awareness, risk perception and poor attitudes towards screening and therefore, poor outcome [33, 34]. The data also shows that our assumption that the longer someone stays in the United States and interacts with healthcare system the more knowledgeable about an important health screening such a mammogram has not been proven.

Previous studies found low breast and cervical cancer screening awareness among Somali women [8], and therefore it is critical that public health planners dedicate resources to improve cancer knowledge in general and more needed to done to reduce breast cancer disparity in particular. Concurring with Somali saying, 'knowledge is light', diseases knowledge, attitude, and practices is thought to be either protective or inhibiting factors for early diagnosis, treatment, and long-term survival outcomes [9, 35]. Clearly, the study participants overwhelmingly indicated their lack of breast cancer awareness and more importantly as shown by less than 30% score of limited knowledge of the risk factors knowledge.

Overall, our respondent indicated a minimal understanding of either their own individual risk for developing breast cancer and lacked knowledge about signs, symptoms and ways to detect breast cancer. The study finding has strong implication for public health education campaign to urgently reach the Somali community and target all women in the hope of behavior change through dissemination of correct information to enhance health-seeking behavior regarding to breast cancer. Majority of the women indicated their health care providers as their best primary source of breast cancer information and so it is imperative that these providers beware and prepare accordingly as a trust frontline workers to routinely provide breast cancer information and leave the decision to screen to a well-informed patient. Some worthy news that was reflected in the results of this study are that the majority of women reported having a

Clinical Breast Exam (CBE) at least once. This is not surprising because most of our participants were women of reproductive age who were screened opportunistically for Pap smear and CBE during antenatal care visits.

When asked whether female providers are better at performing a mammogram, 44% of younger and 28.6% older respondents surprising indicated they do not do better than their male counterpart. Therefore, mammography provider-patient gender concordance preference was not observed among majority of the responses regarding effectiveness of diagnosis. This also shows willingness and acceptance of provider initiated procedure among Somali participants of the study. Therefore, medical providers are better placed to address inhibiting factors as well as motivating factors regarding breast cancer screening which in turn determine long-term survival of breast cancer.

Overall, our respondents indicated less than optimal knowledge, negative attitudes and poor practices. Recommendations to improve KAP and long-term survival should aim to disseminate information about susceptibility and risk factors, symptoms, signs, and screening and diagnostic methods. In addition, patients should be educated about benefits of screening—early detection, diagnosis and prompt treatment using trained bicultural/bilingual patient navigators. It is also important to impalement behavior change program in the community setting using multimedia and other widely available avenues to target and reach this community.

It is hoped that this study's results will stimulate further research on ways to reach hard-to-reach and underserved refugee women of Somali origin to reduce their unmet need for breast cancer screening.

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