

# Mammography Screening Among Arab American Women in Metropolitan Detroit

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**Abstract** Mammography screening behavior has not been well studied among Middle Eastern immigrant women. We conducted a telephone survey of 365 Arab American women residing in metropolitan Detroit, home to one of the largest populations of Middle Eastern immigrants in the US, to determine prevalence of factors associated with mammography, and attitudes and beliefs regarding mammography screening. Of 365 participants, only five were born in the US. Mean age was 53.2 years (SD 10.8). Two hundred twelve (58.1%) reported having mammogram every 1–2 years; 70% ever had mammogram. Age 50–64 years, having health insurance, married status, being in the US over 10 years, and being Lebanese were associated with mammography every 1–2 years. After adjusting for demographic factors, perceived seriousness of disease, general health motivation, and having fewer barriers were associated with more frequent screening. Appropriate mammography screening is decreased in this group. Targeted outreach regarding screening is appropriate for this population; however, lack of insurance may prevent adequate follow-up.

**Keywords** Arab American · Mammography · Breast cancer · Screening · Cancer disparities

## Introduction

Breast cancer is the most common cancer and the second leading cause of cancer deaths among US women [1]. Because it has been demonstrated that breast cancer mortality is reduced by mammography screening [2, 3], numerous expert groups recommend periodic mammograms, either annually [4] or every 1–2 years [5, 6] for women age 40 and older. Although there are little data on breast cancer incidence and mortality disparities based on immigrant status [7], women of racial and ethnic minority groups, including African American, Filipino, Indian, Pakistani, Mexican, South and Central American, and Puerto Rican women, are more likely to be diagnosed at a later stage of breast cancer [8]. Immigrant women, especially those who have immigrated within the last 10 years, tend to have less cancer screening activity than native women [9–14]. For instance, only 41% of Filipino and 25% of Korean immigrant women in Los Angeles reported receipt of a mammogram in the previous 2 years [12].

Arab Americans represent the largest immigrant group in the Detroit metropolitan area. The Arab American Institute Foundation estimates 490,000 Arab Americans live in Michigan [6]. More than 80% live in the three counties (Macomb, Oakland, and Wayne) of metropolitan Detroit, representing one of the largest concentrations of immigrant Arabs in the United States [6]. Based on census data, two-thirds of the immigrants are from Lebanon and Iraq and include people of both Christian and Muslim religions [6]. The 2000 US Census, which is regarded as an underestimate, states the number of persons reporting Arab country ancestry in metropolitan Detroit is 124,520, representing 2.8% of the total population [15]. The true population count most likely lies between the US Census estimate and that of the Arab American Institute Foundation.

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Mammography screening behaviors among Arab American women have not been well characterized. In 2001, the Michigan Department of Community Health, along with the Arab Community Center for Economic and Social Services, distributed health surveys in 34 outreach centers across Michigan. Among the approximately 570 women respondents, 68.9% reported ever having a mammogram [16], compared to 92.6% of Michigan women [17]. In 2003, the Genesee County Health Department, with support from the American Arab Heritage Council, conducted a convenience sample survey of Arab Americans in a county north of metropolitan Detroit estimated to have an Arab American population comprising 0.7% of the total county population [18]. Among the 115 respondents to the question of ever having a mammogram, 59.1% reported they had. As part of the Michigan Behavioral Risk Factor Surveillance System annual telephone survey, a Special Cancer Behavioral Risk Factor Survey (SCBRFS) is conducted every few years. The most recent was in 2004 and included 429 Arab Americans. In that sample, 96% of Arab American women reported ever having a mammogram, but only 48.3% reported having a mammogram in the past year, which was the lowest of all racial/ethnic groups [17].

Cancer screening behaviors among Arab women residing in their native country are largely unknown, as reports of mammography screening in Middle Eastern countries are sparse. From a convenience sample of 250 Turkish women over the age of 40 years, 62 (25%) reported having at least one mammogram [19]. Fewer women in the United Arab Emirates reported mammography (10.3%), which was attributed to poor knowledge of breast cancer screening, and infrequent offering of screening by health care workers [20]. Among Muslim Arab women in Israel over age 50 years, 51% reported ever undergoing mammography; knowledge about breast cancer and mammography were significantly associated with appropriate frequency of mammography [21].

Because of the discrepant estimates of “ever” mammography prevalence among Arab Americans in Michigan, the low breast cancer screening rates among immigrant women in general, and even lower prevalence of mammography in Middle East countries, we undertook to characterize the prevalence of and factors associated with mammography screening among Arab American women in metropolitan Detroit.

## Methods

### Population and Interview Procedure

We conducted a telephone survey of women of Arab descent in the Detroit metropolitan area during November 2004

through May 2005. All telephone calls were placed from the Arab American and Chaldean Council (ACC), a community-based, human services organization assisting Middle Eastern communities. The study population consisted of women 40 years and older, who self-identified as being Arab or Chaldean. Eligible women were identified by use of two population-based telephone lists. The first list was created by linking an Arab and Chaldean surname database [22] with residences' names using telephone directories from the three counties making up metropolitan Detroit. The link was performed by Bresser's Information Service (<http://www.bressers.com>). The ACC had developed the other telephone list by identifying Arabic surnames in a telephone directory from a single zip code geographic area with a large proportion of persons of Arab descent.

The interviewers followed a procedure for recruiting eligible women. After introducing herself, and stating that she was calling on behalf of the ACC and Wayne State University for a survey of women's health, the interviewer asked if there was a woman of Arab or Chaldean descent who was 40 years or older at that telephone number. If there was, the interviewer asked to speak with her or scheduled a telephone appointment for a later date. The interview required about 40 minutes to complete. Participants were offered a \$25 gift certificate to a local grocery store chain as compensation for their time. The protocol was approved by the Wayne State University Institutional Review Board.

### Instrument

The survey instrument contained demographic questions, including age, country of origin, number of years in this country, marital status, education level, and family history of breast cancer. The remainder of the survey was based on validated scales developed by Victoria Champion, DNS, RN [23, 24] using the health belief model (HBM), which is a psychological model used to explain and predict health behaviors. The HBM was first developed in the 1950s by social psychologists, and consisted of four constructs: (1) perceived *susceptibility* or vulnerability to a health condition (in this case, breast cancer); (2) perceived *seriousness* or severity of the condition; (3) perceived *barriers* of an action (in this case, mammography screening); and (4) perceived *benefits* of an action [25]. An additional concept of general health motivation was added later; self-efficacy also is sometimes a component of HBM [26].

The instrument scales in the survey tool used for this study include five items for perceived susceptibility to breast cancer, seven items for seriousness of breast cancer, seven items for health motivation, two items for benefits of mammography, and six items for barriers to mammography. Internal consistency of the scales was measured using

Cronbach's alpha, which ranged from 0.91 for perceived susceptibility to 0.67 for barriers to mammography. All items were anchored with a five-point Likert scale with response options from "strongly disagree", coded as 1, to "strongly agree", coded as 5. For each construct or scale, the sum of the items, means and standard deviations were computed (Table 2). For each scale variable (Table 4), two categories were created—greater than/equal to the mean (agree) and less than the mean (disagree; reference). This was done since polytomous regression models can efficiently model independent variables that are categorical but not variables that are continuous.

For investigation of specific barriers associated with mammography (Table 5) the six barrier items were coded to be more informative. For each item in the barrier scale, the five Likert responses were collapsed to two categories—'agree' (agree and strongly agree) as reference and 'disagree' (neutral, disagree, and strongly disagree).

The instrument was translated by a certified translator at the ACC using as a model an Arabic version of HBM previously validated in a population of Jordanian women [27]. This community-based human service organization has a long history and tradition of working with local health promotion organizations to translate printed materials into Arabic. Although the trained female interviewers spoke English, Arabic, and Chaldean, all interviews were conducted in Arabic.

#### Analysis Plan

The outcome variable, mammography frequency, was defined by response to the question "How often do you have a mammogram?" into three categories: (1) every 1–2 years; (2) every 3–5 years; and (3) no mammography ever or more than 5 years ago. Every 1–2 years was chosen as a category because this time interval is most consistent with experts' screening guidelines and easily compared with national data. We included the category of every 3–5 years to determine if this group was more similar to women who did not receive screening or those that were more adherent to guidelines. Descriptive statistics for all study variables were examined by categories of mammography frequency. Chi square and Fisher's exact tests were used to compare women on demographic variables across the categories of mammography frequency. Analysis of variance was used to assess the differences in mean HBM scores by mammography status. Association between demographic variables, HBM scales and mammography frequency was assessed with multivariate polytomous logistic regression analysis using SAS 9.1.

Each of the demographic and HBM variables was investigated as an exposure (or independent variable) and considered a potential confounder. Bivariate regression

models were developed to assess potential confounding variables in the association between demographic, HBM variables and mammography frequency. Potential confounders were evaluated and included in the multivariate analyses. Associations between demographic variables, HBM scales and mammography frequency were assessed with multivariate polytomous logistic regression. Although the categories seemed to be ordered categorical (no mammography, 3–5 years mammography, 1–2 years mammography), polytomous logistic regression using the proportional odds model was not used because the assumption of proportional odds was not satisfied. Therefore, polytomous regression using generalized logistic regression models for multinomial responses was used to assess the unadjusted and adjusted effects of demographic and HBM factors on the outcome. Outcomes were modeled as: (1) mammography every 3–5 years versus no mammography and (2) mammography every 1–2 years versus no mammography. Control of confounding variables was done using a forward selection procedure, retaining a variable that changed the estimate of the exposure by at least 10%.

#### Results

Nearly 4,000 households were telephoned to identify 755 eligible women, of whom 399 (52.8%) completed the survey. Thirty-four women were removed from the analysis; 30 with a personal history of "breast lumps" and an additional four who were missing this information. The final sample was 365 women. The average age was 53.2 years old (SD 10.8) (results not shown). All but five of the women were born in a country outside the US, with the majority from either Iraq ( $n = 188$ , 52.2%) or Lebanon ( $n = 103$ , 28.6%) (Table 1). Other countries of origin included Palestine ( $n = 23$ ), Jordan ( $n = 18$ ), Yemen ( $n = 16$ ), Syria ( $n = 5$ ), and Ethiopia, Egypt, Kuwait, Saudi Arabia, and Tunis ( $n = 7$ ); these 69 were grouped together as "other Middle Eastern countries". Two hundred fifty-six women (70%) reported ever having a mammogram (Table 1). Of the women reporting a mammogram, 212 (58.1%) had a mammogram every 1–2 years, 44 (12.1%) every 3–5 years, and 109 (29.9%) had no mammogram or had a mammogram more than 5 years ago.

Women in the no mammography group differed from women with more frequent mammograms (Table 1). Compared to women who reported having had a mammography, women who had not had a mammogram were more likely to have no education, be unmarried, have no health insurance, have been in the US for 0–10 years, and be from Iraq (all  $P$ 's < .01).

There were significant differences in two HBM scales across mammography frequency categories: health

**Table 1** Distribution of demographic variables by mammography frequency of Arab American women in metropolitan Detroit, MI, 2004

Variable	Frequency of mammography								P-value
	Total (N = 365)		Every 1–2 years (n = 212)		Every 3–5 years (n = 44)		No mammography (n = 109)		
	No.	%	No.	%	No.	%	No.	%	
Age									0.13
<50 years	156	43.0	91	42.9	17	38.6	48	44.9	
50–64	139	38.3	86	40.6	21	47.7	32	29.9	
65+	682	18.7	35	16.5	6	13.6	27	25.2	
Missing	2								
Education									0.02
None	138	37.9	67	31.6	17	39.5	54	49.5	
Elementary	117	32.1	70	33.0	18	41.9	29	26.6	
High school	64	17.6	47	22.2	5	11.6	12	11.0	
College	45	12.4	28	13.2	3	7.0	14	12.8	
Missing	1								
Marital status									<0.001
Single/divorced/widowed	91	25.1	39	18.6	10	22.7	42	38.5	
Married	272	74.9	171	81.4	34	77.3	67	61.5	
Missing	2								
Family history									0.13
None	304	83.3	173	81.6	34	77.3	97	89.0	
Family history in 1st degree relative	61	16.7	39	18.4	10	22.7	12	11.0	
Health insurance									<0.001
None	100	27.8	41	19.7	8	18.2	51	47.2	
Non-gov/others	107	29.7	72	34.6	15	34.1	20	18.5	
Medicare/Medicaid	153	42.5	95	45.7	21	47.7	37	34.3	
Missing	5								
Length of stay in the US									<0.001
0–10 years	131	36.9	60	29.0	16	37.2	55	52.4	
11+ years	224	63.1	147	71.0	27	62.8	50	47.6	
Missing	10								
Country of birth <sup>a</sup>									<0.001
Iraq	188	52.2	91	43.5	23	53.5	74	68.5	
Lebanon	103	28.6	76	36.4	11	25.6	16	14.8	
Other Middle Eastern countries	69	19.2	42	20.1	9	20.9	18	16.7	
US	5								

<sup>a</sup> Five US born women not included in analysis

motivation ( $P < 0.001$ ) and barriers ( $P < 0.001$ ) (Table 2). The motivation score of women who had mammography every 1–2 years was significantly higher than the scores of women who either had mammograms every 3–5 years or had no mammogram. At the same time, barrier scores of women who had mammogram every 1–2 years were significantly lower than the scores of women in the other two groups.

Results of the multivariate analyses showed that after adjustment for the other demographic variables and HBM scales in the model, the demographics of age, marital

status, health insurance status, length of stay, and country of birth remained predictive for mammography frequency every 1–2 years (Table 3) when compared with the reference group of no mammography. Only age and health insurance status were related to mammography every 3–5 years after adjustment, when compared with the no mammography group. The odds of having a mammogram every 1–2 years for women in the 50–64 age group were 2.07 times greater (OR 2.07, 95% CI 1.09–3.95) than older women and 2.80 times greater (OR = 2.80, 95% CI 1.04–8.37) for mammogram every 3–5 years. Being married was

**Table 2** Mean (SD) of scales in the health belief model (N = 365)

Variable	Frequency of mammography				P-value
	All subjects (N = 365)	Every 1–2 years (n = 212)	Every 3–5 years (n = 44)	No mammography (n = 109)	
Susceptibility	11.5 (3.0) Median = 10	11.5 (3.2)	11.8 (3.1)	11.3 (2.5)	0.67
Seriousness	22.2 (4.3) Median = 22	22.5 (4.5)	21.3 (4.6)	21.9 (3.5)	0.18
Motivation	22.7 (4.3) Median = 22	23.7 (4.4)	21.0 (3.4)	21.4 (3.8)	<0.001
Barriers	14.1 (3.0) Median = 14	13.2 (2.7)	14.5 (2.4)	15.9 (2.9)	<0.001
Benefits	7.6 (1.3) Median = 8	7.6 (1.4)	7.8 (0.8)	7.5 (1.2)	0.29

**Table 3** Adjusted<sup>a</sup> odds ratios and 95% confidence intervals of demographic variables derived from polytomous logistic regression

Variable	Frequency of Mammography			
	Every 1–2 years (n = 212) vs. no mammography (n = 109)		Every 3–5 years (n = 44) vs. no mammography (n = 109)	
	OR	95% CI	OR	95% CI
<b>Age</b>				
<50	1.46	0.79–2.70	0.78	0.56–4.52
50–64	2.07	1.09–3.95	2.80	1.04–8.37
65+	1.00		1.00	
<b>Education</b>				
None	1.00	–	1.00	–
Elementary	1.61	0.89–2.89	1.89	0.84–4.26
High school	1.92	0.88–4.16	1.18	0.35–3.97
College	1.03	0.46–2.30	0.71	0.17–2.90
<b>Marital status</b>				
Single/divorced/widowed	1.00	–	1.00	–
Married	2.54	1.29–5.00	1.71	0.70–4.21
<b>Family history</b>				
None	1.00	–	1.00	–
Family history in 1st degree relative	1.99	0.90–4.41	2.60	0.98–6.88
<b>Health insurance</b>				
None	1.00	–	1.00	–
Non-government/others	3.73	1.74–8.01	4.32	1.46–12.77
Medicare/Medicaid	4.14	2.08–8.23	4.33	1.61–11.66
<b>Length of stay in the US</b>				
0–10 years	1.00	–	1.00	–
11+ years	2.27	1.29–3.99	1.52	0.70–3.29
<b>Country of birth</b>				
Iraq	0.61	0.29–1.32	0.77	0.28–2.11
Lebanon	3.01	1.20–7.56	1.79	0.59–6.47
Other Middle Eastern countries	1.00		1.00	

<sup>a</sup> Each demographic variable was adjusted for other demographic variables and HBM scales

predictive of mammography every 1–2 years. Having any health insurance was similarly predictive of mammography at both frequencies, with the odds of having mammography

among insured roughly four times greater than non-insured. Being in the US 11 years or longer was positively associated with mammography every 1–2 years. Country of

**Table 4** Adjusted<sup>a</sup> odds ratios and 95% confidence intervals of scales in the health belief model derived from polytomous logistic regression

Variable <sup>b</sup>	Frequency of mammography			
	Every 1–2 years (n = 212) vs. no mammography (n = 109)		Every 3–5 years (n = 44) vs. no mammography (n = 109)	
	OR	95% CI	OR	95% CI
Susceptibility				
<Mean	1.00		1.00	
≥Mean	1.16	0.65–2.07	1.11	0.50–2.45
Seriousness				
<Mean	1.00		1.00	
≥Mean	1.75	1.02–3.02	1.18	0.60–2.78
Motivation				
<Mean	1.00	1.07–3.34	1.00	
≥Mean	1.89		0.62	0.27–1.44
Barriers				
<Mean	1.00		1.00	
≥Mean	0.18	0.10–0.31	0.32	0.15–0.68
Benefits				
<Mean	1.00		1.00	
≥Mean	1.77	0.84–3.74	1.93	0.63–5.90

<sup>a</sup> Each HBM variable was adjusted for demographic factors and other HBM scales

<sup>b</sup> Sum of the items of each scale was computed and the mean of each scale for the sample was calculated; variables were categorized as greater than/equal to the mean and less than the mean (reference)

origin also was significantly associated with mammography at that frequency. The odds of mammography for women from Lebanon were three times greater (OR 3.01, 95% CI 1.20–7.56) compared to women from other Middle Eastern countries.

After adjusting for possible demographic confounders, frequency of mammography remained associated with motivation and barriers (Table 4). In the adjusted model, frequency of mammography also was related to seriousness (for the every 1–2 year group). The odds of having a mammogram every 1–2 years was 1.75 times greater (95% CI 1.02–3.02) among women who perceived breast cancer as a serious disease compared to women who did not have this perception and 1.89 times greater (95% CI 1.07–3.34) among women who had higher health motivation. For both mammography frequencies, women with a high barrier score were less likely to have mammography than women with a lower barrier score (OR 0.18, 95% CI 0.10–0.31 for every 1–2 years and OR 0.32, 95% CI 0.15–0.68 for every 3–5 years).

The specific barriers associated with mammography every 1–2 years were “feeling funny about having a mammogram”, “a mammogram will be embarrassing to me”, “will make me worry about breast cancer”, and “will be unpleasant” (Table 5). Women who disagreed with these barrier items were more likely to have mammogram every 1–2 years than those who agreed to these statements. For women in the mammogram every 3–5 year group, those who disagreed with “having a mammogram will make me worry about cancer” and “mammogram will be

unpleasant” were more likely to have mammogram than those who agreed with the statements. Interestingly, the odds of mammogram in both groups were decreased for those who disagreed with “mammogram will be painful” compared to those who agreed.

## Discussion

This exploratory study sought to characterize the prevalence of and factors associated with mammography screening among women of Middle Eastern descent in the Detroit metropolitan area. We found a prevalence of “ever” mammography screening similar to that reported by Aswad in 2001 [16]. In that convenience sample of nearly 570 Michigan Arab American women, the prevalence of ever having a mammogram was 68.9%; we found a prevalence of 70%. This prevalence is still lower than the prevalence among all Michigan women, which is 92.6% [17]. When stratified by age group, the differences between Michigan women and our sample are especially remarkable among the oldest age group. For Michigan women in 2004 (used as comparison since our telephone survey was conducted in 2004 and 2005), 73.8% of women 40–49 years; 82.9% of women 50–64 years, and 81.3% of women 65 years and older reported having mammogram within past 2 years [9]. As seen in Table 1, the percentages of Detroit-area Middle Eastern immigrant women reporting mammogram every 1–2 years for the same age groups were: 42.9, 40.6, and 16.5%, respectively.

**Table 5** Adjusted<sup>a</sup> odds ratios and 95% confidence intervals of the items of barrier scale derived from polytomous logistic regression

Variable	Frequency of mammography			
	Every 1–2 years (n = 212) vs. no mammography (n = 109)		Every 3–5 years (n = 44) vs. no mammography (n = 109)	
	OR	95% CI	OR	95% CI
I feel funny having a mammogram				
Agree	1.00		No stat	
Disagree	4.52	1.58–12.88	(0 cell)	
Having a mammogram will be embarrassing to me				
Agree	1.00		1.00	
Disagree	2.11	1.10–4.07	0.77	0.34–1.78
Having a mammogram will make me worry about breast cancer				
Agree	1.00		1.00	
Disagree	6.75	3.71–12.28	3.20	1.44–7.11
Having a mammogram will take too much time				
Agree	1.00		1.00	
Disagree	2.34	0.85–6.48	1.15	0.31–4.22
Having a mammogram will be unpleasant				
Agree	1.00		1.00	
Disagree	10.93	5.05–23.64	9.74	2.99–31.68
Having a mammogram will be painful				
Agree	1.00		1.00	
Disagree	0.51	0.28–0.91	0.67	0.17–0.84

<sup>a</sup> Adjusted for demographic factors and HBM scales

Not only does mammography occur less frequently in this population as compared to all of Michigan, it also is lower than other racial/ethnic groups in Michigan and nationally. According to 2004 Behavioral Risk Factor Surveillance Survey data, the percentage of Michigan White and African American women 40 years and older reporting a mammogram in the past 2 years was 79.6 and 78.3%, respectively [9]. National figures for the same year and age group were 75.1% White, 75.4% African American, and 69.4% Hispanic, compared with 58.1% of women in our sample who reported having mammogram every 1–2 years.

The demographic predictors of frequent mammography (every 1–2 years) were age between 50–64 years, being married, health insurance, having lived in the US over 10 years, and being from Lebanon (Table 3). Only age 50–64 years and having health insurance predicted mammography less frequently (every 3–5 years).

These demographic predictors are similar to those that have been reported in studies of other immigrant groups. For instance, marriage also is a predictor of regular mammograms among Korean American women [11] and Vietnamese women [10]. In an analysis of cancer screening practices using the National Health Interview Survey data, women without insurance, and those who had immigrated to the US within the last 10 years were significantly less likely to have had mammogram within 2 years [13]. Studies of specific immigrant groups, namely Latinas [28],

Filipino and Korean women [12], and Vietnamese-American women [29], have found similar association with length of stay in the US as we found among Arab American women: women with longer length of stay in the US were more likely to have recent mammograms.

Similar to the entire Arab American population in Detroit, most women in this study were from Iraq followed by Lebanon. Women from Iraq had similar odds of mammography every 1–2 years, while women from Lebanon had greater odds than women from other Middle Eastern countries. Although we adjusted for length of stay in the US (as well as the other demographic factors), there may be factors related to length of stay that were not addressed in this survey that influence mammography frequency. Based on US Census data, the Lebanese population in metropolitan Detroit, as a whole, has fewer foreign-born than the Iraqi population (35 vs. 72%) [30]. Furthermore, among metropolitan Detroit foreign-born Iraqis, approximately 63% arrived between 1990 and 2000. Because most members of the Lebanese group have been in this country longer than members of the Iraqi group, Lebanese women may be more accepting of mammography screening than Iraqi women as a group, or Iraqi women may have less friend and family support for mammography because of the larger proportion of recent immigrants in their community.

Citizenship may also explain some of the discrepancy between Iraqi and Lebanese women. Several investigators

have found that foreign birth [31] and lack of citizenship [32] are barriers to cancer screening. The Personal Responsibility and Work Opportunity Reconciliation Act of 1996, the “welfare reform act”, greatly restricted the provision of public services to undocumented immigrants and bases eligibility on citizenship status [33, 34]. Although we did not ask about citizenship status in our telephone survey, it is likely there were numerous women without citizenship, especially among Iraqi immigrants, given the political events of the past few years.

Perceived susceptibility to breast cancer was not associated with frequency of mammography in our sample. Women with frequent mammograms (every 1–2 years) had higher health motivation, perceived seriousness of breast cancer, and fewer barriers to mammography. Others have found that perceived seriousness of breast cancer was statistically significant in predicting use of mammography among Turkish women [19], Muslim Arab women in Israel [21] and US Vietnamese immigrants [10].

Numerous studies have investigated specific barriers to mammography among both immigrant and Arab women [21, 35–40], finding that perceived painfulness of the procedure [21, 40], embarrassment [35, 37], and fear of detection of cancer are barriers [35–37, 40]. We did not find that perceived painfulness was a barrier; however, feeling funny, embarrassment, fear of detection, and unpleasantness were barriers. Fear of detection of cancer is a barrier cited by Arabic women in Jordan [39]. Other investigators further explored this barrier with a qualitative study of Arab-Israeli women, concluding that women perceive a chain of events starting with screening that might result in a breast cancer diagnosis, which will lead to an inability to fulfill female roles, such as mother and wife [36]. Probing for such fears should be considered when discussing mammography screening with women of Middle Eastern descent.

A number of studies of immigrant women have found that physician advice and the advice of family to obtain mammograms is a predictor of recent mammograms [21, 35, 38]. We did not ask participants this question and therefore cannot compare our group to others on this factor. Another limitation of this study is the response rate of 52.8%, which may limit the generalizability of the results to all Arab American women in the Detroit area; however, the distribution of respondents by countries of origin is similar to estimates of the distribution among all metropolitan Detroit Arab Americans [6]. Because of the small sample size of the group that had mammography every 3–5 years, control of confounding might not have been achieved when comparing this group with the no mammography group. Thus, there should be cautions in drawing conclusions from these associations. Finally, the HBM questions did not undergo reliability and validity testing in this particular population, which again may limit the

conclusions that can be drawn. Yet, given the strikingly low prevalence of mammography every 1–2 years, and similar demographic risk factors as other immigrant women, additional research is warranted to further explore and address the specific barriers in this ethnic group.

Despite its limitations, this is the most thorough breast cancer screening survey of women of this ethnic background in the US. We used a systematic approach to identify households of Middle Eastern descent and randomly surveyed women of mammography screening age in those households. Our study used more of a population-based approach than other reports of this ethnic group, which often used a convenience sample [16, 18]. The 2004 Michigan SCBRFS [17], which was conducted using Michigan Behavioral Risk Factor Survey protocols and over-sampled ethnic/racial minority groups in Michigan, is more similar in methodology to our study. All of these surveys have found decreased mammography screening in this population. Ours is specific to metropolitan Detroit, which is thought to have the largest concentration of persons of Arab descent outside of the Middle East [6]. If this level of mammography screening continues in the future, the cancer burden in this population may be expected to be quite high, which will have substantial consequences for families and communities.

In conclusion, more effort must be made to increase the prevalence of mammography screening among immigrant Middle Eastern women in the Detroit metropolitan area. Physicians who care for these women must address the barriers of fear of cancer diagnosis, feeling embarrassed, and unpleasantness of the procedure. However, it may be the case that many of these women have poor access to healthcare because of their immigrant status. Therefore, outreach facilities in the Arab American community should assist women with obtaining mammograms, either by providing a referral system of low-cost screening or providing screening on-site. On the other hand, it is unethical to provide screening without the ability to continue care (biopsy and surgery) for those women with positive mammograms. Based on the results of this study there is a need to improve breast cancer screening in this population but lack of resources, especially insurance, may negatively affect adequate provision of care.

**Acknowledgements** This project was supported in part by a grant from the Blue Cross Blue Shield of Michigan Foundation. The authors would like to acknowledge the exceptional work of the telephone interviewers, Bindiya Shah and Mariana Kakish.

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