ABSTRACT

Objectives: Breast cancer incidence rates are rising in Qatar. Although the Qatari government provides subsidised healthcare and screening programmes that reduce cost barriers for residents, breast cancer screening (BCS) practices among women remain low. This study explores the influence of socioeconomic status on BCS among Arab women in Qatar.

Setting: A multicentre, cross-sectional quantitative survey was conducted with 1063 Arab women (87.5% response rate) in Qatar from March 2011 to July 2011. Women who were 35 years or older and had lived in Qatar for at least 10 years were recruited from seven primary healthcare centres and women’s health clinics in urban and semiurban regions of Qatar. Associations between socioeconomic factors and BCS practice were estimated using $\chi^2$ tests and multivariate logistic regression analyses.

Results: Findings indicate that less than one-third of the participants practised BCS appropriately, whereas less than half of the participants were familiar with recent BCS guidelines. Married women and women with higher education and income levels were significantly more likely to be aware of and to practise BCS than women who had lower education and income levels.

Conclusions: Findings indicate low levels of awareness and low participation rates in BCS among Arab women in Qatar. Socioeconomic factors influence these women’s participation in BCS activities. The strongest predictors for BCS practice are higher education and higher income levels.

Recommendations: Additional research is needed to explore the impact of economic factors on healthcare seeking behaviours in the Middle Eastern countries that have a high national gross domestic product where healthcare services are free or heavily subsidised by the government; promotion of BCS and intervention strategies in these countries should focus on raising awareness about breast cancer, the cost and benefit of early screening for this disease, particularly among low-income women.

INTRODUCTION

In developed countries, breast cancer incidence rates have stabilised or increased slightly in recent years; however, the mortality rate for this disease has been decreasing.1–3 In contrast, incidence and mortality rates in Middle Eastern countries are on the rise.4–6 It is also found in younger women, and at more developed stages.7

Breast cancer is the most common cancer among women in the State of Qatar, and screening rates remain low.8 In the past few decades, Qatar has experienced substantial development and lifestyle changes driven largely by oil and natural gas wealth.9 As overseen by Qatar’s Supreme Council of Health, public and private healthcare services in Qatar are modern, subsidised and cost-effective.

Cancer prevalence patterns have changed along with environmental and social changes in Qatar.9–7 Although controversies exist regarding the effectiveness of breast cancer screening (BCS), early detection of breast cancer through regular screening activities such as breast self-examination (BSE), clinical...
breast examination (CBE), mammography and improvement of screening quality and treatment have been found to decrease mortality rates of breast cancer.3,5

Significant predictors for CBE and mammography in Qatar and the United Arab Emirates (UAE) are education, urban or semiurban residence, employment and higher socioeconomic status.6,8,10 Cost and availability of health insurance are barriers to healthcare in parts of the Middle East; however, these factors do not appear to be barriers where mammography is free, subsidised or covered by insurance, as in Qatar and Saudi Arabia.6,8,10,14

Ecological models indicate that an individual’s behaviour towards healthcare is influenced by his or her physical environment and by interpersonal and other social determinants of health.15–17 To address breast cancer problems and promote the early detection of breast cancer, we investigated how social determinants of health, such as economic and social factors, influence Arab women’s healthcare choices and practices. The results related to awareness, knowledge and screening behaviours were reported in a previous publication.18 In this paper, we report (A) participation rates in BCS of Arab women living in Qatar and (B) effects of selected socioeconomic factors on Arab women’s awareness and practice of BCS.

METHODS
Participants were recruited from seven urban hospital settings and community health clinics in Doha (capital of Qatar) and semiurban cities in south and north Qatar. Based on Qatar’s 2010 census data,19 the study’s sample size was calculated using a 95% confidence level and Cochran’s formula for sample size.20 Participants were 35 years or older (as previously recommended by Qatar national guidelines for BSE and CBE), had the ability to speak Arabic, were recruited from one of seven designated research sites in Qatar, and had resided in Qatar for at least 10 years. A convenient non-probability sampling technique was used: 1215 self-identified Arab women who met the study’s inclusion criteria were invited to participate in the survey, 1063 of them (40.9%) participated in a 30 min face-to-face interview (87.5% response rate).

Verbal consent for voluntary participation was obtained from each participant. The standard interview protocol and participants’ rights were explained to participants and their anonymity and confidentiality was assured.

Questionnaire and data collection
Data were obtained from in-person interviews using a structured survey questionnaire conducted by female nurses fluent in Arabic and English. Questionnaire items were incorporated from previous peer-reviewed surveys on breast cancer with permission from the authors.21–28 Awareness and practice of BCS were defined by recommendations in the most widely disseminated national guidelines. For example, participants were assessed with appropriate BCS practice if they performed BSE monthly, if 35 years or older and had undergone a CBE, or if 40 years or older and had a mammogram within the past 2 years. Forward-translations and back-translations of the survey questionnaire into Arabic and English were carried out to ensure lexical equivalence.

Statistical analysis
Descriptive statistics analyses (mean, SD for interval variables and frequency with percentages for categorical variables) were performed for the study variables where appropriate. χ² Tests were applied to test for associations between socioeconomic factors and dependent variables (BSE, CBE and mammogram practice). Multicollinearity testing was performed before introducing independent variables into the multivariate analysis. Multivariate logistic regression analyses using the forward stepwise method were used to further assess the association of preselected socioeconomic and demographic factors with binary dependent variables (eg, appropriate practice of BSE, CBE and mammogram). All statistical tests were two-sided with significance established at an α of 0.05. Data analyses were performed under direct instruction from the researchers and conducted by two senior biostatisticians using SPSS V.20.

RESULTS
Selected demographic characteristics of participants
Participants were between the ages of 35–82 years (M=44.9, SD=8.4, n=1063). The majority of the 1063 participants were married (78.9%), were Muslim (98.2%), had children (84.8%) and resided in urban areas (88.7%). Over half (52.1%) of the participants were Qatari citizens; 47.9% were Qatari residents from the greater Middle Eastern region; 10.9% were from other Gulf Cooperation Council (GCC) and regional countries (Saudi Arabia, UAE, Kuwait, Oman, Bahrain, Yemen); 16% were from Levant countries (Syria, Lebanon, Palestine, Jordan); 10.1% were from North African countries (Egypt, Libya, Tunisia, Algeria, Morocco) and 10.9% were from other countries (Sudan, Iraq, Iran, Somalia, Mauritania, Pakistan).

Approximately one-third of the participants were university-educated, employed and had husbands who were university-educated. Most participants were homemakers (59.8%). Of those who reported their annual household income (54.3%), approximately three-quarters reported an income of US$29 390 (QAR 107 000) or higher (table 1).

Awareness and BCS participation rates
Previous findings on the same population indicated that less than half of the participants in the study were aware of BCS recommendations (BSE 28.9%, CBE
Selected demographic characteristics of participants (N=1063)

| Characteristic                          | Number (%) of participants |
|----------------------------------------|----------------------------|
| Age (years)*                           |                            |
| 35–39                                  | 365 (34.4)                 |
| 40–49                                  | 399 (37.6)                 |
| 50+                                    | 297 (29.0)                 |
| Nationality                            |                            |
| Qatar citizen                          | 554 (52.1)                 |
| Non-Qatari resident                    | 509 (47.9)                 |
| Other GCC/peninsular                   | 116 (10.9)                 |
| Levant                                 | 170 (16.0)                 |
| North African                          | 107 (10.1)                 |
| Other                                  | 116 (10.9)                 |
| Marital status                         |                            |
| Single                                 | 224 (21.1)                 |
| Married                                | 839 (78.9)                 |
| Number of children                     |                            |
| 0 (none)                               | 161 (15.2)                 |
| <5 children                            | 516 (48.5)                 |
| >5 children                            | 386 (36.3)                 |
| Religion                               |                            |
| Muslim                                 | 1044 (98.2)                |
| Christian                              | 19 (1.8)                   |
| Living area                            |                            |
| Urban                                  | 943 (88.7)                 |
| Semiurban                              | 120 (11.3)                 |
| Education level of participant         |                            |
| ≤Primary/intermediate                  | 359 (33.8)                 |
| Secondary/trade school                 | 350 (32.9)                 |
| University                             | 354 (33.3)                 |
| Education level of participant’s husband (n=896) |    |
| ≤Primary/intermediate                  | 276 (30.8)                 |
| Secondary/trade school                 | 292 (32.6)                 |
| University                             | 328 (36.6)                 |
| Employment status of participant       |                            |
| Employed                               | 362 (34.1)                 |
| Unemployed or homemaker                | 701 (65.9)                 |
| Occupation—participant                 |                            |
| Unemployed                             | 75 (7.2)                   |
| Management, science, arts             | 225 (21.5)                 |
| Sales and office                       | 59 (5.6)                   |
| Services, production, construction,    | 62 (5.9)                   |
| Transportation, other                  |                            |
| Homemaker                              | 626 (59.8)                 |
| Occupation—husband (n=896)†            |                            |
| Management, business, science, arts    | 305 (35.7)                 |
| Services                               | 105 (12.3)                 |
| Sales and office                       | 130 (15.2)                 |
| Construction, production, transportation, | 104 (12.2)               |
| Other                                  |                            |
| Military                               | 89 (10.4)                  |
| Unemployed or retired                  | 122 (14.3)                 |
| Annual household income‡               |                            |
| <QAR 107 000/US$29 390                 | 138 (23.9)                 |
| QAR 107 000–286 000/US$29 390–US$78 560 | 274 (47.5)               |
| >QAR 286 000/US$78 560                 | 165 (28.6)                 |

*Two participants did not answer this question.
†Forty-one participants did not answer this question.
‡Four hundred and eighty-six participants did not answer this question.

GCC, Gulf Cooperation Council.

Married Qatar resident women from the Levant and North Africa with higher education levels, who also had husbands with higher education levels, or higher annual household incomes were significantly more likely to practise BCS than women of other nationalities, or women who had lower education and income levels. Previous findings indicated that BCS practice was not associated with nationality when comparing Qatari citizens to Qatari residents. However, further analysis in this paper suggests that BCS practice is significantly associated with nationality when comparing Qatar citizens to Qatari resident subcategories (other GCC, Levant, North African, other).

Relationship between selected socioeconomic factors and BCS awareness and practice

Married Qatari resident women from the Levant and North Africa were more likely to have a university degree, to work in management fields, and to be aware of mammography recommendations if they lived in urban areas or if they (or their husbands) worked in management fields (table 2).

Participants who worked in management were more likely to practise BSE than participants who were unemployed or who worked under management, but were less likely to practise BSE if their husbands were unemployed or retired. Although occupation was significantly related to BCS awareness, it was not significantly related to practice of CBE or to mammograms (table 3).

In addition to being less likely to practise BCS than Qatari citizens and participants from the Levant and North Africa, participants from other GCC countries were more likely to be homemakers than women of other nationalities, to have six or more children, and to not have a university education. Their husbands were also less likely to have university degrees, and more likely to work in the military than other nationality groups. Participants from the Levant and North Africa (and their husbands) were more likely to have a university education and work in management occupations than those from other nationality groups. Qatari resident participants from Sudan, Iraq, Iran, Somalia, Mauritania and Pakistan were more likely to report the lowest income levels of all groups, although they did not
### Table 2: Select socioeconomic factors and BCS awareness

| Variables                  | BSE awareness | CBE awareness | Mammogram awareness |
|----------------------------|---------------|---------------|---------------------|
|                            | Yes n (%)     | No n (%)      | p Value             | Yes n (%)     | No n (%)      | p Value             |
| Nationality                |               |               |                     |               |               |                     |
| Qatari citizen             | 141 (25.5)    | 413 (74.5)    | =29.37, p<0.001     |               |               |                     |
| Other GCC resident         | 18 (15.5)     | 98 (84.5)     |                       | 37 (31.9)     | 79 (68.1)     |                       |
| North Africa resident      | 66 (38.8)     | 104 (61.2)    |                       | 83 (48.8)     | 87 (51.2)     |                       |
| Other resident             | 43 (40.2)     | 64 (59.8)     |                       | 53 (49.5)     | 54 (50.5)     |                       |
| Marital status             |               |               |                     |               |               |                     |
| Single                     | 51 (22.8)     | 173 (77.2)    | =5.16, p=0.023       | 223 (40.3)    | 331 (59.7)    | =1.13, p=0.23       |
| Married                    | 256 (30.5)    | 583 (69.5)    |                       | 381 (45.4)    | 458 (54.6)    |                       |
| Living area                |               |               |                     |               |               |                     |
| Urban                      | 274 (29.1)    | 669 (70.9)    | =0.13, p=0.723       | 386 (40.9)    | 557 (59.1)    | =2.40, p=0.122      |
| Semiurban                  | 33 (27.5)     | 87 (72.5)     |                       | 58 (48.3)     | 62 (51.7)     |                       |
| Education level—participant|               |               |                     |               |               |                     |
| ≤Primary/Intermediate      | 42 (11.7)     | 317 (88.3)    | =90.99, p<0.001      | 126 (35.1)    | 233 (64.9)    | =13.34, p=0.001     |
| Secondary/trade            | 110 (31.4)    | 240 (68.6)    |                       | 146 (41.7)    | 204 (58.3)    |                       |
| University                 | 155 (43.8)    | 199 (56.2)    |                       | 172 (48.6)    | 182 (51.4)    |                       |
| Education level—husband    |               |               |                     |               |               |                     |
| ≤Primary/Intermediate      | 35 (12.7)     | 241 (87.3)    | =57.73, p<0.001      | 90 (32.6)     | 186 (67.4)    | =21.37, p<0.001     |
| Secondary                  | 97 (33.2)     | 195 (66.8)    |                       | 139 (47.6)    | 153 (52.4)    |                       |
| University                 | 132 (40.2)    | 196 (59.8)    |                       | 165 (50.3)    | 163 (49.7)    |                       |
| Employment status—participant|           |               |                     |               |               |                     |
| Employed                   | 144 (39.8)    | 218 (60.2)    | =31.74, p<0.001      | 158 (43.6)    | 204 (56.4)    | =0.80, p=0.372      |
| Unemployed                 | 163 (23.3)    | 538 (76.7)    |                       | 286 (40.8)    | 415 (59.2)    |                       |
| Occupation—participant     |               |               |                     |               |               |                     |
| Unemployed                 | 25 (33.3)     | 50 (66.7)     | =39.09, p<0.001      | 41 (54.7)     | 34 (45.3)     | =3.41, p=0.052      |
| Management, science, arts  | 95 (42.2)     | 130 (57.8)    |                       | 94 (41.8)     | 131 (58.2)    |                       |
| Sales and office            | 20 (33.9)     | 39 (66.1)     |                       | 24 (40.7)     | 35 (59.3)     |                       |
| Services, production, other| 25 (40.3)     | 37 (59.7)     |                       | 32 (51.6)     | 30 (48.4)     |                       |
| Homemaker                  | 138 (22.0)    | 488 (78.0)    |                       | 245 (39.1)    | 381 (60.9)    |                       |
| Occupation—husband          |               |               |                     |               |               |                     |
| Unemployed or retired       | 20 (16.4)     | 102 (83.6)    | =22.24, p<0.001      | 45 (36.9)     | 77 (63.1)     | =0.180, p=0.912     |
| Management, science, arts  | 112 (36.7)    | 193 (63.3)    |                       | 151 (49.5)    | 154 (50.5)    |                       |
| Service                    | 39 (37.1)     | 66 (62.9)     |                       | 44 (41.9)     | 61 (58.1)     |                       |
| Sales and office            | 39 (30.0)     | 91 (70.0)     |                       | 62 (47.7)     | 68 (52.3)     |                       |
| Production, other           | 24 (23.1)     | 80 (76.9)     |                       | 42 (40.4)     | 62 (59.6)     |                       |
| Military                   | 25 (28.1)     | 64 (71.9)     |                       | 38 (42.7)     | 51 (57.3)     |                       |
| Annual household income    |               |               |                     |               |               |                     |
| <US$29 390                 | 31 (22.5)     | 107 (77.5)    | =12.47, p=0.002      | 47 (34.1)     | 91 (65.9)     | =14.33, p=0.001     |
| US$29 390–US$78 560         | 72 (26.3)     | 202 (73.7)    |                       | 123 (44.9)    | 151 (55.1)    |                       |
| >US$78 560                 | 65 (39.4)     | 100 (60.6)    |                       | 92 (55.8)     | 73 (44.2)     |                       |

*BCS, breast cancer screening; BSE, breast self-examination; CBE, clinical breast examination; GCC, Gulf Cooperation Council.*

4. Donnelly TT, et al. BMJ Open 2015;5:e005596. doi:10.1136/bmjopen-2014-005596.
| Variables                        | BSE practice | CBE practice | Mammogram practice |
|---------------------------------|--------------|--------------|--------------------|
|                                 | Yes n (%)    | No n (%)     | p Value            | Yes n (%)    | No n (%)     | p Value            |
| Nationality                     |              |              |                    |              |              |                    |
| Qatar citizen                   | 69 (12.5)    | 485 (87.5)   | p=0.005            | 163 (29.4)   | 391 (70.6)   | p=0.036            |
| Other GCC resident              | 7 (6.0)      | 109 (94.0)   |                    | 29 (25.0)    | 87 (75.0)    |                    |
| Levant resident                 | 31 (18.2)    | 139 (81.8)   |                    | 67 (39.4)    | 103 (60.6)   |                    |
| North Africa resident           | 23 (21.5)    | 84 (78.5)    |                    | 40 (37.4)    | 67 (62.6)    |                    |
| Other                           | 18 (15.5)    | 98 (84.5)    |                    | 34 (29.3)    | 82 (70.7)    |                    |
| Marital status                  |              |              |                    |              |              |                    |
| Single                          | 29 (12.9)    | 195 (87.1)   | p=0.0635           | 44 (19.6)    | 180 (80.4)   | p=0.001            |
| Married                         | 119 (14.2)   | 720 (85.8)   |                    | 289 (34.4)   | 550 (65.6)   |                    |
| Number of children              |              |              |                    |              |              |                    |
| ≤5                              | 26 (16.1)    | 135 (83.9)   | p=0.001            | 35 (21.7)    | 126 (78.3)   | p=0.004            |
| >5                              | 88 (17.1)    | 428 (82.9)   |                    | 182 (35.3)   | 334 (45.8)   |                    |
| Living area                     |              |              |                    |              |              |                    |
| Urban                           | 137 (14.5)   | 806 (85.5)   | p=0.110            | 298 (31.6)   | 645 (68.4)   | p=0.588            |
| Semirural                       | 11 (9.2)     | 109 (90.8)   |                    | 35 (29.2)    | 85 (70.8)    |                    |
| Education level—participant     |              |              |                    |              |              |                    |
| ≤Primary/intermediate           | 24 (6.7)     | 335 (93.3)   | p=0.001            | 89 (24.8)    | 270 (75.2)   | p=0.002            |
| Secondary/trade                 | 50 (14.3)    | 300 (85.7)   |                    | 113 (32.3)   | 237 (67.7)   |                    |
| University                      | 74 (20.9)    | 280 (79.1)   |                    | 131 (37.0)   | 223 (63.0)   |                    |
| Education level—husband         |              |              |                    |              |              |                    |
| ≤Primary/intermediate           | 12 (4.3)     | 264 (95.7)   | p=0.001            | 65 (23.6)    | 211 (76.4)   | p=0.001            |
| Secondary                       | 44 (15.1)    | 248 (84.9)   |                    | 108 (37.0)   | 184 (63.0)   |                    |
| University                      | 69 (21.0)    | 259 (79.0)   |                    | 123 (37.5)   | 205 (62.5)   |                    |
| Employment status—participant   |              |              |                    |              |              |                    |
| Employed                        | 71 (19.6)    | 291 (80.4)   | p=0.001            | 124 (34.4)   | 238 (65.7)   | p=0.139            |
| Unemployed                      | 77 (11.0)    | 624 (89.0)   |                    | 209 (29.8)   | 492 (70.2)   |                    |
| Occupation—participant          |              |              |                    |              |              |                    |
| Unemployed                      | 5 (6.7)      | 70 (93.3)    | p=0.001            | 27 (36.0)    | 48 (64.0)    | p=0.410            |
| Management, science, arts       | 55 (24.4)    | 170 (75.6)   |                    | 74 (32.9)    | 151 (67.1)   |                    |
| Sales and office                | 4 (6.8)      | 55 (93.2)    |                    | 22 (37.3)    | 37 (62.7)    |                    |
| Services, production, other     | 10 (16.1)    | 52 (83.9)    |                    | 22 (35.5)    | 40 (64.5)    |                    |
| Homemaker                       | 72 (11.5)    | 554 (88.5)   |                    | 182 (29.1)   | 444 (70.9)   |                    |
| Occupation—husband              |              |              |                    |              |              |                    |
| Management                      | 57 (18.7)    | 248 (81.3)   | p=0.006            | 122 (40.0)   | 183 (60.0)   | p=0.081            |
| Service                         | 19 (18.1)    | 86 (81.9)    |                    | 38 (36.2)    | 67 (63.8)    |                    |
| Sales and office                | 12 (9.2)     | 118 (90.8)   |                    | 41 (31.5)    | 89 (68.5)    |                    |
| Production, other               | 11 (10.6)    | 93 (89.4)    |                    | 31 (29.8)    | 70 (70.2)    |                    |
| Military                        | 14 (15.7)    | 75 (84.3)    |                    | 26 (29.2)    | 63 (70.8)    |                    |
| Unemployed/retired              | 8 (6.6)      | 114 (93.4)   |                    | 33 (27.0)    | 89 (73.0)    |                    |
| Annual household income         |              |              |                    |              |              |                    |
| <US$29,390                      | 13 (9.4)     | 125 (90.6)   | p=0.025            | 27 (19.6)    | 111 (80.4)   | p=0.001            |
| US$29,390–US$78,560             | 36 (13.1)    | 238 (86.9)   |                    | 98 (35.8)    | 176 (64.2)   |                    |
| >US$78,560                      | 33 (20.0)    | 132 (80.0)   |                    | 76 (46.1)    | 89 (53.9)    |                    |

**Table 3** Select socioeconomic factors and BCS practice

BCS, breast cancer screening; BSE, breast self-examination; CBE, clinical breast examination; GCC, Gulf Cooperation Council.
have the lowest BCS awareness or practice levels. Qatari citizen participants reported the highest incomes of all groups, even though more of their husbands were unemployed or retired.

**Multivariate analysis of socioeconomic factors associated with BCS practice**

Table 4 reports socioeconomic factors that might predict BCS activity among participants based on a forward stepwise multivariate logistic regression analysis. Selected independent variables were nationality, living area, education, income level and occupation group: Although the Nagelkerke $R^2$ values indicate that the model does not fit the data well, the selected independent variables—income, husband’s education level and participant’s occupation—significantly predict BCS activity. Annual income significantly predicted CBE and mammogram practice. Participants in the mid to highest annual household income level groups had higher odds of having CBEs or mammograms than those in the lowest income group. Those with the highest reported income levels had over four times the odds of having mammograms than those with the lowest reported income levels. Although nationality was significantly associated with BCS practice, nationality, education level and living area were not found to be predictors of participants’ BCS practice.

**DISCUSSION**

Results indicate that most Arabic women living in Qatar are not aware of, and they do not practise BCS according to national guidelines. Further analysis of data indicate that nationality and income levels are significantly related to participants’ BCS awareness and practice but are not significant predictors of the women’s BSE practice. Consistent with previous research, higher education levels are associated with higher BCS awareness and practice. The State of Qatar has the highest gross domestic product in the world and provides free or subsidised gender-appropriate healthcare services to citizens and

### Table 4 Association between selected factors and BCS practice (significant at $\alpha=0.05$ level)

| Predictors of BSE practice (n=445) | Adjusted OR (95% CI) | p Value |
|-----------------------------------|----------------------|---------|
| Education level—husband (Wald $\chi^2 (2)=6.22$) | | |
| £Primary/intermediate | | |
| Secondary | 3.11 (1.21 to 8.00) | 0.019 |
| University | 3.05 (1.22 to 7.63) | 0.018 |
| Occupation—participant (Wald $\chi^2 (4)=9.93$) | | |
| Unemployed | 1.00 | |
| Management, science, arts | 3.51 (0.99 to 12.47) | 0.053 |
| Sales and office | 1.66 (0.30 to 9.11) | 0.561 |
| Services, production, other | 3.43 (0.73 to 16.23) | 0.120 |
| Homemaker | 1.51 (0.43 to 5.29) | 0.520 |

**Model summary**

| Predictors of CBE Practice (n=445) | Adjusted OR (95% CI) | p Value |
|-----------------------------------|----------------------|---------|
| Annual Income (Wald $\chi^2 (2)=11.90$) | | |
| <US$29,390 | 1.00 | |
| US$29,390–US$78,560 | 1.89 (1.07 to 3.36) | 0.029 |
| >US$78,560 | 2.84 (1.56 to 5.15) | 0.001 |

**Model summary**

| Predictors of Mammogram Practice (40+ years, n=267) | Adjusted OR (95% CI) | p Value |
|-----------------------------------------------|----------------------|---------|
| Annual Income (Wald $\chi^2 (2)=11.52$) | | |
| <US$29,390 | 1.00 | |
| US$29,390–US$78,560 | 2.67 (1.11 to 6.45) | 0.029 |
| >US$78,560 | 4.63 (1.87 to 11.47) | 0.001 |

**Model summary**

| Predictors of CBE Practice (n=445) | Adjusted OR (95% CI) | p Value |
|-----------------------------------|----------------------|---------|
| Annual Income (Wald $\chi^2 (2)=11.90$) | | |
| <US$29,390 | 1.00 | |
| US$29,390–US$78,560 | 1.89 (1.07 to 3.36) | 0.029 |
| >US$78,560 | 2.84 (1.56 to 5.15) | 0.001 |

**Model summary**

| Predictors of Mammogram Practice (40+ years, n=267) | Adjusted OR (95% CI) | p Value |
|-----------------------------------------------|----------------------|---------|
| Annual Income (Wald $\chi^2 (2)=11.52$) | | |
| <US$29,390 | 1.00 | |
| US$29,390–US$78,560 | 2.67 (1.11 to 6.45) | 0.029 |
| >US$78,560 | 4.63 (1.87 to 11.47) | 0.001 |

| Predictors of CBE Practice (n=445) | Adjusted OR (95% CI) | p Value |
|-----------------------------------|----------------------|---------|
| Annual Income (Wald $\chi^2 (2)=11.90$) | | |
| <US$29,390 | 1.00 | |
| US$29,390–US$78,560 | 1.89 (1.07 to 3.36) | 0.029 |
| >US$78,560 | 2.84 (1.56 to 5.15) | 0.001 |

| Predictors of Mammogram Practice (40+ years, n=267) | Adjusted OR (95% CI) | p Value |
|-----------------------------------------------|----------------------|---------|
| Annual Income (Wald $\chi^2 (2)=11.52$) | | |
| <US$29,390 | 1.00 | |
| US$29,390–US$78,560 | 2.67 (1.11 to 6.45) | 0.029 |
| >US$78,560 | 4.63 (1.87 to 11.47) | 0.001 |

BCS, breast cancer screening; BSE, breast self-examination; CBE, clinical breast examination.
Bene
promote awareness among men of breast cancer and the
associated with a higher BCS uptake). Thus, more efforts to
results indicate (higher educated husbands were associ-
ated with lower BCS awareness and uptake compared with
women from the Levant or North Africa.32 Owing to the
challenges of reaching the study population, convenience
sampling was used. This might limit the ability to generalise
results from this study. However, randomly selected times
were chosen for the face-to-face interviews, and attempts
were made to approach all potential respondents in every
interview location that would reduce this bias. The procedures
resulted in a response rate of over 87.5%. Since 45.7%
of the women interviewed did not volunteer their income
levels, our sample size was reduced when conducting
logistic regression analyses (n=445). Also, data
collected from self-reported face-to-face interviews might
be subject to recall or social-desirability response bias.

CONCLUSION
Breast cancer incidence rates in the Middle East are
rising and mortality rates are disproportionately high
compared with North American and European countries.5 As
this study’s findings indicate, socioeconomic factors do
influence BCS practices among women living in Qatar. Thus,
a further reduction in costs or free services for
lower-income women, and more accessible mammogram
facilities in all regions of Qatar, could facilitate women’s
utilisation of BCS activities. To increase women’s partici-
pation rates in BCS activities, non-opportunistic
population-based national screening programmes are
also urgently needed in countries like Qatar.32 Meanwhile,
healthcare professionals must be at the forefront of raising
awareness of both female and male patients, regardless of
nationality, education or socioeconomic status, of the
benefits and availability of early cancer detection and BCS
services in Qatar. A multilevel approach to raising awareness about the cost and benefit
of BCS among at-risk low-income women and the general
population should include the involvement of allied
healthcare professionals, local health centres, national
mass-media campaigns, male relatives, breast cancer sur-
vivors, and religious and community leaders.

Despite the low screening rates, it is encouraging to
note that Arab women are eager to learn more about
BCS, and allied health professionals are willing to
discuss BCS with patients.13 18 33–37 Studies of women’s
health practices often focus on examination of differ-
ences in health beliefs and cultural values of the
women. Although it is important to appreciate the effect
of cultural assumptions on healthcare practice, it is also
imperative to examine the social and economic dimen-
sions of women’s healthcare experience. Future research

residents in state-of-the-art hospitals. It is often assumed
that minimal healthcare costs to patients/clients and
gender-appropriate healthcare services would increase
health-seeking behaviours in countries like Qatar.8 10 14
However, the low BCS rates in Qatar indicate that more
complex factors may be at work. Previous studies done in
countries where healthcare is also subsidised by the
government, such as Canada, indicate that despite
healthcare costs being heavily subsidised by the govern-
ment, multiple barriers such as lower education levels,
language or transportation problems, multiple role prob-
lems and limited social support networks might contrib-
ute to lower accessibility to BCS for lower-income
women.21 29

Participants from other GCC countries living in Qatar
had lower education levels than other women’s groups.
They had the highest number of children, thus having
more domestic responsibility than other women in this
study. In addition to having lower awareness of BCS and
its benefits, it is likely that these women may not be fully
aware of the subsidised healthcare costs and modern
equipment available in Qatar because they have come
from different countries with different healthcare
systems. Compounded with the lower education levels of
their husbands, these factors might contribute to a con-
strained ability to participate in BCS programmes. Thus,
these women are at higher risk of having breast cancer
diagnosed at later stages of the disease.

A cross-sectional study conducted in nearby Saudi
Arabia revealed that 90% of male participants did not
know that mammography can provide early detection of
breast cancer.30 Male relatives can influence health-
seeking behaviours in traditional societies,31 as our
results indicate (higher educated husbands were associ-
ated with a higher BCS uptake). Thus, more efforts to
promote awareness among men of breast cancer and the
benefits of screening for this disease should be consid-
ered. It has been suggested that if women become more
aware of the benefits of BCS, the effects of other com-
pounding barriers may be lessened.25 However, raising
awareness might not be sufficient; further investigation
of additional sociocultural barriers, such as personal and
healthcare system barriers and cultural beliefs, must be
considered among women in higher-risk groups.

In this study, women from the Levant or North Africa
or women with higher education levels were significantly
more aware of and practised more BCS activities than
Qatari citizen participants. It is generally assumed that
higher income is associated with higher education and
higher health-seeking behaviour.21 However, Qatari
citizen women reported the highest annual incomes,
despite having a lower BCS awareness and uptake com-
pared with women from the Levant or North Africa.
This can be explained by the fact that the Qatari govern-
ment provides cost-of-living stipends for all Qatari citi-
zens. Furthermore, health professionals in cancer
research and screening centres have observed that while
Qatari citizen women might not have financial barriers,
should investigate additional factors that younger generations of women living in rapidly changing societies like Qatar might face, including the interplay of modernity and cultural expectations, private versus public healthcare facilities, and increasingly higher income, employment and education levels among Arab women.

Knowledge gained from this study will benefit countries with sociodemographics similar to Qatar throughout the Middle East.

Acknowledgements

The authors are grateful to all the women who participated in this research and to the Qatar National Research Fund which provided us with funding (National Priorities Research Program—NP RR 09-261-3-059) to conduct this study. They give special thanks to staff at the Hamad Medical Corporation (Hamad General Hospital, Women Hospital) and the Qatar Primary Health Care, Community Health Clinics who helped us recruit research participants. They also thank the research assistants Roqia Ahmad Dorri, Shima Sharara, Aisha Al-Ali, Aisha Al-Khayren, Asma Albusilushi, Asma Rehman, Fadi Al-Massri, Khadra Yassin, Salah Hmaid, Yasser Sami, Zeinab Idris, Noona Rashid Al Enazi and Nahrida Nazih Khial Meer, and their former project managers Floor Christie de Jong and SC.

Contributors

TTD contributed to the conception and design of the study and the acquisition, analysis and interpretation of data, drafted the manuscript, and gave final approval of the manuscript version submitted for publication. A-HAK, SBA-B and NA-M contributed to the conception and design of the study and the acquisition of data, revised the manuscript, and gave final approval of the manuscript version submitted for publication. MGAK and MA contributed to the conception and design of the study and the acquisition of data, reviewed the manuscript critically for content, and gave final approval of the manuscript version submitted for publication. SC contributed to the analysis and interpretation of data, revised the manuscript, and gave final approval of the manuscript version submitted for publication.

Funding

This study was made possible by a grant from the Qatar National Research Fund under its National Priorities Research Program (NP RR 09-261-3-059). Its contents are solely the responsibility of the authors and do not necessarily represent the official views of the Qatar National Research Fund.

Competing interests

None.

Ethics approval

Ethics approval for this research study was obtained from the Hamad Medical Corporation Research Committee (Ethics Approval Reference No: RC/1744/2010), the Qatar Supreme Council of Health (Ethics Assurance No: SCH-AUCQ-050), and the University of Calgary (Conjoint Health Research Ethics Board (Ethics ID: E-23551).

Provenance and peer review

Not commissioned; externally peer reviewed.

Data sharing statement

No additional data are available.

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