Breast Cancer Knowledge Assessment of Health Workers in Ibadan, Southwest Nigeria

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ABSTRACT

PURPOSE Breast cancer is the most common cancer among women, and in low- to middle-income countries late-stage diagnosis contributes to significant mortality. Previous research at the University College Hospital, a tertiary hospital in Ibadan, Nigeria, on social factors contributing to late diagnosis revealed that many patients received inappropriate initial treatment.

METHODS The level of breast cancer knowledge among health practitioners at various levels of the health system was assessed. We developed a tool tailored to local needs to assess knowledge of symptoms, risk factors, treatments, and cultural beliefs. The recruitment included doctors, nurses, and pharmacists in public hospitals, physicians and pharmacists in private practice, nurses and health care workers from primary health care centers, community birth attendants, and students in a health care field from state schools.

RESULTS A total of 1,061 questionnaires were distributed, and 725 providers responded (68%). Seventy-eight percent were female, and 90% were Yoruba, the dominant local ethnic group. The majority were Christian, and 18% were Muslim. Median knowledge score was 31 out of 56, and the differences in scores between health care worker types were statistically significant (P < .001). Nearly 60% of the participants believed breast cancer is always deadly. More than 40% of participants believed that keeping money in the bra causes breast cancer, and approximately 10% believed that breast cancer is caused by a spiritual attack.

CONCLUSION Our questionnaire revealed that, even at the tertiary care level, significant gaps in knowledge exist, and knowledge of breast cancer is unacceptably low at the level of community providers. In addition to efforts aimed at strengthening health systems, greater knowledge among community health care workers has the potential to reduce delays in diagnosis for Nigerian patients with breast cancer.

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INTRODUCTION

Breast cancer is the most frequently diagnosed cancer and the leading cause of cancer death in women worldwide,1 with an estimated 1.7 million new cases and 545,000 deaths due to breast cancer in 2016.2 Nigeria is the most populous country in Africa,3 and there is concern about a gradually increasing incidence of breast cancer in Nigeria as well the highest age-standardized mortality ratio for breast cancer in Africa.4-7 There is growing evidence that the biology of breast cancer is more aggressive in Nigeria than in the United States and Europe, including an earlier age of onset and a higher incidence of basal-like and HER2-enriched subtypes of the disease.8-11 When detected early and treated promptly, these cancers have a high cure rate in a well-resources high-functioning health system.

Nigeria has a tiered system of public health care, including primary care clinics at the local level that are under the purview of the local government. These clinics are primarily staffed by nurses and health care workers. There are regional secondary hospitals, which are designed to diagnose and treat more complex medical conditions, including providing surgical services. These hospitals are required to have multiple physicians in a range of specialties on staff. Tertiary hospitals, also known as specialist or teaching hospitals, provide specialty care and conduct research and education. In addition to the public health care system, there is a robust private health care system, which ranges from small clinics to facilities that provide basic inpatient care and surgery.12 Unfortunately, despite access to health care providers, cancer treatment remains poorly organized, leading to advanced stage at diagnoses for Nigerian women. Recent findings from the Nigerian Breast Cancer Study show that the majority of patients have advanced stage at diagnosis and a higher burden of BRCA-associated...
Primary health center providers scored 50% on our knowledge assessment and scored significantly worse than hospital-based providers. Significant knowledge gaps existed around risk factor and symptom identification. Provider education about breast cancer is an important target for future interventions to improve breast cancer outcomes in Nigeria.
knowledge of local resources were key components of our assessment.

After reviewing multiple questionnaires from high-resource settings, the questionnaire was developed with the goal of collecting information about provider demographics, professional and personal experience and education about breast cancer, prevalence of local cultural beliefs identified in previous qualitative research, and the specific knowledge domains of risk factors for breast cancer, signs and symptoms of breast cancer, and diagnostic and treatment modalities of breast cancer. The questionnaire underwent expert review and revisions and was field tested before being distributed to a larger population of health care providers. The expert review included four physicians with experience treating breast cancer in Nigeria, one medical student, and three research assistants with experience in breast cancer and public health research. The expert reviewers were asked to assess both scientific validity and whether the language used was locally appropriate. The questionnaire was pilot tested in a local convenience sample of health care providers at University College Hospital (UCH) in Ibadan, and a small sample of the pretest participants underwent cognitive interviewing to better understand their comprehension of the questions. The final full questionnaire is included in the Data Supplement.

Recruitment included doctors, nurses, and pharmacists from UCH and two secondary medical centers, physicians and pharmacists in private practice, nurses and health care workers from primary health care centers (PHCs) in Ibadan and the surrounding semi-urban area, community birth attendants in Ibadan, and nursing, midwifery, and community health students from state schools in the Ibadan area. Questionnaires were completed independently in English by participants who had good self-assessed English literacy and orally in Yoruba with the help of a trained research assistant if the participant was not comfortable reading English. Statistical analysis was performed by S.O. and T.M. using Stata and L.C.C.P. using R. Comparisons of scores were completed using a Kruskal-Wallis and Wilcoxon rank-sum tests; comparison of categorical variables was performed using a χ² test.

**RESULTS**

We distributed 1,061 questionnaires, and 725 providers responded (68%). Basic demographics of the cohort are listed in Table 1. Median knowledge score was 31 out of 56 (interquartile range [IQR], 24-36) and ranged from 0-47 points. The differences in median scores between occupational groups were statistically significant ($P < .001$; Fig 1). Primary health center nurses and health care workers (median, 27; IQR, 21-31) scored significantly lower than other types of health care workers (median, 32; IQR, 26-38) on our knowledge assessment. Hospital-based providers (physicians, nurses, and pharmacists) had higher knowledge scores (median, 36; IQR, 32-40) than non–hospital-based providers (median, 26; IQR, 20-31). Physician providers (median, 40; IQR, 39-42) scored significantly higher than nonphysician providers (median, 28; IQR, 22-33).

Overall knowledge scores were grouped into four quartiles: Poor (0-14 points), fair (15-28 points), good (29-42 points), and excellent (43-56 points). Overall knowledge scores by

| TABLE 1. Participant Demographics | Overall Cohort |
|----------------------------------|---------------|
| **Demographic**                  |               |
| Sex                              |               |
| Male                             | 158 (21.73)   |
| Female                           | 566 (77.85)   |
| Religion                         |               |
| Christian                        | 578 (79.50)   |
| Muslim                           | 130 (17.88)   |
| Other                            | 19 (2.61)     |
| Ethnicity                        |               |
| Yoruba                           | 659 (90.65)   |
| Ibo                              | 28 (3.85)     |
| Edo                              | 7 (0.96)      |
| Ibibio                           | 2 (0.28)      |
| Hausa                            | 1 (0.14)      |
| Other                            | 30 (4.12)     |
| Marital status                   |               |
| Never married                    | 226 (31.09)   |
| Married                          | 455 (62.59)   |
| Widowed                          | 16 (2.20)     |
| Education                        |               |
| No formal education              | 1 (0.14)      |
| Some primary education           | 5 (0.69)      |
| Completed primary education      | 6 (0.83)      |
| Some secondary education         | 7 (0.96)      |
| Completed secondary education    | 39 (5.36)     |
| Some tertiary education          | 261 (35.90)   |
| Completed tertiary education     | 255 (35.08)   |
| Post tertiary education          | 130 (17.88)   |
| **Occupational group**           |               |
| Hospital-based physicians        | 115 (15.82)   |
| Hospital-based nurses            | 145 (19.94)   |
| Hospital-based pharmacists       | 43 (5.91)     |
| Primary health center nurses and community health workers | 204 (28.06) |
| Private practice physicians      | 18 (2.48)     |
| Private practice pharmacists     | 45 (6.19)     |
| Community birth attendants       | 44 (6.05)     |
| Students (nursing and community health) | 113 (15.54) |

**NOTE.** Data are presented as No. (%).
occupational group are shown in Table 2. Hospital-based and private practice physicians scored predominantly in the good range with a subset of excellent scores, whereas PHC nurses and health care workers scored in the good to fair range with a subset in the poor range (Fig 2). The questionnaire was broken down into multiple subsections, including those to assess for knowledge of risk factors as well as common local beliefs about causes of breast cancer. Median risk factor knowledge score for all providers was 6 out of 15 (IQR, 4-7) and ranged from 0-14. Risk factor knowledge score varied significantly by provider type (P < .001; Fig 3). When asked to list five possible symptoms of breast cancer, 16% of providers could not name a single accurate symptom; however, 57% could name four or five accurate symptoms. Assessment of local beliefs around breast cancer revealed significant misconceptions about breast cancer. In our study, 58.5% of participants believed breast cancer is always deadly, including 6.4% of hospital-based physicians. Furthermore, 41.4% of participants believed that keeping money in one’s bra causes breast cancer, and 10% believed that breast cancer is caused by a spiritual attack. In our cohort, 10% of providers indicated that breast cancer is contagious, and 25% believed that it could be treated effectively with antibiotics.

In our cohort, 7.7% of health care providers reported having a family member who had been diagnosed with breast cancer, and 54% reported knowing someone outside of their family with a breast cancer diagnosis. Of our participants, 21% reported personally knowing a breast cancer survivor. The two most common sources of provider education were the television and the radio; however, a complete list of educational sources is shown in Table 3.

TABLE 2. Overall Knowledge Scores by Occupational Group

| Occupational Group                                      | Poor  | Fair | Good   | Excellent |
|--------------------------------------------------------|-------|------|--------|-----------|
| Hospital-based physicians                              | 0 (0) | 0 (0) | 83 (72.2) | 32 (27.8) |
| Hospital-based nurses                                  | 1 (0.7) | 30 (20.7) | 114 (78.6) | 0 (0) |
| Hospital-based pharmacists                             | 0 (0.0) | 15 (34.9) | 27 (62.8) | 1 (2.3) |
| Primary health center nurses and community health workers | 21 (10.3) | 98 (48.0) | 84 (41.2) | 1 (0.5) |
| Private practice physicians                            | 0 (0) | 1 (5.6) | 16 (88.9) | 1 (5.6) |
| Private practice pharmacists                           | 4 (8.9) | 16 (35.6) | 24 (53.3) | 1 (2.2) |
| Community birth attendants                             | 15 (34.1) | 25 (56.8) | 4 (9.1) | 0 (0) |
| Students (nursing and community health)                | 11 (9.7) | 67 (59.3) | 35 (31.0) | 0 (0) |
| All groups (total)                                     | 52 (7.2) | 252 (34.7) | 387 (53.2) | 36 (5.0) |

NOTE. Data are presented as No. (%). Total knowledge scores were grouped into quartiles: poor knowledge (0-14 points), fair knowledge (15-28 points), good knowledge (29-42 points), and excellent knowledge (43-56 points). These scores were then stratified by health care worker type.
Of the respondents, 60% reported feeling somewhat or completely qualified to treat patients with breast cancer, 6% felt neither qualified nor unqualified, 20% felt somewhat or completely unqualified to treat patients with breast cancer, and 14% did not respond to the question. Self-assessment of qualification to treat breast cancer was significantly different by occupational group (P < .001; Table 4). There was significant correlation between overall knowledge score and self-assessment of qualification (R = 0.41; P < .001).

Of the female providers surveyed (n = 566), 95% reported being aware of self-breast examinations, and 91% reported regularly performing self-breast examinations. In the same group of providers, 37% had undergone a clinical breast examination in the last year, and the majority of those examinations were for routine screening. Of the female providers > age 45 years (n = 168), 38% reported they had undergone prior mammography, and 86% of those mammograms were for screening. Of the female providers > 45 years of age, 83% stated they would be interested in
screening mammography. The most common reasons for not wanting a mammogram were concern about radiation exposure and the belief that they did not need one.

Of the health care workers surveyed, 86% reported that they would be interested in an education program on breast cancer, and 29% reported that they would be willing to spend a whole day or more on an education program. Suggested formats for an intervention included an in-person class and internet-based education.

**DISCUSSION**

Delayed diagnosis of breast cancer in Nigeria has been well documented and has a significant impact on breast cancer morbidity and mortality.14-17 Better understanding of the causes of delay in care is critical to develop relevant and effective interventions. In Southwestern Nigeria, patients report that provider education is a barrier to timely breast cancer care.19 Further assessment across the tiered health system is needed to determine where education is lacking and to be able to design an appropriate intervention. This cross-sectional knowledge assessment is a first step toward that understanding. Our study reveals that nurses and community health workers at primary health care centers scored < 50% on our knowledge assessment and could correctly identify only 40% of risk factors for breast cancer. This knowledge level is significantly lower than hospital-based providers. This knowledge deficit among primary care workers is of particular concern, as they are often responsible for referral to larger health care centers that are capable of diagnostic imaging and biopsy.

Furthermore, subset analysis of our questions shows a poor understanding of the causes and risk factors for breast cancer. This suggests that providers would not be able to identify specific patients who should be screened more carefully for breast cancer. Deficits also exist in symptom identification, further raising concerns that if a patient presented with clinical evidence of breast cancer a provider may not have sufficient awareness to make an appropriate referral or order appropriate imaging.

Our study also included questions about local beliefs and misconceptions about breast cancer. Even among health care providers, a subset believed breast cancer to be a communicable disease that can be treated by antibiotics or that breast cancer was caused by a spiritual attack or by keeping money in one’s bra. Education about the underlying causes of breast cancer is important to reduce the blame that might be placed on the victim and potential associated stigma as well as to ensure that appropriate referrals are made and are not delayed by inappropriate treatments, such as antibiotics.

Female health care providers in our sample show high levels of awareness about and practice of self- and clinical screening techniques. Female providers > 45 years of age also showed a dramatic interest in receiving a screening mammography; however, the belief that they did not need a mammogram persisted and reveals that further education even in this healthcare-oriented population is still needed.

Despite the knowledge deficits identified in our study, the encouraging finding is that health care providers at all levels of the health care system in this area of Nigeria are eager for further breast cancer education and are willing to invest their professional time for that education. This attitude, combined with the knowledge deficits, makes provider education an attractive and potential powerful leverage

| Occupational Group                                      | Somewhat or Completely Unqualified | Neither Qualified nor Unqualified | Somewhat or Completely Qualified | Did Not Answer |
|--------------------------------------------------------|-----------------------------------|---------------------------------|----------------------------------|----------------|
| Hospital-based physicians                              | 8 (7)                             | 1 (0.8)                         | 104 (90)                         | 2 (2)          |
| Hospital-based nurses                                  | 13 (9)                            | 6 (4)                           | 110 (76)                         | 17 (12)        |
| Hospital-based pharmacists                             | 14 (33)                           | 8 (19)                          | 19 (44)                          | 2 (5)          |
| Primary health center nurses and community health workers | 34 (17)                           | 12 (6)                          | 119 (58)                         | 39 (19)        |
| Private practice physicians                            | 0 (0)                             | 0 (0)                           | 17 (94)                          | 1 (6)          |
| Private practice pharmacists                           | 14 (31)                           | 5 (11)                          | 17 (38)                          | 9 (20)         |
| Community birth attendants                             | 35 (80)                           | 1 (2)                           | 4 (9)                            | 4 (9)          |
| Students (nursing and community health)                | 29 (26)                           | 10 (9)                          | 49 (43)                          | 25 (22)        |

NOTE. Data are presented as No. (%).
point in the mission to clinical downstage breast cancer in Nigeria at the time of diagnosis.

One of the limitations of this study is that although multiple levels of the health care system were surveyed, all of the health care centers are in a relatively limited geographic area within Nigeria, which is located in close proximity to a large urban area. The data captured here may not reflect health care provider knowledge in other areas of the country or in a more rural setting. Furthermore, our knowledge assessment tool has not been previously validated; however, it did undergo extensive expert review and a pilot feasibility test. The variation between knowledge scores in different types of providers does suggest that we are able to capture a range of breast cancer knowledge and awareness in our sample population. Respondents to the survey were aware that the survey was being conducted by the University of Chicago and the University of Ibadan and may not have been comfortable expressing traditional beliefs, such as spiritual attacks as an underlying cause of illness, knowing who the audience was. As such, our survey may underestimate the true prevalence of non-Western beliefs about disease causation.

Our knowledge assessment reveals that health care worker knowledge of breast cancer in Southwestern Nigeria varies greatly depending on the type of provider; hospital-based and physician providers have higher overall knowledge, and PHC providers have significantly lower overall knowledge. PHC providers (both nurses and health care workers) and community birth attendants, many of whom may be the first point of contact for women with breast ailments, have significant gaps in their knowledge about breast cancer, with median knowledge scores < 50%. Specific areas of weakness in their knowledge, including risk factors for breast cancer and breast cancer symptoms, are attractive targets for future educational interventions targeted at reducing delays in diagnosis of breast cancer among patients who present to non–hospital-based health care providers. Furthermore, providers across the health care system are willing to participate in future educational programs to better care for their patients. Building on the foundation of this work, multiple members of this research team have incorporated health care provider education as a central component of their breast cancer research and capacity-building efforts in Southwest Nigeria, with the goal of maximizing community impact.
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Open Payments Link: https://openpaymentsdata.cms.gov/physician/olopade

No other potential conflicts of interest were reported.

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