

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

Liese C.C. Pruitt, MD<sup>1</sup>; Stella Odedina, PhD<sup>2</sup>; Imaria Anetor, MPH<sup>2</sup>; Tolulope Mumuni, MSc<sup>2</sup>; Helen Oduntan, MSc<sup>3</sup>; Adeyinka Ademola, MBBS<sup>4</sup>; Imran O. Morhason-Bello, MBBS<sup>2</sup>; Temidayo O. Ogundiran, MD<sup>4</sup>; Millicent Obajimi, MBBS, DMRD<sup>5</sup>; Oladosu A. Ojengbede, MBBS<sup>2</sup>; and Olufunmilayo I. Olopade, MD<sup>6</sup>

**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,<sup>1</sup> with an estimated 1.7 million new cases and 545,000 deaths due to breast cancer in 2016.<sup>2</sup> Nigeria is the most populous country in Africa,<sup>3</sup> 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.<sup>4-7</sup> 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.<sup>8-11</sup> When detected early and treated promptly, these cancers have a high cure rate in a well-resourced 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.<sup>12</sup> 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

## ASSOCIATED CONTENT

### Data Supplement

Author affiliations and support information (if applicable) appear at the end of this article.

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## CONTEXT

### Key Objective

What is the breast cancer knowledge level of health care providers in Southwestern Nigeria?

### Knowledge Generated

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.

### Relevance

Provider education about breast cancer is an important target for future interventions to improve breast cancer outcomes in Nigeria.

inherited breast cancers than has been reported in other populations.<sup>13</sup> This underscores the need for systems-level interventions to downstage breast cancer in Nigeria.

Stage at presentation in breast cancer has a direct relationship to likelihood of long-term survival.<sup>14</sup> Late-stage diagnosis of breast cancer is a significant concern in low- and middle-income countries, including sub-Saharan Africa.<sup>15-17</sup> The causes of late-stage diagnosis are complex and, in addition to aggressive molecular subtypes, include lack of access to comprehensive screening and preventive care as well as social and cultural factors such as alternative healing, financial concerns, and lack of education.<sup>18</sup> A previous qualitative study of patients with breast cancer and physicians in Ibadan, Nigeria revealed that lack of patient education, use of nonphysician providers, and delays in referral for prompt biopsy of breast lumps were the most significant themes raised in delay in diagnosis.<sup>19</sup> In contrast, fear of unanticipated surgery and costs were the most significant themes that contributed to delays in treatment.<sup>19</sup>

In a previous study, both patient and provider lack of education about breast cancer contributed to delays in care.<sup>19</sup> Nonphysician provider education was a theme of unanticipated importance in patient narratives. These narratives focused on the lack of awareness about breast pathology and its management among nonphysician providers. Whether these patient impressions are backed up by an objective measure of provider awareness is unknown. There are multiple small studies of health care provider awareness in Nigeria,<sup>20-23</sup> as well as a systematic review that synthesized awareness studies across many professional and lay groups.<sup>24</sup> These studies demonstrated that there is an increasing awareness that breast cancer exists and that it has a high fatality rate; however, awareness of risk factors and genetic susceptibility was much lower.<sup>24</sup> This is consistent with studies of both the lay public and health care providers in other low- and middle-income countries that have demonstrated significant gaps in awareness even among female health care professionals.<sup>25,26</sup>

Despite these assessments of breast cancer awareness, there had not been a comprehensive tool for assessing

provider education that had been applied on a larger scale to assess the scope of the problem across all tiers of the health care system. Compared with changing widespread cultural beliefs or practices, addressing educational deficiencies is one of the attractive targets for systems reform to improve breast cancer outcomes in Nigeria. In multiple low-resource settings across multiple continents, improving physician awareness and educating community health care workers has been shown in pilot studies to be an effective option for diagnosis and clinical downstaging of breast cancer.<sup>27-30</sup> Understanding the extent of the problem and the specific areas of weakness allows the best distribution of future resources. Given our preliminary findings on knowledge gaps at the provider level,<sup>19</sup> the goal of this study was to assess health care provider knowledge of breast cancer and to identify specific knowledge gaps that could be targeted for future education interventions. We hypothesized that different types of health care providers would have very different levels of knowledge and that identification of signs and symptoms and effective treatments would be the most likely areas of weakness.

## METHODS

This study was completed from August 2013 to May 2014 in and around Ibadan, Nigeria. Institutional review board (IRB) approval was obtained from the University of Chicago IRB as well as the University of Ibadan IRB. Permission to recruit in the area was also obtained from the local government. For this study, a knowledge assessment instrument was developed that was tailored to local needs to assess knowledge of symptoms, risk factors, treatments, and cultural beliefs. The questionnaire was developed and validated after an initial culturally tailored qualitative survey of patients and providers about their understanding of breast cancer.<sup>19</sup> One of the authors (L.C.C.P.) with medical anthropology expertise spent a year in Nigeria working with the local team to develop and field test the questionnaire. We found that there was no word for breast cancer in the local language and that a major barrier to quality breast cancer care was delay of diagnosis. A previously validated questionnaire from a high-income country was not used, because local understanding and beliefs as well as

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  $\chi^2$  test.

## RESULTS

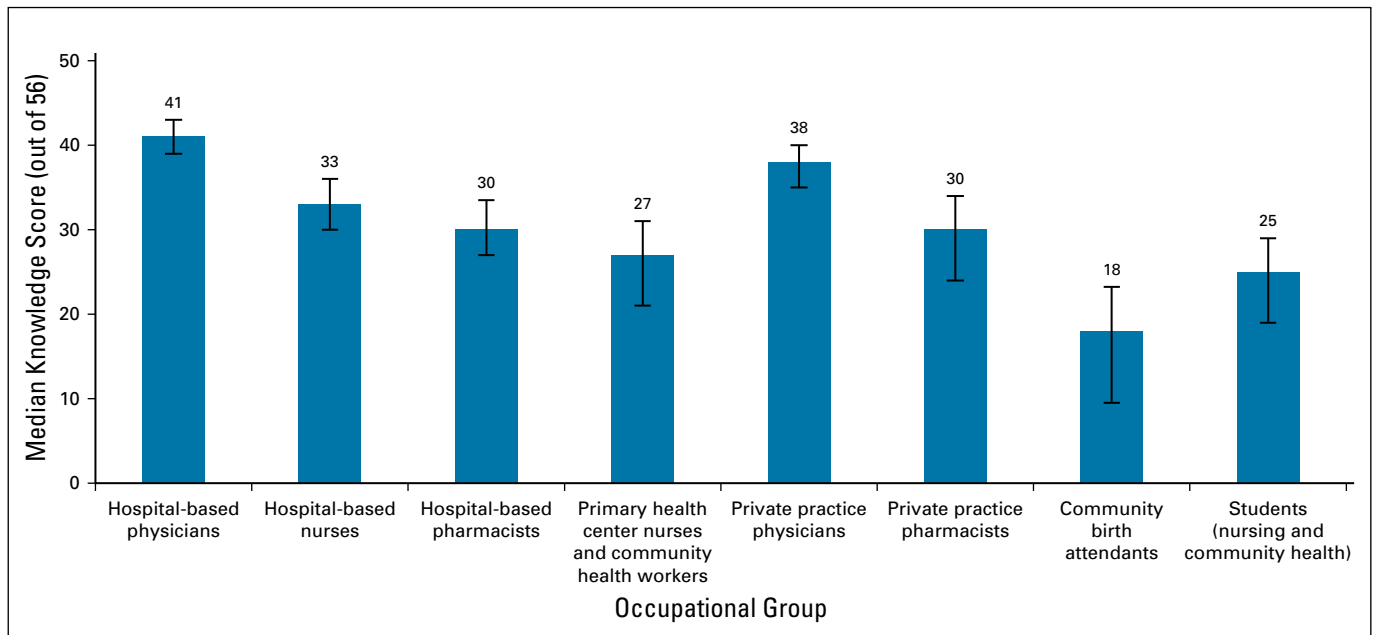
We distributed 1,061 questionnaires, and 725 providers responded (68%). Basic demographics of the cohort are listed in Table 1. Median knowledge score was 31 out of 56 (interquartile range [IQR], 24-36) and ranged from 0-47 points. The differences in median scores between occupational groups were statistically 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

Demographic	Overall Cohort
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. (%).



**FIG 1.** Median knowledge assessment score stratified by occupational group. Error bars represent interquartile range.

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

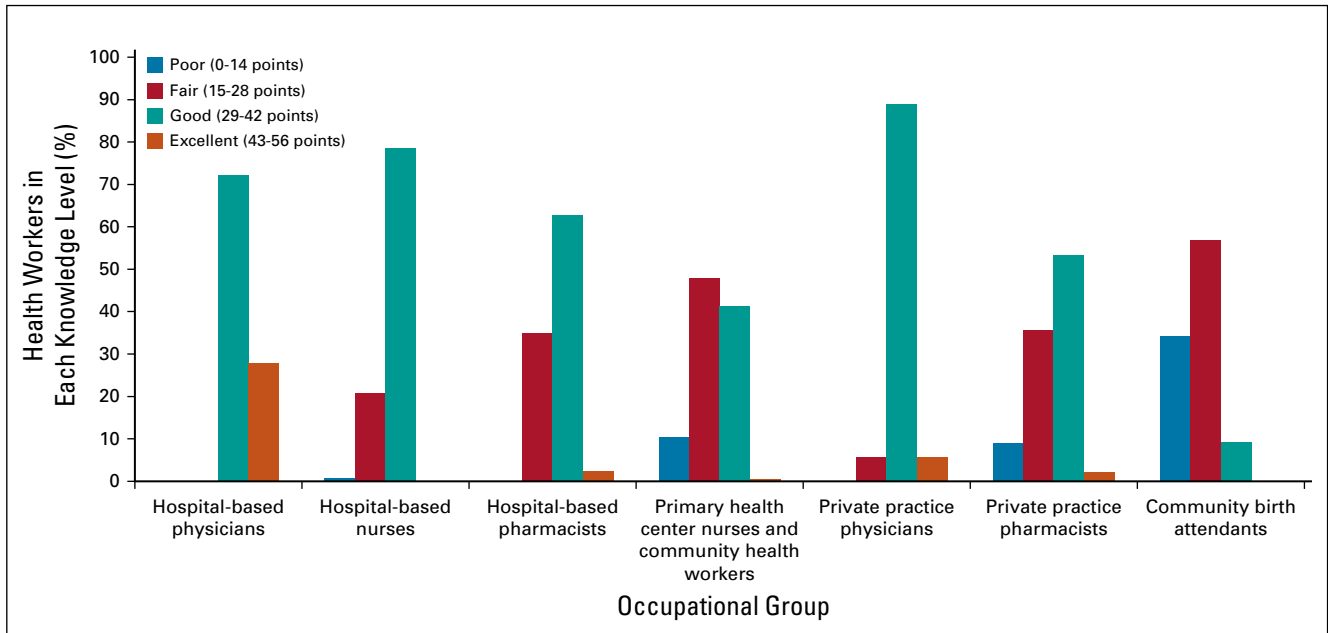
study, 58.5% of participants believed breast cancer is always deadly, including 6.4% of hospital-based physicians. Furthermore, 41.4% of participants believed that keeping money in one's bra causes breast cancer, and 10% believed that breast cancer is caused by a spiritual attack. In our cohort, 10% 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)

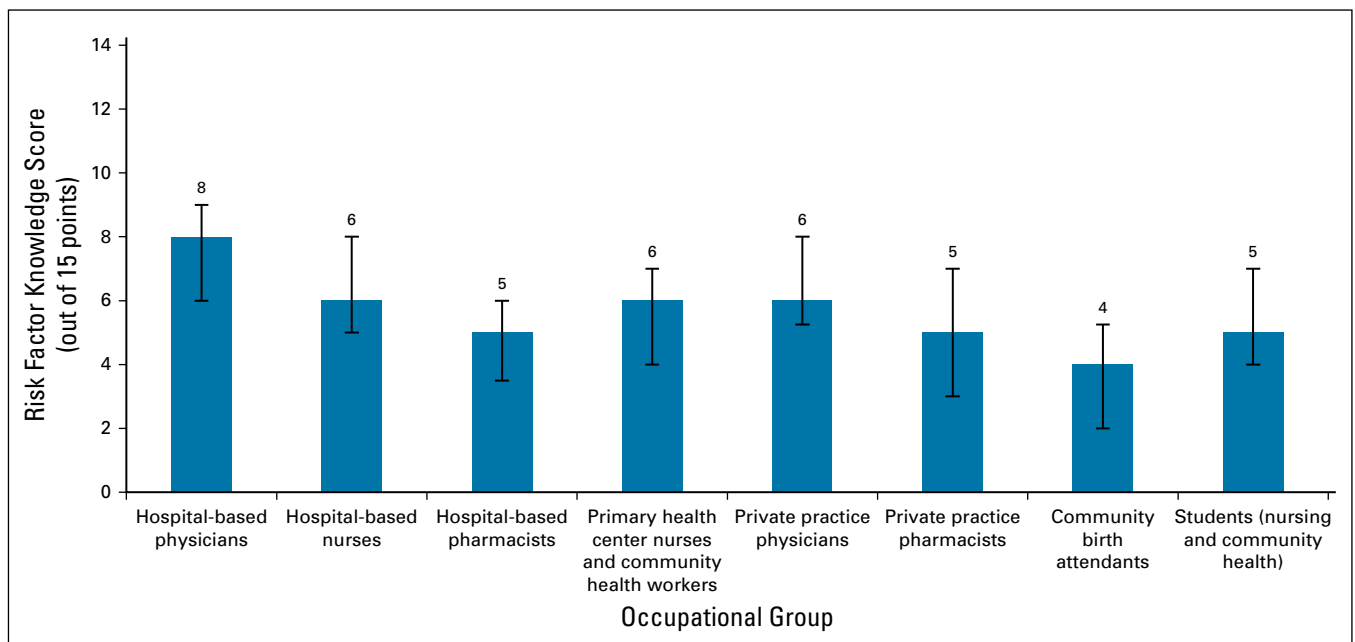
NOTE. Data are presented as No. (%). Total knowledge scores were grouped into quartiles: poor knowledge (0-14 points), fair knowledge (15-28 points), good knowledge (29-42 points), and excellent knowledge (43-56 points). These scores were then stratified by health care worker type.



**FIG 2.** Knowledge level by occupational group. 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



**FIG 3.** Median knowledge of risk factors stratified by occupational group. Error bars represent interquartile range.

**TABLE 3.** Sources of Provider Education About Breast Cancer

Source of Education	Participants
Television	548 (75)
Radio	531 (73)
Newspaper	473 (65)
Formal training for degree	407 (56)
Experience treating patients	333 (46)
Educational workshop	312 (43)
Poster or billboard	311 (43)
Educational pamphlet	291 (40)

NOTE. Data are presented as No. (%).

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.<sup>14-17</sup> 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.<sup>19</sup> 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

**TABLE 4.** Self-Assessment of Qualification to Treat Breast Cancer

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.

## AFFILIATIONS

<sup>1</sup>Center for Global Surgery, Department of Surgery, University of Utah, Salt Lake City, UT

<sup>2</sup>Centre for Population and Reproductive Health, College of Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria

<sup>3</sup>Department of Pharmacy, College of Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria

<sup>4</sup>Department of Surgery, College of Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria

<sup>5</sup>Department of Radiology, College of Medicine, University of Ibadan, Ibadan, Oyo State, Nigeria

<sup>6</sup>Center for Clinical Cancer Genetics and Global Health, Department of Medicine, University of Chicago, Chicago, IL

## CORRESPONDING AUTHOR

Olufunmilayo I. Olopade, MD, The University of Chicago Medicine, 5841 S Maryland Ave, MC 2115, Chicago, IL 60637; e-mail: folopade@medicine.bsd.uchicago.edu.

## PRIOR PRESENTATION

Presented at the American College of Surgeons Clinical Congress, San Francisco, CA, Oct 26-30, 2014; the Symposium on Global Cancer Research, National Cancer Institute, Washington, DC, May 9, 2014; and the 5th Annual Consortium of Universities for Global Health Conference, Washington, DC, May 10-12, 2014.

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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.

## AUTHOR CONTRIBUTIONS

**Conception and design:** Liese C.C. Pruitt, Oladosu Ojengbade, Olufunmilayo I. Olopade

**Administrative support:** Millicent Obajimi, Oladosu Ojengbade

**Provision of study material or patients:** Helen Oduntan, Oladosu Ojengbade

**Collection and assembly of data:** Liese C.C. Pruitt, Stella Odedina, Imaria Anetor, Tolulope Mumuni, Helen Oduntan, Adeyinka Ademola, Imran O. Morhason-Bello, Temidayo O. Ogundiran, Millicent Obajimi, Olufunmilayo I. Olopade

**Data analysis and interpretation:** Liese C.C. Pruitt, Tolulope Mumuni, Imran O. Morhason-Bello, Oladosu Ojengbade, Olufunmilayo I. Olopade

**Manuscript writing:** All authors

**Final approval of manuscript:** All authors

**Accountable for all aspects of the work:** All authors

## AUTHORS' DISCLOSURES OF POTENTIAL CONFLICTS OF INTEREST

The following represents disclosure information provided by authors of this manuscript. All relationships are considered compensated unless otherwise noted. Relationships are self-held unless noted. I = Immediate Family Member, Inst = My Institution. Relationships may not relate to the subject matter of this manuscript. For more information about ASCO's conflict of interest policy, please refer to [www.asco.org/rwc](http://www.asco.org/rwc) or [ascopubs.org/jgo/site/misc/authors.html](http://ascopubs.org/jgo/site/misc/authors.html).

Open Payments is a public database containing information reported by companies about payments made to US-licensed physicians ([Open Payments](http://OpenPayments)).

**Helen Oduntan**

**Travel, Accommodations, Expenses:** MSN Laboratories, India

**Olufunmilayo I. Olopade**

**Employment:** CancerIQ (I)

**Leadership:** CancerIQ

**Stock and Other Ownership Interests:** CancerIQ, Tempus

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No other potential conflicts of interest were reported.

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