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Healthcare utilisation, cancer screening and potential barriers to accessing cancer care in rural South West Nigeria: a cross-sectional study

Avinash Sharma ,[1] Olusegun Isaac Alatise,[2] Kelli O'Connell,[3] Samson Gbenga Ogunleye,[4] Adewale Abdulwasiu Aderounmu,[4] Marquerite L Samson,[3] Funmilola Wuraola,[2] Olalekan Olasehinde,[2] T Peter Kingham,[1] Mengmeng Du[3]

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For numbered affiliations see end of article.

Correspondence to
Dr Avinash Sharma;
avinash.s.sharma@gmail.com
and
Dr Mengmeng Du, Epidemiology and Biostatistics, Memorial Sloan Kettering Cancer Center, New York, New York, USA;
dumeng@mskcc.org

ABSTRACT

Background/aims Cancer burden is predicted to double by 2030 in sub-Saharan Africa; access to healthcare services for cancer management is a priority in the region. In Nigeria, National Cancer Control Plan aims to ensure >50% cancer screening of eligible populations by 2022 for all Nigerians. We describe healthcare utilisation, cancer screening activities and potential barriers to accessing cancer care within an understudied rural community-based adult population in South West Nigeria.

Methods In April 2018, we conducted a cross-sectional study of community-based adults (>18 years) ~130 km east of Ibadan, 250 km from Lagos in Osun State, South West Nigeria. Participants completed a face-to-face survey in local dialect. We used a questionnaire to assess demographics, health status, income, medical expenditures, doctor visits and cancer screening history.

Results We enrolled 346 individuals: with median age of 52 years and 75% women. Of the entire cohort, 4% had medical insurance. 46% reported a major medical cost in the last year. Cancer screening activities were infrequent in eligible participants: 1.5% reported having had cervical cancer screening, 3.3% mammogram and 5% colonoscopy screening. Cancer screening assessment was less frequent in those with less income and lower education levels. Using a multivariable logistic regression model including personal income, insurance status and education, higher personal income was associated with more cancer screening activity (OR 2.7, 95% CI 1.3 to 5.7, p<0.01). Despite this, most individuals had contact with a primary healthcare doctor (52% in the last year), and over 70% access to radio and TV suggesting the opportunity to expand community-based screening interventions and awareness exists.

Conclusions Despite national increases in cancer cases, we highlight a deficiency in cancer screening and universal healthcare coverage within a community-based adult Nigerian population. Subject to availability of governmental resources, increasing financial risk protection, awareness and targeted resource allocation may help expand access in Nigeria.

Strengths and limitations of this study

- ► Rigorously trained interviewers fluent in the local dialect collected contemporary perspectives of potential barriers to accessing medical and cancer care in a crucially understudied population in rural South West Nigeria.
- ► Questionnaire items derived by adapting features from validated and/or widely implemented local or nationwide surveys and tailored to the local population in collaboration with local clinicians, epidemiologists and nutritionists.
- ► Study conducted in conjunction with local community healthcare workers and the regional tertiary referral hospital to help build capacity, increase healthcare awareness and establish a sustained relationship with these rural communities.
- ► Potential for measurement error or recall bias, as we relied on individuals to retrospectively describe their own health and socioeconomic status as well as their interactions with healthcare services.
- ► Survey conducted at a single time (midweek, during the day) in two geographical locations, which may have affected sample composition (eg, more women than men).

INTRODUCTION

The burden of non-communicable disease (NCD), in particular cancer, in sub-Saharan Africa is well documented.[1–3] According to recent International Agency for Research on Cancer Global Cancer Observatory estimates, by 2030, 75% of new cancer cases will be within low-to-middle-income countries (LMICs).[4 5] In sub-Saharan Africa, despite the fact that cancer burden is predicted to double by 2030, the entire region accounts for <1% of worldwide medical cancer expenditures.[6–8] Central to addressing the growing burden of cancer in sub-Saharan Africa is the need

to improve access to cancer care services for screening, prevention and treatment.[9]

NCDs, including cancer, threaten to overwhelm fragile health systems in sub-Saharan Africa and lead to dramatic rises in health and social care costs in the near term.[7 10] In the region, out-of-pocket health expenditures are a major contributor to poverty,[11–13] and a lack of adequate social protection has the potential to drive families and individuals further into poverty. In Nigeria, universal healthcare coverage in the form of the National Health Insurance Scheme (NHIS) was implemented in 2005, with an overarching goal of universal health coverage for all Nigerians.[14] However, uptake has been limited and restricted,[15] and as a result, the large majority of Nigerians still face significant financial burden when healthcare needs arise.[15 16]

In Nigeria, cancer incidence and mortality are increasing, and women have a higher cancer incidence than men.[17] The most common forms of cancer in Nigeria are breast and cervical, with these accounting for over 50% of cancer deaths.[17–19] Regionally, the need to improve access to cancer services for early detection has been recognised, with a focus on these cancers. In 2018, Nigeria launched the 'National Cancer Control Plan 2018–2022', with the goal to make screening services available for all Nigerians and at least 'greater than 50% screening of all eligible populations by 2022'.[20] Despite this, the current state of cancer screening activities and barriers to care in this region (esp. rural areas) is not well defined or documented. This gap limits our ability to define actionable steps towards improving access and achieving the established screening goal. National programmes for screening breast and cervical cancers are lacking. Typically, screening interactions occur at primary healthcare facilities or community health clinics—often for women when they are being seen during pregnancy or for other related health issues such as immunisations. Screening services for cervical and breast cancers have been implemented sporadically by both government and non-government organisations but predominantly in urban areas. The overwhelming majority of individuals in the region are symptomatic when they present with disease. With 50% of Nigeria's population living in rural areas,[21] we hypothesise that unique challenges may exist for individuals in these communities, where nationwide initiatives may have limited reach.

This study aimed to describe potential barriers to accessing cancer care within a rural community-based adult population in South West Nigeria. This study was performed as part of a broader community-based capacity building project in South West Nigeria[22] investigating potentially modifiable cancer risk factors in the setting of rising rates of cancer in the region.[6 19 20 23] Herein, we report health insurance coverage and socioeconomic status in relation to health conditions, health expenditures and cancer screening assessment and provide a snapshot of the health needs and burden faced by individuals in the region.

METHODS

During April 2018, a cross-sectional study of community-based adults was conducted in Osun State, South West Nigeria. Two rural towns Ijebu-Jesa and Ere-Jesa (approximately 130 km east of Ibadan, 250 km from Lagos and on latitude 7.45 degrees north within the rain forest belt), were selected at random. These towns were in proximity to Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, the main tertiary referral centre in the region. This study was part of a broader capacity building project in the region to improve cancer care and prevention in this understudied population. It served as a baseline study to assess access to cancer services as well as a pilot study to explore endemic risk factors for cancer—such as unique dietary, exercise and environmental exposures.

Patient and public involvement

Prior to the study, local community leaders in the towns were contacted, and the goals of the research were explained. In the time leading up to the study, healthcare workers and community leaders notified and mobilised all potential participants in the two communities. They were also involved in the design of the study and in disseminating the results to all participants. Participants were notified of the study through discussion at the weekly local community meetings in the month leading up to the study, advertisements on local radio stations and community workers visiting regional sites.

Participants

Adults >18 years in the two towns were invited to participate. Adult participants were consecutively enrolled on arrival at predesignated locations (main town hall) in the two towns. Sample size for this study was therefore based on resource capacity of each town hall, available number of interviewers to administer the questionnaire and the size of each rural community in which we recruited; enrolment was capped at a maximum of 300 participants at Ijebu-Jesa and 100 at Ere-Jesa over the recruitment period. All study participants received blood pressure checks, and health promotion talks were held for those waiting to be surveyed. Study participants were given a small stipend to cover their transportation costs to the study venue on the study day (300 Naira, ~80 US cents). This amount was determined by local healthcare workers.

Questionnaire

The survey consisted of a questionnaire to gather quantitative data on demographics, health status, income, medical expenditures, dietary habits, physical activity, family history, screening history, medical history, reproductive history, primary healthcare visits, medication use and environmental exposures (see online supplemental file 2). The questionnaire used was developed in collaboration with local clinicians, epidemiologists and nutritionists and was derived by adapting features from validated and/or widely implemented local or

nationwide surveys. This included the Nigerian Demographic and Health Survey,[24] Nigeria General Household Survey,[25] WHO-endorsed Global Physical Activity Questionnaire[26] and Nurses' Health Study Questionnaire.[27–30] We therefore did not additionally test for reliability, and our study was intended to capture a cross-sectional snapshot of our rural communities. However, we expect low social mobility in our two rural Nigerian towns and therefore limited changes over time for the sociodemographic features collected in our questionnaire.

Data collection

After obtaining informed consent, the study participants underwent a 50–60 min one-on-one, face-to-face survey conducted in the local Yoruba dialect by a trained research assistant. All research assistants underwent a 2-day training programme that involved education into the research aims, methodology and ethics as well as interview techniques through role-playing exercises, pilot testing of the questionnaire and the use of electronic tablets for recording data.

Outcome measures

Cancer screening activities in screen-eligible individuals included history of cervical examination and screening test in women >21 years, mammogram in women >40 years and colonoscopy in all individuals >50 years. Because cervical cancer screening intervention was self-reported, screening could be by pap smear or visual inspection with acetic acid or Lugol's iodine. This could be conducted in a primary healthcare setting. Manual breast examination by a healthcare worker was not captured, and therefore, the assessed intervention evaluated management at local secondary and tertiary healthcare facilities. All of the assessed interventions were screening activities specified as part of the Nigerian National Cancer Control Plan 2018–2022. Medical expenses were defined as any 'major medical costs' as perceived by the study participant on direct questioning. This was clarified by recording the amount spent in Naira, and the medical reason for the expenditure was also documented. Demographical and socioeconomic data collected from our study population were compared with data from the Nigerian Demographic and Health Survey and the Oxford Poverty Health Indicator[31 32] to assess external validity.

Statistical analysis

Data were summarised in the form of proportions and frequency tables for categorical variables. Continuous variables were summarised using mean, median and SD. Comparisons of discrete variables were computed using Fisher's exact test and multiple logistic regression. Missing data were not possible for completed questionnaires as only complete responses to questions could be processed in order to advance the survey on the electronic tablets. All analyses were conducted using SAS software V.9.4.

Table 1 Demographical characteristics of the study group (n=346)

Variable	N (%)
Median age, years (range)	52 (18–100)
Sex	
Man	85 (24.6)
Woman	261 (75.4)
Marital status	
Single	27 (7.8)
Married	213 (61.6)
Others (divorced/cohabiting)	106 (30.6)
Tribe	
Yoruba	332 (96.0)
Ibo	5 (1.4)
Others	9 (2.6)
Religion	
Christian	326 (94.2)
Muslim	19 (5.5)
Others	1 (0.3)
Education	
No formal education	88 (25.4)
Primary	92 (26.6)
Secondary	92 (26.6)
Vocational/technical	45 (13.0)
Higher	29 (8.4)
Occupation	
Unemployed	30 (8.7)
Civil servant	30 (8.7)
Trader	123 (35.5)
Farmer	35 (10.1)
Self-employed	80 (23.1)
Others	48 (13.9)
Number of live births (women, n=242)	
0	6 (2.5)
1	15 (6.2)
2	23 (9.5)
3	28 (11.6)
4	54 (22.3)
5 or more	116 (47.9)

*n=268 Ijebu-Jesa and n=68 Ere-Jesa.

RESULTS

A total of 346 individuals were consecutively enrolled in the study and interviewed during the recruitment period. All individuals that were interviewed provided data for analysis. The demographical features of the group are presented in table 1. The majority of participants were Yoruba speaking (n=332, 96%) and married (n=213, 62%) with a median age of 52 years. Women accounted

for 75% of the cohort (n=261). Most individuals had some form of education, with 166 participants (48%) reporting more than primary school education. In addition, 30 participants (9%) reported being unemployed. Of female participants, 70% had ≥4 live births.

Overall, 155 participants (45%) had a personal monthly income of <10 000 Naira (~US$1 per day), and 134 individuals (76%) had a family monthly income of <50 000 Naira (US$140 per month) (table 2A). In addition, 198 participants (57%) lived in a family home or owned an apartment. The majority of participants (92%) reported having access to electricity, and over 70% reported access to television (76%) or radio (73%).

To assess the comparability of our results to the general Nigerian population, we compared the data from our study population to that recorded in the Nigerian Demographic and Health Survey (table 2B).[31] Both groups had similar degrees of education at the primary level for men and women, but overall, there were fewer uneducated men and women within our surveyed population when compared with national averages. Our surveyed group also had better access to electricity, radio and television compared with the national survey group (rural). When compared with equivalent parameters for Nigeria from the Multidimensional Poverty Index developed by the Oxford Poverty and Human Development Initiative,[32] our study population had similar levels of deprivation for years of schooling (defined as <6 years of school) and electricity (defined as no household electricity).

Within the group surveyed, cancer screening/assessment activities were limited: 2% (4/267) of female participants had a previous cervical smear/assessment, and 3% (6/182) of women >40 years had never had a mammogram (table 3). The prevalence of colonoscopy screening in those >50 years was 5% (9/200). In terms of healthcare access, 180 individuals (52%) had seen a primary healthcare doctor in the last year and were less likely to see a traditional healer during this period. Of all participants, 110 reported being diagnosed with hypertension (32%), but most individuals were not on daily hypertensive medication (n=324, 94%). The use of other medications for primary prevention of NCDs, such as aspirin and anticholesterol medications, was also infrequent.

Only 15 individuals out of 346 (4%) had medical insurance (table 4). For the remaining uninsured participants, 66% reported that they were unaware that health insurance existed. A further 73 participants (22%) stated that insurance was too difficult to access. Despite this, nearly half of those surveyed (n=160, 46%) reported a major medical cost in the last year, with the majority from unforeseen events, such as acute illness, trauma or surgery (58%). The costs incurred ranged from 5000 to 1 500 000 Naira, with a median of 10 000 Naira, an amount that is more than the monthly income for ~45% of individuals in this study. In addition, 52 participants (33%) reported that their major medical costs were for chronic conditions. Overall, individuals, with incomes in the lowest brackets (<50 000 Naira), accounted for most of

Table 2A Income and household conditions

Variable	N(%)
Personal income (per month, in Naira)	
<10 000	155 (44.8)
10 000–49 999	139 (40.2)
50 000–99 999	26 (7.5)
100 000–249 999	16 (4.6)
250 000–499 999	9 (2.6)
≥500 000	1 (0.3)
Family income (per month, in Naira)	
<10 000	117 (33.8)
10 000–49 999	147 (42.5)
50 000–99 999	38 (11.0)
100 000–249 999	28 (8.1)
250 000–499 999	11 (3.2)
≥500 000	5 (1.4)
Type of dwelling	
Own apartment	131 (37.9)
Rent apartment	146 (42.2)
Family house	67 (19.4)
Others	2 (0.6)
Type of toilet	
Water system	151 (43.6)
Pit latrine	164 (47.4)
Bush	23 (6.6)
Bucket	7 (2.0)
Others	1 (0.3)
Water source	
Pipe borne/boreholes	185 (53.5)
Well	146 (42.2)
River	15 (4.3)
Appliances	
Electricity	318 (91.9)
Television	262 (75.7)
Radio	251 (72.5)
Refrigerator	154 (44.5)
Air conditioner	8 (2.3)
Generating set	99 (28.6)
Personal computer	38 (11.0)
None	18 (5.2)

Table 2B Comparison between study sample characteristics and 2013 Nigerian National Demographic and Health Survey (NDHS)

	NDHS urban (%)	NDHS rural (%)	NDHS total (%)	Current study (%)
Cooking fuel				
Electricity	0.7	0.2	0.4	10.7

Continued

Table 2B Continued

Liquefied petroleum gas/natural gas/biogas	4.6	0.5	2.3	21.1
Kerosene	47.6	8.7	25.5	31.8
Charcoal	5.3	1.6	3.2	2.3
Wood	37.9	83.3	63.7	34.1
Electricity				
Yes	83.6	34.4	55.6	91.9
No	16.3	65.4	44.2	8.1
Missing	0.1	0.2	0.2	0
Household appliances				
Radio	77.7	61.3	68.3	72.5
Television	73.2	28.2	47.6	75.7
Refrigerator	32.5	7.5	18.3	44.5
Means of transportation				
Bicycle	12.7	18.3	18.3	0.9
Motorcycle/scooter	27.0	31.2	31.2	15.0
Car/truck	14.4	8.7	8.7	12.1
	NDHS woman (%)	**NDHS man (%)**	**Current study woman (%)**	**Current study man (%)**
Education				
No formal education	37.8	21.2	28.7	15.3
Primary	17.3	16.7	26.8	25.9
Secondary	35.8	47.7	28.0	22.4
More than secondary	9.1	14.3	16.5	36.5

those that incurred major medical costs in the last 2 years (74.4%), had more visits to their primary care doctor in the year (75.6%) and higher levels of hypertension (80.4%).

Within eligible populations, we performed analysis to look for the association between cancer screening activity and income, insurance status and education (table 5). Individuals with lower levels of income were less likely to have had cancer screening assessments. Cancer screening activity was more frequent in those with higher levels of education. No significant relationship was observed by insurance status or other factors that were assessed. In a multivariable logistic regression model including personal income, insurance status and education, the only statistically significant OR for association with cancer screening activity was observed for personal income (personal income OR 2.7, 95% CI 1.3 to 5.7, p<0.01; education level OR 1.7, 95% CI 0.98 to 2.7, p=0.06; and insurance status OR 4.3, 95% CI 0.8 to 23.1, p=0.09).

Table 3 Screening activities, access to medical services and health conditions

Variable	N (%)
Cancer screening	
Cervical cancer assessment (if woman >21, n=261)	4 (1.5)
Previous mammogram (if woman >40, n=183)	6 (3.3)
Previous colonoscopy (if >50 years, n=190)	9 (4.5)
Last primary healthcare physician visit	
<1 year ago	180 (52.0)
1–4 years ago	93 (26.9)
5–10 years ago	32 (9.2)
>10 years ago	41 (11.8)
Last time seen traditional healer	
Never	254 (73.4)
<2 years ago	66 (19.1)
≥2 years ago	26 (7.5)
Hypertension	110 (31.8)
Diabetes	16 (4.6)
High cholesterol	24 (6.9)
Stroke	18 (5.2)
Alcohol use*	
No	227 (65.6)
Yes, drank in past but quit	65 (18.8)
Yes, currently drinks alcohol	54 (15.6)
Smoking status†	
Never	303 (87.6)
Ever	43 (12.4)
Medication use	
Reported ant-hypertensive use	78 (22.5)
Reported aspirin use	89 (25.7)
Reported anticholesterol use	7 (2.0)
Reported herbal supplement use	233 (67.3)
Oral contraceptive use	
Never	175 (67.0)
Past use	64 (24.5)
Current use	22 (8.4)

*Participants were asked 'Have you had 10 or more drinks of alcohol in your life?'
†Participants were asked 'Have you smoked five packs of cigarettes (100) or more in your lifetime?'

DISCUSSION

We performed a cross-sectional community-based study in Osun State, Nigeria, to provide a snapshot of the challenges faced in the management of NCDs in the region. This study was conducted with an emphasis on cancer within broader research aims of identifying risk factors (lifestyle, diet and biological) associated with

Table 4 Insurance coverage and medical costs

Variable	N (%)
Insurance	
No	331 (95.7)
Yes	15 (4.3)
Last time used insurance	
In the last 2 years	6 (40.0)
>2 years ago	9 (60.0)
How many family members covered by insurance	
None	331 (95.7)
1–2	8 (2.3)
3–4	3 (0.9)
5 or more	4 (1.2)
Reasons for not having insurance (n=331)	
Expense	32 (9.7)
Lack of coverage	13 (3.9)
Too difficult to access	73 (22.1)
Others	217 (65.6)
Major medical costs in the last 2 years	
No	186 (53.8)
Yes	160 (46.2)
Estimated amount	
<10 000 Naira	73 (45.6)
10 000–49 000 Naira	38 (23.8)
50 000–99 999 Naira	16 (10.0)
>100 000 Naira	22 (13.8)
Unknown	11 (6.9)
Reasons for major medical costs (n=158)	
Surgery	17 (10.8)
Chronic conditions	52 (32.9)
Acute illness/trauma	74 (46.8)
Other/multiple reasons	15 (9.5)
Amount spent (continuous)	
Overall median (range)	10 000 (50–1 500 000)
Median amount spent by reason (range)	
Surgery	60 000 (7000–150 000)
Chronic conditions	18 000 (500–150 000)
Acute illness/trauma	5000 (50–400 000)
Other/multiple reasons	70 000 (800–500 000)

Table 5 Association between cancer screening activity and income, insurance and education (n=310)*

Variable	Cancer screening (n=17)	No cancer screening (n=293)	P value†
Personal income (per month, in Naira)			
<10 000	2/138 (1.5)	140/138 (98.5)	
10 000–49 999	9/122 (7.4)	115/122 (92.6)	<0.01
>50 000	6/43 (14.0)	38/43 (86.0)	
Family income (per month, in Naira)			
<10 000	1/108 (0.9)	107/108 (99.1)	
10 000–49 999	8/129 (6.2)	121/129 (93.8)	<0.01
>50 000	8/66 (12.1)	58/66 (87.9)	
Insurance status			
No	15/290 (5.2)	275/290 (94.8)	0.12
Yes	2/13 (15.4)	11/13 (84.6)	
Education			
No formal education	1/86 (1.2)	85/86 (98.8)	0.04
Primary	3/83 (3.6)	80/83 (96.4)	
Secondary	8/78 (10.3)	70/78 (89.7)	
Higher	5/56 (8.9)	51/56 (91.1)	

No association by gender, marital status and religion.
*Adjusted for eligible population, whereby cancer screening activities defined as history of cervical assessment in women >21 years, mammogram in women >40 years and colonoscopy in all individuals >50 years.
†Fisher's exact test for association.

the rising cancer incidence in the region. We observed that screening assessment for breast, cervical and colon cancers (the major contributors to cancer morbidity in the region)[6 19 33] were extremely low. This observation was despite a median age of 52 years and a high representation of women. In addition, <5% of the surveyed population possessed universal healthcare in the form of health insurance. We also found low incomes, high fertility rates and evidence of poorly controlled chronic diseases, such as hypertension, in our cohort. The rates are comparable to national averages (suggesting our sample sits between the urban/rural divide)[31] and likely represent broad health and development deficiencies present in the community. For example, the high prevalence of hypertension in this population is remarkably similar to that reported in a systematic review and meta-analysis conducted in the region.[34 35] The high burden of hypertension in the region has also been recently acknowledged by the WHO in its efforts to control hypertension in Nigeria.[36]

Previous studies conducted in the region[37–45] have demonstrated that poor access to cancer services is associated with late presentation and high incidence/mortality ratio.[5 46] This highlights a need to develop sound healthcare infrastructure, whereby individuals can be screened for asymptomatic disease and also adequately access services in a timely fashion when symptomatic. Our study identifies that screening activities may be lacking through either delivery or uptake and that the potential cost implications of accessing treatment when symptoms arise, in the absence of adequate health insurance, can be high. The experience from other sub-Saharan African nations suggests that individuals seeking cancer services face significant barriers to access.[38 39 47–50] The Nigerian 'National Cancer Control Plan 2018–2022'

specifically details goals to make screening services and early detection of cancer available for all Nigerians and to improve access to quality, cost-effective and equitable diagnostic and treatment services for cancer care. This is centred around investment in eight public comprehensive cancer centres covering all geopolitical zones, as well as the implementation of various screening strategies throughout different sectors of the health system.[20] Our results suggest that considerable work is required to reach the goal of 'greater than 50% screening of "eligible populations" by 2022'.[20] We assessed cancer screening using measures that are recommended in this national plan. The methods we assessed are accessed at different levels of the healthcare system—cervical cancer assessment predominantly at a primary healthcare level, breast cancer at secondary/tertiary level through mammography and colon cancer at tertiary level through colonoscopy. While our analysis provides some idea of how individuals may have navigated the health system, further detailed study is required to look at specific engagement at these different levels to inform appropriate resource allocation.

It is important to acknowledge that cancer screening in LMICs requires measures tailored to local capacity and disease prevalence. For breast cancer, although mammography remains the gold standard for early detection of breast cancer, the Breast Health Global Initiative resource-stratified guidelines recommend clinical breast examination as a practical and necessary alternative for early detection in low-resource settings.[19 48 51] This has been recommended in local policy and was not assessed in the current study.[20] Despite this, with over 50% of individuals in this study visiting a primary healthcare doctor in the last year, our findings strongly support the need to concentrate cancer screening efforts at primary healthcare where possible through the use of similar interventions. Colon cancer screening by colonoscopy for those over the age of fifty as recommended in high-income countries does not exist in sufficient capacity for this to be recommended in an LMIC setting.[52] Efforts to intervene at primary healthcare level through the use of stool testing and symptom stratification are ongoing.[53 54] Overall, education, training and adequately resourcing community healthcare workers and physicians at primary healthcare level for cancer screening assessment are essential.

We demonstrated that both income and medical expenditure relative to this level of income, compounded by the lack of universal healthcare coverage, must be factored into strategies laid out to address cancer control. The costs of the screening interventions assessed in this study relative to income are prohibitive for the majority of individuals without government subsidy: approx. US$50, ~18 000 Naira (for mammography); US$15, ~3000 Naira (cervical smear). This is compounded by the finding of only 4% of our cohort having health insurance coverage. In addition, major medical costs were incurred by over half of those interviewed, and a significant proportion of these costs were for chronic diseases (33%). Those individuals with the lowest income were more likely to report visits to the doctor, chronic disease and significant 'out-of-pocket' medical expenditures. The Nigerian NHIS has been in place since 2005. When it was introduced, state governments were instructed to adopt the programme for their employees in the formal sector. After insuring government employees, state governments were instructed to expand coverage across all individuals with the goal of universal health coverage.[14 15] Recent reports confirm that this expansion has been limited in Nigeria. In line with previous studies, our data indicate that the NHIS is severely underused in the community population.[15 16] The state health insurance scheme has been instituted in only two out of 36 states of the federation at community level, and this has not been the case in Osun State where the study took place.[15]

We found wide range of 'major' medical expenditure in our study group, with a median expenditure exceeding the monthly salary of ~45% of the group. It is important to note that we did not obtain information on total household expenditures to allow a relative assessment of the amount spent on medical costs and, in turn, determine 'catastrophic' costs.[16] However, based on income and demographical comparisons with other groups studied in the region, it is likely that catastrophic spending is high.[55] Further research into how the money to cover medical expenditure is generated (ie, personal savings, family savings and loans) is required. Taken together with prior work in the region,[56 57] it is evident that risk pooling and financial risk protection are required for the provision of preventative and therapeutic NCD health services.

While we did not directly assess awareness of cancer screening, we did demonstrate an association between cancer screening activity and education level. Levels of education have been associated with awareness and accessing cancer services in previous studies.[38 45 47 58] In addition to this, we also found that ~75% of participants had access to radio and/or television within family and social networks, suggesting that mass communication channels to promote health awareness exist. In fact, these facilitated the current study when combined with strategies using mobile phone technologies. More broadly, these channels represent promising avenues to promote health and prevention of disease in the region.[59] In addition, 'demand-side' approaches to resource allocation, such as the stipend we provided for travel in the study or e-vouchers,[60 61] are likely to be well received by the community and may promote uptake of health screening activities.

A strength of this study is that it was performed within the community and involved trained research staff fluent in the local dialect and used a validated questionnaire. The study was performed in conjunction with local community healthcare workers and the tertiary referral hospital, which was intended to help residents develop an awareness of how and where healthcare can be accessed in the area and to establish a sustained relationship with this community. Limitations of this work include the

potential for misclassification and recall bias, as we relied on individuals to retrospectively describe their own health and socioeconomic status as well as their interactions with healthcare services. While we have documented low levels of screening activities and associations with income and education, we did not directly require individuals to state specifically their personal reasons for not being screened; we were therefore unable to delineate specific barriers to cancer screening, such as emotional barriers (eg, concern about cancer diagnosis and limited awareness) and barriers to access (eg, screening locations, availability of transportation and limited finances). Detailed qualitative analysis of these barriers would be worthwhile and is the subject of our future work in the region. In addition, while the study sample was chosen at random and consecutive individuals were enrolled, the survey was conducted at a single time that was midweek, during the day; this timing may have affected our sample composition. For instance, 75% of participants in our study were women, which may potentially limit the generalisability of our findings. However, it is reassuring we observed overall consistency with national demographical indicators (eg, income, education and living conditions), which indicates that our sample is likely reflective of rural community-dwelling individuals in the wider region.[31 32]

In summary, our results highlight infrequent cancer screening activities in a Nigerian community population and identify areas that can be targeted to address this, including the use of measures focused at primary healthcare level, financial risk protection, awareness and strategic resource allocation.

Author affiliations
[1]Surgery, Memorial Sloan Kettering Cancer Center, New York, New York, USA
[2]Surgery, Obafemi Awolowo University Teaching Hospitals Complex, Ile-Ife, Osun State, Nigeria
[3]Epidemiology and Biostatistics, Memorial Sloan Kettering Cancer Center, New York, New York, USA
[4]Surgery, Obafemi Awolowo University Teaching Hospital Complex, Ile-Ife, Osun State, Nigeria

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ORCID iD
Avinash Sharma http://orcid.org/0000-0003-3501-5432

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