Research Article

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http://www.imedpub.com

Translational Biomedicine
ISSN 2172-0479

2016
Vol. 7 No. 3: 77

DOI: 10.21767/2172-0479.100077

Raising Awareness about Tuberculosis among Women Living in Rural Communities on the Atlantic Coastline of Nigeria

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Citation: Afolabi BM, Ezedinachi ENU, Okon BI, et al. Raising Awareness about Tuberculosis among Women Living in Rural Communities on the Atlantic Coastline of Nigeria. Transl Biomed. 2016, 7:3.

Abstract

Background: The disease Tuberculosis (TB) is a contagious illness which is rampant in Nigeria.

Setting: The rural coastline of Atlantic Ocean in Lagos State, Nigeria.

Respondents: Women of child-bearing age (WCBA), 15-49 years' old.

Intervention: A prospective, questionnaire-based study to evaluate perception of TB in a coastal geographical setting.

Main outcome measures: Moderately low awareness of TB among WCBA on the coastal area of Lagos. Considerable proportion of women had not heard of TB and a high proportion did not know its cause and did not know how someone may contact the disease.

Results: A total of 818 women of child-bearing age were involved in the study. About half of them were 25-34 years old while majority were married, of the Yoruba ethnicity and traders. Among the respondents, 330 (40.3%) have never heard of the disease known as tuberculosis, especially those aged 25-34 years (172, 52.1%), married (259, 78.5%) and those who had achieved senior secondary level of education (192, 58.2%). Only 56 (6.8%) of the participants, mostly those aged 15-24 years (45, 80.4%) and those with senior secondary education (25, 46.3%), correctly identified bacteria and germs as the cause of TB. About half (400, 48.9%) of the respondents did not know that TB could be contacted from person-to-person while 466 (57%) were unaware that it could be contacted through the air when a person with tuberculosis coughs. Approximately 35%, 19% and 16% of the respondents agreed that coughing up blood, weight loss and chest pain are signs and symptoms of TB. In all, about 70% of respondents regarded orthodox medical treatment as the best "treatment option" for tuberculosis although only 51% regarded the disease as treatable while 47% did not know whether it is treatable or not. Common sources of information of TB were health facilities (27%), friends and colleagues (17%) as well as schools and educational institutions (13%). Regression analysis showed that educational level and age group explained a significant 85.0% of the variation in the perception of TB (r^2=0.850, P-value<0.005) and also that age group was significantly (r=0.40, t=30.53, P-value<0.005, 95% CI=0.38, 0.43) correlated with awareness of TB.

Conclusion: The study has demonstrated that awareness of tuberculosis as a disease is relatively low among women living on the geographical coastline of Atlantic Ocean in Lagos, Nigeria. There was also some misinformation about this disease that needs urgent attention and correction. Data from this study may also be used to design penetrating health education on tuberculosis in rural coastal and non-coastal areas.

Recommendations: Appropriate authorities and agencies should strengthen or develop effective surveillance system in which cases can be quickly identified.

There should also be a spread out of DOTS to riverine and coastal areas. A continuous educational program for rural dwellers on infectious diseases and how to control them is desirable. Secondary schools' curriculum should include further education on how to recognize, and report infectious diseases such as TB.

Keywords: Tuberculosis; Contagious; Women; Coastal; Nigeria

Received: April 29, 2016; **Accepted:** June 27, 2016; **Published:** June 30, 2016

Abbreviations

ACSM: Advocacy Communication and Social Mobilization; AIDS: Acquired Immune Deficiency Syndrome; DALY: Disability Adjusted Life Year; DOTS: Directly Observed Treatment Short-course; CI: Confidence Interval; HIV: Human Immunodeficiency Virus; LLINs: Long Lasting Insecticide-treated Nets; MDCD: Mobile Data Capturing Device; NPC: National Population Control; NTLCP: National Tuberculosis and Leprosy Control Programme; OR: Odds Ratio; SDG: Sustainable Development Goals; Std. Err: Standard Error; STEP-B: Science and Technology Education Post-Basic; SDG: Sustainable Development Goals; sSA: sub-Saharan Africa; SUFI: Scale-up-for-impact; WCBA: Women of Child-Bearing Age; WHO: World Health Organization

Introduction

For over 4000 years, tuberculosis (TB) has been affecting mankind (http://www.umdnj.edu/~ntbcweb/history.htm). Also known as consumption, wasting disease, and the white plague (https://www.dshs.state.tx.us/idcu/disease/tb/history/), the disease is a major global health problem that causes ill-health among millions of people each year and ranks alongside the human immune-deficiency virus (HIV) as a leading cause of death worldwide. This multi-systemic disease, with myriad presentations and manifestations, is still a major disease burden and a major cause of illness and death globally [1]. Tuberculosis ranks highest as a most common cause of microbial infectious disease–related mortality worldwide. In 2004, approximately 9 million people around the world developed TB for the first time, and nearly 2 million people died with or from the disease [2].

The World Health Organization (WHO) has published a global TB report every year since 1997. The main aim of these reports is to provide a comprehensive and up-to-date assessment of the TB epidemic and progress in prevention, diagnosis and treatment of the disease at global, regional and country levels, in the context of recommended global TB strategies and targets endorsed by WHO's Member States. Although TB rates are decreasing in the US, the disease is becoming more common in many parts of the world. In addition, the prevalence of drug-resistant TB is increasing worldwide. WHO declared TB a global emergency in 1993 and it remains one of the world's major causes of illness and death. Globally, TB is currently responsible for more years of healthy life lost (2.5 percent of all disability-adjusted life years, or DALYs) than any other infectious disease, bar AIDS and malaria [3-5]. Only AIDS is responsible for more deaths. The full cost of the worldwide TB epidemic is rarely appreciated. The direct monetary costs of diagnosis and treatment are borne by health services and by patients and their families. Added to these are the indirect costs of lost income and production, incurred when TB patients are too sick to work and when young adults-often parents and householders-die prematurely [6]. Beyond these losses, baldly expressed in DALYs and dollars, enormous psychological and social costs are associated with TB. These extra costs are less easily quantified, but they are nonetheless real.

A decade ago the problem of TB in Africa attracted little attention, not even meriting a chapter in the first edition of Disease and Mortality in sub-Saharan Africa (sSA). Part of the reason was that TB incidence was low and falling in most parts of the continent [7]. The burden of TB in Sub-Saharan Africa is far greater today. Continuing poverty and political instability in parts of the continent has inhibited progress in implementing effective TB control measures. But the principal reason for the resurgence of TB in Africa is not the deterioration of control programs. Rather, it is the link between TB and the human immunodeficiency virus and the acquired immune deficiency syndrome (HIV/AIDS). People who are latently infected with Mycobacterium tuberculosis-about one-third of the inhabitants of Sub-Saharan Africa (2)-are at hugely greater risk of developing active TB if they are also immunologically weakened by a concurrent HIV infection. HIV-positive people are also more likely to develop TB when newly infected or re-infected with M. tuberculosis. Over the past decade, the TB caseload has increased by a factor of five or more in those countries of eastern and southern Africa that are most affected by HIV [8]. Incidence rates in these countries are now comparable with those recorded in Europe half a century ago, before the introduction of anti-tuberculosis drugs.

The unprecedented growth of the tuberculosis epidemic in Africa is attributable to several factors, the most important being the HIV epidemic. Although HIV is Africa's leading cause of death, tuberculosis is the most common coexisting condition in people who die from AIDS. Autopsy studies show that 30%-40% of HIV-infected adults die from tuberculosis [9]. Among HIV-infected children, tuberculosis accounts for up to one in five of all deaths [10].

Nigeria is ranked 4th among the 22 worst TB-affected countries in the world and the 1st in Africa. In Nigeria, Lagos state carries 8.4% of Nigeria's TB burden and consistently has been responsible for about 11% of the cases of TB registered in Nigeria. Ending the TB epidemic by 2030 is among the health targets of the newly adopted Sustainable Development Goals. WHO has gone one step further and set a 2035 target of about 100% decline in incidence and deaths due to TB-similar to current levels in low TB incidence countries today. The Strategy outlines 3 strategic pillars that need to be put in place to effectively end the epidemic:

- Pillar 1: integrated patient-centered care and prevention
- Pillar 2: bold policies and supportive systems
- Pillar 3: intensified research and innovation.

The National Tuberculosis and Leprosy Control Programme (NTBLCP) stresses the need for evaluation of the most effective strategies for scaling up TB treatment, including directly observed treatment short-course (DOTS) implementation through community-based programs [11]. The purpose of this evaluation is to scale-up-for-impact (SUFI) the overall management of TB cases taking into consideration effective implementation of directly observed treatment short-course (DOTS).

There is scarcity of data on awareness of tuberculosis, especially among women living along the Atlantic coastline of Lagos Nigeria. This geographical area is densely populated with little attention to health, shortage of health facilities and associated high morbidity and mortality pattern. The objective of our study therefore was to determine the awareness of TB among women in child-bearing age group living in rural Atlantic Ocean coastline of Lagos.

Philosophy

Women are quick to learn and assimilate ideas that can protect their children and family from danger. Women are also able to easily impact knowledge to their children and to other women at various places of work, neighborhood, community, congregational assemblies, markets and salons. Also, participants at congregations, assemblies and markets where TB can be easily transmitted are mostly women. Therefore, finding out the extent of knowledge as a first step to raising awareness of women on infectious disease such as TB is appropriate in the effort to prevent and control tuberculosis and other infectious diseases in Africa.

Materials and Methods

This population-based cross-sectional study on rural community awareness of TB used semi-structured, open and close-ended questionnaire to elicit responses from women in various child-bearing age groups living on the coastline of Atlantic Ocean in Lagos, Nigeria during the period of October 2012 and March 2013. It compared these data among different age groups, marital status, educational levels and parity. Literature search revealed no such study has been conducted in this geographical location of the country and extremely few in other similar locations in sub-Saharan Africa.

Study population

The study population, study site, study design and data collection methods have been described elsewhere [12]. Briefly, definition of the study population meant the homogenous group of people co-existing for a minimum of 10 years at Elegushi Community in Ibeju-Lekki Local Government Area and Ijede Community at Ikorodu Local Government Area of Lagos State, Nigeria. There was a high literacy rate of 88.4% in Lagos State and 91.6% among those aged 15-49 [13]. Although the 2006 population of Ibeju-Lekki and of Ikorodu LGAs were recorded as 99,540 and 689,045 respectively [14], by 2013 when this study took place, there has been an increase in the population due to natural annual increase and rural-urban drift. The approximate population of Elegushi community and that of Ijede were 30,350 and 88,000 respectively. Each of these two communities has been further subdivided into wards and further still into different families living in either rented or owned houses. The population was mostly traders with some who were government workers and farmers.

Study sites

Ikorodu, located at approximately 30 km from metropolitan Lagos, is a semi-urban town sited close to the Bight of Benin of Atlantic Ocean. It is separated from Ibeju-Lekki LGA by a large body of inland water, the Lagos Lagoon. Ikorodu shares its northern boundary with Ogun State and its eastern and western borders with Epe and Kosofe Local Government Areas respectively. It is a traditional settlement of the Aworis, a sub-group of the Yorubas. A newly-built 10-lane expressway links metropolitan Lagos to Ikorodu thus enlarging its population. There are thermal stations, mini port, and institutions of higher learning at Ikorodu. Ibeju-Lekki sits next to the Atlantic Ocean. It is more of a resort center with sea-side hotels and tourist center. The climate is generally coastal though the raining and dry seasons follow their regular pattern. Luscious and verdant vegetation surround these communities that have minimal air pollution. Houses are made of bricks, roads are mostly tarred and the communities have private and public school and hospital systems. Most houses are connected to electricity grid though electricity is not regular. Housing and sewage systems however need improvement. The State government conducts regular In-door residual spraying and occasionally gives free long-lasting insecticidal nets (LLINs) and free malaria treatment to indigenes.

Study design

The target population was women in different stages of childbearing age residing in these communities. It is estimated that 25% of the population in these communities were women of childbearing age (WCBA). Measured independent variables in the study were marital status, highest level of education, religion, and ethnic group. The dependent variable was perception of TB and perception was assessed by asking what the respondents regarded as the cause, signs and symptoms of and best treatment option for tuberculosis. Epi Info 7 was used to calculate the sample size for the projected WCBA population of each site of study, using 30% as an expected frequency of correct perception of tuberculosis in each of the communities, a confidence limit of 5%, and confidence level set at 95%. The calculated sample size was 641 (319 for Ibeju-Lekki and 322 for Ikorodu). For contingencies, especially the considerations of attrition, nonresponse, and increase in representativeness, the sample size was inflated by 30%, bringing it to 833 and rounding the figures to 845.: In all, 818 (96.8%) respondents participated. Majority (21/27, 77.8%) of those who did not participate had traveled out when the study started. Data of the remaining 6 were inconclusive and therefore excluded from further analysis. Systematic random sampling was used, in which the starting point was the first house on a popular street in a particular direction and then every fourth house was selected for the study. If a selected house did not have any WCBA, then the next house was visited to replace it for a respondent. All the WCBA (15-49 years) who agreed to participate were interviewed. Only women aged between 15 and 49 years, resident within the communities of study and not just visiting, of sound mind and not mentally compromised were included in the study. Those excluded were women hospitalized for any reason, those moribund, visitors and tourists, Caucasians and commercial sex workers.

Mobile data capturing device

Questionnaires were electronically prepared in a mobile data capturing device (MDCD). The electronic questionnaire was divided into six parts, consisting of administrative information; demographic information; knowledge of HIV/tuberculosis/malaria; contraceptive use; self-assessment of individual health; and, in the last part of the electronic questionnaire, the reports of testing for hemoglobin concentration, malaria parasitemia, and HIV. It took roughly 45 minutes to complete a questionnaire in a face-to-face interview at household level. Six field workers were trained in administering the electronic questionnaire. Once data were captured, the questionnaires were electronically sent to a central location where they were automatically recorded in an Excel spreadsheet.

Statistical analysis

The information was collected using a pretested semi-structured questionnaire. The collected data were analyzed using STATA 13. Frequency tables were used for categorical variables. Cross-tabulations and *chi-square* tests were used for appropriate variables. Multivariate regression analysis was applied to assess various degrees of correlation. P-value was set at <0.05.

Ethical considerations

Ethical considerations included taking verbal informed consent from all the participants. The confidentiality of the data was ensured and clearance was obtained from the State Government ethics committee. The survey was anonymous in order to preserve the privacy of study subjects.

Definitions

Respondents were divided into five age groups in years-about 15, 15-24, 25-34, 35-45 and ≥45. Marital status was defined as "single" if the participant had never had a conjugal relationship, "married" if there had been or still was a conjugal relationship, divorced if respondent was no longer living with her spouse as "wife" and widowed if her spouse has died. Educational level meant the stage of education where each respondent was or stopped at the time of the study. Parity meant the number of times the respondent has delivered a baby.

Findings

Table 1 presents the socio-demographic characteristics of the respondents in the study, who were only females, majority (405, 49.5%) of whom were aged between 25-34 years. In all, 633 (77.4%) were married, 158 (19.3%) single, 23 (2.8%) were divorced and only 4 (0.5%) were widowed. Most (342, 41.8%) of them had between 1-2 children and only 9 (1.1%) had more than six children. The Table also shows that a high proportion (457, 55.9%) of the women attained senior secondary education while very few attained post-graduate (3, 0.4%) or graduate (50, 6.1%) degrees. The dominant (664, 81.2%) ethnic group was the Yorubas and trading was the prevailing (472, 57.7%) occupation of the respondents.

A considerable proportion (330, 40.3%) of the respondents have never heard of tuberculosis, especially those aged 25-34 (172, 52.1%), married women (259, (78.5%) as well as those who had attained secondary education (192, 58.3%) (**Table 2**). Be that as it may, all were asked about the possible or perceived causes of tuberculosis for which very few (56, 6.8%) responded correctly (**Table 3**). Some attributed the cause of tuberculosis to cigarette smoking (166, 20.3%), to dust (192, 23.5%), witchcraft (13, 1.5%) and "others" (391, 47.8%). These responses were also stratified according to age group and other variables. We then probed further on what the respondents meant by "others" as their perceived causes of tuberculosis. Their responses were tabulated in **Table 4** indicating that a very high proportion of the respondents (365, 93.4%) did not know about the cause of tuberculosis. Other perceived but wrong responses were dry season (1, 0.26%), too much sweet food (1, 0.26%), malaria (1, 0.26%) and kissing and drinking cold water (1, 0.26%). One woman responded that refusal of immunization was a cause of tuberculosis.

Table 5 shows the responses of the study participants on how a person may contact TB. Interestingly, majority (795, 97.2%) of respondents were of the opinion that tuberculosis could be

Variable	Item	Frequency	%
Age group	About 15	10	1.2
	15-24	236	28.9
	25-34	405	49.5
	35-44	157	19.2
	≥45	10	1.2
Parity	0	177	21.6
	1-2	342	41.8
	3-4	231	28.2
	5-6	59	7.2
	>6	9	1.1
Marital status	Single	158	19.3
	Married	633	77.4
	Divorced	23	2.8
	Widowed	4	0.5
Highest level of Education	No formal education	45	5.5
	Primary	129	15.8
	Junior Secondary	81	9.9
	Senior Secondary	457	55.9
	Diploma	30	3.7
	Graduate	50	6.1
	Post-graduate	3	0.4
	Others	23	2.8
Religious faith	Christianity	471	57.6
	Islam	343	41.9
	Traditional	4	0.5
Ethnic background	Yoruba	664	81.2
	Ibo	70	8.6
	Hausa	2	0.2
	Others	82	10.0
Occupation	Trader	472	57.7
	Civil servant	19	2.3
	Farmer	3	0.4
	Student	91	11.1
	Unemployed	42	5.1
	Others	191	23.4

Table 1 Socio-demographic characteristics of 818 respondents.

Variable	Item	Have heard about tuberculosis				Total	%
		Yes	%	No	%		
Age group (years)	All	488	59.7	330	40.3	818	100.0
	About 15	7	1.4	3	0.9	10	1.2
	15-24	152	31.2	84	25.5	236	28.9
	25-34	233	47.7	172	52.1	405	49.5
	35-44	95	19.5	62	18.8	157	19.2
	≥45	1	0.2	9	2.7	10	1.2
Marital status	Single	99	20.3	59	17.9	158	19.3
	Married	374	76.6	259	78.5	633	77.4
	Divorced	11	2.3	12	3.6	23	2.8
	Widowed	4	0.8	0	0.0	4	0.5
Level of Education	No formal education	25	5.1	20	6.1	45	5.5
	Elementary	67	13.7	62	18.8	129	15.8
	Junior Secondary	48	9.8	33	10.0	81	9.9
	Senior Secondary	265	54.3	192	58.2	457	55.9
	Diploma	24	4.9	6	1.8	30	3.7
	Graduate	40	8.2	10	3.0	50	6.1
	Post-graduate	3	0.6	0	0.0	3	0.4
	Others	16	3.3	7	2.1	23	2.8

Table 2 Frequency distribution of those who have heard about Tuberculosis according to age, marital status and level of education.

Variable	Item	Causes of Tuberculosis					Total
		Cigarette	Dust	Bacteria/Germs	Witchcraft	Others	
	All	**166 (20.3)**	**192 (23.5)**	**56 (6.8)**	**13 (1.6)**	**391 (47.8)**	**818 (100.0)**
Age group (years)	About 15	1 (0.6)	3 (1.6)	1 (1.8)	0 (0.0)	5 (1.3)	10 (1.2)
	15-24	58 (34.9)	44 (22.9)	18 (32.1)	1 (7.7)	115 (29.4)	236 (28.9)
	25-34	79 (47.6)	108 (56.3)	27 (48.2)	5 (38.5)	186 (47.6)	405 (49.5)
	35-44	28 (16.9)	36 (18.7)	9 (16.1)	6 (46.2)	78 (20.0)	157 (19.2)
	≥45	0 (0.0)	1 (0.5)	1 (1.8)	1 (7.7)	7 (1.8)	10 (1.2)
Marital status	Single	40 (24.1)	32 (16.7)	17 (30.4)	1 (7.7)	68 (17.4)	158 (19.3)
	Married	121 (72.9)	152 (83.5)	39 (69.6)	12 (92.3)	309 (79.0)	633 (77.4)
	Divorced	4 (2.4)	7 (3.6)	0 (0.0)	0 (0.0)	12 (3.1)	23 (2.8)
	Widowed	1 (0.6)	1 (0.5)	0 (0.0)	0 (0.0)	2 (0.5)	4 (0.5)
Level of Education	No formal Education	5 (3.0)	7 (3.7)	6 (11.1)	1 (7.7)	26 (6.7)	45 (5.5)
	Elementary	29 (17.6)	25 (13.0)	5 (9.3)	3 (23.1)	67 (17.1)	129 (15.8)
	Junior Secondary	18 (10.9)	25 (13.0)	4 (7.4)	1 (7.7)	31 (7.9)	79 (9.7)
	Senior Secondary	82 (49.7)	108 (56.3)	25 (46.3)	6 (46.2)	235 (60.1)	456 (55.7)
	Diploma	6 (3.6)	8 (4.2)	3 (5.7)	1 (7.7)	12 (3.1)	30 (3.7)
	Graduate	18 (10.9)	16 (8.3)	6 (11.1)	1 (7.7)	9 (2.3)	50 (6.1)
	Post-graduate	0 (0.0)	0 (0.0)	1 (1.9)	0 (0.0)	2 (0.5)	3 (0.4)
	Others	7 (4.2)	3 (1.6)	4 (7.4)	3 (0.0)	9 (2.3)	26 (3.2)

Table 3 Perceived causes of tuberculosis according to age group, marital status and educational level of residents in coastal communities.

contacted through handshake while a lesser proportion (352, 43.0%) agreed that it could be contacted through the air when a person with tuberculosis coughs. Interestingly, a woman thought that tuberculosis could be contacted through having sex and another responded that it could be contacted through kissing.

Figure 1 depicts perceived signs and symptoms of TB in the community to which respondents agreed that coughing up blood (34.5%), weight loss (18.7%), chest pain (16.1%) and shortness of breath (14.7%) were some of its manifestations. **Figure 2** illustrates perceived best treatment of TB for which majority (70.4%) of respondents agreed that orthodox treatment is the best option. A very low proportion of respondents recommended traditional treatment (5.4%) or prayer house (0.6%). Still, 23.6% of respondents did not know the best treatment for TB. On whether TB "is or is not a treatable disease," 51% of the respondents agreed that it is a treatable disease, only 2% did not agree that it is a treatable disease and 47% did not know whether it is treatable or not (**Figure 3**). In the same vein, **Figure 4** indicates that 49% of the respondents agreed that a person with tuberculosis must be admitted into a hospital while only 4% disagreed, and 47% were not sure whether such a patient should be admitted into a hospital or not.

Health facilities were the sources from where about a quarter (223, 27.4%) of the respondents got information on TB (**Figure 5**).

Variable	Item	Specified "other" causes of Tuberculosis									Total
		Dry season	Too much sweet food	Don't know	Malaria	Catarrh	Eating too much corn and coconut	Refusal of immunization	Not applicable	Kissing and drinking cold water	
	All	1 (0.26)	2 (0.5)	365 (93.4)	1 (0.26)	1 (0.26)	1 (0.26)	1 (0.26)	12 (3.1)	1 (0.25)	391
Age group (years)	About 15	0 (0.0)	0 (0.0)	5 (1.30)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	5 (1.23)
	15-24	0 (0.0)	2 (100.0)	105 (28.8)	0 (0.0)	1 (100.0)	1 (100.0)	0 (0.0)	3 (25.0)	0 (0.0)	112 (28.6)
	25-34	1 (100.0)	0 (0.0)	174 (47.7)	1 (100.0)	0 (0.0)	0 (0.0)	0 (0.0)	7 (58.3)	1 (100.0)	184 (47.1)
	35-44	0 (0.0)	0 (0.0)	75 (19.5	0 (0.0)	0 (0.0)	0 (0.0)	1 (100.0)	2 (16.7)	0 (0.0)	78 (19.26)
	≥45	0 (0.0)	0 (0.0)	6 (1.6)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6 (1.48)
Marital status	Single	0 (0.0)	1 (50.0)	67 (17.4)	0 (0.0)	1 (100.0)	1 (100.0)	0 (0.0)	3 25.0)	0 (0.0)	73 (18.02)
	Married	1 (100.0)	1 (50.0)	305 (79.2)	1 (100.0)	0 (0.0)	0 (0.0)	1 (100.0)	8 (66.7)	1 (100.0)	318 (78.52)
	Divorced	0 (0.0)	0 (0.0)	11 (2.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (8.3)	0 (0.0)	12 (2.96)
	Widowed	0 (0.0)	0 (0.0)	2 (0.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.49)
Level of Education	No formal education	0 (0.0)	0 (0.0)	24 (6.2)	0 (0.0)	0 (0.0)	1 (100.0)	0 (0.0)	1 (8.3)	0 (0.0)	26 (6.4)
	Elementary	1 (100.0)	1 (50.0)	67 (17.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	69 (17.0)
	Junior Secondary	0 (0.0)	0 (0.0)	26 (6.8)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6 (50.0)	0 (0.0)	32 (7.9)
	Senior Secondary	0 (0.0)	0 (0.0)	233 (60.5)	1 (100.0)	1 (100.0)	0 (0.0)	1 (100.0)	5 (41.7)	1 (100.0)	242 59.8)
	Diploma	0 (0.0)	0 (0.0)	14 (3.4)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	14 (3.5)
	Graduate	0 (0.0)	1 (50.0)	8 (2.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	9 (2.2)
	Post-graduate	0 (0.0)	0 (0.0)	2 (0.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (0.5)
	Others	0 (0.0)	0 (0.0)	11 (2.9)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	11 (2.7)

Table 4 Specified "other" causes of tuberculosis by age group, marital status and level of education.

Response	Knowledge of how one contacts tuberculosis					
	Yes		No		Don't know	
	Freq.	%	Freq.	%	Freq.	%
From person to person	388	47.4	30	3.7	400	48.9
Through handshake	795	97.2	23	2.8	0	0.0
Through the air when a person with tuberculosis coughs	352	43.0	466	57.0	0	0.0
By sharing dishes/cutlery	100	12.2	718	87.8	0	0.0
By eating from the same plate	110	13.4	708	86.6	0	0.0
Touching item	54	6.6	764	93.4	0	0.0
Through having sex	1	0.1	817	99.9	0	0.0
By smoking	1	0.1	817	99.9	0	0.0
Through kissing	1	0.1	817	99.9	0	0.0

Table 5 Responses on how someone may contact tuberculosis.

They also got information on TB from others (220, 27.0%), friends and colleagues (136, 16.7%), schools or educational institutions (103, 12.6%), television and radio (85, 10.4%) and much less from family members (38 (4.7%). The respondents received virtually little or no information about TB from church or mosque (2, 0.25%) or from books, newspapers and magazines (2, 0.25%).

Multivariate regression analysis (**Table 6**) showed a significant correlation between awareness of TB as dependent variable and both educational level and age group as independent variables (coef. =0.06, t=4.57, P-value<0.005, 95% CI: 0.03, 0.09) accounting for a significant 84.9% of the variation in awareness of TB (r^2=0.849, P-value<0.005). There were also significant correlations between age group (r=0.40, t=30.53, P-value<0.005, 95% CI: 0.38, 0.43) and educational level (r=0.06, t=4.57, P-value<0.005, 95% CI: 0.03, 0.09) in respect of awareness of TB (**Table 7**).

Discussion

Tuberculosis, a top contagious killer disease globally and also a leading killer of HIV-positive individuals, occurs in every part of the world, especially in Africa, the continent that carries the most severe burden, with 281 cases per 100,000 population in 2014 in comparison with global average of 133 [15]. Our study

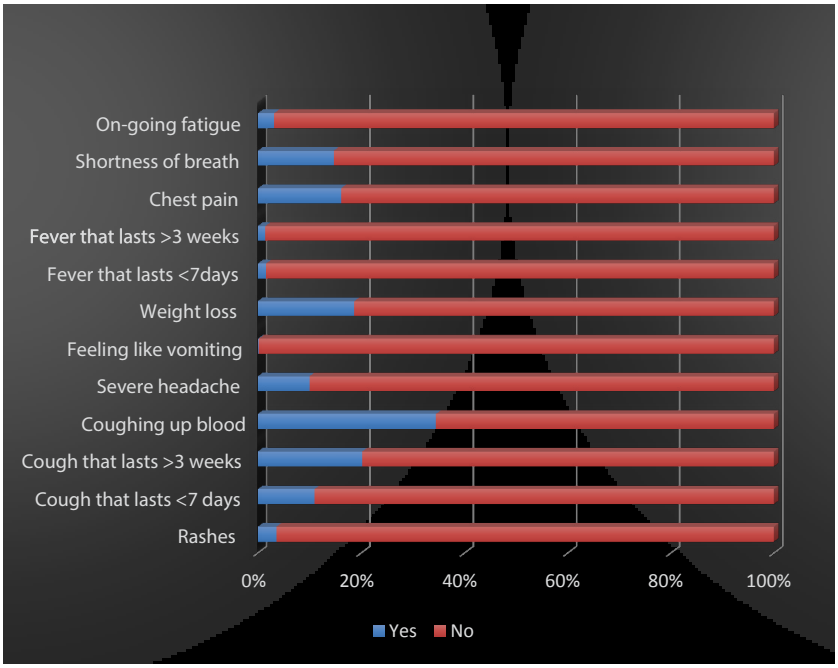

Figure 1 Perceived signs and symptoms of tuberculosis in the community.

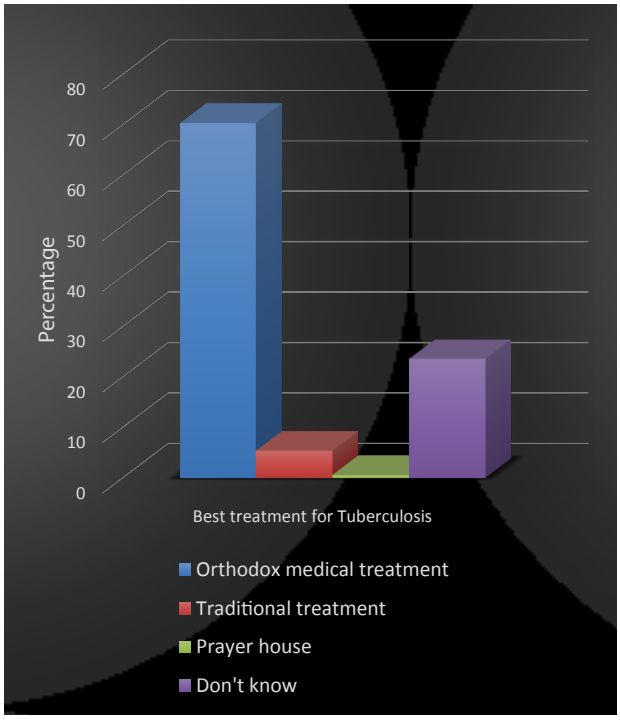

Figure 2 Perceived best treatment option for tuberculosis.

found that, among women living in coastal communities of Lagos, Nigeria, awareness of tuberculosis was very low and strongly associated with age group and level of education. According to WHO [16], TB case reports are typically male-biased, but in several African countries with high rates of HIV infection, the majority of notified TB cases are now women. Dr. Kochi [17] of WHO adopted, as a global policy package, some key components of successful TB programme, which, in summary are as follows: i) political commitment, ii) case finding by sputum microscopy, iii) use of short course chemotherapy under supervision, iv) a secured supply of anti-TB drugs, and v) a standardized recording, reporting and monitoring system [18]. From the perspective of this study, raising public awareness of tuberculosis should be an integral component of a successful TB programme. The reason

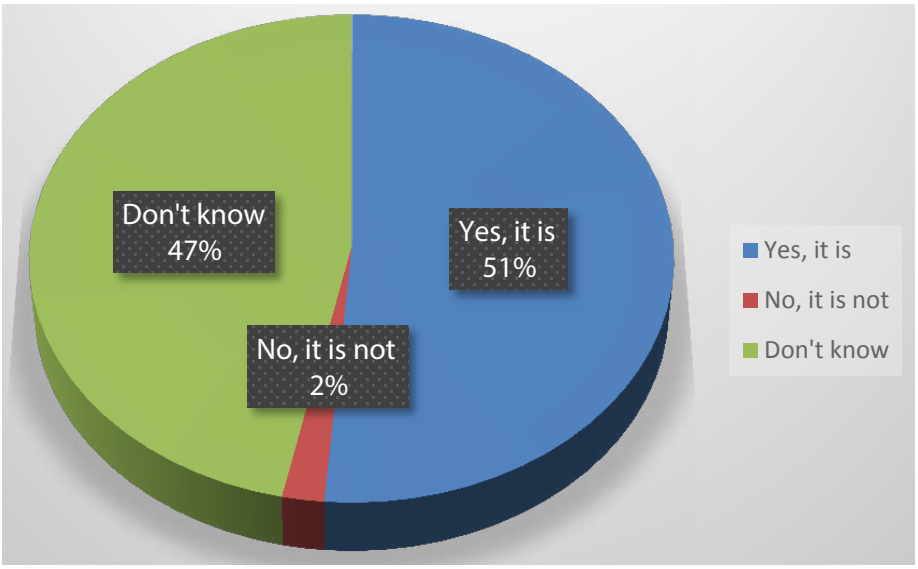

Figure 3 Participants' responses on if tuberculosis is or is not a treatable disease.

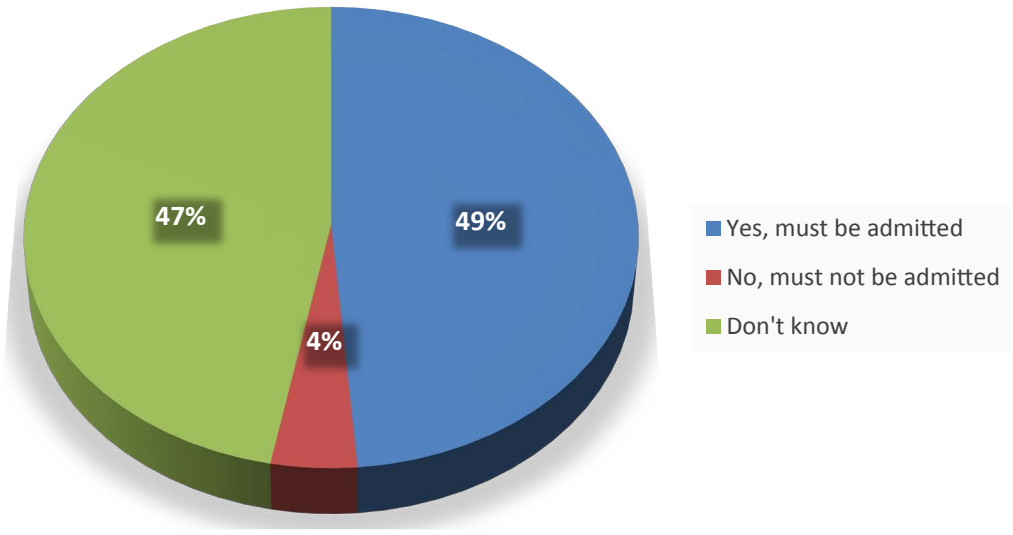

Figure 4 Knowledge of whether person with tuberculosis must or must not be admitted into a hospital.

behind this suggestion is that the ability of African health care systems to respond to, manage, and contain the growing number of cases of tuberculosis is constrained by limitations of funding, facilities, personnel, drug supplies, and laboratory capacity [19].

Various studies have been undertaken in various countries to have a good understanding of the knowledge, attitude, practices and perception of communities regarding tuberculosis [20,21]. An important aspect of our results indicate that a sizable proportion of the rural coastal community have information about tuberculosis though this proportion is smaller compared to the results from other parts of the world [22,23]. Similar to other study in the eastern Nigeria [24], the age group mostly represented was 25-34 years although there was a disparity in the marital status, our study having more married women than theirs. In addition, while the dominant ethic group in our study was the Yorubas in the west, the dominant ethnic group in the above study was the Ibos in the east of the country and it would be very interesting to know the differences in awareness of tuberculosis in these two ethnic groups. In general, knowledge about TB was much higher, over 90% in eastern Nigeria [24], India [25] and in Ethiopia [26-28] respectively than the almost 60% reported in our study. This disparity may be attributable to intensive screening for TB in patients referred to free government health clinics, chest clinics and DOTS centers as well as distance to DOTS center. The geographical remoteness of our study community may be a limiting factor for their poor awareness of TB. The location of DOTS and diagnostic centers are very far away from many coastal communities and hardly are there any public workshops, seminars and public lectures on TB organized by the Local Governments or covered in electronic and print media.

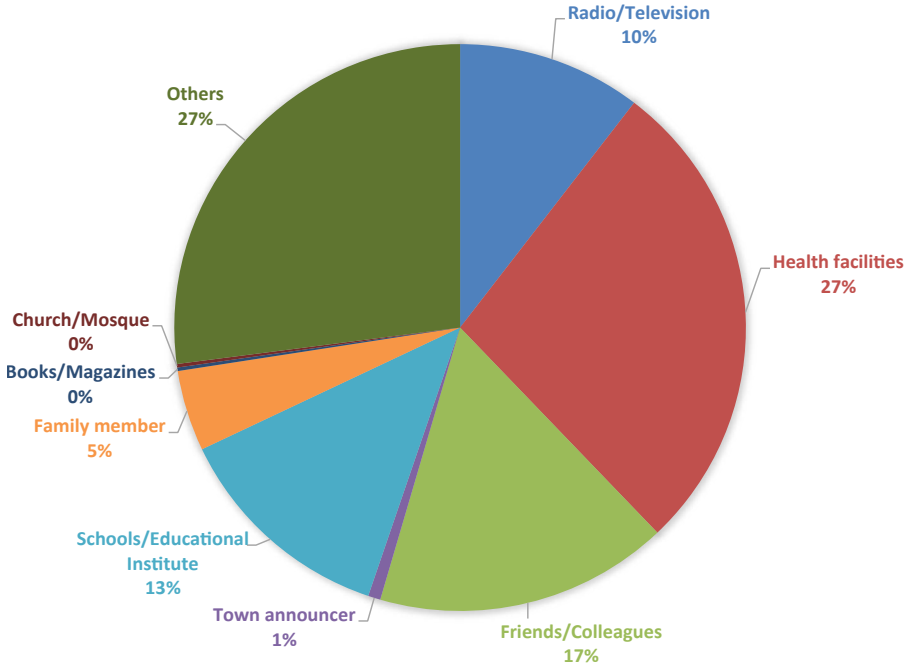

Figure 5 Sources of information on TB.

Equation	Observed	RMSE	R^2	F	P-value
Age group	818	0.577	0.850	2305.001	<0.005
Educational level					

Table 6 Multivariate regression showing association between awareness of TB, age group and educational level of rural coastal women.

	Correlation Coefficient (r)	Standard error	t	P-value	95% Confidence Interval	
Age Group	0.40	0.013	30.53	<0.005	0.378, 0.430	
Educational level	0.06	0.013	4.57	<0.005	0.034, 0.085	

Table 7 Correlation coefficient outcomes between awareness of TB as dependent variable and other independent variables.

Despite almost 60% awareness, the proportion of respondents that knew that bacteria/germ is the cause of TB was very low (6.8%) which accords with earlier studies in Africa [26,28-31], and Pakistan [32]. Among those who responded that they knew the cause of TB, 20.3% said it was due to smoking cigarette, 23.5% mentioned that it was caused by inhaling dust and 1.3% stated witchcraft, result at variance to what was reported from the study in eastern Nigeria (24). Most (93.4%) of those who mentioned "other" as the cause of tuberculosis in our study actually did not know its cause, which agrees with the findings in other studies [24,27,33]. Only 27% of information on TB are sourced from Health Facilities, therefore, it is quite uncertain if lectures and health talks of the disease are freely given to patients at primary health care centers. Of the 818 respondents in our study, only 6.8% mentioned Bacteria/Germs as the causative agent of tuberculosis. This proportion is slightly higher than the 3.3% response to similar question is a study in Gambella Region of Southwestern Ethiopia [33], but lower than the 22.9% response from Somali Regional state still in eastern Ethiopia [27]. The perceived seriousness of TB was assessed by a combination of three factors-treatability (whether it is a treatable disease), best treatment option (perceived best treatment option) and hospital admission (whether a person with TB must be admitted into a hospital). Only about half of the study group were aware that TB is a serious disease judging by the fact that only 51% said that it is a treatable disease and 49% agreed that a person with tuberculosis must be admitted into a hospital. This contrasted sharply with the 71% respondents of another study that considered TB as a serious disease, an important determinant of health care seeking [25]. Considering the other factor of perceived seriousness of TB-best treatment option, 70% of the respondents agreed that orthodox medical treatment "is the best option" for treatment, which does not correspond with the 38% reported from eastern Nigeria [24] but is in accord with what a qualitative study in Belgrade, Serbia reported [34].

Consequent upon the results from our study, respondents agreed that coughing up blood (35%), weight loss (18.7%), cough that lasts for more than three weeks (20.2%), chest pain (16.1%) and shortness of breath (14.7%) are some of the signs and symptoms of TB, findings which are not up to par with what another study reported [27].

Another key finding in our study was that, regarding practices related to prevention and spread of TB, a substantial 48.9% did not know how tuberculosis spreads while cumulatively, 47.4% were aware of spread from person-to-person and 43.0% were aware of

its spread through the air when a person with tuberculosis coughs. Scanty knowledge of tuberculosis stimulates stigmatization [35]. In our study, for instance, 97.2% of the respondents were of the opinion that TB is spread through handshake. However, only 12.2%, 13.4% and 6.6% respectively said that TB could be transmitted by sharing dishes/cutlery, by eating from the same plate with someone with tuberculosis and by touching items that a TB patient previously touched, such as door knobs. Further, only 0.1% thought that TB could be transmitted by having sex, or kissing, which, cumulatively, is similar to the findings of another study [24].

Some studies consider literacy as a key factor deciding the level of awareness [20,36]. For example, multivariate regression analysis conducted on our data showed that both age group and educational level were significantly associated with knowledge and awareness of TB. It is therefore important to focus attention, not only in urban areas but also in rural areas, on educating especially young people by including knowledge of infectious diseases and how to control them, in their school curriculum. Community education should also be organized and implemented not only to raise rural consciousness of tuberculosis but more importantly to achieve prevention, diagnosis, improved treatment adherence and care that positively influence the outcomes of drug-sensitive, drug resistant and HIV-associated TB. In this regard, government at various levels should ensure community mobilization to stimulate effective communication and participation among community members to generate demand for TB prevention, diagnosis, treatment and care services [37,38]. Strong emphasis should also be placed on introducing or strengthening health education in rural health facilities, schools, places of worship, where large number of women congregate, on the various ways by which TB is transmitted and can be prevented. An accurate, effective and penetrating campaign must involve the people at local level, must encompass national leadership, and must utilize appropriate and adequate print and electronic media to get to all people. Such a campaign should have its beginning in the cultural milieu and ambience of the public instead of its imposition by foreign programmes or outside funding agents.

According to WHO [39], ending the TB epidemic by 2030 is among the health targets of the newly adopted Sustainable Development Goals. WHO has gone one step further and has set a 2035 target of 95% reduction in deaths and a 90% decline in TB incidence-similar to current levels in low TB incidence countries today.

Conclusion

This study shows that the rural coastal communities of Lagos, Nigeria are not familiar with TB as only very few women there indicated ever hearing of tuberculosis as a disease. This study revealed a low level of awareness of TB, poor knowledge of the signs and symptoms of the disease and an apparent lack of health seeking behavior in rural coastal communities. For these reasons, appropriate governments, the National Tuberculosis and Leprosy Control Programme, non-government organizations and/or international agencies should concentrate their efforts also in the direction of intensive health education-using advocacy, communication and social mobilization (ACSM)-as a strategy to educate the densely populated and poor rural coastal communities on the causative agent, symptomatology and different modes of transmission of tuberculosis. This approach will further aid the control and prevention of the disease in this geographical location and elsewhere.

Study limitations

A number of study limitations deserve discussion. First, our study population consisted of only females and thus their awareness and perception of TB may be different from those of their male counterparts in the same geographical location. Female awareness of TB may not be adequate to alter policy on the disease control. In addition, majority of the females were married and the view of unmarried could have been left out. Secondly, one ethnic group-the Yorubas dominated the respondents and therefore their view may not be generalizable to the view of other ethnic groups in the country. However, they may be relevant to the sub-group of at-risk indigenous Nigerians who have been understudied and may be especially informative for policies and programme designed to address the spread of TB and its awareness. A third limitation was our reliance on self-reported verbal interview through questionnaire instrument which may have been affected by social desirability and skewed towards personal interest. Fourthly, the study could have benefited more from the inclusion of qualitative method of data gathering, such as Key Informant Interview, Exit Interview and definitely Focus Group Discussion, where triangulation could have strengthened the views, opinions and responses recorded in the questionnaire interviews. An observational study could have been an added advantage to the robustness of the data. We also did not identify any tuberculosis patient or ask questions about medications in regard to the disease. Although we asked questions on HIV, however, these questions were not in relation to TB. Despite these limitations however, our study involved some strengths. First, our attention was on a large number of women who were at risk of coming in contact with TB. We also collected data from respondents on many occasions enabling us to ascertain the verification and validity of what was reported.

Acknowledgement

This study is one of the projects sponsored by the Federal Ministry of Science and Technology Education Post-Basic (STEP-B) of Nigeria, assisted by the World Bank.

Conflict of Interest

Authors have none to declare

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