

A Descriptive Study of the Knowledge-Base of Malaria between the Visually-impaired and the Non-Visually impaired in Two Primary Schools in Lagos, Nigeria; implications for health education

ORIGINAL

Abstract

Background: The study was carried out in two primary schools in Lagos State, Nigeria. One hundred students were from Pacelli School for the Blind and one hundred and sixty-four students were from Onitolo Primary School, a main stream school. The study compared the knowledge base of the two groups on malaria prevention and treatment options. Approval for the study was granted by the Ethics Committee of the Lagos University Teaching Hospital, Nigeria and consent was sought from parents/guardians of the students and from the principals of the two schools.

Method: The instrument of data collection was a close ended questionnaire. The average time it took to fill the questionnaire was twenty minutes. Analysis of categorical variables was done by Chi-Square Analysis.

Results: The respondents from Pacelli School for the Blind were older than the respondents from Onitolo Primary School when matched by class in primary school ($P < 0.05$). The majority of the respondents were Yorubas, 178 (70.5%). In Pacelli School, the number of males that were visually-impaired was more than the number of females ($P < 0.05$).

There was a statistically significant difference on their knowledge base on the cause of malaria ($P < 0.05$). The students from Pacelli School 92 (92%) knew that malaria was caused by mosquitoes and only 75 (45.7%) of the respondents from Onitolo knew that malaria was caused by mosquitoes. The age at which respondents from Pacelli School became visually impaired was not statistically related to the correct knowledge that malaria was caused by mosquito ($P < 0.05$).

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The number of respondents that preferred the parenteral route for treatment of malaria was fewer in Pacelli School than in Onitolo School ($P < 0.05$). A greater number of respondents from Pacelli School did not like to take malaria tablets because the malaria tablets were bitter ($P < 0.05$). The major source of information about malaria from both schools was from their doctors and other health personnel 116 (43.9 %). When the responses from both groups were combined, the least source of information about malaria in both groups was from teacher/school 27 (10.2%).

Two hundred and twenty-seven (85%) of the respondents would choose a doctor as their health-care provider if they had malaria ($P > 0.05$). In Pacelli School, 44 (44%) of the respondents had had malaria in the past twelve months. In Onitolo School, 49 (29.9%) of the respondents had had malaria in the past twelve months. There was no statistically significant difference in the number of times both groups had had malaria in the past twelve months.

Conclusion: There were more visually-impaired males in Pacelli School than females. There was a statistically significant difference on their knowledge base on the cause of malaria. More students from Pacelli School had the correct knowledge on the cause of malaria. The major source of information about malaria from both schools was from their doctors and other health personnel. Teacher/School was the least source of information about malaria when responses from both schools were combined. Health Education on preventable diseases like malaria should be strengthened in both schools. More schools for the visually-impaired should be replicated across the states in Nigeria and more schools for the visually-impaired should be replicated in Lagos State.

Keywords: Malaria; Health Education; Visually-impaired; knowledge base; Pacelli School; Onitolo School; The Blind; Treatment; Prevention; Lagos, Nigeria.

Introduction

Objectives:

1. To determine the socio-demographic pattern of pupils in the school for the visually-impaired and in the main stream school.
2. To determine the knowledge-base on the cause and treatment options for malaria in the visually-impaired group.
3. To determine the knowledge-base on the cause and treatment options for malaria in the non-visually impaired group.

In 2012, ninety percent of deaths due to malaria occurred in Africa [1]. In 2012, there were over 300,000 deaths from malaria [2]. Two thirds of the people that suffer from malaria are from West Africa. A prompt diagnosis and an early treatment continue to be the mainstay of the current approach to malaria control. The World Bank estimates that the Gross Domestic Product of some African countries is reduced by 1.3% due to malaria [3].

In a recent study conducted in the south eastern part of Nigeria to determine the economic burden of malaria, the findings showed that even though the government was providing free malaria treatment to mothers and children in public health facilities, the indirect costs of care and lost pay outweighed the direct costs of treatment of malaria [4]. A separate study conducted in Uganda to determine the economic loss due to malaria showed that the economic burden of malaria reduced the Gross Domestic Product of Ugandans [5].

The correct knowledge on the cause, control and treatment of malaria will reduce the deaths and morbidity due to malaria. Health Education is a level of prevention and is usually cheaper than a curative approach. In order for the preventive approach to be achieved, the knowledge-base of the two study groups must be elicited. The two groups were chosen from the primary school because a primary school is a place of secondary socialization. In addition, health education is part of a school health program and the study would determine their source of

knowledge on malaria. The study helps to identify any deficit if any in the knowledge base of malaria. When a pupil has the correct knowledge on the cause, treatment and cause of malaria, morbidity and mortality will be reduced because s/he would practice a healthy life style. Health education and assessment of handicapped children is a component of a school health service.

Health education program introduced in a school in Kenya improved the health status of the children [6]. A separate study conducted in Central Zambia concluded that health education could improve the health of the school children studied [7]. Many of the school children studied in Central Zambia had hookworm, schistosomiasis and malaria. However, among the three infections identified, the highest incidence was found in malaria [7]. In a school health program in Tanzania, annual malariometric surveys on children showed that plasmodium falciparum accounted for one hundred percent of the infections. Further, the researchers were able to teach the teachers in the school to diagnose and treat malaria in the school children [8]. The study concluded that teachers could play a major role in school health programs if they were supported by health and educational authorities [8]. Another study conducted in the south eastern part of Nigeria showed that as the number of years of formal education increased, the belief that herbal remedies could treat malaria decreased [9].

Materials and Methods

Pacelli School for the blind and partially sighted children

Pacelli School for the Blind and partially sighted children was named after Pope Pius XII who was Eugenio Pacelli. The first set of pupils arrived on the 1st of June, 1961. They were two boys and two girls. There was only one building for the pupils, the office block and the convent for the sisters

managing the school. In June 1962, Pacelli School for the Blind was officially opened. It was built by the Federal Government of Nigeria as a voluntary agency school. It was granted aid by the Federal Ministry of education until 1967 when the Lagos State Government assumed responsibility. It was handed back to the Catholic Mission on the 5th of August 1997. It has boarding facilities. The curriculum is designed to prepare pupils for entry into Secondary Schools. The Pacelli School is entirely funded by charity. It has the capacity to accommodate 100 students. The subjects taught include Religion, English, Mathematics, Science, Creative Arts, Health Education, Social Studies, Home Economics, Music, Physical Education, Mobility Training, Typewriting, Swimming, Braille Reading and Writing. Many of the graduates of the school are married and some have become teachers in the schools.

Onitolo Primary School

Onitolo Primary School was formerly known as Government Demonstration School and was initially established as a Government Teacher Training College. After the creation of Lagos State in 1967, the administration and financing of both the teachers' college and the school was transferred to the State Education Ministry. The population of the school rose to over 2000 in 1976. Onitolo Primary School has always been a day school. The pupils do not pay fees apart from the Parents Teachers Association fees which is an equivalent of ten dollars.

Type of Study

This was a descriptive, cross-sectional study. Pupils from Pacelli school for the Blind and Partially-Sighted, Surulere, Lagos, Nigeria and pupils from a main stream public school, Onitolo Primary School also in Surulere, Lagos were selected as participants in the study. Ethical clearance for the study was given by the Research and Ethics Committee of the Lagos University Teaching Hospital. Consent was

also obtained from the parents/guardians of the pupils. In addition, consent was obtained from the principals of the two schools.

Data Collection

Onitolo Primary School was selected from a comprehensive list of 61 Public main stream primary schools in Surulere Local government area of Lagos State. The school was selected by simple random sampling. Unanswered questions were considered as non-responses.

Inclusion Criteria for the visually-impaired from Pacelli School

1. Any pupil that was visually-impaired and was aged between 6 and 24 years old by their last birthday.

Exclusion Criteria for the visually-impaired from Pacelli School

1. Any pupil that was not between 6 and 24 years old as at their last birthday.
2. Any pupil that had other disabilities affecting any of the other senses.

Inclusion Criteria for the non- visually-impaired from Onitolo Primary School

1. Any pupil that was between 6-24 years as at the last birthday.

Exclusion Criteria for the non- visually-impaired from Onitolo Primary School

1. Any pupil that was not between 6-24 years as at the last birthday.

Ethical Issues

In each of the two schools, the study took two weeks and the students' timetable was slightly disrupted for the period of study.

Instrument of Data Collection

1. Questionnaire

The questionnaire consisted of a total of 22 questions. The questionnaire was divided into five parts consisting of questions covering socio-demographic data, knowledge questions on the cause of malaria, knowledge questions on prevention of malaria,

questions on school absenteeism due to malaria and questions on the route for the treatment of malaria. The Principal Investigator trained the teachers for the non-visually impaired pupils on how to ask the question. The pupils from the school for the visually-impaired were interviewed by their teachers who interviewed them verbally using the structured questionnaire. The Principal Investigator was not allowed to interview the pupils from the school for the visually-impaired.

In Onitolo Primary School, the Principal Investigator interviewed some of the pupils verbally by explaining and reading each question to the respondents in each class.

2. Data Analysis and Interpretation

Data was collected and analyzed for statistical association. Raw data were coded and input into the computer. Errors in the data entry were cleared to remove entry errors. Tests of association analysis and interpretation were conducted by the Principal Investigator and reviewed by a biostatistician. Analysis was done only on the responses. The results were presented as tables. Statistical association using Chi-Square was used to test for association between categorical variables.

Results

The main results are included in the following tables:

Table 1: Socio Demographic Distribution of Respondents.

Number of respondents in each school				
School	Frequency		Percentage	
Pacelli	100		37.9	
Onitolo	164		62.1	
Total	264		100	
Sex of respondents in both schools				
Sex	Pacelli n (%)	Onitolo n (%)	Total n (%)	P Value < 0.05
Female	41(41.0)	92(56.1)	133(50.4)	
Male	59 (59.0)	72(43.9)	131(49.6)	
Total	100	164	264	
Religion of respondents in both schools				
Religion	Pacelli n (%)	Onitolo n (%)	Total n (%)	P Value < 0.05
Christian	78 (78)	92 (56.1)	170 (64.4)	
Muslim	22 (22)	72 (43.9)	94 (35.6)	
Total	100	164	264	
Ethnic distribution of respondents in both schools				
Ethnic Group	Pacelli n (%)	Onitolo n (%)	Total n (%)	P Value < 0.05
Yoruba	62 (62)	124 (75.6)	186 (70.5)	
Hausa	1 (1)	6 (3.7)	7 (2.7)	
Igbo	19 (19)	17 (10.4)	36 (13.6)	
Others	18 (18)	17 (10.4)	35 (13.3)	
Total	100	164	264	
Age distribution of respondents in both schools				
Age (in Years)	Pacelli n (%)	Onitolo n (%)	Total n (%)	Non Response = 3, P Value < 0.05
6-10	33 (33.6)	109 (66.9)	142 (54.4)	
11-15	46 (46.9)	53 (32.5)	99 (37.9)	
16-20	17 (17.0)	1 (0.01)	18 (6.9)	
21-25	2 (2)	0 (0)	2 (0.8)	
Total	98	163	261	

Distribution of respondents in both schools according to fathers' occupation

Occupations	Pacelli n (%)	Onitolo n (%)	Total	P < 0.05*
Doctors, Scientists	10 (10)	23 (14)	33	
Small business owners, teachers	42 (42.0)	66 (40.2)	108	
*Clergy, Pastors	3 (3.0)	1 (0.6)	4	
*Factory workers, agricultural workers	2 (2.0)	0	2	
*Domestic servants, casual employees	1 (1.0)	0	1	
*Unemployed	3 (3.0)	0	3	
**Clerks, Foremen, Forewomen, Artisans	39 (39.0)	72 (43.9)	111	
**Deceased	0	2 (1.2)	2	
Total	100	164	264	

Distribution of respondents in both schools according to mothers' occupation

Occupations	Pacelli n (%)	Onitolo n (%)	Total	P > 0.05
Doctors, Scientists	1 (1.0)	0	1	
Small business owners, teachers	24 (24)	64 (39.0)	88	
*Clergy, Pastors	1 (1.0)	1 (0.6)	2	
*Factory workers, agricultural workers	1 (1.0)	0	1	
*Domestic servants, casual employees	0	0	0	
*Unemployed	3 (3.0)	7 (4.3)	10	
**Clerks, Foremen, Forewomen, Artisans	70 (70.0)	92 (56.1)	162	
**Deceased	0	0	0	
Total	100	164	264	

Distribution of respondents in both schools by class in primary school

Class in primary school	Pacelli n (%)	Onitolo n (%)	Total	P < 0.05
1 and reception class	42 (42.0)	5 (3.0)	47	
2	14 (14)	20 (12.2)	34	
3	11 (11.0)	32 (19.5)	43	
4	10 (10.0)	42 (25.6)	52	
5	12 (12.0)	34 (20.7)	46	
6	11 (11.0)	31 (18.9)	42	
Total	100	164	264	

*Categories in clergy, factory workers, domestic servants and unemployed were combined in Chi-Square calculation to avoid having many cells with zero values

**Categories in clerks and deceased were combined to avoid having many cells with zero values

Table 2. Age at which respondents became blind in Pacelli School.

Age in years	Frequency n (%)
At Birth	31 (31)
1-5	37 (37)
After the age of 5	32 (32)
Total	100

In this study, there was a total of 264 respondents. One hundred and sixty-four (62.1%) of the respondents were from a public main stream school. In Pacelli School, there were more male respondents than female respondents but in Onitolo School, there were more female students ($P < 0.05$). Altogether, there were more female students in the total number of respondents 133 (50.4%). About two-thirds, 170 (64.4 %) of the respondents were Christians. A greater proportion of the respondents were Yorubas 186 (70.5%). In Pacelli School, majority of the respondents 46 (46.9%) were aged between 11 and 15 years ($P < 0.05$). In Onitolo, majority of the respondents were aged between 6-10 years 109 (66.9%).

Table 3. Age at which respondents in Pacelli became blind and the correct knowledge that mosquito caused malaria.

Age blind in years	Incorrect Knowledge n (%)	Correct knowledge n (%)	Total	P Value > 0.05
At Birth	2	29	31	
1-5	2	35	37	
More than 5 years	4	28	32	
Total	8	92	100	

Majority of the mothers of respondents in both schools were clerks, artisans and forewomen ($P > 0.05$). None of the mothers of the respondents in the public main stream school were doctors, lawyers or engineers. In Pacelli School, one of the mothers was a doctor. The fathers of the respondents in both schools were doctors, lawyers or engineers 33 (12.6%).

In Pacelli School, the greatest number of respondents were from primary one 42 (42%) while in Oni-

tolo, the greatest number of respondents were from primary four 42 (25.6%). The oldest respondent in Pacelli was a female in the pre-primary one class. She was 23 years old and became blind after the age of five years. The ages at which students from Pacelli School became blind were almost evenly distributed.

Thirty-one (31%) were blind at birth, 37 (37%) were blind between the ages of 1 and 5 years old and 32 (32%) were blind after the age of five years. Less than fifty percent of the respondents in both schools 105 (40%) had not had an episode of malaria in the past twelve months.

There was no statistically significant difference between the age the Pacelli student became visually-impaired and the knowledge that mosquito caused malaria ($P > 0.05$). Over two-thirds of respondents 200 (76%) from both schools felt that fever was the most important sign of malaria ($P < 0.05$). Ninety percent 237 (90.1%) of respondents from both schools agreed that mosquito nets could protect against malaria ($P < 0.05$). In Pacelli School,

only three respondents (3%) said that drugs could not be a prophylactic against malaria ($P < 0.05$). In Onitolo, 18 (11%) said that drugs could not be prophylactic against malaria. In Pacelli School, only 15 (15%) knew that certain ointments could protect against malaria. In Onitolo School, 96 (58.5%) knew that certain ointments could protect against malaria ($P < 0.05$). In both schools, a total of 147 (55.9%) had not been absent from school in the past twelve months due to malaria ($P > 0.05$).

Table 4. Comparison on major source of information about malaria.

Source (what I know most about malaria)	Pacelli n (%)	Onitolo n (%)	Total n (%)	P Value < 0.05
Doctor/Hospital	32 (32.0)	84 (51.2)	116 (43.9)	
Television/Radio	13 (13.0)	21 (12.8)	34 (12.9)	
Mother/Father	26 (26.0)	26 (15.9)	52 (19.7)	
Teacher/School	21 (21.0)	6 (3.7)	27 (10.2)	
I don't know	8 (8.0)	27 (16.5)	35 (13.3)	
Total	100	164	264	

Table 5. Comparison on the knowledge on cause of malaria.

What causes malaria?	Pacelli n (%)	Onitolo n (%)	Total n (%)	P Value < 0.05
Drinking dirty water	6 (6.0)	62 (37.8)	68 (25.8)	
Mosquito	92 (92.0)	75 (45.7)	167 (63.3)	
Eating unwashed fruits	2 (2.0)	24 (14.6)	26 (9.8)	
Eating too much fruits	0	3 (1.8)	3 (1.1)	
Total	100	164	264	

On choices of places to go for treatment of malaria treatment, none of the respondents from Pacelli School would decide to go to a traditional healer for

treatment. In Onitolo, five of the respondents would prefer to go to the traditional healer for treatment of malaria ($P > 0.05$).

Table 6. Comparison on the commonest symptoms of malaria.

Commonest sign of malaria	Pacelli n (%)	Onitolo n (%)	Total	Non response = 1, P Value < 0.05
Fever	87 (87.0)	113 (69.3)	200	
Joint pains and headaches	2 (2.0)	18 (11.0)	20	
Loss of appetite	11 (11.0)	32 (19.6)	43	
Total	100	163	263	

Table 7. Responses to questions on preventive measures against malaria.

Mosquito net as a protector against malaria				
Mosquito net is a protector	Pacelli n (%)	Onitolo n (%)	Total	Non-response = 1, P Value < 0.05
True	94 (94.0)	143 (87.2)	237	
False	5 (5.0)	21 (12.8)	26	
Total	99	164	263	
Some drugs as prophylaxis against malaria				
Some drugs can be a protector	Pacelli n (%)	Onitolo n (%)	Total	P Value < 0.05
True	97 (97.0)	146 (89.0)	243	
False	3 (3.0)	18 (11.0)	21	
Total	100	164	264	
Some ointments can be used as a protective barrier				
Ointments can protect against malaria	Pacelli n (%)	Onitolo n (%)	Total	P Value < 0.05
True	15 (15.0)	96 (58.5)	111	
False	85 (85.0)	68 (41.5)	153	
Total	100	164	264	
Sweeping the floor as a protector against malaria				
Sweeping the Floor can protect against malaria	Pacelli n (%)	Onitolo n (%)	Total	P Value > 0.05
True	33 (33.0)	54 (32.9)	87	
False	67 (67.0)	110 (67.1)	177	
Total	100	164	264	

Table 8. Episodes of malaria and treatment of malaria.

Comparison on number of times respondents have had malaria in the past 12 months				
Number of malaria episodes in past 12 months	Pacelli n (%)	Onitolo n (%)	Total	Non response = 1, P Value > 0.05
None	31 (31.3)	74 (45.1)	105	
Once	44 (44.4)	49 (29.9)	93	
Twice	15 (15.2)	25 (15.2)	40	
Thrice	5 (5.1)	11 (6.7)	16	
More than 3 times	4 (4.0)	5 (3.0)	9	
Total	99	164	263	
Comparison on number of times absent in school in the past 12 months due to malaria				
Number of times absent in past 12 months	Pacelli n (%)	Onitolo n (%)	Total	Non Response = 1, P Value > 0.05
None	63 (63.6)	84 (51.2)	147	
Once	23 (23.2)	41 (25.0)	64	
Twice	8 (8.1)	18 (11.0)	26	
Thrice	2 (2.0)	11 (6.7)	13	
More than 3 times	3 (3.0)	10 (6.1)	13	
Total	99	164	263	
Comparison on choice of health care provider for treatment of malaria				
Choice of health care provider	Pacelli n (%)	Onitolo n (%)	Total	P Value > 0.05
Doctor	90 (90.0)	137 (83.5)	227	
Traditional Healer	0	5 (3.0)	5	
Chemist	5 (5.0)	11 (6.7)	16	
Church/Mosque	4 (4.0)	8 (4.9)	12	
I would do nothing	1 (1.0)	3 (1.8)	4	
Total	100	164	264	
Comparison of reasons for disliking malaria tablets				
Reasons	Pacelli n (%)	Onitolo n (%)	Total	Non response = 2, P Value < 0.05
It is bitter	60 (60.6)	75 (46.0)	135	
Causes hitching	25 (25.3)	34 (20.9)	59	
Feels worse	0	26 (16.0)	26	
Don't like taking tablets	14 (14.1)	28 (17.2)	42	
Total	99	163	262	

Comparison on number of respondents who do not mind taking injections for malaria treatment

Prefers injections	Pacelli n (%)	Onitolo n (%)	Total	P Value < 0.05
Yes	53 (53.0)	124 (75.6)	177	
No	47 (47.0)	40 (24.4)	87	
Total	100	164	264	

Comparison on number of respondents that do not mind taking tablets or capsules for malaria

Prefers tablets/ capsules	Pacelli n (%)	Onitolo n (%)	Total	P Value < 0.05
Yes	65 (65.0)	110 (67.1)	175	
No	35 (35.0)	54 (32.9)	89	
Total	100	164	264	

Most of the respondents from both schools 135 (51.5 %) did not like taking malaria drugs because they tasted bitter. In Onitolo School, 124 (75.6%) of the respondents did not mind taking injections for the treatment of malaria unlike 53 (53%) of respondents from Pacelli School that did not mind taking injections for the treatment of malaria ($P < 0.05$). In Pacelli School, 65 (65%) of the respondents liked to take tablets/capsules for malaria while 110 (67.1%) of respondents from Onitolo liked to take tablets for the treatment of malaria ($P < 0.05$). The major source of information on malaria among respondents from Pacelli School and Onitolo School was from the doctor ($P < 0.05$). When the responses from both groups were combined, the least source of information about malaria in both groups was from teacher/school 27 (10.2%).

Discussion

The study described the knowledge base of the students from Pacelli School and Onitolo School. They are both primary schools. However, Pacelli School is for the visually-impaired while Onitolo is a main stream public school. The knowledge base of students from both schools was examined on the cause of malaria, the preventive measures against

malaria, the treatment of malaria and the source of information on malaria.

The age at which a child became blind was not statistically significant to the knowledge on the cause of malaria ($P > 0.05$). In Pacelli School, a greater proportion of the male respondents were blind ($P < 0.05$). This finding was consistent with studies done in Ireland and in Bradford, United Kingdom [10, 11]. The survey in Ireland was a national survey of children under the age of 16. The survey conducted in Bradford was done for children between the ages of 5 and 16 years old. In both studies, more males were reported to be blind than females [10, 11]. However, these findings were contrary to a meta-analytic survey on gender blindness [12]. The meta-analytic study showed that globally, there were more blind females [12]. However, the meta-analytic survey did not include childhood blindness [12]. The surveys in Ireland and Bradford were conducted on children [10, 11].

In a study conducted in south eastern, Nigeria, there were more blind male students than females [13]. Another study conducted on the visually impaired students and sighted children in Taiwan also had more visually impaired males. [14]. The researchers explained that parents were reluctant to send blind, female children to boarding schools

which might also be a possible explanation for the preponderance of males in the visually-impaired group [14].

In comparing the ages of respondents by class in primary school, the students in Pacelli School were older ($P < 0.05$). This could be because Pacelli School is the only school for the visually-impaired in Lagos State where the pupils are taught to read braille. Lagos, Nigeria has a population of 22 million [15] and the schools for the blind are not enough. In south eastern Nigeria, the visually impaired students had an age range of 8-33 years and they were selected from three states [13]. The age range of Pacelli School students was between 6-23 years.

The fathers of respondents from both schools were doctors, engineers or lawyers ($P < 0.05$). The Principal Investigator observed that amongst the children in the main stream school, even if their father worked as a cleaner or an orderly in a hospital, the children insisted that their father was a doctor. This is not surprising because children idolize their fathers [16-18]. Several studies have shown inconsistencies between what the child reports as the parents' occupation and what the parents report as their occupation [16-18]. Studies have also shown that the inconsistencies in children reporting their parents' occupations vary by the gender of the child reporting, the grade level of the child and by the academic achievement of the child [16-18]. Children in lower grades tend to exaggerate the occupations of their fathers while children in the upper grade level at school report their fathers' occupation more accurately [18]. Research also showed that when children were asked to report on their mothers' income and to tell if the mothers received food stamps, the reports by children on their mothers' economic status also varied by the child's gender, age and race [16]. Children also exaggerate their parents' educational level [17]. In Pacelli School, the occupation of the respondents was more consistent because the

parents/guardians filled forms prior to enrolling in the school and such information could be verified from the school register.

On the choice of places to go for treatment of malaria, five of the respondents from Onitolo would choose to go to a traditional healer ($P > 0.05$). None of the respondents from Pacelli School would choose to go to a traditional healer. Pacelli School is a boarding School run by the Catholic Organization and all the respondents in Pacelli School are taught from the Bible which might have influenced their choice not to use a traditional healer. In addition, the answers from the visually-impaired students were coded in by their teachers so that the responses a pupil from the visually-impaired pupil gave were not strictly anonymous to the teachers although the answers were anonymous to the Principal Investigator. Some of the pupils in Onitolo School were brought up in the villages before coming to school in Lagos. In the villages, they have more access to a traditional healer than a doctor. Therefore, students that would prefer to go to a traditional healer could have been influenced by past encounters with traditional healers in the villages. Further, some traditional healers do not know the cause of malaria [19]. A study on the perceived cause of malaria amongst traditional healers in Nigeria showed that some of them felt that malaria was caused by the scorching heat of the sun and they would not refer a suspected case of malaria to a health facility because they believed in the capability of their treatment [19].

The major source of the information the respondents had on malaria was from the doctor/hospital for both groups of respondents ($P < 0.05$). This shows that at some point in the lives of the respondents, they had had health education on malaria through contact with a doctor or from a visit to a hospital. The next major source of information on malaria for both groups was from their mother/father. In Pacelli School, the teacher/ school was the third most major source of information on ma-

laria 21 (21%). In Onitolo School, the teacher/school was the fifth most major source of information on malaria 6 (3.7%).

A study on the relationship between bible literacy and academic achievements among students attending public schools and students attending Christian schools showed that those that had higher scores on Bible literacy had higher academic achievements [20]. A separate cross-country study also showed that students from private schools obtained higher scores in mathematics, reading and science than those from public schools [21]. Students from Pacelli School outperforming students from Onitolo on knowledge questions on cause of malaria agrees with other studies that find higher academic achievements among private, Christian schools [20, 21].

About thirty percent of the total respondents said malaria was caused by drinking dirty water 68 (25.8%). Ninety percent of respondents from both schools 237 (90.1%) knew that mosquito nets could protect against malaria. Forty-two percent of the total respondents knew that certain ointments could protect against malaria 111 (42%). Thirty-three percent of total respondents said that sweeping the floor could protect against having malaria 87 (33%). However, a greater proportion of respondents from both groups had the correct knowledge on the cause of malaria. The age at which a child became visually-impaired was not statistically significant to the knowledge on the cause of malaria.

Recommendations

1. Schools should make concerted efforts to teach their pupils about malaria.
2. There is a need to increase and strengthen the existing human and material resources so that the visually-impaired children can enroll in primary schools at an earlier age.
3. The gaps identified in the knowledge base of the two groups can be articulated in a comprehensive health education program for schools.

4. Teachers from the public main stream school should collaborate with teachers from the Pacelli School because a greater proportion of students from Pacelli School had the correct knowledge on the cause of malaria and the school was their main source of information.
5. The Principal Investigator did not find empirical studies on the knowledge base of malaria or other endemic diseases amongst both groups of students. More studies are needed to identify the knowledge gaps in health topics like malaria.
6. Traditional healers were preferred by some of the students in the treatment of malaria. Traditional healers should be trained in the aetiology of malaria so that any contact they have with students should be an opportunity to also teach them about malaria.

Conclusion

In Pacelli School, there were more male respondents than female respondents. Fifty-nine of the respondents in Pacelli School were males 59 (59%). In comparing the age of respondents by class in primary school, the students in Pacelli School were older than the students from the public main stream school ($P < 0.05$). In both groups, Yoruba was the predominant ethnic group 186 (70.5%) and the P value was < 0.05 . In both groups, Christianity was the predominant religion ($P < 0.05$).

On the knowledge on the cause of malaria, majority of the respondents knew that mosquitoes caused malaria 167 (63.3%, $P < 0.05$). However, more of the students in Onitolo did not know that malaria was caused by mosquitoes 89 (54.3 %). Both groups of respondents had some misconceptions about the cause of malaria. In Pacelli School, only six students (6%) did not know that mosquito caused malaria. The age at which a child became blind was not statistically significant to the knowledge on the cause of malaria ($P > 0.05$). The major source of information

on malaria in both groups was doctor/hospital 116 (43.9%). Combining both schools, the least source of information on malaria was from teacher/school ($P < 0.05$) 27 (10.2%).

On the choice of health care provider if respondents in both groups had malaria, 227 (86 %) would prefer to go to a doctor ($P > 0.05$). More than half of the respondents 177 (67%) did not mind taking injections for treatment of malaria ($P < 0.05$). More than half of the respondents 175 (66.3%) did not mind taking tablets/capsules for treating malaria ($P < 0.05$).

While a lot of research has been conducted on malaria amongst students like measuring the amount of parasites in the blood and direct and indirect cost of malaria, studies have not been conducted on the knowledge base of students on malaria.

Similarly, although numerous researches have been conducted on causes of blindness and the level of intelligence tested on the visually-impaired students [22], there is scant literature on their health information needs and gaps in their health knowledge which can only be identified by knowledge base research such as this. Visually-impaired students should not be assumed to be ignorant on health topics because the results of this study just showed that they outperformed mainstream students on the knowledge question on the cause of malaria.

There are presently few tests if any to determine the health information needs of the visually-impaired. Identifying the gaps in the knowledge base on health topics like malaria would go a long way in developing and planning a need responsive health education program for schools. Misconceptions about diseases should be quickly corrected in the primary schools before the misconception becomes engrained into adulthood by which time, it may be more challenging to correct because such misconceptions may prove harmful as we have seen in the current Ebola virus disease outbreak.

Students in the main stream school indicated preference for malaria treatment by traditional healers.

Traditional healers play a major health role in places where there are not enough health care workers. Therefore, traditional healers should be trained on the cause and treatment of malaria and any misconceptions that they might have should be respectfully debunked.

Competing interests

The author declares that she has no competing interests.

Authors' contributions

TTO conceived the study design, assisted in data collection and analysis. TTO wrote the entire manuscript.

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