

Perceptions, Preferred Treatment Methods, and Compliance to WHO Recommended Control Regime for Buruli Ulcer Disease in Imo State, Nigeria

¹Onwuka, C.D* ²Oparaocha, E.T., ²Nwoke, E.A., ²Abanobi, O.C., ²Chukwuocha, U.M

1 Department of Environmental and Applied Biology, Imo State University, Owerri,

2 Departments of Public Health, School of Health Technology, Federal University of Technology Owerri, Nigeria

*Corresponding author email: dymoore37@gmail.com. Telephone: +234 8036750337

*Institutional Email Address: divine.onwuka@imsu.edu.ng

Abstract: *The study determined the community perceptions, preferred treatment methods, and compliance with the WHO Recommended Control Regime for Buruli ulcer disease by respondents in Imo State, South-Eastern Nigeria.*

Keywords: *Buruli ulcer, Perception, Preferred treatment, Compliance to World Health Organization (WHO), Regime.*

Subjects and Methods: A total of 360 participants from 32 communities were randomly selected for the study. Data were collected using questionnaires as well as focus group discussions and in-depth interviews.

Results: The results showed a high level (93.9%) of knowledge of the disease in the studied communities. There were different perceptions among participants about the disease and the victims; (41.7%) perceived Buruli ulcer victims as those who have been bewitched, 11.1% saw them as people bitten by insects, 23.4% victims were people who were unable to take good care of their selves, 14.1% saw them as people with normal wound while 9.7% saw them as normal sick people in the community. It was found that self-medication (56.7 %) was the first choice of treatment for Buruli ulcer disease in the studied communities, while (22.2%) of participants said sufferers resorted to herbal therapy before going to health facilities amid deteriorating conditions. There were strong associations ($p \leq 0.05$) between Age, Education, and occupation with an understanding of the disease with the exclusion of sex ($p \geq 0.05$). Further findings showed that most patients and health workers were aware of the prescribed protocol for control by the WHO and this greatly increased the management of the ulcer in studied communities. An in-depth interview further disclosed that the respondents identified two types of ulcers that determined the course of treatment/management. Patients with ulcers assumed to be caused by spirits or charms were taken to the traditional healer for treatment while ulcers not inflicted by spirits/charms were treated at home or in medical centers.

Conclusion: Misconceptions and wrong treatment methods were found to be obstacles to the management and control of Buruli ulcers in the studied endemic communities. Therefore, enhanced community health education will assist in the early identification of ulcers and prevent deformities. The need for health workers and community members in endemic communities to be properly sensitized /educated in other to quickly identify the disease and adhere to recommended by the WHO is highlighted.

Introduction

Buruli ulcer (BU) is a debilitating, infectious disease caused by ulcerative *Mycobacterium*. Infection with *Mycobacterium ulcerans* affects the skin, underlying tissues, and occasionally bones. After

Mycobacterium tuberculosis (causing tuberculosis) and *Mycobacterium leprae* (causing leprosy), *Mycobacterium ulcerans* is the third most dangerous human mycobacterial pathogen. (Meyers, 1996; Amofah, 2002., Sizaire, 2006., WHO, 2016.). In Imo State, Nigeria, the disease is called "Acha-ere", meaning ulceration and worsening decaying condition. Buruli ulcer usually starts as a painless, elastic skin swelling known as a nodule. The disease can demonstrate a large size of indurations or diffuse swelling of the legs and arms (Kargbo-labour, 2010). There were two stages of the BU disease; pre-ulcer stage and ulcer stage. (Figure1).

Buruli ulcer is a tropical disease that is often misunderstood. It's more common during the rainy season in Africa, and exposure can happen in muddy farming fields. Skin damage is the most possible way for the organism to spread (Kumar, 2015). (Huang, 2014). Insects may play a part in some transmission foci, but not all of them. Though water insects (*Naucoris* and *Belostoma* spp.) have been linked to infection transmission in the lab, studies in West Africa have cast doubt on their ability to serve as vectors (Zogo, 2015). In Australia, positive polymerases chain reaction signals were discovered in salt marsh mosquitos (Johnson, 2007). Aquatic species may also play a role as intermediary hosts. Transmission has also been related to amoeba, but their effect is minimal. It's incredibly rare for a virus to spread from one person to another.

In a known endemic area, diagnosis of buruli ulcer can be made based on clinical observation that considers clinico-epidemiological features which indicate that most cases are in children less than 16 years of age, about 85% of lesions are on the limbs and lower limb lesions are twice as common as upper limb lesions. The condition leads to disabilities resulting from amputations and loss of vital organs such as the eyes that lead to school dropout and other social and economic effects for the affected family due to delayed health searches. Trust in traditional medicine as a first line of treatment, fear or lack of trust in modern medicine, and financial constraints (Renzaho, 2007) were complex in undermining early detection and treatment of Buruli ulcer disease. The disease is currently endemic in Nigeria, Benin, Cote d'Ivoire, Ghana, Guinea, Liberia, Sierra Leone, and Togo (WHO, 2006). The infection rate between males and females is not substantially different.

Established contributing factors for the Buruli ulcer disease includes, late disease diagnosis, lack of awareness of the disease etiology, geographic exposure, and lack of funds, superstitious beliefs, and stigma. When injected into the skin or subcutaneous tissue, *Mycobacterium .ulcerans* multiplies and releases a toxin known as Mycolatone (WHO, 1998), which causes necrosis through the bite of the insect vector. The type of disease caused however ranges from a localized nodule or ulcer to a widespread ulcerative (figure 2) or non-ulcerative disease and osteomyelitis.

Many researches in Nigeria and Ghana indicate that the disease is very costly to treat especially if suspected cases are not identified early (Asiedu & Etuafu, 1998). Until recently, surgery was the only method of treatment, either with or without skin grafting. Owing to prolonged hospitalization it was very difficult to handle infected individuals. It prevented affected individuals from looking for treatment or reporting on time until all choices were exhausted

Despite inadequate information on some main aspects of Buruli ulcer, the policy of the Global Health Organization has concentrated on early detection through the BUPaT Programme. The first phase of a BU system for prevention and treatment (BUPaT) was launched in 2005–2008, though the surgery was the first line of care before the launch of the BUPaT program. This program uses WHO-recommended approaches that include: building capacity for nurses and other Para-medical personnel to identify

improve and handle cases efficiently in established health centers; training community-based volunteer surveillance (CBSVs), school teachers, other health workers, and traditional healers (THs). Others are; development of a community-based surveillance program using CBSVs; the creation of a database, provision of surgical and antibiotic treatment for all Buruli ulcer patients (WHO, 2007), monitoring, and evaluation. These preventive measures depend on successful health care to prevent pre-ulcerative conditions from worsening and treatment of ulcers.

Global Health Organization has therefore provided an avenue for education and sensitization centered on Buruli ulcer disease and encourages those who think they have Buruli ulcers to prefer early medical attention urgently to prevent morbidity and deformity. Minor ulcers and nodules should be diagnosed and handled at the local level with little expense. The goal is to prevent further widespread deterioration and disease-caused disabilities.

Studies have shown that misperception and understanding of the disease by the community affects the preferred method of treatment and compliance with the WHO recommended regime adopted by patients. For this purpose, all data on socio-cultural factors and the integration of preventive approaches by the World Health Organization are highly important to a better understanding and management of the disease as a whole and to serve as a useful material for future study and reference for policymakers, government and non-governmental organizations, global bodies such as the World Health Organization (WHO) and Centre for Disease Control and Prevention. Therefore, the title of this study, Perceptions, preferred method of treatment and compliance with the prescribed WHO control regime for Buruli Ulcers in Imo State, South-East Nigeria, was informed by the above-mentioned issues. This study aimed at determining the perceptions, understanding of preferred treatment methods, and implementation of the WHO prescribed control regime for Buruli ulcer disease in selected communities along the Otamiri River in Imo State, Nigeria.

2.0 Designs and Methods

2.1 Study Area

Imo State is located in the south-eastern part of Nigeria. It lies between latitudes $5^{\circ} 10' 51''$ North and $6^{\circ} 35' 28''$ South of the Equator. The State is bounded by Anambra State on the North, Rivers State on the South and West, and Abia State on the East. It has three senatorial zones with twenty-seven local government areas.

It occupies an area of approximately $5,530 \text{ Km}^2$, which is about 0.9% of the Federation's total land area. The population is estimated at 4,927, 563 as of 2016 (Imo Report 2016, Wikipedia), which is around 2.8% of the Federation's total, With a population density of 230 to 1,400 persons per square kilometer, the majority of the population is widely scattered in a large number of rural areas. There are 3 major urban areas; Owerri, the State Capital, Orlu, and Okigwe. Major rivers in the State include River Orashi, Imo River, which flows through Abia State, where Aba River joins the Atlantic Ocean. Others are; Otamiri River, Nworie River, Onas creek in Ohaji / Egbema, Okitankwo River in Umudi, and Ohia and Efuru in Okigwe.

Less than 50 % of the population has access to pipe-borne water and good toilets; some communities in both municipalities and rural areas have boreholes, but the use is low due to the high salinity and iron content of the water. Most rural communities, therefore, depend on reservoirs, lakes, and streams for their water supply for domestic and agricultural activities. These water bodies are mainly for economic

activities, which include Crop and livestock rising, fishing, sand mining, and stone quarrying.

The state has a public hospital (Federal Medical Centre) in the State capital that serves as a referral center for other hospitals and clinics in the State. Aside from the State-owned Specialist hospital, there are private hospitals and clinics. In risk endemic LGAs, three cluster health centers coordinated the activities of other health centers. They are the Umuagwo Health Centre in Ohaji/ Egbema LGA, Owerri Zone, Ihitte Owerri primary Health center in Orlu LGA, Orlu zone, and Ezelu Okwe Health Centre in Onuimo LGA, Okigwe Zone. These health centers provide patients with free diagnosis and care, including the German Association for Leprosy and Tuberculosis Relief (GLRA), which acts as a rehabilitation and referral center for tuberculosis, Buruli ulcer, and leprosy prevention in Imo State. Around 70% of roads are in horrible conditions, makes access to both health services and socio-economic activities very difficult. As a result, many sick participants seek home care medication from home-grown herbal medicine dealers while some patronize drug stores and itinerant drug vendors as the first treatment choice.

2.2 Study Designs and Data Collection

This was a cross-sectional, community-based study carried out in Imo State, Southeast Nigeria between September 2018 and August 2019 to determine Perceptions, preferred treatment methods, and compliance with the WHO Prescribed Control Regime for Buruli ulcer disease. Interviews were performed with 360 respondents using a survey questionnaire. For the sake of clarification, household heads/guardians or any members of the family over 17 years were interviewed. The study used structured questionnaires, focus group discussions, visits to traditional healing centers, and clinics, direct observations on patients with Buruli ulcer to document how they integrate the recommended WHO control measures in the studied area for the treatment of Buruli ulcer.

Before the main data collection, the survey questionnaire was pre-tested in Ikeduru, a community that is not part of the chosen community. In total, twenty-five members of the group (10 males and 15 females) were selected and randomly interviewed. This allowed the researcher to validate the tools before the main data collection. The questionnaire covered the following subjects: demographic information, knowledge of the disease, community perception, and preferred methods of treatment, and compliance with the WHO Prescribed Control Regime for the study area of Buruli ulcer disease. All questionnaires were administered to study participants familiar with the field of study by a qualified research assistants and community-based voluntary surveillance officers. All the methodologies used for this study were carried out following the guidelines and regulations of the World Health Organization. (WHO, 2000) using the following registers (New BU 01, BU 02, and BU 03 forms).

2.3 Study Population and Sampling

The population for the study included community members, Buruli ulcer patients, their caregivers, conventional healers, faith-based healers, and former Buruli ulcer patients in the research area. Survey questionnaires were used to collect data from the sampled group participants. When choosing participants for the group survey, systematic sampling method was used to pick compounds from potential participants. The compounds were identified in the thirty-two (32) most endemic Buruli ulcer populations. Using the method of systematically selecting compounds, the compounds in the chosen communities were selected for the survey. Thus, there were 4,325 compounds in all the selected communities. Hence, the sample size of 360 given 12 was broken down by 4,325. Every twelfth compound was visited for the survey. Within a given compound, two respondents were interviewed. To

make up for contingencies and non-response, however, questionnaires were administered to 360 participants.

The eligibility criteria for the survey were adults in a given compound who were 17 years and above.

2.4 Data Analysis

The data were recorded on a standardised BU report form, double-entered into a Microsoft Excel (Microsoft Office) database and analysed using Epi-Info 7 for interpreting the findings. A basic statistical analysis of variables of interest was performed by performing tabulations and cross-tabulations. The related tabulations yielded frequencies that were used to describe the variables' basic summaries. For comparison between variables, the cross-tabulations made it possible. Chi-squares and P-values were gathered for the testing of associations between variables. At ($p \leq 0.05$), the p-value was considered significant.

2.5 Ethical Consideration

The Department of Public Health, School of Health Technology, Federal University of Technology Owerri (FUTO), and the Imo State Ministry of Health (MoH) approved and received ethical approval from the ethics committee (Protocol No. 8763). Participants were told of the goals, notified of the confidentiality of the study, and when they agreed to participate in the study, and were asked to sign a written agreement of informed consent. Participants were informed that their participation in the study was voluntary and that their inability to participate would not have an impact on their access to the health facility's services. No monetary rewards were available to persuade respondents to participate in the study.

3.0 Results

3.1 Socio-Demographic Characteristics of the Respondents

Of the 360 participants, 189 (52.5 %) were females while 171 (47.5 %) were males. The age distribution shows that 244 (67.8 %) ranged from 18 to 57 years. 188 (52.2 %) of the participants were analphabets (Table 1). It was revealed that 80 (22.2 %) were mainly traders.

3.2 Community Participants' Knowledge of Buruli Ulcer

In selected endemic populations, results indicated a high degree of awareness of Buruli ulcer. This discovery came to light when participants were asked if they knew about the disease that is causing blisters, nodules, plaque, etc. Of the 360 respondents, 338 (93.8 %) responded that they know. (Table2). To validate their knowledge of the disease, respondents were asked to indicate where they heard of the disease first. 190 (53.0%) of participants had learned about Buruli ulcer in their communities; 62 (17.2%) of respondents said they either had seen any of the Buruli ulcer patients before their infection or had been infected before; About 21 (5.8%) reported hearing of Buruli ulcer from the media while 26 (7.2%) reported hearing of it from the health centers (Table2).

About the signs and symptoms of ulcer infection with Buruli, 300 (83.3%) of respondents reported that painless itchy burns were associated with early signs and symptoms, while 60 (16.7%), indicated that injuries were associated with infection. Participants identified two major causes of the disease; natural causes 172 (47.8%), and supernatural causes 182 (50.5%). 6 (1.6%), of the participants, however, said both natural and supernatural causes. Females 189 (52.5%) and males 171 (47.5%) varied significantly ($p \leq 0.05$), with females recording natural causes of Buruli ulcer than males. There was a significant difference ($p \leq 0.05$) between participants with no education and those with at least primary education in terms of the level of education and identification of the cause of Buruli ulcer infection. Participants with

at least primary education 92(25.6%) were significantly ($p \leq 0.05$) more likely to report that Buruli ulcer was caused by both natural and supernatural causes than those without education 188(52.2%). Besides, those with education 172(47.7%) were significantly higher than those without education to report only natural causes.

Table 1: Status of Participants Socio-Demographic Characteristics

Characteristics	Frequency (N=360)	Percentage
Sex-Related		
Female	189	52.5
Male	171	47.5
Age Distribution		
17 – 30	30	8.3
31- 43	104	28.9
44- 56	110	30.6
57- Above	116	32.2
Educational Qualification		
No formal Education	188	52.2
Primary	92	25.6
Junior High School	39	10.8
Senior High School	24	6.7
Vocational/Technical	7	1.9
Tertiary	10	2.7
Occupational Status		
Unemployed	15	4.2
Civil Servant	9	2.5
Trading	80	22.2
Farming	184	51.1
Laborers/Sand Quarry	38	10.6
Fishing	22	6.1
Others	12	3.3

Table 2: Knowledge, Source of Knowledge of the disease

Characteristics	Frequency (N=360)	Percentage
(Blisters, Plague and Nodules)		
YES	338	93.9
Sources of Information		

Community volunteers	190	53.0
Patients	62	17.1
Media	21	5.8
Health Centre	26	7.2
Former Buruli ulcer patients	25	7.0
Rumour	14	3.8

3.3 Community Perceptions and attitudes towards Buruli Ulcer Victims

Of the total interviewees, 150 (41.7%) saw Buruli ulcer patients as bewitched people, and 84 (23.4%) viewed them as people who did not take good care of themselves, 51(14.2%) saw infected people as getting regular wounds, whereas 40(11.1%) of the participants saw patients as people bitten by insects 35(9.7%) claimed that they were normal sick people in the community (Table 6). There was no gender gap in how the research area treated Buruli ulcer patients. Nevertheless, respondents in the age group 44-56 years 110(30.6%) saw people diagnosed with Buruli ulcer as people that were cursed compared to those 31-43 years of age 104(28.9%), Participants aged 18-30 years 30 (8.3%) saw people diagnosed with Buruli ulcer as witches and wizards than those aged 57 years and above 116(32.2%). There was no significant difference between the informed and the uneducated on how they saw patients with Buruli ulcer in the study area.

Participants registered varying reactions to Buruli ulcer patients. Further in-depth findings showed that Buruli ulcer infection does not elicit sympathy from certain community members as; 43.1% of participants said they would avoid the infected person with Buruli ulcer, 31.4% said they might interact with them but with caution, while 25.5% said they would approach the person diagnosed with Buruli ulcer without hesitation. Asked whether they can communicate with individuals diagnosed with Buruli ulcers in terms of being in a relationship, unequal proportions of participants said they will 53.8% and they won't 46.2%.

However, 233(64.7%) of the respondents said Buruli ulcer was contagious when it comes to its transmission, some said, it could be transmitted from one person to another with 116(32.2%) insisting that it is not transmittable and that it cannot be transmitted from one person to another, while 11(3.1%) said that they did not know whether or not Buruli ulcer could be transmitted. 209 (58.1%) of the 360 participants said that Buruli ulcer is a severe health problem in the studied field. This position was supported by numerous factors including the fact that Buruli ulcer's mode of transmission wasn't understood, there was no way to avoid the infection and the disease also affects children in the studied area.

Nonetheless, 151 (41.9%) of the participants said that Buruli ulcer was not a serious health problem in the studied area because of the intense knowledge and sensitization that is taking place in the community these days. On the question of whether or not Buruli ulcer can be treated, 316(87.8%) said the condition was curable while 44(12.2%) said it was not. To those who have suggested Buruli ulcers could be treated, Thirty-three percent 119(33.1%) said it can be cured by orthodox medicine, 130(36.1%) said it can be cured by conventional healers and 53(14.7%) said it can be healed by both orthodox and secular treatments. Of the participants who said that Buruli ulcer was not curable, 23(6.4%) said it is because the disease was caused by a demonic spirit, 26(7.2%) said the disease was psychologically induced and 9(2.5%) said they didn't know why they can't cure it. It is important to note

that the curability of Buruli ulcer is not linked to socio-demographic characteristics and expectations of the group.

FGD data mirrored absolute recognition among BU sufferers. Representatives noted:

“We're compassionate to them because this disease is weird; no one knows where it comes from. The next target maybe you. There is one thing about the disease that you will get infected if you mock someone who has it. We don't discriminate against them we usually live with victims of BU. We are not stopping them from taking part in social activities. The disease is so debilitating we must show them sympathy, but because of the smell and the discomfort, they shy away from gatherings. If you're sick, you can't talk, you won't be able to sit here with us and communicate so easily, because of the smell from the wound you'll still feel awkward

Table 3: Health Facilities and Preferred Treatment Options

Characteristic	Frequency	Percentage
The First Option of Treatment When Sick		
Traditional healer	80	22.2
Pharmacy/Drug Store	204	56.7
Prayer house	18	5.0
Health Facilities	50	13.9
Did Nothing	8	2.2
Health Facilities Available		
Pharmacy/Drug Store	257	71.4
Hospitals/Clinics	40	11.1
Herbal Treatment	47	13.1
Prayer House	16	4.4
Health Facilities Frequently Used		
Pharmacy/Drug store	204	56.7
Clinic/Hospital	46	12.8
Traditional Healer	88	24.4
Prayer House	22	6.1
Distance to the Health Facilities		
Close	200	55.6
Very Close	68	18.9
Far	73	20.3
Very Far	19	5.3
System of Transportation to Health Centres		
Okada/Tricycle	100	27.8
Car (Taxi And Private)	42	11.7
Bicycle	14	3.9
Walk	204	56.6

3.4 Preferred Treatment Methods for Buruli Ulcers

Findings indicate that a significantly higher number ($p \leq 0.05$) 74.1% of participants would prefer care as soon as they saw the signs and symptoms of Buruli ulcer, while 23.7% would not prefer care as long as they waited to see if their condition developed before any treatment was desired. Upon arriving at the health center, most respondents sought treatment elsewhere. Of this number 88 people (24.4%) visited herbalists, while 204 (56.7.2%) used self-medication (Table 3). Community members in rural areas typically used herbal treatment as a second choice before taking further action. It was noted that when diagnosed with Buruli ulcer disease, most participants 204 (56.7%) resorted to self-medication as their first treatment choice. There was a correlation between age and the first choice of treatment option. Significantly, more participants aged 44 and older were more likely to take self-medication ($p \leq 0.001$). Visit medical health facilities ($p \leq 0.05$) and consult traditional/spiritual healers ($p \leq 0.031$) compared to those aged 43 years and below (Table 5).

There was a significant difference ($p \leq 0.001$) between reported education and first care choices. Consequently, comparatively more 188(52.2%) non-educated participants said that they would choose self-medication as their first care choice for Buruli ulcers than those who reached primary education 25.6% ($p \leq 0.001$) and those with primary education and above 47.8% will visit medical facilities as their first care choice compared to respondents without education (table 5). Different reasons for choosing a specific care choice were mentioned, and the two most widely recorded ones were that they are the best place to handle the disease' 253(70.3%) and easy to use' 107(29.7%)

There was no association between participants' sex and early preferred method of treatment. Thus, there was a significant difference relationship between participants' age and early preferred method of treatment, where participants who were 44 years of age or older were more likely to seek early treatment relative to those aged 43- 18yrs ($p \leq 0.001$). There was also a significant relationship between the degree of education and the early preferred form of treatment, where those with education were more likely to receive early care relative to those without education ($p \leq 0.021$) Table 4.

The participants' understanding of the illness affected their desired disposition toward care to a significant degree. All those who felt their illness were caused by their enemies or witches met with herbalists (Table 6) before heading to the health center. Some people tended not to believe in biomedicine, or the doctor's ability to "understand the cause of their infection." Several patients also absconded when being treated with antibiotics, according to the Supervising Nurse at the Buruli Ulcer Treatment Centre. She said

"Most participants have little faith in biomedicine and didn't believe it will cure their wounds. They will stay for a few days before going to the health center they've been referred to by the General Services unit and are recommended to remain and undergo some antibiotic administration but later absconded. Many participants return later with open sores totally 'decayed' with herbal treatment on it"

The finding confirms the FGD results, as shown by the respondent:

"I saw swollen on my right arm which later became a boil. The boil was getting very bigger as the days pass on. My mother began to treat it with all the local remedies she could think of at home but my arm was still increasing. It then grew into a very nasty wound ... and one day someone told my mother to take me to the health center in Orsu-Obodo. I was told in the health center that this is BUD"

Table 4: Relationship between Sex, Age, Education, and participants who preferred immediate

treatment for Buruli ulcer

Preferred treatment	Female N = 189 (%)	Male N= 171 (%)	P-value	Chi Square Value	Degree Freedom	of
Immediately						
YES	140 (74.1)	120 (70.17)	0.888045	9.28		
NO	44 (23.28)	48 (28.07)	0.968701	9.87	2	
Did Nothing	5 (2.64)	3 (1.75)	0.43			
Age:	18 – 43 years N = 134 (%)	44 & Above N = 226 (%)				
YES	90 (67.16)	170 (75.22)	0.001	33.41		
NO	44 (32.83)	56 (24.77)	0.048157	15.57	2	
Educational Status:	NO EDUCATION N = 194 (%)	PRIMARY & ABOVE N = 166 (%)				
YES	140(72.16)	116(69.87)	0.033602	15.43		
NO	54(27.83)	50(30.12)	0.190234	0.21	2	

From **Table 6**, those who immediately reported the infection to the Health Centre were primarily those who assumed it to be an insect bite (42.7%), but in absolute terms, more of those who do not know the cause of the disease visited the health center than the others. Many who believed no cause spread equally over all the different care choices except to visit a private clinic, the two are presented poorly. About the same proportion of those who did not know the root of BU directly contacted the BU Centre or bought drugs from a drug store (27.4%) or visited herbalists (25.9%). Furthermore, 4.0% of those who thought that they were infected with insect bites visited a private clinic.

The household heads/guardians were asked if they had taken the first move in treatment. For those who blamed bites of insects and/or water as the source of the disease; and those who had no idea of the cause of the disease distance from the treatment site, potential treatment costs, and lack of awareness of what was the best action to take, stigmatizations were the key motivating factors which led them to visit or, use herbal therapy. The main reason for finding relief from herbalists was accessible (55.6%) of the households studied. For those who used medicines or visited a herbalist, 32.4% of those who attributed the infection to the water they used, (38.3%) were the cause, and (34.5%) of those who had no idea what caused the disease said that they did so because the herbalists were more available, less costly and less time spent or cared for quickly (Table 6).

Participants were also asked if they would combine more than one treatment choice when infected with Buruli ulcer disease and their responses were as follows; 210 (58.3%) of them said they would not combine more than one treatment scheme for their condition management while 136 (37.7%) said they

would combine more than one treatment scheme when infected with Buruli. The remaining 14 (2.8%) participants said that if they use one or more treatment programs, the seriousness of the disease would influence their decision. The 210 participants who said they won't combine more than one treatment regimen to control their condition offered different reasons why they won't do it and these were: to prevent complications' (49 (23.3%)), to prevent further infection' (61 (29.0%)). And preventing delays in wound healing'(100 (47.6%)). The reasons provided by the 128 participants who said they would incorporate more than one care regimen to control their infection were: fulfil spiritual and physical needs (60 (46.9%)), heal the wound rap' (46 (35.9%)), and help each other' (22 (17.2%) for quick healing of the ulcer.

During an interview session, a Buruli ulcer patient thus has this say

" I would mix both orthodox and conventional care for my condition as it was caused by evil spirits and they can inflict wound on you ... Orthodox treatment can drive away evil spirits while orthodox treatment can cure me physically without reoccurrence ... (75-year-old farmer interview)"

Table 5: Relationship between sex, age, education, and the first line of treatment for Buruli ulcer

The first line of treatment	Female N = 189 (%)	Male N = 171 (%)	P-Value	Chi-Square	Degree of Freedom
Self-Medication	80(42.32)	63(36.84)	0.781097	7.60	
Health Centre	59(31.21)	58(33.91)	0.778733	7.23	3
Traditional treatment	47(24.86)	42(24.56)	0.99	23.00	
Prayer House	3(1.75)	8(4.68)	0.001		
Age Group	18 -43yrs N=134 (%)	44yrs &above N=226 (%)			
Self-Medication	58(43.28)	100(44.25)	0.001667	26.67	
Health Centre	30(22.38)	62(27.43)	0.008961	20.91	3
Traditional treatment	40(29.85)	57(25.22)	0.060231	15.12	
Prayer House	8(5.97)	7(3.10)	0.150		

Education	NO	PRIMARY			
	EDUCATION	& ABOVE			
	N= 188	N= 172			
	(%)	(%)			
Self-Medication	93(49.47)	48(27.91)	0.0012	31.23	
Health Centre	46(24.47)	74(43.02)	0.009760	22.54	3
Traditional treatment	45(23.94)	44(25.58)	0.318170	7.76	
Prayer House	4(2.13)	6(3.49)	-	-	

Table 6: Community perceptions, and reactions of respondents towards the disease

Characteristics	Frequency (N=360)	Percentage
Bewitched	150	41.7
Lack of hygiene	84	3.3
Sustained wounds	51	14.2
Insects bites	40	11.1
Normal sick people	35	9.7

Reactions to cause of Buruli Ulcer by Treatment Centre

Place	Insect	Enemies/Witches	Water	No Idea	Lack of Hygiene
BU Centre	42.7	22.0	32.4	34.5	31.2
Drug Shop	27.4	31.3	22.9	33.6	24.0
Hospital/ Clinic	4.0	5.1	6.4	10	6.8
Herbalist	25.9	41.6	38.3	21.9	38.0
TOTAL	100	100	100	100	100

3.5 Respondents Compliance To Who Recommended Control Regime for Buruli Ulcer

Participants were asked whether they conform to the prescribed WHO Buruli ulcer management protocol and how they incorporate it into their everyday activities. Many of the respondents had already adopted the methods, though few were unaware of them. Results indicated the importance of compliance with comprehensive health education for early detection of incidents, community-based surveillance, Capacity building, strengthening of health facilities, and cooperation between stakeholders in the study area to monitor Buruli ulcer diseases. Treatment with the administration of WHO-recommended antimicrobials (rifampicin and streptomycin) at least for early lesions has proven successful. Threats to livelihoods as well as feeding and transportation costs also influence delay to preferred medical care. Findings also indicate the need for an integrated approach to delivering health services by incorporating diseases that require similar antibiotic treatment regimes. The incorporation of private health care services into the public care system enables greater access to antibiotic therapy in a close population. Health education has been observed to play a vital role in antibiotic treatment in reducing sequelae disease and the importance of preferred medical treatment for all skin lesions, whether large or small.

Nevertheless, the finding shows that late presentation to medical facilities was associated with confusion on the likelihood of amputation with medical services from traditional healers. Some traditional healers brainwashed the victims affected because herbal therapy was more effective than medical care. Participants saw approaches proposed by the WHO as helpful in raising awareness, fostering disease detection, and facilitating the early presentation of affected individuals for treatment. One participant said once;

"Compliance with these strategies resulted from extensive collaboration and coverage across all communities of the respondents. The community-based surveillance volunteers were neighbourhood arrowheads and have performed exceptionally well in tracking, case identification, and referral. They were the anchormen of the society and the health centers"



1



2

Fig 1: Ulcerative leg of an adult female farmer captured during the study

Fig 2: Ulcerative leg of an adult male trader captured during the study.

4. Discussion

The high level of awareness of community participants in Buruli ulcer was corroborated by a study in Ghana that recorded a high prevalence in the study district that was more than four times the national average (Amofah, 2002). This is in line with reported findings (Amofah, 2002; Asiedu & Etuaful, 1998; Kargbo- labor, 2010). Participants' thorough knowledge is also reflected in their understanding of early signs and symptoms of the disease, which has been recorded as a painless itch or boil. This is theoretically consistent with (Portaels, 2009; Elliott, 2010; Nienhuis, 2010). These results contrasted with Renzaho's (2007) work in the Ga West district where they reported community members had a very poor understanding of the disease's etiology, although the Buruli ulcer was almost a household name. However, the shift in perception of community members can be seen in the context of continuing connections between traditional health systems and communities over time as regards case finding and reporting. People became more familiar with the early signs and symptoms of the disease as case detection, diagnosis and treatment spread across endemic communities (Ahorlu, 2013; Ahorlu, 2014). There were two recognized factors considered to be affecting the natural and supernatural causes of Buruli ulcer disease in the studied communities. For example, a common bite from an insect, which is a natural cause, can be interpreted equally as a supernatural cause because of the belief that a spirit, a

witch/wizard, and gods can also transform into insects and infect a person with Buruli ulcer. Results also revealed that while there is a high knowledge of Buruli ulcer signs and symptoms among studied community members, their understandings and interpretations of its causative factors have changed from those of the orthodox understandings. Benin-based research shows that the preferred method of treatment can be linked to a patient's understanding of the cause of the disease (Aujoulat, 2003). Going to health centers is synonymous with a sickness that is perceived to be induced by natural causes, whereas sickness that is perceived to have been induced by sorcery must be handled by a traditional healer to combat the sorcery (Aujoulat, 2003). In medical health services, the result of this leads to delayed care for the disease by resorting to self-medication and conventional therapy as the first line of treatment. This suggests a major public health problem as it inevitably contributes to extreme sores and horrible deformities resulting in disfigurements when Buruli ulcer progresses to a big stage (category 3). Treatment is very costly during the major stages, and the financial consequences for families, health facilities, and the nation become a severe burden.

Moreover, one of the reasons affecting the option of self-medication over conventional treatment may be the assumption that Buruli ulcer is caused by both natural over supernatural factors. This strongly supports a Cameroon thesis where researchers see this as double causality; suggesting illness with both normal and supernatural derivations (Grietens, 2012). Findings from Grietens (2012), strongly supportive of some studies by Hausmann-Muela (1998) and Thomas (2008), it is in line with Stienstra (2002) that the cause of Buruli ulcers was attributed to only supernatural factors, especially witchcrafts. This study has highlighted the fact that while formal education expands its reach and contributes to a shift in world view, people's activities have a significant impact on understanding and interpreting issues. Participants of formal education are therefore more likely to attribute Buruli ulcer cause to both natural and supernatural causes. The consequence of assuming that Buruli ulcer is caused by both natural and supernatural causes may have consequences for public health because it can influence people's chosen form of care. Depending on the prevailing attributions made to potential causes, this can impact early case diagnosis and care. This also supports the argument that schooling and/or career do not halt either of its cultural orientation (Louw & Pretorius, 1995; Pretorius, 1991; Wessels, 1985; Karim, 2007).

This study demonstrates that the presumed cause of Buruli ulcers frequently and simultaneously comprised both normal and mysterious causal layers. For example, participants who have always assumed that an insect bite infected them with Buruli ulcers, many of whom still believe that this insect was intentionally sent to them by witchcraft. As such, attempts to disseminate scientific reasons for Buruli ulcer, as illustrated in health education messages, that adversely affect the preferred method of treatment and delay in care; but this is not generally the case because additional mystical elements may be present in natural causes (Grietens 2012). According to Portaels, (2001), a mixture of various events and interactions, whether normal or spiritual, help to alienate each individual's understanding and also establish their cultural structure. The study shows that compliance with the WHO prescribed control regime for Buruli ulcer significantly reduced Buruli-related suffering and impairment through early diagnosis and treatment of cases. Extensive cooperation has been documented in all populations, thus helping to improve the health system. The finding revealed that the ability of health workers in antibiotic treatment of the wound, teacher training, health professionals, and community-based volunteers in health education, screening, early detection, and prompt referral for medical treatment has

been improved and is crucial in reducing the Buruli ulcer pain and burden.

Inventory of participants was collected using approved WHO forms for simple clarifications and records. WHO-recommended antibiotics have dramatically improved treatment and cure, particularly for early lesions, thus preventing recurrences. It was also found that feeding and reimbursement of travel costs proved to be a valuable technique for encouraging early medical treatment. Further findings indicated several problems related to access to accommodation (lack of adequate room for the ward), use of conventional care, failure of follow-up, and non-adherence to medication. Regardless of the increased understanding, patients with both pre-ulcerative symptoms and ulcers were taken to treatment facilities. Although some participants with Buruli ulcer's unwillingness to seek medical care are consistent with results from other research (Debacker, 2005 and Renzaho, 2007), The findings indicate that Buruli ulcer's socio-economic effect is a deciding factor in care choice and therapeutic adherence (Peeters 2008 and Asiedu 1998). Self-medication and traditional treatment for certain affected persons were the first options for treatment due to easy local access compared to the burden of high travel costs, And the loss of income due to lack of employment while at a remote site of medical care (Aujoulat, 2003, Nienhuis 2010).

Findings showed that there were varying beliefs about patients with Buruli ulcer. Although a greater proportion of participants saw Buruli ulcer patients as bewitched people while few participants saw them as individuals who could not take care of themselves. Such results contradict the claim that ulcer patients in Buruli in Ghana were viewed exclusively as witches/wizards or bewitched in their societies (Stienstra, 2002). This shows that the current community education projects in endemic communities have a positive effect on people's understanding and need to be sustained (Ahorlu, 2013). The study revealed that the infected person's condition does not receive sympathy from certain respondents as most of them would stay away from a person diagnosed with Buruli ulcers and even those who associate with the patients said they would do so with caution. These results are similar to what was reported by Renzaho (2007) from Ghana, where more than a third of participants explicitly indicated that they would not consider a Buruli ulcer patient as ahead of the group, but would communicate with them. Such arguments against the patients may impact preferred care as people with the disease can choose to conceal their illness from the wider community to avoid stigmatization. This also strengthens the need for ongoing health education on Buruli ulcer in endemic communities in Imo state to demystify it and reduce negative reactions to the infected and individuals affected (WHO, 2001; Ackumey, 2011). Findings indicate that most participants will at any time have access to self-medication or visit the pharmacy shop when they are not sick. The majority said the drug store was for them the most accessible delivery point for health services.

These results were consistent with similar research done by Grietens (2012) in Cameroon where several participants resorted to self-medication or visited the drug store when they were sick. Besides, Kibadi (2009) published a report on Buruli ulcer patients in the rural Democratic Republic of Congo and also noticed that patients waited an average of two months after discovering their Buruli ulcer status by using their social network to confirm the disease. They resorted to self-medication, and this was usually without prescription often of allopathic medicines in the form of non-specific antibiotics and anti-inflammatory drugs. Normally these medicines were bought from local sellers and covered the wound with local fabric. When they've been frustrated with all these procedures and problems set in, their next choice is the use of the health facility. Many patients in the study area said they were been far away

from the health facilities open to them. Nonetheless, some of the participants agree it is less onerous, socially, and financially entry to treatment in a drug store, rather than driving long miles for treatment in a health center. Findings in this study supported Ahorlu's (2013) and Adamba & Owusu' (2011) argument that cares outside the group, whether medical or conventional, usually put a significant financial and social burden on the patient and his / her household as it indicated either a continuous journey to seek care or social isolation for the patient who was expected to live at the place of care without relatives. Such trends also contribute to social isolation for the patient who has to live at the place of care without a family to save money on travel costs (Grietens, 2012).

Contrary to the reasons cited in this study for treatment choices of Buruli ulcer patients, Awusabo-Asare and Anarfi (1997) reported in their HIV study that people affected tend to avoid other people because of the social meanings given to certain diseases, since they may initially prefer home or self-administered treatment strategies often involving herbal use; Self-medication, and counter-drug buying. This propensity leads to delays in providing early attention to the infection, thus increasing the enormity of coping required. The health consequences of self-medication and patronization of drug stores are severe for the patient, as well as for society. This could lead to drug addiction and misuse, particularly patient antibiotics, as most of the store attendants are not professionals who could give their clients the right dosage.

Although raising community understanding helped bring more respondents to medical attention, FGDs also found that specific symptoms (cuts, bites, stings, and abrasions) were not recognized as a potential sign of Infection of *M. ulcerans* but they have benefited from the diagnosis. Antibiotics' efficacy in avoiding recurrences is making considerable headway. A report by stakeholders and main informants indicates satisfaction with the low cost of diagnosis and surgery for antibiotics. These results are consistent with other drug efficacy research (Johnson, 2005, Nienhuis 2010, and Etuaful 2005). These were not chronic illnesses, though a small proportion of the patients healed with deformities were ulcers in most of these cases. Post-operative health treatment and physiotherapy are used at the medical facility to eliminate deformities. For an already burdened and under-resourced rural health service, the expense of such programs is also immense (Johnson, 2005). WHO recommends that patients need rehabilitation (WHO, 2006).

The recommendations for effective Buruli ulcer control, particularly for poorly resourced rural health systems, are highly needed based on the study findings, which include health education and community monitoring, cooperation with testing laboratories to validate cases, enhancement of access to antibiotic treatment and wound care, alignment of BU care with related disease management and disease mappings. Consequently, health education messages should not focus solely on awareness building. They should also stress the importance of early reporting and adequate care to prevent sequelae. Messages should encourage people who are affected to seek early medical treatment for boils, abrasions, cuts, stings, and blisters. They should correct local ideas on the cause of BU which could hinder acceptable preferred care. In this regard, it is critical to evaluate all suspect pre-ulcerative lesions with laboratory tests. World Health Organization recommends a study of the polymerase chain reaction (PCR) to validate and diagnose cases. Despite the lack of resources and knowledge to perform these analyzes, cooperation with research laboratories and organizations could support the health system.

4.1 Conclusion

This study concludes that assumptions, attitudes, and, behaviors of the respondents may be impediments

to the management and control of Buruli ulcers in endemic Nigerian communities. Therefore, it is pertinent to improve early Buruli ulcer treatments; improve existing clinics to expand access to antibiotic therapy, comprehensive health education, community-based monitoring, capacity building, and stakeholder cooperation is vitally important. Consequently, scaling up health education and surveillance will potentially improve early case detection and diagnosis concerning the efficacy of antibiotic treatment to minimize disease disfigurement and the value of preferred treatment method for all skin lesions, whether small or big. Hence, delayed care can in some cases lead to high care costs and longer treatment durations if not handled properly.

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Conflicts of Interest

The author hereby declares no conflicts of interest.

***Institutional Email Address:**

divine.onwuka@imsu.edu.ng

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