

Household Perceptions, Treatment Seeking Behaviour, and Health Outcomes for Buruli Ulcer Disease in Owerri, South-Eastern Nigeria

Nwachukwu Innocentia Ogechi¹, Onwuka Chigozie Divine², Ekeanyanwu Raphael Chukwuma^{3,*}

¹Department of Microbiology, Faculty of Biological Sciences, Imo State University, Owerri, Nigeria

²Department of Animal and Environmental Biology, Faculty of Biological Sciences, Imo State University, Owerri, Nigeria

³Department of Biochemistry, Faculty of Biological Sciences, Imo State University, Owerri, Nigeria

Email address:

dvmoore37@gmail.com (Ekeanyanwu Raphael Chukwuma), Divine.onwuka@imsu.edu.ng (Onwuka Chigozie Divine)

*Corresponding author

To cite this article:

Nwachukwu Innocentia Ogechi, Onwuka Chigozie Divine, Ekeanyanwu Raphael Chukwuma. Household Perceptions, Treatment Seeking Behaviour, and Health Outcomes for Buruli Ulcer Disease in Owerri, South-Eastern Nigeria. *American Journal of Nursing Science*. Vol. 11, No. 5, 2022, pp. 123-133. doi: 10.11648/j.ajns.20221105.12

Received: June 30, 2022; **Accepted:** August 2, 2022; **Published:** September 21, 2022

Abstract: This study aimed to identify and ascertain the participants' beliefs and the impact that this has on their health-seeking behaviors and expected health outcomes in Owerri, south-eastern Nigeria. For this investigation, a purposeful sample of 178 case-positive individuals who had received care or were receiving care at health centers in Imo State was taken. A qualitative, in-depth interview guide and a semi-structured questionnaire were both used to obtain the data. According to the data, 34.8% of the participants believed that Buruli ulcer sickness was a spiritual illness brought on by their enemies, while 17.97% said that poor cleanliness was to blame, 32.4% said that contaminated water was to blame, and 16.9% said that inflicted wounds were to blame. According to other findings, the first line of treatment is often a traditional herbal remedy (44.9%), but some people prefer self-medication (22.5%), including the use of ointments and pain relievers since they think it has been defined as a boil. According to the findings, most people seek care after being dissatisfied with both traditional medicine and self-medication and possibly after issues have developed. As a result, the views of what caused the illness affected health-seeking behavior, which in turn affected the results of therapy. A lot of information is required regarding the etiology and signs of the illness, as well as encouraging early attendance at the Health Center for treatment.

Keywords: Buruli Ulcer, Perceptions, Health Seeking Behaviours, Conventional Herbal Process, Imo State Nigeria

1. Introduction

The ulcerative mycobacterium is what causes Buruli ulcer (BU). It is a neglected illness that manifests itself in sporadic foci throughout the world, with higher concentrations of cases typically occurring in underdeveloped West African communities where patients lack access to healthcare [1]. It is a crippling illness that also affects the tissues beneath the skin. If neglected, initial symptoms may start as a painless lump and progress to painful, severe ulceration (Figure 1). After the pathogens that cause leprosy and tuberculosis, *Mycobacterium leprae* and *Mycobacterium tuberculosis*, respectively, *Mycobacterium ulcerans* is currently the third most prevalent

mycobacterial pathogen among humans. Poor individuals are particularly vulnerable to the Buruli ulcer if they reside near wetlands, in or near still lakes, or near slow-moving streams in outlying or rural areas [2]. The Neglected Tropical Disease (NTD), which has a significant impact by causing malformations, functional disabilities, and social stigma when measured by DALYs [3], most usually affects children under the age of fifteen. Increased morbidity from severe skin necrosis, subcutaneous tissues, bone involvement, and varying degrees of contracture (a contracture is a permanent tightening of the muscles, tendons, skin, and nearby tissues that causes the joints to shorten and become very stiff, preventing normal movement of joint or other body parts) is very common in BU patients and combined with inadequate or no access to

healthcare facilities in rural settings, all of which lead to increased mortality in BU patients. [4]

The WHO's designation of BU as a neglected tropical disease (NTD) demonstrates that the disease is a growing global health concern [5]. The prevalence of Buruli ulcers is highest in West Africa, where an estimated 7000 persons worldwide contract it each year [6]. The harmful *M. ulcerans* prefers watery environments including rivers, streams, fields, and irrigated areas, where the majority of rural poor people engage in a variety of subsistence activities like farming, fishing, and domestic water collecting [7]. Most cases from sub-Saharan Africa that are recorded come from underdeveloped rural areas or settlements [8]. Buruli ulcers may also be referred to as "Acha-ere" in some local dialects in southeast Nigeria. White Sore's meaning Aquatic insects (narcosis and dyplonychus), which are reservoirs and vectors of *Mycobacterium ulcerans* in disease transmission but are not known and are still under discussion [9], geographical accessibility, stigma, farming and aquaculture practices, and late disease detection are a few notable contributing factors for Buruli ulcer disease. Swampy environments have the potential to spread disease [10]. There is no evidence that the disease can spread from one person to another [11]. Therefore, it shouldn't promote the potential excessively. Although there is a significant correlation between disease incidences and proximity to bodies of still or moving water, the exact process of exposure has not been shown, therefore details regarding the transmission remain a mystery. Due to the difficulty in preventing Buruli ulcer illness, those who become afflicted must seek and receive treatment. While most people prefer visiting herbalists and spiritual homes, Buruli ulcer disease (BUD) treatment has been ongoing for decades, leading to the usage of antibiotics as a surgical replacement. Every region of the body is affected by a Buruli ulcer, but the lesion is on the limbs in 90% of cases, and roughly 60% of all lesions on the lower limbs result in contractures [12]. Much of Africa has continued to experience serious and significant harm as a result of the disease [13]. The affected suffer greatly as a result. Buruli ulcer illness has already destroyed the majority of patients due to the late diagnosis of this disease by health professionals or educated community workers. The World Health Organization designated Buruli ulcer as a disease of public health concern in 1998. Buruli ulcer is a destructive, damaging, and slowly digesting bacteria that, when left untreated, causes significant morbidity and disfigurement to sufferers.

The disease is exceedingly expensive to treat, especially when suspected cases are not discovered early, according to certain studies conducted in Nigeria and Ghana [14-16]. Before the development of antibiotics, surgery, with or without skin grafting, was the only available treatment. This usually comes at a high expense to people and households because of the protracted stay. Because of this, those who are affected frequently delay seeking treatment until all other choices have been tried. The World Health Organization created a strategy to concentrate on early intervention due to the lack of knowledge in some important areas of ulcer

disease in Buruli. To urge people who think they may have Buruli ulcer illness to seek quick medical attention, the World Health Organization has started an awareness and sensitization effort. To avoid poor management and the deformities brought on by the disease, the WHO also recommended that minor ulcers and nodules be detected and treated locally at a minimal cost.

Nigeria's government, with assistance from development NGOs and donor organizations, made Buruli ulcer disease treatment free of charge in response to a request from the World Health Organization in 2005. Therefore, this statement has two objectives: To safeguard patients from financial hardship and social stigma, it is important to encourage patients to report medical problems as soon as possible. Therefore, this act has not yet been completed. Because of the increasing management circumstances, patients continue to endure Buruli infection and an ulcer. Before presenting themselves to health centers, it has been noted that almost 77 percent had attempted alternative treatment options, mainly those offered by herbalists [17]. In the Owerri zone, the only way to get medical attention is to present the ulcer in a deteriorating state.

The condition has both short- and long-term effects on people in Owerri, the research location. In the first place, ongoing illness and hospitalization could substantially interrupt their ability to attend class. These kids' education was typically limited by extended absences from school, and frequently they were unable to attend class with their peers because of the stigma associated with the sickness on a personal and family level. Second, the results of kid amputations and disabilities may affect their ability for output. In the end, this would have an impact on both the households of these youngsters and their ability to work as adults. Children with disabilities can grow into adulthood and become a burden on society as people with disabilities in Nigeria are mostly left without care, rehabilitation, and socio-structural support aside from the typical minimal extended family support [18].

The spread of the illness could be accelerated by poor management. Due to a lack of knowledge about the local etiology, attitudes, and beliefs that are connected to people's socio-cultural behavior, illness prevention efforts in developing countries fail to succeed. To set a sustainable goal for disease control and create appropriate health programs, Public Health should make a conscious effort to understand the perspectives, treatment-seeking behavior, and health outcomes. As a result, Imo state is making an effort to eliminate Buruli ulcer illness, which has remained a barrier to early case diagnosis, treatment approach, and control (19).

The purpose of the study is to identify the characteristics of Buruli ulcer-infected households, their health-seeking behavior that influences how they perceive the disease, and the results of care for Buruli ulcer disease in Owerri, Imo state.

2. Designs and Methods

2.1. Study Area

The study was carried out at Owerri, in southeast Nigeria.

In the state of Nigeria Owerri serves as its administrative center. It is also the biggest city in the state, with Orlu and Okigwe coming in second and third, respectively. With coordinates of 50 4850N 70350 N, Owerri is divided into three local governments: Owerri Municipal, Owerri North, and Owerri West. As of 2016, its estimated population was 1,401,873, and its area was roughly 100 square kilometers (40 sq mi). The Nworie River and Otamiri River form the eastern and southern boundaries of Owerri, respectively. 26.4°C is the average temperature yearly rainfall is between 214 and 220 cm during rainfalls (April to September) and the dry season (October to March). The health centers in Orsu-Obodo and Umuagwo that have been recognized as the state's ulcer treatment centers for Buruli are home to the treatment facilities that provide the victims with free care. Health services are more evenly distributed in urban regions than they are in these rural settings. Patients with Buruli ulcers have limited access to the medical facilities that are available in rural areas, which has an impact on how they seek out healthcare and how those communities deliver it.

While the capital city has an urban feel and the majority of towns are rural, certain towns in the Owerri zone have rural traits. Most rural areas suffer from extreme poverty, which has hampered the growth of the local infrastructure. Most settlements lack excellent roads, piped water, and electricity. The urban population has access to clean water from water boards and boreholes provided by water vendors, while the remaining population primarily collects water from lakes, streams, wells, and ponds in rural settlements.

In each of the three Local Government Areas, 40 settlements were chosen. For the survey, basic random sampling was used to select a sample of 18 localities or around one-third of the population of the three Local Government Areas. The population is mostly made up of Christian Igbos who work in agriculture, business, government, etc. The Nwaorie River and the Otta-Miri River are used by most citizens of the state for socioeconomic activities such as drinking water, dishwashing, cotton, melon, and rice growing, among others.

2.2. Methods

From June 2019 to February 2020, a descriptive study was undertaken on a sample of one and seventy-eight (178) positive Buruli ulcer cases. This study employed mixed methods sampling techniques. When treating children, household heads were questioned (1-15 years). In addition, patients receiving or still undergoing treatment for Buruli ulcers from the medical facilities within 10 months of the time data was collected were included. Records on affected communities and households were obtained from health centers, Buruli ulcer treatment centers, and traditional healing centers in the study area.

2.3. Selecting Participants for the Study

Utilizing maximum variation principles and in-depth descriptions of all aspects of the cases under study (such as

older community members' interactions with traditional healers and past patients' experiences with Buruli ulcers), a purposeful sampling technique was used to choose the patients who had contracted the disease. Twelve (12) health centers were chosen at random from among the eighteen (18) municipalities that make up the study's estimated population. Within the identified health centers, a total of 178 case-positive participants were purposefully picked. With an 800 population and a sample size of 262, the community surveys were created using Epi-Info 7 software (Leslie *et al.*, 1965). Surveys were given out to 282 individuals to account for any potential inaccuracies.

Each of the eighteen villages has twelve health centers that were deliberately picked for the survey. Interviews were conducted with two people from each health center. However, in a health center with more than two patients, the two survey respondents were chosen using a straightforward random selection technique (where the words "yes" or "no" were written on pieces of paper and tossed for potential participants).

2.4. Instrument for Data Collection

To gather data, the study uses surveys, in-person interviews, and observations. A well-designed questionnaire that was given to participants to complete to gather pertinent data was used to determine perceptions, treatment-seeking behavior, and health result.

2.5. Methods of Data Collection

Using a straightforward random procedure, in-depth interviews were done with Buruli ulcer patients, caregivers, senior community members, and traditional healers to get information about perceptions of the ailment, treatment-seeking behavior, and health outcomes for the disease. To gather data for this analysis, a semi-structured questionnaire was created and used for the qualitative responses. Questions about general illness awareness, understanding of Buruli ulcer disease, community medical literacy, familiarity with the causes and symptoms of Buruli ulcer, treatment-seeking behaviors, potential causes for seeking treatment, and treatment outcomes were taken into consideration. Also, consideration was given to queries about the socioeconomic traits of the individuals. Participants completed standardized questions and received information that was both quantitative and qualitative. Additionally, a thorough interview with the community health personnel at the Buruli ulcer treatment center and a physical examination of the affected people were added to obtain an accurate result.

38 people were randomly chosen for in-depth interviews, and they were divided up as follows: (13 Buruli ulcer patients, 5 caretakers of patients; 11 elderly community members drawn from different communities, and 4 traditional healers). Except for the traditional healers, who were all men, all other groups had an equal representation of women. Traditional healers were chosen at random to represent all traditional healers in the eighteen villages, while patients with Buruli ulcers, their family carers, and elderly community members were purposefully picked.

Additionally, 5 key informant interviews with healthcare professionals were conducted to talk about the problems the health system is currently facing, particularly about Buruli ulcer control initiatives. The director of the Imo State Ministry of Health in Nigeria, healthcare managers, providers, and health officers in charge of the various health centers served as key informants in this study.

2.6. Laboratory Confirmation/Clinical

The test utilizing the Ziehl-Neelsen method (Acid-fast bacillus) for case confirmation was carried out at the Divine Heritage Laboratory (DHL) in the state of Imo. Tissue swabs or fine-needle aspirates from the infected individuals were sent to a reference laboratory at the Nigerian Institute of Medical Research (NIMR) in Lagos for diagnostic confirmation by PCR, and the results were received within five working days. Depending on the kind of ulcer, the afflicted patients were informed of the outcome and given a 56-day supply of either erythromycin or rifampicin. The German Leprosy and Tuberculosis Relief Association (GLRA) provide drugs and clothing materials without charge. Erythromycin is given orally as pills in community health centers, and patients visit the detection health center once every 12 days for an examination.

2.7. Data Analysis

Using the software Epi-Info 7, the data were evaluated and analyzed. A straightforward statistical analysis of the relevant variables was used to do tabulations and cross-tabulations. The associated tabulations produced frequencies, which were then utilized to describe the basic summary of the variables. Variable comparisons were made possible by the cross-tabulations. When determining the correlations between the variables, chi-squares and P-values were generated, and a p-value was deemed significant at ($p \leq 0.05$).

2.8. Ethical Consideration/Inform Consent

The Department of Microbiology, Faculty of Science, Imo State University Owerri, and the Ministry of Health provided ethical clearance, and protocol number (8967). Participants were briefed on the study's objectives before being advised that participation was voluntary and that being unable to participate would not affect their ability to receive the health facility's services. All study participants gave informed consent, and the parents or guardians of the chosen children also did.

3. Results

3.1. Characteristics of Buruli Ulcer Patients and Households

In the Owerri zone of Imo State, more than 80% of Buruli ulcer sufferers live in rural areas. From some settlements, it takes roughly 45 kilometers to get to the treatment facilities. Health centers can be found in the

communities of Obinze and Ihiagwa. Contrary to other underdeveloped regions lacking functional health facilities. The German Leprosy Centre and other NGOs frequently organize weekly health services for outreach in several of these communities. 78 (43.8%) female and 100 (56.2%) male individuals out of the 178 total were found in the case. The gender gap was statistically significant ($p \leq 0.05$). According to the age distribution, 134 people (75.3%) were between the ages of 5 and 37. Between children aged 15 and under and those aged 16 and over, there was a significant difference in the percentage of children afflicted ($p \leq 0.05$).

About 72 (40.4 percent) of those affected were under the age of 15, while 106 (59.6 percent) were infected at the age of 16 or older. Between those with no formal education and those with at least a primary education, there was a significant difference ($p \leq 0.05$) between the two groups. In terms of education level and attribution of Buruli ulcer infections' origins, participants with at least a primary education were substantially more likely than those without education (33.7 percent) to report that Buruli ulcer infections' causes are natural and supernatural, respectively (Table 1). 30 (16.9%) of the patients affected were farmers, according to occupational status. 70 (39.5%) of the casualties were children or young adults.

Table 1. Participants Social-Demographic Characteristics of Buruli Ulcer Data.

Characteristics	Frequency (N=178)	Percentage (%)
SEX RELATED STATUS		
Male	100	56.2
Female	78	43.8
AGE-RELATED STATUS		
5 – 15	72	40.4
16 – 26	34	19.1
27 – 37	28	15.7
38 – 48	22	12.4
49 – 59	12	6.7
60 & Above	10	5.6
EDUCATIONAL STATUS		
Never	60	33.7
Primary	56	31.4
Junior Secondary School	30	16.9
Senior Secondary School	26	14.6
Tertiary	6	3.4
OCCUPATIONAL STATUS		
Unemployed	18	10.1
Farming	30	16.9
Hunting	10	5.6
Government Official	8	4.5
Trading	28	15.7
Pupil/ Students	70	39.3
Apprentice	4	2.2
Others	10	5.6

3.2. Knowledge, Source of Knowledge of the Disease

Before submitting a report to the treatment center, 160 (89.9%) of the homes were asked if they were aware of the disease and the free therapy available. A foreign NGO operating in the state, German Leprosy, informed about 80 (44.9%) of patients who are aware of the disease and free medication before receiving care at the health center; 11

(6.2%) were informed through a patient; 7 (3.9%) were informed via social media; 18 (10.2%) were informed when they arrived at the health center for care and were referred to the Buruli ulcer treatment unit, and 20 (11.2%) by a formal Buruli u. (Table 2).

Table 2. Knowledge, Source of Knowledge of the disease.

Characteristics	Frequency (N=178)	Percentage
(Blisters, Plague and Nodules)		
YES	160	89.9
NO	18	11.1
Sources of Information		
German Leprosy	80	44.9
Patients	11	6.2
Media	7	3.9
Health Centre/hospital	18	10.2
Former patients	20	11.2
Community volunteers	24	13.5

3.3. Occupation of Head of Household Affected with Ulcer Disease

Only a small portion of the population in the study area was involved in economic pursuits like fishing, hunting, crafts, etc. Agriculture is the main economic activity in the area. A total of 16 (8.99%) of all adult infected people were unemployed according to the occupation of the head of their families, and 84 (47.2%) of the patient households are farming households. They were working on a system of subsistence farming for domestic use. Government employees made up 10 (5.6%) of the population, while artisans made up 6 (3.4%). (Table 3). Four to seven households on average make up each household. Based on adjusted PPP Poor Percentage (\$74.2), households had an average yearly income of about 18,000 nairas (\$18,000) per day and a per capita annual income of 26,000 nairas (\$26,000). 72 patients were questioned about who was the head of the home.

Table 3. Occupations of head of household affected with buruli ulcer disease.

OCCUPATIONS	FREQUENCY (N= 178)	PERCENTAGE
Unemployed	16	8.99
Farmer	84	47.2
Hunter	12	6.7
Government Official	10	5.6
Trader	35	19.7
Craftsman	6	3.4
Fisherman	11	6.2
Bindery	4	2.2

3.4. Percieved Causes and Participants Reaction to Buruli Ulcer Disease

The participants determined that there were two main causes of Buruli ulcers, which were natural reasons (89%) and supernatural causes (72%). But 17 people listed both supernatural and natural reasons (10%). Participants in their families gave many different explanations for why the sickness occurred. 36 (20.2%) of the participants believed

witchcraft to be the disease's source, whereas 30.5% of participants did not know the disease's cause or how they contracted it. Of the participants, 32.4 percent believed their water was poisoned. This conviction was more prevalent among households in coastal communities like Otta Mmiri and Nworie River that also work and live there. Children were thought to become infected by certain behaviors like swimming in the river, whilst adults were thought to become infected through wading over the river and coming into touch with muddy places and swampy valleys. 20.2 percent of cases were thought to have been contracted through an insect bite. (Table 4)

Most participants who believe the illness was brought on by adversaries couldn't fathom an innocent bug bite could turn into a large sore like their own, nor did they ever think there was a bacterium that can be extremely difficult to treat, like the one that causes Buruli ulcer. At the Orsu-Obodo health center, about 22 patients who were seeking care never had any faith that the medication they were taking would be able to cure them. Furthermore, they never consider that surgery could provide essential recovery. One of the participants underwent a thorough interview,

Someone once remarked, *"If I choose not to seek treatment, I'll be referred to as an analphabet, and since I don't believe in the efficacy of a medicine or the ability of the doctors who treat me, that's halted so the condition won't be healed."*

During the interview, a few participants claimed that an insect bite was the root of their Buruli ulcer, but they were unable to identify the specific kind of insect. the idea that they contracted the sickness from the insect as a result of working on a farm or touching dirt while strolling through contaminated water. Additionally, they believed that their body's propensity to scratch may have caused blisters to break open, allowing other bacteria to enter and spread the infection. This, they reasoned, explains why it exclusively affects their lower limbs, particularly the knee.

In another in-depth interview of the participants *"Farmers are continuously traveling through filthy water and growing in marshy valleys, which puts us at risk for contracting various germs, worms, and insects. I believe the river gave me the illness."*

It is conceivable that youngsters who swim in contaminated water contract the illness. 28 heads of households reported that the rivers in their different villages were the source of the ailment for their children. An in-depth conversation with a widow.

"My child went swimming with his buddies in the Nwaori River; and later that day he saw a mark on his arm that ultimately developed into a blister. The blister's soft, bulging surface was untreated until it grew significantly and became very dangerous."

The participants' belief that a change in body color was the first sign of the disease harmed the first course of treatment. Participants who believed that their problems were the result of opponents lacked faith in medical facilities to offer them any relief. Even after receiving treatment at the Orsu-Obodo

medical facility, some patients were not quite convinced that witchcraft was not the root of their illness.

Table 4. Community perceptions, and reactions of patients towards the disease.

Cause of buruli ulcer disease

Characteristics	Frequency (N=178)	Percentage
Natural	89	50
Supernatural	72	40
Natural and supernatural	17	10

Characteristics	Frequency (N=178)	Percentage
Bewitched	62	34.8
Lack of hygiene	32	17.97
Sustained wounds	30	16.9
Insects bites	36	20.2
Normal sick people	18	10.1

Reactions to cause of Buruli Ulcer Disease by Treatment Centre

Place	Insect	Enemies/Witches	Water	No Idea	Lack of Hygiene
BU Centre	44.7	24.0	32.4	30.5	33.2
Drug Shop	25.4	29.3	20.9	37.6	25.0
Hospital	6.0	5.1	6.4	10	5.8
Herbalist	23.9	41.6	40.3	21.9	36.0
TOTAL	100	100	100	100	100

Participants Reaction to Buruli Ulcer

The majority of those who reported the infection to the health center right away thought it was caused by an insect bite (44.7%), but in absolute terms, more people who did not speculate about the cause of the illness contacted the health center than the others. Except for going to a private clinic, those who believed there was no cause were distributed rather evenly across all of the available treatments. The two are presented inaccurately. Similar numbers of people who were unaware of the origins of BU contacted the BU Center directly, purchased medications from a pharmacy (24.6%), or went to a herbalist (23.9%). Likewise, 6.0% of individuals who believed they had been bitten by an insect sought medical attention from a hospital, while 23.9% went to a local herbalist (Table 4).

Table 4 shows that everyone who believed their illness was the result of enemies or witches sought the advice of herbalists before going to the health center. The ability of the doctor to "understand the etiology of their infection" or the practice of conventional treatment appeared to be non-belief among those individuals. The Supervising Nurse at the Buruli Ulcer Treatment Centre claims that some patients even flee while being given antibiotics.

If patients had taken the first step in receiving care, they or the household's head or guardian were interviewed. Distance from the treatment site, the perceived cost of treatment, and ignorance of the best course of action were the main factors that encouraged them to visit or use herbal treatment. These factors were especially important for those who believed that the disease was caused by water or insect bites and for those who had no idea what the cause of the disease was. The primary justification for turning to herbalists for assistance was easily accessible for 49.5% of the families under study.

When asked why they used herbs or went to a herbalist, 7 percent of those who did so said it was because of the water they drank, 12 (27.3%) said it was because of insect bites, and 13 (28.3%) said it was because the herbalist was more approachable, less expensive, and wasted less time or gave quick attention. Because they were unsure of the disease's underlying etiology, some people merely utilized the herbalists as a "try-and-see strategy".

An in-depth interview of a participant "*When I got a boil once, I only used the herbs, and it was cured, And even though I don't know what caused the illness, I just tried them (the herbs) to see if it worked.*"

3.5. Health Seeking Behaviours of Affected Households

The participants were asked about their initial course of treatment after seeing a change in the color of their body skin during an interview. It was discovered that most homes tended to use herbs the most. About 80 (44.9%) of the participants utilized herbs to treat pre-ulcer lesions at home, removing local nodules to reveal sick tissues before applying herbs to sores. Analgesics, balms, blood tonics, and antibiotics were purchased from neighborhood pharmacies and traveling drug salespeople to ease the discomfort, in particular, Terramycin and Phenoxymethylpenicillin (commonly known as Penicillin V). When they realized there was no improvement in the disease, about 10 (5.6%) of the remaining people sought assistance from their local priests, while 8 (4.5%) waited to act (Table 5). Due to the consanguine relationship, they have with their clients, the ease with which their mobile services can be accessed, and the expectation that their clients will be able to continue their employment or education as a result of their treatment, herbalists are frequently used as first-line counseling providers. The main difficulty that seemed to have prevented the participants from avoiding the disease's incapacitating effect was late reporting to the Orsu-Obodo treatment facility for prompt medical attention. An interview with the Supervising Nurse of the Buruli ulcer treatment section at the health center indicated that people with the ailment don't come to the center until other, mainly herbal, efforts have failed and the problem appears to be getting worse.

A victim once remarked "*Over a year has passed since I started boring my sore. When using it for the first time, I used hot water and a local herbal balm called Aboniki balm. After that, it faded but reappeared when I went to our neighborhood herbalist to get some herbs. My friends started avoiding me because of the soreness, and I wanted to stay inside. Then I discovered that German leprosy organizations provided wound care for people. When they arrived in my village, someone brought them to my home before transporting me to the treatment facility.*"

In a second comprehensive interview with the participant "*Once I reached a boil, I utilized hot water and purchased some medications from a drugstore. When it wasn't getting better, I went to a herbalist in the neighboring hamlet. I found the herbalist to be beneficial. After expelling the witch's supernatural energy, I did not doubt that the doctor*

was able to perform his duties. The herbalists were flourishing".

Before visiting the Orsu-Obodo health center, just over 68% of the households surveyed had received care elsewhere. Of this number, 40 (22.5%) turned to self-medication, while 80 (44.9%) went to herbalists (Table 5). Participants' perceptions of the condition had a significant impact on how they approached obtaining health.

Table 5. The participant's first line of action of treatment.

Action Sought	Frequency	Percentage
Self-medication	40	22.5
Visited Health centre	24	13.5
Visited drug shop	16	8.99
Sought prayers	10	5.6
Used Herbal Treatment	80	44.9
Did nothing	8	4.5

3.6. Outcomes of Health-Seeking Behaviours and Treatment

The bodily parts that were most severely impacted by the illness (BU) were the limbs that covered the largest joints. As a result, the majority of patients with contracture—limited joint function—complete their treatment. This study discovered that contracture ended in roughly 72 (40.5%) instances (Table 6). Before visiting the Orsu-obodo health center, there was a significant difference ($p < 0.05$) among those who had utilized herbal medicine. Approximately 61.0% of those who visited herbalists before going to the Buruli Ulcer Center developed contracture (Table 6). This was more than five times greater than those who immediately reported to the Buruli Ulcer Centre and more than two times greater than those who first visited the pharmacy.

Only 11.1% of those who reported right away to the BU Center developed contracture. The majority of patients with this poor outcome were children under the age of nine, even though 2.8 percent of patients required amputation as a result of limb degradation and delayed reporting to the treatment facility after several months of conventional treatment.

According to Table 6, a scar has been the typical result for patients who reported receiving therapy as soon as possible. 44.1 percent of individuals whose treatment resulted in scars went to the Buruli ulcer treatment center as their first point of contact. This is so that, if the illness is detected early, it can be treated more effectively with antibiotics. The Buruli Ulcer Center's first course of treatment entails the required administration of rifampicin and erythromycin for eight weeks. To ensure that they take the amount at the appropriate time, patients are placed under intensive care, according to the directly observed treatment system (DOTS) advised by the WHO [20].

Participants who traveled to other sites before reporting to the Buruli ulcer treatment center were also questioned about how and why they ultimately ended up at the BU center. Because they didn't notice any change in their health, almost all of them (89%) left. 12 percent of those who visited the center did so because they were unable to continue to afford

the high expenses of care they were required to pay at private clinics. About 21 percent of those who visited the center stated their relatives had recommended it to them.

Table 6. Location of First line of treatment, the Result of the Outcome and Outcome of treatment.

Location	Scar	Contracture	Amputation%
BU Centre	44.1	11.1	2.8
Private Clinic	10.2	6.1	8.4
Drug Shop	24.6	22.0	14.4
Herbalist	21.1	61.0	74.4

Outcome of treatment

Variables	Frequency	Percentage
Contracture	72	40.5
Scar	102	57.3
Amputation	4	2.2



Figure 1. An adult male with a typical Buruli ulcer on his leg was observed during the investigation.

4. Discussion

The findings of this study are crucial for decision-makers in politics. Even while the condition has affected more children than adults, we discovered that the difference is too small to support the persistent allegation that children experience Buruli ulcers more frequently than adults. This discovery supports Amofah *et al* [20]'s concern that the sickness shouldn't be perceived as affecting exclusively youngsters. If this warning is not heeded, we risk focusing our attention and interactions on kids while adults suffer in silence. The fact that adults are more likely to refer a child to the doctor than they will is consistent with reports indicating children have a higher prevalence of the disease. Contrary to this, adults may opt to conceal their infection out of fear of being ridiculed or called a witch because some participants associated Buruli ulcers with supernatural forces such as witchcraft and curses [21]. Adult victims of the disease experience a considerably bigger acute economic impact than youngsters do. This scenario has been discovered to be characteristic of adult victims. After multiple outreach initiatives, it's puzzling that NGOs do not appear to alter their perception of the illness. The sickness is still conceptualized by people using both science and a magico-religious undertone [22].

The attitude toward looking for a cure varied depending on how sickness was perceived to have been caused. People's perceptions about what causes Buruli ulcers have an impact

on how they seek medical care, which has an impact on how well treatments work. Two factors contributed to the fact that many patients whose first point of care was the Buruli Ulcer Centre had scars that had comparatively superior outcomes. The effectiveness of medical treatment for the condition might be stated first. Recent studies and clinical trials have demonstrated the ability to eradicate *Mycobacterium ulcerans* in early disease lesions when rifampicin and streptomycin or amikacin are administered for 4–12 weeks [19]. Second, it is very likely that patients who visited the Buruli ulcer center had pre-ulcerating cases (nodules). Our findings are consistent with those of Awusabo-Asare and Anarfi [23], who observed that people who believe that diseases are caused by supernatural forces (such as witchcraft, curses, enemies, and so on) do not behave in a way that supports the germ theory of disease causation. Instead, they behave in ways that promote health.

Slow-healing ulcers, on the other hand, reinforced local witchcraft stories as a potential cause of BU due to problems in detecting early lesions and progressing pre-ulcer lesions that are excessively enmeshed. People were influenced by health messaging that emphasized water contact as a risk factor for BU infection, but witchcraft notions did not deter participants from seeking medical care. Observing that household health-seeking behaviors affect treatment outcomes and the financial burden of the condition is equally crucial. Notably, approximately 75% of participants claimed to have sought care elsewhere before going back to the community health center (68%) to do so. Each of those patients had limbs that were just partially functioning or contracted. None of the Buruli ulcer patients we looked at received comprehensive treatment anywhere other than the health center, as was the case with all of the locations they searched for. Finally, every patient we looked at showed up at the clinic to receive care. This increases treatment costs (more antibiotics, longer periods of wound dressing, and high opportunity costs) because it always follows that a sickness that is reported late was deteriorating and required extensive hospitalization and expensive types of treatment. As a result, many also developed contractures or missing limbs.

It seems likely that traditional treatment methods will be used in a community where more than 30.5 percent of sick patients and caregivers are unaware of the disease's cause and more than 20.2 percent believe it to be a witchcraft-related illness. However, the patterns we saw in terms of seeking health care are alarming since they result in reporting delays and eventually ineffective care that has detrimental developmental effects. It is not surprising that this portion of participants (about 40.3%) cited easier accessibility to herbalists as the most important reason for consultation with the latter. Considering that close to 32.4 percent of households who claimed they may have had the disease through contact with water also visited the Buruli ulcer center.

As was already said, the majority of endemic locations are rural, where it is difficult to find potable water and there is a poor distribution of medical services with Buruli ulcer

endemicity. Except for Orsu-Obodo and Umuagwo, which have a health center, the other endemic communities lack health posts, as was already mentioned. There are frequently places where automobile traffic is less prevalent. On the other side, the herbalists live with them in most communities, particularly in rural ones, making them highly accessible and less priced. When compared to individuals who believed they contracted the sickness by water contact and visited a private clinic, the percentage of herbalists was seven times greater. The community does not favor using private clinics. Less people used private clinics. This could be because there aren't many private healthcare facilities in the district, or it could be owing to the high cost of using private healthcare services. Herbalists were the most often used sources of community advice since they were so close by.

However, regardless of beliefs, health-seeking behavior is part of a larger pattern that is likely socio-cultural and socio-structural in a community. Whatever the public's understanding of the illness, herbalists appeared to be the first port of call before subsequently seeking medical care. They could be brought on by the disease's predominant magico-religious ideas. Additionally, herbal medicines and other medical-religious treatments were widely used in Owerri before colonial contacts and the subsequent introduction of science-based medicine. This hasn't changed much as a result of several factors, including the city's isolation and the significantly higher cost of modern healthcare [17].

In general, the patients in this study only consented to visit the hospital after the wound started to enlarge, when the ulceration started to get worse, and when it was evident that earlier treatments had failed. Those who sought out herbalists believed that the public health institution was ill-equipped to handle these situations, which was consistent with their understanding of the disease's origin. Others believed that doctors were incapable of understanding the magical and religious roots of illness. The study discovered that, particularly in children under the age of fifteen, the majority of cases of treatment resulted in contracture (40.5 percent). Future socio-economic outcomes for these kids and their families would be significantly impacted by this treatment's outcome.

The sickness has a significant immediate impact on a society's development and decreases household poverty. This could be in the form of diminished movement of vital body parts brought on by contractures and the loss of revenue from being unable to work. People with impairments cannot work on farms due to difficulties including contractual inconsistencies that are frequent. It becomes even more alarming to futurists when one realizes that 75.3% of the victims with those outcomes were primarily people in the most productive time of their lives (16–37 years old) and that they were children under the age of 15, which is close to 40.4%. The goal of the Buruli ulcer treatment fee exemption program is to lower the overall cost of treating the condition while increasing the possibility that patients will seek medical attention for even the smallest symptom they

experience. Additionally, households are anticipated to be protected from having to make large care expenditures that may push them farther into the safety net of poverty. However, the fact that many more individuals frequently seek out herbal remedies before visiting a clinic raises questions about possible causes. First, because of the widespread magico-religious beliefs around sickness, it's possible that the fee-free care policy was not as well understood in rural areas. Access to health care is a common issue in Nigeria, particularly in rural areas with bad roads [17, 23, 24]. There may be issues with access to health care services due to concerns about prolonged hospitalization (for the direct administration of antibiotics), delay in in-hospital care, difficulty in accessing medical treatment, transportation, high travel costs, and loss of household income due to time spent pursuing medical attention.

In adults more so than in children, there was a high level of sympathy and acceptance for those suffering from Buruli ulcers. Children discriminated against those who had the Buruli ulcer due to their concern of spreading the disease. As is the case in the majority of the study field, it was widely believed that people suffering from Buruli's ulcer avoided social situations out of shame. The study's findings indicate that the majority of cases were reported after their due dates, necessitating longer hospital stays. Providing information to people, educating users, and disseminating information in a way that is acceptable to everyone must all be significant aspects of any health intervention program [24].

According to the study, there is a need for community health education that focuses specifically on the causes of infections with Buruli ulcers and the early warning indications of Buruli ulcer infection. It showed the necessity of expanding access to healthcare resources, and that expanding access would benefit from community-based surveillance and a referral system that would promote prompt medical attention. The research also recommended that to relieve children's concerns regarding transmission, information about Buruli ulcers be included in the school curriculum. It was proposed that herbalists be trained to know all the clinical signs of Buruli ulcers to identify them and refer cases because the community preferred herbal treatment. It is necessary to implement information, education, and communication campaigns (IEC) that integrate tactics, strategies, and approaches that empower people to actively pursue, maintain and defend their health. To modify behavior, it is necessary to examine how the underlying social, cultural, economic, and environmental variables affect health.

Early case detection is more important than ever in the battle to eradicate Buruli ulcers from our atmosphere. This has not gotten much attention despite being a major theme of the declaration made in Yamoussoukro [25]. Today, the great majority of patients arrive at the hospital after hours. We must carefully examine the limitations of our current actions, as well as the resources needed to carry them out, and how they might be utilized in different situations to support our collective efforts to eradicate poverty in society. Free care

might not be the answer on its own, as there is abundant evidence elsewhere that households still bear a significant financial burden from BU's overall costs even when public health services are provided at no cost at the point of delivery. This means that to reduce the expenses of treatment and the burden on the economy, we will need to take additional steps to be able to diagnose cases early or prevent infection where this is possible. Monitoring and/or supervision are necessary for early detection. In Nigeria, there is insufficient surveillance of the Buruli ulcer. To improve Buruli ulcer surveillance, we must look into and discuss working with other similar disease-control initiatives and NGOs.

Due to the Buruli ulcer disease's seeming mysticism, people hold varying views about it, which ultimately influences their health-seeking behaviors. The purpose of this study was to evaluate household perceptions, ensuing health-seeking behaviors, and Buruli ulcer outcomes in Owerri, a region of south-eastern Nigeria where the illness is endemic. Medical treatment for Buruli ulcers is free, and efforts are undertaken to offer precise information so that vulnerable communities' health-seeking decisions can be more effectively targeted. The general patterns of health-seeking among Nigerian residents, particularly rural residents, were largely derived from their perceptions of the disease by the treatment actions that we studied, despite understandably socio-cultural views of the cause of disease and difficult geographic settings that restrict opportunities for early health-seeking in medical care centers. The people's response to the disease's symptoms is still influenced by their cultural beliefs [26]. Before reporting to the Buruli ulcer center's community, roughly 68% of respondents sought out various kinds of medical therapy.

Our study discovered a strong correlation between participants' views on how to spread illness, attitudes toward seeking out health care, and how well their treatments worked out. The likelihood that early patients would recover without deformity after receiving care from the Buruli ulcer center was lower. The spatial distribution of the disease and its association with ecological factors that may facilitate the beginning of the disease will be better understood by examining the cartography of affected communities and the surrounding ecological elements (such as rivers and farms). Mapped out and well-studied locations include, for instance, the towns along the Ota-mmiri and Nwaorie River. When applied to BU's contact, control, and analysis activities, such crucial knowledge would be helpful. To improve the early detection and treatment of Buruli ulcer cases, a significant number of village health professionals, school teachers, ex-Buruli ulcer patients, and other members of the general public must be trained. These groups of people will also aid in educating the community's residents on the causes, symptoms, and propensity for early treatment of the disease. It is also necessary to include herbalists in rural communities in any Buruli ulcer education program to aid them in identifying early symptoms of the disease and possibly refer patients to the treatment center as soon as possible because

they represent an important primary group of caregivers for the BU patients under study.

5. Recommendation

As a result, community education is required to present a compelling case for early reporting to prevent ulcers or at least severely painful ones that need to be reported to biomedical facilities. Local attitudes may have a substantial impact on wound care and treatment outcome, hence it is important to educate doctors and community people affected by the Buruli ulcer epidemic about one another's expectations for wound care.

Funding

The Tertiary Education Trust Fund (TETFund) Research-Based Interventions of Nigerian Universities provided funding for this study. TETFUND/DESS/UNI/OWERRI/2015/RP/Vol.1 is the grant number (No. 16). The TETFund had no input into the study's planning, data collection, or analysis, interpretation, or writing of the paper or the choice to submit it for publication.

Conflict of Interest

The authors declare that they have no competing interests.

Acknowledgements

We thank all health professionals and CBSVs for their assistance in locating diverse community members and thank all respondents for their cooperation and involvement. Special thanks are extended to Mr. Joel Amarachukwu Okereke, field assistant, and Mr. Ifeanyi Uzoigwe, field manager, as well as to the staff members of the Public Health Department, the Ministry of Health, and the Buruli ulcer ward at the Orsu-Obodo and Umuagwo Health Centre.

References

- [1] World Health Organization. 2017. Buruli ulcer (Mycobacterium ulcerans infection). WHO, Geneva, Switzerland. <http://www.who.int/mediacentre/factsheets/fs199/en/> Accessed 3 January 2018.
- [2] Komolafe, O. O. 2001. Buruli ulcer in Malawi- a first report. *Malawi Medical Journal*, 13 (3); 37-39.
- [3] Seddon, A., Onyeze, A., Gyapong, J. O., Holt, J., & Bundy, D. 2013. Towards an investment case for neglected tropical diseases: including new analysis of the cost of intervening against preventable ntds in sub-Saharan Africa. The Lancet, CIH Working Paper, July 2013 (<http://globalhealth2035.org/sites/default/files/working-papers/towards-an-investment-case.pdf>; accessed 16 March 2015).
- [4] Portaels F, Silva MT, & Meyers, W. M. 2009. Buruli ulcer. *Clinical Dermatology*, 27 (3): 291–305. DOI: 10.1016/j.clindermatol.2008.09.021.
- [5] World Health Organisation, 2013. Health Observatory (GHO) Buruli ulcer: situation and trends. Accessed on 21 June 2016.
- [6] Portaels, F., *et al.*, (2009). Buruli ulcer. *Clinics in Dermatology*, 27 (3), 291–305.
- [7] Sopoh, G. E, Barogui, Y. T., Johnson, R. C., Dossou, A. D., Makoutodé, M., Anagonou, S. Y., Kestens, L & Portaels, F. 2010. Family relationship, Water Contact, and Occurrence of Buruli Ulcer in Benin. *Plos Neglected Tropical Diseases*, 13; 4 (7): e746. doi.org/10.1371/journal.pntd.0000746.
- [8] World Health Organisation, 2016. Health Observatory (GHO) Buruli ulcer: situation and trends. 2013. Accessed on 21 June 2016.
- [9] Vincent, A.-L., Roussel, M., Prevot, G., Nacher, M., De-Paris. X., & Couppié, P. 2004. Factors of exposure to mycobacterium ulcerans infection in French Guyana: A control-case study. *Report of the 7th WHO Advisory Group Meeting on Buruli Ulcer*, Geneva, 8-11 March 2004, 60-61.
- [10] Van der Werf, T. S., Van der Graaf, W. T. A., Tappero, J. W., & Asiedu, K. 1999. *Mycobacterium ulcerans* infection. *Lancet*, 354, 1013-1018. DOI: 10.1016/S0140-6736(99)01156-3.
- [11] Muelder, K., & Nourou, A. 1990. Buruli ulcer in Benin. *Lancet*, 336, 1109-1111. DOI: 10.1016/0140-6736(90)92581-2.
- [12] World Health Organization, 2017. Buruli ulcer (Mycobacterium ulcerans infection) *Lancet*, 354, 1013-1018. DOI: 10.1016/S0140-6736(99)01156-3.
- [13] World Health Organisation, 2006. *Guidelines for controlling Buruli ulcer in the African Region*, Harare: WHO Regional Office for Africa.
- [14] Asiedu, K & Etuaful, S. 1998. Socioeconomic implications of Buruli ulcer in Ghana: A three-year review. *American Journal of Tropical Medicine and Hygiene*, 59, 1015-1022. DOI: 10.4269/ajtmh.1998.59.1015.
- [15] Mumma, G. A., Whitney, E. A. S., Dadzie, F., Etuaful, S., & Ampadu, E. 2003. Economic burden of Buruli ulcer in Ghana. *6th WHO Advisory Group Meeting on Buruli Ulcer*, Geneva, 10-13 March 2003.
- [16] Drummond, C., & Butler, J. R. G. 2004. Mycobacterium ulcerans treatment costs, Australia. *Emerging Infectious Diseases*, 10, 1038- 1043. DOI: 10.3201/eid1006.030428.
- [17] Oppong, J. R., & Williamson, D. A. 1996. Health care between the cracks: Itinerant drug vendors and HIV-AIDS in West Africa. *African Rural and Urban Studies*, 3, 13-34.
- [18] Louw, D. A., & Pretorius, E. (1995). The Traditional Healer in a Multicultural Society: The South African Experience. In L. L. Adler, & B. R. Mukherji (Eds.), *Spirit versus Scalpel: Traditional Healing and Modern Psychotherapy* (pp. 41-58). London: Bergin and Garvey.
- [19] Ahorlu, C. K., *et al.*, (2013). Enhancing Buruli ulcer control in Ghana through social interventions: a case study from the Obom sub-district. *BMC Public Health*, 13 (1), 59.
- [20] World Health Organisation, 2014. Laboratory Diagnosis of *Buruli ulcer*, a manual for health care providers. Portaels F, ed. WHO/HTM/NTD/IDM/2014.1, World Health Organisation, Geneva.

- [21] Amofah, G. K., Bonsu, F., Tetteh, C., Okrah, J., Asamoah, K., Asiedu, K., & Addy, J. 2002. Buruli ulcer in Ghana: Results of a national case search. *Emerging Infectious Disease*, 8 (2): 167-70. DOI: 10.3201/eid0802.010119.
- [22] Grietens, K. P., Toomer, E., Boock, A. U., Hausmann-Muela, S., Peeters, H., Kanobana, K., & Ribera, J. M. (2012). What Role Do Traditional Beliefs Play in Treatment Seeking and Delay for Buruli Ulcer Disease? Insights from a Mixed Methods Study in Cameroon. *PLoS ONE*, 7, e36954.
- [23] Stienstra, Y, Van Der Graaf, W. T. A., Asamoah, K. And Van Der Werf, T. S. 2002. Beliefs and attitudes toward Buruli ulcer in Ghana. *American Journal of Tropical Medicine and Hygiene*, 67, 207-213. Doi: 10.4269/ajtmh.2002.67.207.
- [24] Awusabo-Asare, K., & Anarfi, J. K. 1997. Health seeking behaviours of persons with HIV/AIDS in Ghana. *Health Transition Review*, 7, 243-256. <https://europepmc.org/article/med/10169648>.
- [25] Oppong, J. R. 1992. *Location-allocation models for primary health care in Suhum District, Ghana*. PhD. Dissertation, Edmonton: University of Alberta.
- [26] Hausmann-Muela, S., Ribera, J. M., & Nyamongo, I. 2003. Health- seeking behaviours and the health system response. URL (last checked 19 January 2011). <http://www.dcp2.org/file/29/wp14.pdf>.