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Ethnobotanical Survey of Plants used in the Treatment of Typhoid and its Complication(s) in Esan North East Local Government Area, Uromi, Edo State

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A – research concept and design; B – collection and/or assembly of data; C – data analysis and interpretation; D – writing the article; E – critical revision of the article; F – final approval of article.

Abstract
Background: Medicinal plants played a key role in the health maintenance of local residents; an ethnobotanical survey might help to preserve the traditional information and knowledge on the medicinal uses of these plants
Objective: To obtain an inventory of major medicinal plants used traditionally for the management of typhoid fever and its associated illnesses from Esan North East Local Government Area of Edo state.
Materials and methods: The use of semi-structured questionnaire was adopted to obtain relevant ethnomedicinal data. A total of seventy-one (71) questionnaires were administered to obtain ethnobotanical information on the plants used in the treatment of typhoid and its associated diseases such as dysentery, malaria, abdominal pain, diarrhea, nausea etc.
Results: A total of 71 respondents (traditional healers, herb sellers, mothers, elders and others) in the communities were interviewed. Many of the respondents claimed to have inherited their knowledge of herbal treatment from their ancestors and training. The plants obtained were identified in Forest Herbarium Ibadan and Ambrose Alli University herbarium, Ekpoma. A total of forty-eight plants mentioned from thirty-three families were collected. These families include: Asteraceae, Rutaceae, Apocynaceae and others. Most of the recipes are used in combination for proper treatment of typhoid fever. Methods of administration were concoction, decoction, infusions and paste.
Conclusion: Results from the survey reveals different herbs used in the treatment of typhoid and related diseases. The study further gives credence to ethnobotanical survey as relevant tool in natural product drug discovery and documentation.
Keywords: Ethnobotanical survey, Typhoid, complication

INTRODUCTION

With about 80% of the world's inhabitants relying mainly on traditional medicines for their primary health care, traditional medical practice continues to play an essential role in health care. Traditional medicine is a principal form of health care for many populations, particularly in low- and middle-income countries where traditional healers are appealing since they share a common perspective with their clients, and make use of knowledge, beliefs, and practices indigenous to the local culture and also for its cost implication, the affordability of most traditional medicines makes them all the more attractive at a time of soaring health-care costs (WHO, 2013). This form of health care have continued to gained attention as an important means of health care coverage globally, (Gureje *et al*., 2015; Nortje *et al*., 2016; Stanifer *et al*., 2017).

Nature has been a source of medicinal agents for thousands of years and an impressive number of modern drugs have been isolated from natural sources. Many of these isolations were based on the uses of the agents in traditional medicine especially medicinal plants. Plants are usually the major component of traditional medicine (Global Initiative for Traditional Systems of Health, 1997;Schmincke, 2003;World Health Organization, 2003). From time immemorial, mankind has been developing a traditional medicinal system, based on the knowledge

of medicinal plants throughout the world (Busia, 2005; Falodun, 2010; Petrovska, 2012) and these plants and their products have also continuously played important role in the health care systems; especially of the people living in developing countries (Sofowora *et al*., 2013; Pan *et al*., 2014; Harvey *et al*., 2015).

Historically, the use and practices of many traditional medicine, including experiences are passed on through oral information from generation to generation and such knowledge survives because it is transferred from one generation to another (Zlatković *et al*., 2014; Kayani *et al*., 2015; Ijaz *et al*., 2016). High emigration rates, exposure to modern culture, rapid land degradation, access to modern facilities and urban developmental processes altering the distribution of communities are affecting transformation of such knowledge, thus indigenous knowledge in this area is gradually (Rahman *et al*., 2016; Amjad *et al*., 2017) eroding. There is therefore a strong need to conserve this valuable knowledge, in order to (i) preserve cultural heritage, (ii) to provide basis for ethnopharmacological drug research and (iii) to preserve our biological diversity. (Weldegerima, 2009)

Typhoid fever is a life-threatening systemic infection caused by the bacterium, *Salmonella typhi*. It is a global public health problem that is especially worse in the developing nations of the world where sanitation is deficient, (Rokaya *et al*., 2014) it is a significant contributor to morbidity and mortality in Nigeria and surrounding regions (Enabulele and Awunor, 2016). It is transmitted through the ingestion of food or drink contaminated by the faeces or urine of infected people (WHO, 2008).

In this study we conducted an ethnobotanical study, focused on medicinal plants used for the treatment of typhoid and its complications in Esan North East LGA, Uromi, Edo State. The Esan people are traditionally agriculturalists, trado-medical practitioners, mercenary warriors and hunters. The Esan traditional medicine takes care of physical, psychological, psychosomatic and social diseases. Medicine to the Esan people is the art of curing and protecting the body, soul, spirit, materials and even the environment. They have various medicines for planting, hunting, trading and so on. Many traditional practitioners have died with their talents and gifts simply because they were not literate to put them down for their offspring to discover (Onimhawo and Ebhomienlen, 2014). This has made some aspect of the traditional medicine to go into extinction. Our study was undertaken to document and preserve valuable traditional knowledge of medicinal plants use in the region and to compare our result with previously published data collected from surrounding territories.

METHODOLOGY

Study area

The study area consisted of rural and urban communities in Edo State Southern Nigeria as shown in Figure 1. The areas in Edo State included: Uromi (urban); Egbele (rural) and Ubierumu (rural) all in Esan North East LGA with longitude $3^0$24' E and latitude $6^0$27' N. It has an altitude of 361 m with a population of 108,608. There are two rainy seasons, with the heaviest rains falling from April to July and a weaker rainy season in October and November. There is a brief relatively dry spell in August and September and a longer dry season from December to March. The average temperature in January is 27 °C (79 °F) and for July it is 25 °C (77 °F). On average, the hottest month is March with a mean temperature of 29 °C (84 °F) while July is the coolest month. The language of the people is known as Esan and the people are mainly traders and farmers. The Esan people have a rich cultural heritage, which is reflected in the well-developed herbal medicine used to cure and manage various disease conditions.

Figure 1. Map of the Esan part of Edo State highlighting the Local Government Area surveyed

Ethnobotanical survey

Informed consent

At all instances, the objectives of the study were explained to the intending participants, informed consent were obtained as far as willingness to divulge information is concerned and when consent was refused, no question was forced on the individual.

Data collection

Seventy-one (71) questionnaires were administered to obtain ethnomedicinal information on the plants used in the treatment of typhoid and its complication(s) such as dysentery, malaria, abdominal pain, diarrhea, nausea and were obtained by consulting traditional healers, herb sellers, mothers, elders and others in the communities. The use of semi-structured questionnaire was adopted to obtain the relevant ethnomedicinal data. The questionnaire was prepared in English language and discussion with the respondents conducted in Esan language. The questionnaire was divided into three sections; Section (1) deals with demographic information such as type of respondent, age, sex, religion, level of education, occupation and marital status. Section (2) has to do with the treatment of typhoid disease and complication(s) which consisted of questions like: list the herbs you know that can be used to treat any of these diseases, the preparation, administration and effectiveness of the herbs while Section (3) comprised symptoms of the diseases, prevalence, treatment and side effects of the herbs. Other questions were centered on suggestions on how natural drugs used in the treatment can be improved and their opinions about using either herbal or orthodox medicines in the treatment of the diseases or both.

Frequency index (FI) which is a mathematical expression of the percentage of frequency of mentioning for a single botanical species by informants was also calculated. FI was calculated using the formula below:

FI = number of informants who cited the species/ total number of informants.

Plant collection and Identification

Plants obtained from the ethnobotanical survey were collected as provided by the respondent from Ubierumu and Egbele villages of Esan North East LGA, Uromi, Edo State. The plants were preserved as specimens using standard methods and transported to Ambrose Alli University herbarium, Ekpoma and Forest Herbarium Ibadan (FHI) in Forestry Research Institute of Nigeria (FRIN), Ibadan for Identification.

RESULTS AND DISCUSSION

Demographic Data of Respondents and Treatment Practices

The respondents included traditional healers (2.8%), herb sellers (1.4%), mothers (47.9%), elders (8.5%) and others (39.4%) in the communities within the ages of >20 to <75 and were all from the Esan tribe. The gender ratio is 1:2 (23%:48%) of males to females, and the education level is moderate to high (between secondary to tertiary education). Many of them claimed to have inherited their knowledge of herbal treatment from their ancestors while others got theirs through training.

Data Information

From the survey carried out, the following information was obtained from 71 respondents who proffered 48 species of plant from about 33 families

as shown in Table 1. Eighteen (18) species were mentioned for the treatment of typhoid, seven (7) species were mentioned for the management of malaria, eleven (11) species mentioned for the management of dysentery, four (4) species mentioned for the management of nausea, five (5) species mentioned for the management of abdominal pain and three (3) species mentioned for the management of diarrhea. All the plants mentioned are always available; most of the plants can be found in the forest, around the homes and in the market.

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Table 1: Plants used in the treatment and management of typhoid disease and complication(s) in Esan North East LGA, Uromi, Edo state

S/N	Botanical name	Family	Common name	Local name	Part used	Ailment	F1
1	*Aframomum melegueta* K. Schum.	Zingiberaceae	Alligator pepper	Asin oto	Seed	Nausea, abdominal pain	2.8%
2	*Ageratum conyzoides* L.	Asteraceae	Goat weed	Ukpigho jedowanlan	Leaf	Diarrhea	1.4%
3	*Allium sativum* L.	Alliaceae	Garlic		Bulb	Abdominal pain	4.2%
4	*Aloe vera* (L.) Burm. f.	Asphodelaceae	Aloe vera		Gel	Typhoid	2.8%
5	*Alstonia boonei* De Wild.	Apocynaceace	Pattern wood	Ojegbukhu	Leaf	Dysentery, abdominal pain	25.3%
6	*Anacardium occidentale* L.	Anacardiaceae	Cashew	Ikashu	Leaf	Typhoid	25.3%
7	*Ananas comosus* (L.) Merr.	Bromeliaceae	Pineapple	Edin-ebo	Unripe peels	Typhoid	21.1%
8	*Aspilia africana* C. D. Adams	Asteraceae	Haemorrhage plant	Ebe-ohawe	Leaf	Dysentery, malaria	4.2%
9	*Azadirachta indica* A. Juss.	Meliaceae	Neem	Dongoyaro	Leaf	Malaria	67.6%
10	*Bambusa vulgaris* Schrad. ex J.C. Wendl.	Poaceae	Bamboo	Atosi	Leaf	Typhoid	4.2%
11	*Cajanus cajan* (L.) Millsp.	Fabaceae	Pigeon bean	Olene	Leaf	Typhoid	1.4%
12	*Carica papaya* L.	Caricaceae	Pawpaw	Inyawa	Leaf	Malaria	49.2%
13	*Ceasalpinia bonduc* (L.) Roxb.	Ceasalpiniaceae	Gray nicker	Ebe-ise	Leaf	Dysentery	7%
14	*Chromolaena odorata* (L.) King & H.E.Robins	Asteraceae	Siam weed	Awolowo	Leaf	Dysentery, diarrhea	18.3%
15	*Citrus aurantifolia* (Christm.) Swingle	Rutaceae	Lime	Anumene guegue	Fruit	Typhoid	52.1%
16	*Citrus limon* (L.) Burm.f.	Rutaceae	Lemon	Anume Esan	Fruit		5.6%
17	*Citrus aradisi* Macfad.	Rutaceae	Grape		Fruit & leaf	Typhoid	11.2%
18	*Citrus* x *sinensis* (L.) Osbeck	Rutaceae	Orange	Anume	Leaf	Typhoid	7%
19	*Cocos nucifera* L.	Arecaceae	Coconut	Uvin	Juice	Nausea	2.8%
20	*Cola nitida* Schott & Endl.	Sterculiaceae	Kola nut	Ebhie	Leaf	Nausea	1.4%
21	*Cymbopogon citratus* (DC.) Stapf	Poaceae	Lemon grass	Ebe-iti	Leaf	Typhoid, malaria	36.6%
22	*Daucus carota* L.	Apiaceae	Carrot		Fruit	Typhoid	5.6%
23	*Euphorbia hirta* L.	Euphorbiaceae	Asthma weed	Ohugben	Leaf	Nausea	5.6%
24	*Garcinia kola* Heckel	Clusiaceae	Bitter kola	Adu	Seed	Abdominal pain, nausea	14%
25	*Gongronema latifolia* Benth.	Asclepiadaceae		Utazi	Leaf	Dysentery	1.4%
26	*Leea guineensis* G. Don	Leeaceae	Bandicoot berry	Iyeghibhie	Leaf	Diarrhea	2.8%
27	*Solanum lycopersicon* L.	Solanaceae	Tomato	Itomato	Fruit	Typhoid	8.4%
28	*Mangifera indica* L.	Anacardiaceae	Mango	Imago	Leaf	Typhoid	23.9%
29	*Morinda lucida* Benth.	Rubiaceae		Ebe-ogo	Leaf	Malaria, abdominal pain	18.3%
30	*Moringa oleifera* Lam.	Moringaceae	Drumstick		Leaf	Malaria, typhoid	12.6%

31	*Musa paradisiaca* L.	Musaceae	Plantain	Oghede	Unripe fruit	Diarrhea	8.4%
32	*Musa sapientum* L.	Musaceae	Banana	Oghede ni khere	Leaf	Malaria	1.4%
33	*Newbouldia laevis* Seem.	Bignoniaceae	African border tree	Ebe-uhinbhin	Leaf	Malaria	2.8%
34	*Nicotiana tobacum* L.	Solanaceae	Tobacco	Itaba	Leaf	Abdominal pain, diarrhea	1.4%
35	*Ocimum basilicum* L.	Lamiaceae	Basil	Ebe-oria	Leaf	Dysentery, typhoid	8.4%
36	*Ocimum gratissimum* L.	Lamiaceae	Scent leaf	Alumokho	Leaf	Dysentery, diarrhea	69%
37	*Parquetina nigrescens* L.	Periplocaceae		Ebe-olanmhen emena	Leaf	Malaria	2.8%
38	*Paullinia pinnata* L.	Sapindaceae	Guarana	Ukpogho	Leaf	Nausea	1.4%
39	*Pennisetum purpureum* Schumach.	Poaceae	Elephant grass	Oghodogbo	Grass	Malaria, typhoid	1.4%
40	*Persea americana* Mill.	Lauraceae	Avocado	Olubhun-ebo	Leaf	Malaria, typhoid	12.6%
41	*Phyllanthus amarus* Schum. & Thonn.	Phyllanthaceae	Stonebreaker	Ikeke ebe dazukpe	Leaf	Nausea, dysentery	18.3%
42	*Piper guineese* Schumach.	Piperaceae	Ashanti pepper	Ebe-usira	Leaf	Abdominal pain	5.6%
43	*Piper umbelata* L.	Piperaceae	Wild pepper	Ebe-uronbhehen	Leaf	Abdominal pain	1.4%
44	*Psidium guajava* L.	Myrtaceae	Guava	Igova	Leaf	Malaria, abdominal pain	28.1%
45	*Sarcocephalus latifolius* (Sm) E.A. Bruce	Rubiaceae	African peach	Olibo	Leaf & root	Malaria, abdominal pain	2.8%
46	*Synclisia scabrida* Meirs	Menispermaceae		Ukponuku	Leaf & root	Dysentery	5.6%
47	*Vernonia amygdalina* Delile	Asteraceae	Bitter leaf	Oriwo	Leaf & stem	Malaria, dysentery	49.2%
48	*Zingiber officinale* Roscoe	Zingiberaceae	Ginger		Rhizome	Dysentery, abdominal pain	5.6%

FI - Frequency index

More research is now being directed towards medicinal plants especially now that lots of side effects results from synthetic drugs. Therefore, the claims of cure made by traditional healers on medicinal plants are researched on thus providing scientific basis for their efficacy (Olukoya *et al*., 1993). This study shows that majority of the respondents were female (67.6%) and adult (76%). This justifies the findings of (Faleyimu *et al*., 2010) and (Ogungbile *et al*., 2002) who opined that age bracket is the economically active age and such will respond positively to any intervention aimed at improving their productive capacities and well-being. Majority of the respondents are married and are mothers. This shows that families were being supported with the administration of these herbs. This agreed with the findings of Adekunle and Sam-Wobo, 2004; Faleyimu *et al*., (2009) and Faleyimu *et al*., (2010) that medicinal plants, apart from providing substantive medicine, are also items of trade providing employment and income to indigenous people in Nigeria. Table 1 showed that 33 families of plants were discovered for the treatment of typhoid fever and its related diseases in the study area. The medicinal plants discovered from this survey include *Aspilia africana, Ananas comosus, Cymbopogon citratus, Musa x paradisiaca, Citrus x sinensis, Mangifera indica, Vernonia amygdalina, Zingiber officinale, Citrus x limon, Sarcocephalus latifolius, Synclisia scabrida, Moringa olifera, Citrus x auranifolia, Bambusa vulgaris, Carica papaya, Alstonia boonei, Phyllanthus amarus, Cymbopogon citratus* and others. Different medicinal plant species have been shown to be biologically active against various illnesses (Abena *et al*., 2007); (Okoli *et al*., 2007); (Sonibare and Gbile, 2008); (Faleyimu *et al*., 2010); (Fadimu *et al*., 2014); (Shosan *et al*., 2014). Most of the plants obtained from the survey had their local names attached to it together with the ailments they are being used for as shown in Table 1. This study also revealed that different plant parts are used for the treatment of typhoid and its complications. The percentage occurrence of overall plant families as shown in figure 2 revealed that the species of plants used belonged to different families; Asteraceae and Rutaceae (8%), Poaceae (6%), Anacardiaceae, Asclepiadaceae, Lamiaceae, Musaceae, Piperaceae, Rubiaceae, Solanaceae and Zingiberaceae (4%), all others were 2%.

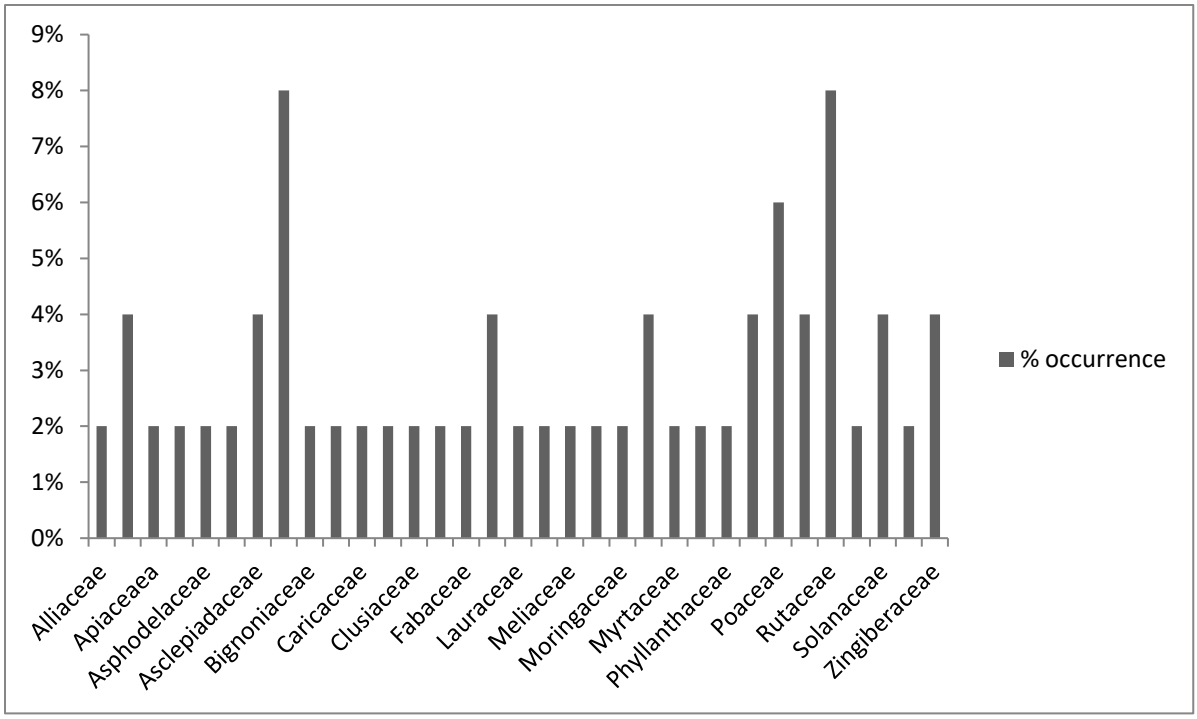

Figure 2. Percentage occurrence of overall plant families

It was also observed from this study that the most common modes of preparation were decoction and infusion while for other species other materials (palm oil, ash, salt etc.) were added to some of these plants during preparation before they were being administered. Other non-plant materials encountered during the survey include honey, charcoal, alabukun, lipton, ogogoro (local gin) and minerals like potash. The liquid preparations were usually prepared with water, local gin or pap water (liquid preparation of maize) and drunk regularly with either glass cup or tea spoon, while the pastes were usually licked or applied externally on the affected part (Tables 2, 3, and 4). The most common form of administration was orally except for the case of one of the plants which was through inhalation for nausea. Previous studies also prove that the species of plants obtained from this study were also mentioned in the surveys made. Aguoru and Ogaba, (2010) reported that *Bambusa vulgaris*, *Mangifera indica*, *Ananas comosus*, *Carica papaya*, *Ocimum gratissimum*, *Azadirachta indica*, *Psidium guajava*, *Citrus aurantifolia* and *Moringa oleifera* were used in the treatment of typhoid amongst the Idoma people of Benue state. Halimat *et al.*, 2017 also reported that *Mangifera indica*, *Alstonia boonei*, *Ananas comosus*, *Carica papaya*, *Ocimum gratissimum*, *Azadirachta indica*, *Psidium guajava*, *Sarcocephalus latifolius*, *Citrus aurantifolia*, *Citrus paradisi and Zingiber officinale* were used in the treatment of typhoid in Minna, Niger State. Another study carried out by Sodipo and Wannang, (2015) in Jere Local Government Area of Borno State showed that *Azadirachta indica* and *Citrus aurantifolia* were also mentioned.

Table 2: Enumeration of recipes, method of preparation, mode of administration used in the treatment and management of typhoid and malaria fever in Esan North East LGA, Uromi, Edo state

Disease	Recipe	Method of preparation	Mode of administration
Typhoid	Boil *Carica papaya* leaves, *Psidium guajava* leaves, *Cymbopogon citratus* and unripe *Ananas comosus* with water for about 1-2 hours. Allow to cool	Decoction	1 full glass 3 times daily for 4 days
	Wash *Alstonia boonei* root and *Morinda lucida* bark and leaves, then soak in water. Squeeze the leaves to obtain the extract	Infusion	Half a glass 3 times daily
	Blend ripe *Solanum lycopersicon* and *Daucus carota* together and mix with water and allow to ferment for 60 minutes. Add honey	Fermentation	Drink morning and evening for 5 days
	Boil *Carica papaya* leaves and unripe fruits	Decoction	Drink 50 mL 2 times daily
	Grind *Ceasalpinia bonduc* leaves with little pepper	Paste	Lick 3 times a day (after eating)
	Boil dried *Carica papaya* leaves, dried *Mangifera indica* leaves, *Cymbopogon citratus*, *Citrus* x *aurantifolia* (cut into two equal halves) and dried *Anacardium occidentale* leaves together till the water turns dark yellow. Allow to cool	Decoction	Drink when warm 3 times daily
	Boil *Azadirachta indica* leaves, *Cajanus cajan* leaves, *Ocimum gratissimum* leaves and *Citrus* x *aurantifolia* together	Decoction	Half a glass morning and evening
	Boil *Azadirachta indica* leaves and root, *Anacardium occidentale* leaves, *Cymbopogon citratus*, *Aloe vera* and *Garcinia kola* leaves together for an hour	Decoction	Drink 3 times daily
	Cut unripe *Ananas comosus* into pieces and wash in clean water. Boil for about 15 minutes, add 'alabukun' powder and boil for another 20 minutes	Decoction	Drink half a glass morning and evening after meals
	Wash and boil *Bambusa vulgaris* leaves, dry *Musa* x *sapientum* leaves, *Citrus* x *aurantifolia* leaves, *Mangifera indica* leaves and *Persea Americana* leaves	Decoction	Drink 175 mL morning and evening for 3 – 5 days

	together for about 30 minutes		
	Squeeze the fruits of *Citrus* x *aurantifolia*, *Citrus* x *paradisi* and *Citrus* x *sinensis* to obtain the juices	Juice	Take 3 times daily
	Boil *Cymbopogon citratus*, *Citrus* x *aurantifolia* fruit, *Citrus* x *paradise* fruit, alabukun powder, water from maize and *Ananas comosus* fruit together and allow to cool	Decoction	Half a glass 3 times daily
	Boil *Sarcocephalus latifolius* leaves for at least 1 hour	Decoction	Half a glass 3 times daily for 1 week
	Boil *Carica papaya* leaves, *Cajanus cajan* leaves, Mangifera *indica* leaves and *Zingiber officinale* leaves together	Decoction	Drink a glass 3 times daily
Malaria	Wash *Azadirachta indica* leaves, *Musa* x *sapientum* leaves and boil with the cut *Citrus* x *aurantifolia*	Decoction	1 full glass morning and evening for 3 days
	Boil *Carica papaya* leaves, *Psidium guajava* leaves, *Mangifera indica* leaves and the outer part of *Ananas comosus* together with water	Decoction	A glass 2 times daily. Steam the body with the heat from the recipe
	Boil *Cymbopogon citratus*, *Musa* x *paradisiaca* leaves and *Citrus* x *aurantifolia* leaves with water	Decoction	Drink 50 mL 2 times daily
	Soak *Sarcocephalus latifolius* bark in 'ogogoro' for 3 days	Infusion	Drink little 3 times daily after eating
	Boil *Azadirachta indica* leaves, *Cymbopogon citratus* and *Psidium guajava* leaves with water together	Decoction	A glass morning and evening
	Prepare *Piper guineese* leaves as soup	Decoction	Eat the soup
	Boil *Azadirachta indica* leaves, *Cymbopogon citratus* and *Chromolaena odorata* leaves with water together	Decoction	Drink the liquid and use as steam bath
	Squeeze *Morinda lucida* leaves with water	Percolation	Half a glass 2 times

	to obtain the extract		daily
	Squeeze *Alstonia boonei* leaves with water to obtain the extract	Percolation	Half a glass 2 times daily
	Squeeze *Ocimum gratissimum* leaves with water to obtain the extract	Percolation	Half a glass 2 times daily
	Squeeze *Aspilia Africana* leaves with water to obtain the extract	Percolation	Half a glass 2 times daily
	Grind or squeeze the leaves of *Azadirachta indica* and chew the stem or soak the stem for drinking	Paste/infusion	Lick/drink 3 times daily
	Squeeze *Vernonia amygdalina* leaves with water to obtain the extract	Percolation	Half a glass morning and evening
	Squeeze *Carica papaya* leaves and *Vernonia amygdalina* leaves with water to obtain the extract	Percolation	A glass full 3 times daily for 1 week
	Boil *Azadirachta indica* leaves, *Citrus* x *aurantifolia*, *Cymbopogon citratus*, *Carica papaya* leaves, *Persea Americana* leaves and lipton tea with water together and allow to cool	Decoction	Half a glass 3 times daily and can also be used to massage the body

Table 3: Enumeration of recipes, method of preparation, mode of administration used in the treatment and management of dysentery and diarrhea in Esan North East LGA, Uromi, Edo state.

Dysentery	Squeeze *Ocimum gratissimum* leaves with water to obtain the extract	Percolation	Apply the extract in the anus morning and evening for 3 days
	Pluck a handful of *Ocimum gratissimum* leaves, rinse and grind with pepper. Add a little salt	Paste	Lick
	Soak *Alstonia boonei* bark with water for 2 days	Infusion	Drink 50 mL 2 times daily after eating
	Squeeze *Persea Americana* leaves with water to obtain the extract	Percolation	Drink little 3 times daily after eating
	Grind *Piper guineese* leaves with little pepper and salt	Paste	Lick 3 times daily
	Soak *Alstonia boonei* bark with clean water for 3 days	Infusion	Drink little 3 times daily after eating
	Squeeze *Aspilia Africana* leaves and *Ocimum basilicum* leaves with water to obtain the extract	Percolation	Drink little 3 times daily
	Squeeze *Parquetina nigrescens* leaves with water to obtain the extract	Percolation	Half a glass morning and evening
	Collect and rinse a handful of *Phyllanthus amarus* leaves		Chew
	Squeeze *Vernonia amygdalina* leaves with water to obtain the extract	Percolation	Half a glass morning and evening
	Boil fresh *Psidium guajava* leaves with water for 45 – 50 minutes	Decoction	A glassful two times daily for 3 days
	Wash and scrape the root *Synclisia scabrida*, grind with a seed of pepper and add little water and salt	Paste	Lick 2 times daily
Diarrhea	Soak raw pap in water for 30 minutes	Infusion	Drink the water as often as needed
	Cook *Leea guineensis* leaves as soup	Decoction	Eat with pounded yam

	Mix raw pap with water	Infusion	Drink at once
	Squeeze *Chromolaena odorata* leaves and *Ocimum gratissimum* leaves together with water to obtain the extract	Percolation	Drink the extract
	Grind *Piper guineese* seeds with little pepper and salt	Paste	Lick
	Soak *Alstonia boonei* bark with water for 3 days	Infusion	Drink little 3 times daily
	Squeeze *Morinda lucida* leaves with water to obtain the extract	Percolation	Drink
	Grind *Leea guineensis* leaves with alligator pepper	Paste	Lick
	Roast and scrape Unripe *Musa* x *paradisiaca*, add oil	Paste	Lick
	Squeeze or chew *Ocimum gratissimum* leaves	Percolation	Take 2 times daily
	Grind *Phyllanthus amarus* leaves with one pepper. Add water and salt to taste	Paste	Lick to satisfaction 3 times daily for 1 week

Table 4: Enumeration of recipes, method of preparation, mode of administration used in the treatment and management of nausea and abdominal pain in Esan North East LGA, Uromi, Edo state.

Nausea	Take a clean charcoal from a burning fire. Allow to cool		Chew
	Chew *Vernonia amygdalina* stem		Swallow the fluid as you chew
	Squeeze *Ocimum gratissimum* leaves with water to obtain the extract	Percolation	Drink
	Cut *Citrus* x *aurantifolia* into small parts	Juice	Use as a mouth wash
	Grind *Ocimum gratissimum* leaves and add a pinch of potash	Paste	Drink 2 tablespoon when necessary
	Grind *Euphorbia hirta* leaves	Paste	Lick 2 times daily
	Collect small green *Paullinia pinnata* as much as you can		Chew
Abdominal pain	Boil *Citrus* x *aurantifolia* and *Citrus* x *sinensis* whole fruits for 30 – 40 minutes	Decoction	Half a glass 3 times daily
	Take a handful of *Ocimum gratissimum* leaves and squeeze with water to obtain the extract or instantly chew the leaves	Percolation	A glass 2 times daily for 2 days
	Grind *Ceasalpinia bonduc* leaves	Paste	Lick
	Grind *Piper guineese* leaves	Paste	Lick
	Rinse *Aspilia Africana* leaves		Chew
	Grind *Ocimum gratissimum* leaves, *Aspilia Africana* leaves, *Alstonia boonei* leaves and bark and *Citrus* x *aurantifolia* smoothly, add water and salt to taste	Paste	Take ¼ glass 3 times daily
	Soak *Sarcocephalus latifolius* roots in clean water or gin	Infusion	Take ¼ glass 3 times daily for 1 week
	Grind *Phyllanthus amarus* leaves with 1 pepper	Paste	3 table spoon full 3 times daily for 1 week
	Grind *Zingiber officinale*, *Allium sativum* and *Ocimum gratissimum* leaves and soak in water	Infusion	Drink 2 times daily

An ethnobotanical study carried out by Agbodeka *et al*., (2016) reported that all the plants used in the treatment of malaria obtained from our survey were mentioned in theirs as plants also used in Togo to treat malaria. Table 2 shows that some of the species mentioned were common to some of the complications. For instance, *Azadirachta indica*, *Psidium guajava*, *Mangifera indica* and *Carica papaya* were common to typhoid and malaria while *Ocimum gratissimum* was common to typhoid, abdominal pain, dysentery and nausea. For nausea, it was even mentioned twice with regards to the mode of preparation. This explains that those species used for the treatment of typhoid can also be used in the treatment of its complications.

The major criticisms of herbal medicines as compared to orthodox medicine are the dosage difficulty because of the differences in the measurement of the concoctions during administration.

From this survey, more plants have been discovered as useful in the treatment of typhoid and its complication(s) in Esan North East Local Government Area of Edo State. The claims obtained from the study need to be evaluated through the use of phytochemical analysis and bioactive assays to discover their active compounds.

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