

Tourism Potential of Plants Species Used for the Treatment of Malaria and Typhoid Fever in Omo Forest Reserve Southwest Nigeria

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Abstract

This research study was carried out to investigate medicinal plant species that is used to treat malaria and typhoid fever and to provide information on the tourism potentials of these plants species in Omo forest reserve southwest Nigeria. The study area was divided into two compartments for the purpose of this research work, undisturbed forest and secondary forest compartments. Data was collected using field surveys and visiting traditional medicine homes for parts the used for the treatment of malaria and typhoid fever. Field trips were embarked upon for three months from July to September 2020 for medicinal plant species identification. The researchers were accompanied by a field assistant who can identify the plant species in local languages.. The computer PAST Model version 3 was used to analyze plant species diversity indices. The result obtained from the study shown that the study area is rich in plant species that are used to treat malaria and typhoid fever in southwest Nigeria. In all, a total of 81 plant species belonging to 42 families were recorded in the study area with great tourism potential when a sustainable management is set up. The family Asteraceae has a plant

Keywords

Medicinal, plant species, malaria, typhoid fever, tourism, potentials

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diversity of 6 and this is followed by Rubiaceae and Solanaceae family's which have five (5) each Figure 2. The diversity index was higher in the undisturbed compartment (4.414) than the secondary forest compartment (4.364).

Introduction

Medical tourism is the term commonly used to describe international travel to receive all care. Medical tourists may pursue medical care abroad for a variety of reasons, such as decreased cost, a recommendation from friends or family, the opportunity to combine medical care with a vacation destination, a preference for care from providers who share the traveler's culture, or to receive a procedure or therapy not available in their country of residence. Medical tourism is a worldwide, multibillion-dollar market that continues to grow (Hallmann *et al*, 2012).. Surveillance data indicate that millions of US residents travel internationally for medical care each year (Lipmann, *et al*, 2014). Ongoing reports of infections and other adverse events following medical or dental procedures abroad serve as reminders that medical tourism is not without risks. 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(Kazemi, M. 2013).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, 2007, Schmincke, 2009; World Health Organization, 20013). With about 80% of the world's inhabitants relying mainly on traditional medicines for their primary health care, the 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 has continued to gain attention as an important means of health care coverage globally (Rokaya, et al, 2014). Malaria fever is one of the tropical diseases of socio-economic importance to which man have been looking for a solution for along time. It is the most prevalent of the tropical diseases identified as a threat to more than 40% of the world's population with about 200 to 450 million infections reported annually worldwide (Muriuki 2006, Adekunle, 2008). The annual death rate has been recorded at between 1.2 and 2.7. Its area of endemism covers more than 100 topical countries and its control remains a major concern for improved healthcare worldwide. The majority of malaria cases i.e about 90% are in sub-Saharan Africa and Plasmodium falciparum is the main cause of severe clinical malaria and eventual deaths Recently, many medical authorities like the world health organization (WHO)

has come to recognize the place of herbal medicines as a viable alternative in the treatment of malaria infections. Since it mainly afflicts poor populations in the tropics, it attracts scant rewards for bioprospecting by big pharmaceutical companies for active molecules that could lead to new drugs. Whereas herbal antimalarial drug development based on traditional knowledge of plant use may hold more promise for developing countries' medicines. (WHO, 2014). Hence the relevance of this study investigated the indigenous use of plant species in the treatment of malaria and typhoid fever in the Omo forest reserve where the disease is prevalent. Thus this paper will highlights strategies and initiatives integrating tourism and botany for the purpose of knowledge transfer and education, with a specific emphasis on Omo forest reserve potential for developing herbal medicine-based tourism

Literature review

Tourism industry, as the biggest service industry in the world, has received much attention in the world. The majority of the developed or developing countries have considered tourism industry as their first economic priorities. Therefore, they plan to achieve to the highest rate of international tourism statistically. The phenomenon of tourism has developed over the last 50 years to become an enormous global industry nowadays (Ritchie and Crouch, 2000) and along with this a powerful economic source (Kayar and Kozak, 2007). These kinds of changes have led to massive tourism changes and in the near future, it will turn to qualitative tourism. Currently, tourism is a kind of strong and professional activity in the world. Tourism industry has developed substantially during the last 50 years and it has changed to an international major industry, which is regarded as the biggest economic source (Hallmann et al., 2012). Tourism is a kind of complex social and economic activity, which must be investigated at various levels to achieve the intended and organized development (Risteski et al., 2012). In order to design programs in tourism industry, we should consider various kinds of tourists and their definitions. Since the demands and the required services are not at the same level for different types of tourists (Kazemi, 2006). Nowadays the countries that aim to increase their national gross income have considered tourism industry as an essential industry with the highest financial circulation, generative job creation, and great profits. Increase in the rate of international trips and getting interested in tourism destinations have branched out this term to some great extent. Thus, there are various kinds of tourism such as religious tourism, sport tourism, war tourism, leisure tourism, medical Tourism, etc. Medicine tourism is considered as one of the most important kinds of tourism. Currently medical tourism has received industries (Connell, 2013). Zanjan city enjoys tremendous historical and natural tourism attractions it is a major tourism destination among tourists. Therefore, the improvement of medical services in terms of place and technical features plays essential role for economic development. In fact, when a health tourist utilizes the

medicinal potentials of the city can be attracted to other types of tourism attractions and vice versa. Tourism can be classified and defined for various reasons but one of the most important groups can be medicinal tourism

Herbs and medicinal herb-based niche tourism

Kala (2015) highlighted how medicinal and aromatic plants can create entrepreneurial opportunities, particularly in the tourism sector. Butthongdee (2015) indicated that community herbal learning centres in Thailand have the potential to become important tourist attractions. In addition, Deka, *et al.*, (2015) noted, and ecological benefits for rural communities through tourism. In their study, herbal that the traditional use of herbal health remedies in India provides significant nutritional, economic gardens not only engage farmers in introducing home herb gardens but also enhanced a sense of familiarity with local biodiversity and its conservation, especially herbal plants. Establishing herb gardens was shown to create jobs in nearby villages, and results showed that people are interested in herbal medicine tourism. The Indian state of Kerala is well known for herbal tourism, especially for Ayurvedic treatment, and a large number of people visit India for herbal tourism; these herbal tourists provide employment for thousands of people (Sharma, 2013). In 2009, India received approximately 180,000 foreign tourists who came for health services such as yoga, meditation, herbal therapies, and skin treatments (Sharma, 2013). Dzida, *et al.*, (2014) studied the opinions of potential recipients of agritourism services on the need for herb gardens and the possible use of herbal plants on a farm. The results illustrated that 89% of respondents recognize the importance of herb gardens in enhancing the attractiveness of agritourism farms. The results also indicated that for 91% of respondents, the possibility of using fresh herbs was appealing, providing a potential advantage for such enterprises. Most of Dzida *et al.*'s respondents believe that natural aromatherapy can be an important part of the offer on agritourism farms. Opinions on the usefulness of herbs on the farm were divided: 43% were of the opinion that these are spice plants, 33% considered them medicinal plants, and 24% consider them ornamentals. Despite the growing recognition of herb-based tourism, there is a general lack of studies on the subject, and most recent studies emphasize herbal tourism as being part of health and wellness tourism (Nolan and Schneider, 2011), medical tourism (Chambers and McIntosh, 2008), or agritourism (Berdzenishvili, Abesadze, *et al.*, 2013). However, none of these approaches take into consideration strategies and initiatives that can promote herbal medicine niche tourism specifically, nor do any of these tourisms consider medicinal herb tourism as an integrated niche form of tourism. Likewise, until now, no significant work has been undertaken on herbal medicine tourism to investigate innovative strategies for developing this niche in Iran. The importance of research on this topic will become more obvious when there is a significant increase in innovative strategies

for promoting herbal medicine tourism in the Traditional Herbal Medicine Tourist Park, restaurants, teahouses, and wellness tourism centres of Isfahan and other cities in the future. Herbal medicine niche tourism as an integrated tourism Education and learning have become an increasingly important and recognized component of travel activity and travel experiences (Canadian Tourism Commission, 2001; Ritchie, Carr, and Cooper, 2003). Educational tourism has developed because of the growing population of travellers who have a formal education, the importance of education in motivating people to travel, and the growing popularity of formal teaching and learning outside the classroom environment. Travel for educational purposes can be a diverse and complicated area of study (Ritchie *et al.*, 2003). According to some authors (Donaldson and Gatsinzi, 2005; Gogoi and Balaji, 2015; Ohe, *et al.*, 2014), educational tourism has generated excitement from the tourism industry and is a lucrative market segment. Education or learning may be either the main reason for a trip or a secondary reasons that is perceived to be an important way of using leisure time (Canadian Tourism Commission, 2001; Ritchie *et al.*, 2003). Educational tourism offers opportunities to travel and study overseas and outdoors (Benson, 2005).

Educational tourism is one of several niche tourism forms (scientific tourism and research tourism) that emphasize knowledge transfer and knowledge management. Museums are key components of educational tourism and are open for the purpose of conserving and preserving, studying, interpreting, assembling, and exhibiting objects and specimens of educational and cultural value to the public for their instruction and enjoyment (Ambrose and Paine, 2006). Botanical gardens, such as traditional herbal medicine tourist parks, are good examples of a sort of open-air museum (Benfield, 2013) that exhibits and educates about traditional medicine as places of intangible cultural heritage (ICH). Normally, in Persian culture, most soft medicinal plants are used in foods and served as tea and beverages in teahouses, restaurants, and hotels. For example, borage is very commonly associated with refreshing drinks; lemon verbena (*Aloysia citrodora*) tea is useful for relaxation and decreases depression and nervousness; saffron and mint teas are relaxing drinks with healthful benefits. However, most customers, tourists, and visitors who drink these teas or beverages are unfamiliar with the medicinal plants and their therapeutic properties. The establishment of a traditional herbal medicine tourist park in Isfahan, Iran, is being considered as an outdoor strategy for knowledge transfer and the popularization of traditional medicine, botany, and medicinal plants.

Knowledge transfer is also a crucial element of heritage tourism. Cultural heritage involves inherited objects, beliefs, practices, and activities from the past that are valued and used in the present (Timothy, 2011). Food, cuisine, and food ways are crucial elements of human heritage and tell many stories of nationalism, identity, migration, colonialism, faith, family, and humankind's struggles with nature

(Mahachi-Chatibura, 2016; Timothy, 2016). In recognition of food as a heritage product, specific food types (e.g. spices, dishes, herbs, food preparation methods) are salient elements of the heritagescapes of tourist destinations and can function as primary attractions or as enhancers of a place's cultural brand (Jolliffe, 2014).

It has been estimated that in developed countries such as United States, plant drugs constitute as much as 25% of the total drugs, while in fast developing countries such as China and India, the contribution is as much as 80%. Thus, the economic importance of medicinal plants is much more to countries such as India than to rest of the world (Monier and Abd, 2016). These countries provide two third of the plants used in modern system of medicine and the health care system of rural population depend on indigenous systems of medicine. More than one-tenth of plant species are used in drugs and health products, with more than 50,000 species being used. However, the distribution of medicinal plants is not uniform across the world (Cole, *et al*, 2007) For ex example, China and India have the highest numbers of medicinal plants used, with 11,146 and 7500 species, respectively, followed by Colombia, South Africa, the United States, and another 16 countries with percentages of medicinal plants ranging from 7 % in Malaysia to 44 % in India versus their total numbers of plant species (Hamilton2005, 2003 Marcy, 2005, Ratknić,et al, 2011)`

. The use of traditional medicine in various therapies by the indigenous population over the world cannot be overemphasized, according to the World Health Organization (WHO, 2005) as many as 80% of the world's people depend on traditional medicine for their primary healthcare needs. Due to poverty, ignorance and unavailability of modern health facilities, most people especially rural people are still forced to practice traditional medicines for their common day ailments, most of these people form the poorest link in the trade of medicinal plants (Khan, 2002). A vast knowledge of how to use the plants against different illnesses may be expected to have accumulated in areas where the use of plants is still of great importance (Diallo et al.,2009). In the developed countries, 25 per cent of the medical drugs are based on plants and their derivatives (Principe, 2001).

During the past decade, traditional medicinal practices have become a topic of global relevance. In many developing nations, a significant number of indigenous populations rely on medicinal plants to meet their health care needs. According to Lewis and Elvin-Lewis (2003), botanically derived medicinal plants have played a major role in human societies throughout history and prehistory and people have used plants as medicine since the beginning of civilization, as they were believed to have healing powers (Connie and King, 2003). The use of plants in the tropical and subtropical regions is diversified and most of the uses are for medicine, source of food, clothing and shelter. But the medicinal uses of plants are rapidly declining among the present generation of local people as a consequence of modernization and

civilization (Cox, 2005). The younger generation is showing little interest in learning this valuable science of healing. Usage of medicinal plants to cure diseases has also been much influenced by religious practices (Trease and Evans, 1989; Wambebe, 1999). All over the world, several ethnobotanical studies focusing on medicinal plants have been documented (Ekpendu et al., 1998; Balansard and Timon, 2000; Singh and (Cox, 2005; Kumar et al., 2005; Pei, 2005). But in Nigeria, very little information about ethnobotanical studies has been documented (Sofowora, 2013). Therefore the need for proper documentation of traditional medicinal practices among the people in Nigeria where there has been a dearth of published information is immediately called for and this accounts for the rationale to undertake the present study.

Importance of medicinal plants

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 (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 (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 (Pan *et al.*, 2014; Harvey *et al.*, 2015).

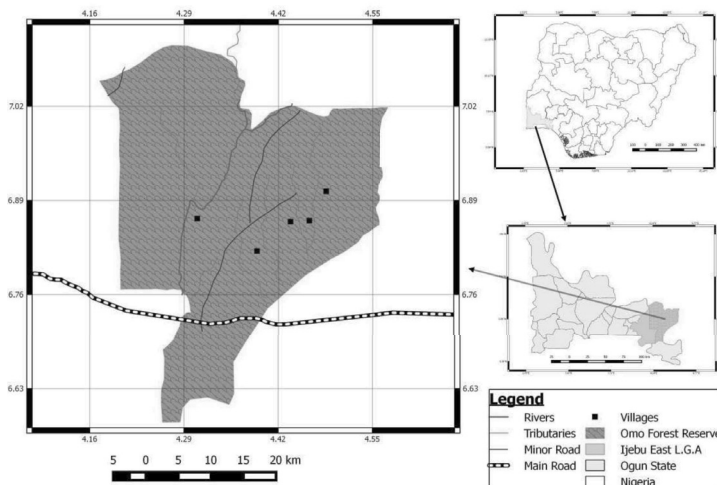
Historically, the use and practices of many traditional medicine, including experiences are passed on through oral information from generation to generation and such knowledge survives because it is transferred from one generation to another (Kayani *et al.*, 2015; Ijaz *et al.*, 2016). High emigration 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 (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).

Materials and method

The study was carried out in Omo Forest Reserve which is situated between latitude 6° 35' to 7° 03' North longitudes 04° 9' to 04° 40' East in the southwestern part of Nigeria (Adesoye Ezenwenyi, 2014). The reserve is bounded by Benin-Shagamu expressway to the south and Omo River and Oni River to the east. The forest soils are dominantly ferralitic and highly weathered. The texture of the forest soil is usually loamy and sandy becoming heavier at greater depths, frequently with layers of gravel found between 30-60 cm. The soils tend to be acidic with low cations exchange capacity. If the soils are not maintained under forest cover surface soil erosion would set in (Isichei, 2005). An annual rainfall of 2,000 mm and a dry season from November to March and wet season from April to November, with the rains falling almost every day during our survey (Mengistu, Salami 2007, Okosodo *et al*, 2016). The terrain is undulating with an elevation of about 300 m on some rocky hills. The areas south of the reserve are at lower elevations than those to the north (Adekunle, 2006). The pockets of primary forests are around inaccessible areas where timber extraction is impossible. In the logged areas, vines are tangled with the secondary growth forest dominated by *Musanga cecropoides*, and a few oil palm trees *Elaeis guineensis* compared to sites further west along the road to Lagos. Most remaining larger trees are the soft-wooded *Cieba pentandra* (Bombacaceae). Along the low-lying areas are drainages covered by tangled vegetation with few trees making access difficult. Cocoa farms now replace cleared areas of the forest (Okosodo, *et al*, 2016).

Figure 1: Map of the study area source: (Ezenwenyi and Onyekachi)



Data collection

The study was carried out in Omo forest reserve. The study area was divided into two compartments for the purpose of this research work, undisturbed forest and secondary forest compartments. Data was collected using field surveys and visiting traditional medicine homes for parts the used for the treatment of malaria and typhoid fever in (Igbarese and Ogbole 2018). Field trips were embarked upon for three months from August to September 2020 for medicinal plant species identification. The researchers were accompanied by a field assistant who can identify the plant species in local languages. Six popular and highly patronized traditional healing homes across the three villages surrounding the Omo forest reserve were visited. This was followed by direct observation and collections of herbal plants from the wild. The plants collected were identified by their vernacular names and their scientific equivalent found and documented. Identification of herbs as well as their uses was done with the aid of a book of the tress of Nigeria (Gbele and Soladoye, 2012) while the inventory of available herbs was recorded. The literature on medicinal plants was searched to back up the claims by the traditional practitioners. Also, parts of medicinal plants not readily identifiable were taken to the herbarium at the Department of Forestry and Wood technology, the Federal University of Technology Akure for proper identification. Plant parts mostly leaves were put in the press for proper preservation

Statistical analysis

Data obtained from the field survey were entered into Excel (version 15) spreadsheet before both descriptive (tables, frequency, and percentage frequency, graph, pie, and bar charts). The computer PAST Model version 3 was used to analyze plant species diversity indices,

Results

The result obtained from the study shown that the study area is rich in plant species that are used to treat malaria and typhoid fever in southwest Nigeria. In all, a total of 81 plant species belonging to 42 families were recorded in the study area. The family Asteraceae has a plant diversity of 6 and this is followed by Rubiaceae and Solanaceae family's which have five (5) each Figure 2. The diversity index was higher in the undisturbed compartment (4.414) than the secondary forest compartment (4.364) Table 1. Plant type that is used to treat malaria and typhoid fever indicates that tree species (56) more than the shrubs (25). Figure 3 The pats of the plant species used, the form either dry or fresh and mode it is used Table 2. Checklist of plants that win the was recorded in the study area Table 3

Figure 2: The Family composition of ethnobotanical plant species in the study area

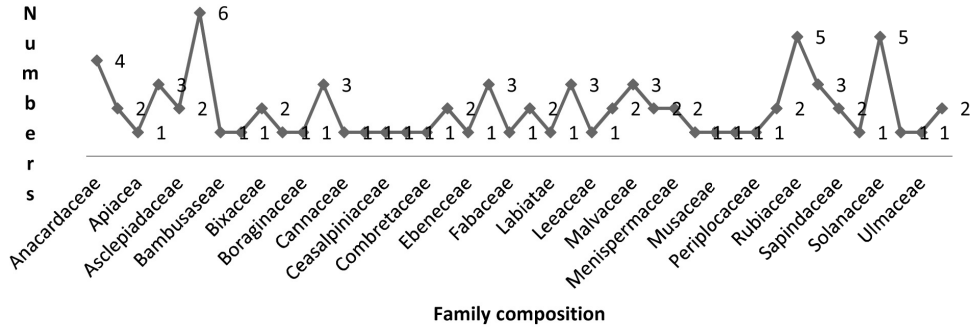


Table1: Diversity index plants species in the plots in the study area

Diversity index	Undisturbed compartment	Lower	Upper	Secondary forest compartment	Lower	Upper
Taxa_S	84	56	68	84	56	69
Individuals	88	88	88	94	94	94
Dominance_D	0.0124	0.01756	0.02428	0.01426	0.01811	0.02784
Shannon_H	4.414	3.887	4.138	4.364	3.844	4.128
Evenness_e^H/S	0.9836	0.8562	0.9295	0.9357	0.8101	0.913
Brillouin	3.482	3.19	3.339	3.479	3.18	3.358
Menhinick	8.954	5.97	7.249	8.664	5.776	7.117
Margalef	18.54	12.28	14.96	18.27	12.11	14.97
Equitability_J	0.9963	0.9619	0.9825	0.985	0.9484	0.9783

Figure 3: Plant Type recorded in the study area

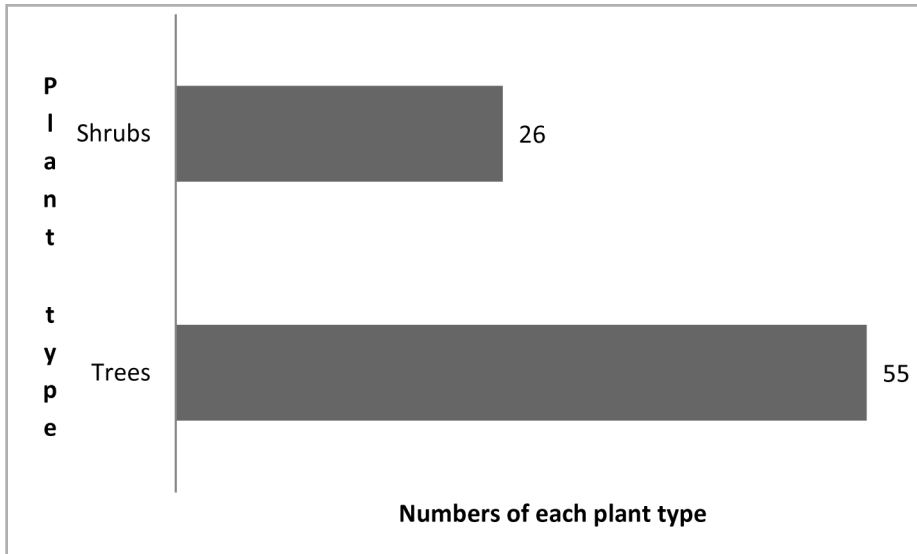


Table 2: Medicinal herbs, parts used, form and the mode of used

Plant species name	Parts used	Form used	Mode of use
Acanthospermum hispidum	leaves	Fresh	Boil with khaya seneganiensis, and dry pawpaw leaves as concoction
Aframomum melegueta	Seeds	Dried seeds	Boil with Anacardium occidentale leaves, Alcornea cordifolia leaves used for vapor bathing
Ageratum conyzoides			Boil leaves is taken orally
Alchornea cordifolia	Leaves	Fresh	Boil with Alstonia boonei bark and dry pawpaw leaves as concoction
Anacardium occidentale	Leaves and bark	Fresh or dried	Leaves and bark boil with leaves and mango

Plant species name	Parts used	Form used	Mode of use
Ananas comosus	Leaves and bark	Fresh and dry	Boil leaves and bark with leaves and fruits of citrus lemon add drink as concoction
Alstonia boonei	Leaves and bark	Fresh and dry	Squeeze fresh leaves in water and drink the extract. Dried leaves can be cooked with soup
Aspilia africana	Leaves	Fresh	Boil with other herbs
Bambusa vulgaris	Apex leaves	Fresh	Squeeze fresh leaves in water and drink the extract.
Blighia sapida	Leaves, bark, and roots	Fresh and dry	Boil leaves and bark with leaves, Dried leaves can be cooked with soup
Bridelia ferruginea	Leaves, bark,	Fresh and dry	
Cajanus cajan	Leaves	Fresh and dry	Boil with other herbs as concoction
Canna indica	Leaves	Fresh and dry	Boil singly and drink the extract
Carica papaya	Leaves	Fresh and dry	Boil with other herbs
Capsicum frutescens	Leaves and fruits	Fresh and dry	Boil with other herbs and drink and use vapor bathing
Ceasalpinia bonduc	Leaves, and roots	Fresh and dry	Cook leaves and roots together and drink
Cassia sieberiana	Leaves, flowers, roots	Fresh	Boil the leaves, bark and flowers together and drink. Also soak the bark and root for 8 hours and drink
Ceiba pentandra	Leaves	Fresh	Boil with other herbs as concoction

Plant species name	Parts used	Form used	Mode of use
<i>Chromolaena odorata</i>	Leaves	Fresh	Boil with other herbs as concoction
<i>Chorchorus litorus</i>	Leaves	Fresh	Boil with other herbs as concoction
<i>Chrysophyllum albidum</i>	Leaves, bark, roots and seeds	Fresh and dry	Squeeze fresh leaves in water and drink the extract. Dried leaves can be cooked with soup
<i>Citrus medica</i> <i>Citrus limon</i>	Leaves and fruits	Fresh	Boil singly and drink the extract
<i>Citrus limon</i>	Leaves and fruits	Fresh and dry	Squeeze fresh leaves in water and drink the extract. Dried leaves can be cooked with soup
<i>Citrus aurantifolia</i>	Leaves and fruits	Fresh	Cook with other herbs and drink the . concoction
<i>Cochlospermum tinctorium</i>	Leaves and seeds	Fresh and dry	Squeeze fresh leaves in water and drink the extract. Dried leaves can be cooked with soup
<i>Cola latertia</i>	Leaves	Fresh and dry	Boil with other herbs as concoction
<i>Combretum reticulatum</i>	Leaves	Fresh and dry	Squeeze fresh leaves in water and drink the extract. Dried leaves can be cooked with soup
<i>Curcuma longa</i>	Fruits	Fresh and dry	Boil singly and drink the extract
<i>Cymbopogon citratus</i>	Leaves	Fresh and dry	Boil singly and drink the extract
<i>Daucus carota</i>	Leaves	Fresh and dry	Boil singly and drink the extract
<i>Diospyros mespiliformis</i>	Leaves	Fresh and dry	Boil singly and drink the extract

Plant species name	Parts used	Form used	Mode of use
<i>Emilia sonchifolia</i>	Leaves	Fresh and dry	Boil with other ingredients and drink
<i>Euphorbia hirta</i>	Leaves	Fresh	Boil singly and drink the extract
<i>Funtumia africana</i>	Leaves	Fresh	Boil singly and drink the extract
<i>Garcinia kola</i>	Leaves, bark, fruits, and roots	Fresh and Dry	Boil singly and drink the extract.
<i>Gongronema latifolia</i>	Leaves	Fresh	Boil singly and drink the extract.
<i>Gossypium barbadens</i>	Leaves and roots	Fresh	Boil singly and drink the extract.
<i>Gossypium hirsutum</i>	Leaves and roots	Fresh and Dry	Boil singly and drink the Extract, Also the roots in water for 12 hours and drink or use to bath
<i>Haematostaphis barberi</i>	Leaves	Fresh and Dry	Boil singly and drink the extract
<i>Harungana madagascariensi</i>	Leaves	Fresh and Dry	Boil singly and drink the extract
<i>Heliotropium indicum</i>	Leaves	Fresh and Dry	Boil singly and drink the extract
<i>Hyptis suaveolens</i>	Leaves	Fresh and Dry	Boil with cashew leaves and drink the concoction
<i>Khaya senegalensis</i>	Leaves, bark and roots	Fresh and Dry	Boil singly and drink the extract
<i>Khaya senegalensis</i>	Leaves, bark and roots	Fresh and Dry	Boil singly and drink the extract
<i>Leea guineensis</i>	Leaves and bark	Fresh and Dry	Boil with cashew leaves and drink the concoction
<i>Mangifera indica</i>	Leaves and bark	Fresh and Dry	Boil with cashew leaves and drink the concoction

Plant species name	Parts used	Form used	Mode of use
<i>Mitragyna inermis</i>	Leaves	Fresh and Dry	Boil singly and drink the extract
<i>Morinda lucida</i>	Leaves	Fresh and Dry	Squeeze the leaves in water and drink the extracts.2.cook with other herbs and drink as concoction.
<i>Musa paradisiaca</i>	Fruits	Fresh	Boil singly and drink the extract
<i>Musa sapientum</i>	Fruits	Fresh	Boil singly and drink the extract
<i>Nauclea latifolia</i>	Leaves	Fresh and Dry	Boil with pap water and drink the extracts
<i>Newbouldia laevis</i>	Leaves	Fresh and Dry	Boil singly and drink the extract
<i>Nicotiana tobacum</i>	Laves	Fresh and Dry	Squeeze fresh leaves in water and drink the extract. Dried leaves can be cooked with soup
<i>Ocimum basilicum</i>	Leaves	Fresh and Dry	Squeeze fresh leaves in water and drink the extract. Dried leaves can be cooked with soup
<i>Ocimum gratissimum</i>	Leaves	Fresh and Dry	Squeeze fresh leaves in water and drink the extract. Dried leaves can be cooked with soup
<i>Parquetina nigrescens</i>	Leaves	Fresh and Dry	Squeeze fresh leaves in water and drink the extract. Dried leaves can be cooked with soup

Plant species name	Parts used	Form used	Mode of use
<i>Parquetina nigrescens</i>	Leaves	Fresh and Dry	Squeeze fresh leaves in water and drink the extract. Dried leaves can be cooked with soup
<i>Paullinia pinnata</i>	Leaves	Fresh and Dry	Squeeze fresh leaves in water and drink the extract. Dried leaves can be cooked with soup
<i>Pennisetum purpureum</i>	Leaves	Fresh	Boil singly and drink the extract
<i>Pergularia daemi</i>	Leaves	Fresh	Boil singly and drink the extract
<i>Piliostigma thonningii</i>	Leaves	Fresh and Dry	Boil singly and drink the extract
<i>Pseudocedrella kotschyi</i>	Leaves	Fresh and Dry	Squeeze the leaves in water and drink the extracts.
<i>Pycnanthus angolensis</i>	Leaves and bark	Fresh and Dry	Squeeze the leaves in water and drink the extracts. Squeeze dry leaves inn a soup eat
<i>Physalis angulata</i>	Leaves and seeds	Fresh and Dry	Squeeze the leaves in water and drink the extracts. Soak the dry leaves in palmwine for 6 hours and drink
<i>Rauvolfia vomitoria</i>	Leaves, bark and root	Fresh and Dry	Squeeze the leaves in water and drink the extracts. Soak the dry leaves in palmwine for 6 hours and drink
<i>Sarcocephalus latifolius</i>	Leaves	Fresh and Dry	Boil the fresh leaves or dry leaves in water and drink

Plant species name	Parts used	Form used	Mode of use
Senna podocarpa	Leaves and seeds	Fresh and Dry	Boil singly and drink the extract
Senna siamea	Leaves and flowers	Fresh and Dry	Cook with Xylopia ethiopia leaves and seeds and drink when hot
Sida acuta	Leaves	Fresh	Boil the fresh leaves in water and drink
Solanum lycopersicon	Fruits	Fresh	Boil singly and drink the extract
Solanum nigrum	Leaves and fruits	Fresh	Boil with pap water and drink the extracts
Sphenocentrum jollyanum	Leaves	Fresh and Dry	Boil with pap water and drink the extracts
Synclisia scabrida	Leaves	Fresh and Dry	Soak in water for 8 hours drink the extract.
Trema orientalis	Leaves	Fresh and Dry	Boil with pap water and drink the extracts.
Tithonia diversifolia	Leaves	Fresh and Dry	Soak in water or pap water for 8 hours and drink the extract
Vernonia amygdalina	Leaves	Fresh and Dry	Soak in water or pap water for 8 hours and drink the extract
Vigneasu bterranea	Leaves	Fresh and Dry	Boil singly and drink the extract
Xylopia aethiopia	Leaves and seeds	Fresh and Dry	Cook with other herbs and add pepper and fish and drink when hot

Table 3, Checklist of Ethnobotanical plant species in the study area

Name of Plant Species	Family	Parts used	Uses
<i>Acanthospermum hispidum</i>	Compositae	Leaves	Malaria , Typhoid fever
<i>Aframomum melegueta</i>	Zingiberaceae	Seed	Malaria
<i>Ageratum conyzoides</i>	Asteraceae	Leaves	Malaria
<i>Alchornea cordifolia</i>	Euphorbiaceae	Leaves	Malaria , Typhoid fever
<i>Anacardium occidentale</i>	Anacardiaceae	Leaves and bark	
<i>Ananas comosus</i>	Anacardiaceae	Leaves	Malaria
<i>Alstonia boonei</i>	Apocynaceae	Leaves and bark	Malaria , Typhoid fever
<i>Aspilia africana</i>	Asteraceae	Leaves and bark	Malaria
<i>Bambusa vulgaris</i>	Bambusaceae	Aex shoots	Malaria
<i>Blighia sapida</i>	Sapindaceae	Leaves, bark and roo	Malaria
<i>Bridelia ferruginea</i>	Euphorbiaceae	Leaves and bark, roots	Malaria
<i>Cajanus cajan</i>	Fabaceae	Leaves	Malaria
<i>Canna indica</i>	Cannaceae	Leaves	Malaria , Typhoid fever
<i>Carica papaya</i>	Caricaceae	Leaves	Malaria , Typhoid fever
<i>Capsicum frutescens</i>	Solanaceae	Leaves and fruits	Malaria
<i>Ceasalpinia bonduc</i>	Ceasalpiniaceae	Leaves and roots	Typhoid
<i>Cassia sieberiana</i>	Asteraceae	Leaves and bark	Malaria
<i>Ceiba pentandra</i>	Bombacaceae	Leaves	Typhoid
<i>Chromolaena odorata</i>	Leguminosae	Leaves	Malaria
<i>Chorchoruso litorus</i>	Bixaceae	Leaves	Malaria

Name of Plant Species	Family	Parts used	Uses
Chrysophyllum albidum	Sapotaceae		Typhoid
<i>Citrus medica</i>	Rutaceae	Leaves and fruits	Typhoid
Citrus limon	Rutaceae	Leaves and fruits	Malaria
Citrus aurantifolia	Rutaceae	Leaves and fruits	Malaria , Typhoid fever
Cochlospermum tinctorium	Bixaceae	Leaves	Malaria
Cola latertia	Sterculiaceae	Leaves	Malaria
Combretum reticulatum	Combretaceae	Leaves and seeds	Malaria
Curcuma longa	Zingiberaceae	fruit	Malaria
Cymbopogon citratus	Poaceae	Leaves	Malaria
Daucus carota	Apiacea	Leaves	Malaria
Diospyros mespiliformis	Ebeneceae	Leaves	Malaria
Emilia sonchifolia	Asteraceae	Leaves	Malaria Typhiod fever
Euphorbia hirta	Euphorbiaceae	Leaves	Malaria
Funtumia africana	Apocynaceae	Leaves	Malaria
Garcinia kola	Clusiaceae	Leaves and fruits	Malaria Typhoid fever
Gongronema latifolia	Asclepiadaceae	Leaves	Malria
Gossypium barbadens	Malvaceae	Leaves and roots	Malaria, Typhoid fever
Gossypium hirsutum	Malvaceae	Leaves and roots	Malaria
Haematostaphis barteri	Anacardiaceae	Leaves	Malaria
Harungana madagascariensi	Hypericaceae	Leaves	Malaria

Name of Plant Species	Family	Parts used	Uses
Harunganamada gascariensis	Hypericaceae	Leaves	Malaria
Heliotropium indicum	Boraginaceae	Leaves	Malaria
Hyptis suaveolens	Labiatae	Leaves	Malaria
Khaya senegalensis	Meliaceae	Leaves and bark	Typhoid
Khaya senegalensis	Meliaceae	Leaves, bark and roots	Typhoid
Leea guineensis	Leeaceae	Leaves and bark	Typhoid
Mangifera indica	Anacardaceae	Leaves and bark	Malria Typhoid Fever
Melicia excelsa	Moraceae	Leaves and bark	Malria Typhoid Fever
Mitragyna inermis	Rubiaceae	Leaves	Malria
Morinda lucida	Rubiaceae	Leaves	Malaria
Musa paradisiaca	Musaceae	Leaves	Malaria
Monadora myristica	Annonaceae	Leaves and seeds	Malaria, Typhoid fever
Musa sapientum	Asteraceae	unripe fruits	Malaria
Nuclea latifolia	Rubiacea	Leaves	Malaria
Newbouldia laevis	Bignonaceae	Leaves	Malaria
Nicotiana tobacum	Solanaceae	Leaves	Malaria
Ocimum basilicum	Lamiaceae	Leaves	Malaria
Ocimum gratissimum	Lamiaceae	Leaves	Malaria
Parquetina nigrescens	Lamiaceae	Leaves	Malaria
Parquetina nigrescens	Periplocaceae	Leaves	Malaria
Paullinia pinnata	Sapindaceae	Leaves	Malaria
Pennisetum purpureum	Poaceae	Leaves	Malaria
Pergularia daemi	Asclepiadaceae	Leaves	Malaria
Piliostigma thonningii	Caesalpinaceae	Leaves	Malaria

Name of Plant Species	Family	Parts used	Uses
<i>Pseudoecdrella kotschy</i>	Rubiaceae	Leaves	Malaria
<i>Pycnanthus angolensis</i>	Myristicaceae	Leaves	Malaria
<i>Physalis angulata</i>	Solanaceae	Leaves and seeds	Malaria
<i>Rauvolfia vomitoria</i>	Apocynaceae	Leaves	Malaria
<i>Sarcocephalus latifolius</i>	Rubiaceae	Leaves	Malaria
<i>Senna podocarpa</i>	Caesalpiniaceae	Leaves and flowers	Malaria,
<i>Senna siamea</i>	Caesalpiniaceae	Leaves	Malaria
<i>Sida acuta</i>	Malvaceae	Leaves	Malaria
<i>Solanum lycopersicon</i>	Solanaceae	Fruits	Malaria
<i>Solanum nigrum</i>	Solanaceae	Leaves and fruits	Malaria
<i>Sphenocentrum jollyanum</i>	Menispermaceae	Leaves	Malaria
<i>Synclisia scabrida</i>	Menispermaceae	Leaves	Malaria
<i>Trema orientalis</i>	Ulmaceae	Leaves	Malaria
<i>Tithonia diversifolia</i>	Compositae	Leaves	Malaria, Typhoid fever
<i>Vernonia amygdalina</i>	Asteraceae	Leaves	Malaria, Typhoid fever
<i>Vigneasu bterranea</i>	Asteraceae	Leaves	Malaria, Typhoid fever
<i>Xylopia aethiopica</i>	Annonaceae	seeds	Malaria

Discussion

The result obtained indicates that the study area is rich pant species that is used to treat malaria fever and typhoid in southwest Nigeria. In all, a total of eighty-one (81) Plant species belonging to 41 families was recorded in the study area. These findings consist of other studies such as (Sodipo, and Wannang, 2015). on the use of forest plants to treat some tropical diseases.

It is also consistent with the work of several researchers who carried similar ethnobotanical surveys in Nigeria. 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.

The result has also shown that leaves, the bark of the trees were mostly used. The leaves of these plants were used singly or in combination with other herbal materials in the fresh or dried forms which are either in the combination of other herbal roots, flowers, and gum of other plant species Table 2. The mode of application is mostly oral by drinking the extracts or concoctions or vapor bathing. However, the dosage levels and the quantities harvested at a time are not measured.. The treatment could be repeated till the person be treated is healed

The development of tourist capacities based on natural resources is a long-term process.

Therefore, the evaluation of ethnobotanical surveys becomes very important. Sustainable tourism represents a type of approach that incorporates within itself the preservation and enhancement of natural resources and increases the value of local cultural characteristics and traditions. Thus this survey will of ethnobotanical medicinal herbs is very vital medicinal plants are widely accepted by Nigerians and most residents depend on them for a livelihood (Onimhawo, *et ai*, 2014)

Tourism developed based on medicinal herb increasingly popular in several developed countries, especially as a part of alternative medicine. This results in a growing demand for medicinal herbs, which, in consequence, may lead to excessive use of this resource in natural habitats and, consequently, to the extinction of some species (Ratknić *et al.*, 2011).

The abundance of medicinal and related species, represented in the diverse flora of the Omo forest reserve, offers large possibilities for their rational use. However, careless, irresponsible, and, most frequently, unskilled collection of wild medicinal herbs in the last few decades has contributed to the destruction and excessive reduction of numerous valuable species in their natural habitats. This also may be due to the lack of participation of interested parties in the decision-making process. (Samardžić, 2014).

The local population that collects herbs for sale most commonly receives financial compensation for the unprocessed herb material. Most wild species, medicinal species, in particular, are still to be collected in the wilderness, which means that it is very huge potential when sustainable development practiced

Conclusion and recommendation

The research has shown that southwest Nigeria has a great potential for plant species used to treat malaria and typhoid fever. Health and wellness tourism has grown throughout the world and includes the consumption of much traditional medicine. Owing to its medicinal history, India and Nigeria has significant potential for promoting traditional medicine as a consumer product for local consumption, as an export product, and as a tourism resource. It is clearly one of the most important elements of these countries intangible heritagescape that is worthy of additional consideration by tourism developers. Based on this research study many local residents can establish herbal gardens that will enhanced a sense of familiarity with local biodiversity and its conservation, especially herbal plants. The traditional use of herbal health remedies will provides significant nutritional, economic, and ecological benefits for rural communities through tourism. Environmental and management problems are imminent such as deforestation barking of trees, defoliation of plant leaves, and overexploitation, hence efforts should be made to educate the residents on the sustainable harvest. Efforts management plans should be set up to train loal residents on the need to cultivate most of these plants around their homes and farms to reduce damages done to the forest reserve The government should set up a mechanism to integrate alternate medicine which is the use of wild herbs with orthodox medicine. This will improve the sustainable use of these wild plants and create an efficient method of collecting extract from the plant species. It is also common knowledge that the safety of most herbal products is further compromised by lack of suitable quality controls, inadequate labeling, and the absence of appropriate patient information

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