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Used for the Treatment of Malaria in Kiyawa  
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## ETHNOBOTANICAL ASSESSMENT OF MEDICINAL PLANTS USED FOR THE TREATMENT OF MALARIA IN KIYAWA TOWN, JIGAWA STATE NIGERIA

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**ABSTRACT:** The aim of this study was to make an inventory of medicinal plants for the treatment of malaria and examine how people used them to treat the disease in Kiyawa Town, Jigawa State, with a view to providing benchmark information for health practitioners and policy makers to enhance the medical system in the State. Snowball sampling technique was used to select a total of nine respondents (four traditional healers and five herbalists). Structured interview was conducted to elicit information on the type of species used for the preparation of remedies for malaria treatment and methods of administration and preparations of the remedies. Findings of this study showed that seven plants are widely used for malaria treatment in the study area. The study also found that *Senna occidentalis* and *Azadirachta indica* are used commonly for the treatment of malaria. The remedies were administered orally as decoction of leaves and bark of plants. In conclusion, this study found that people are increasingly using plants to treat malaria due to increasing resistance of *Plasmodium falciparum* against the widely available antimalarial drugs. This study recommended that integrated research should be conducted in this field because traditional knowledge is continuously changing, evolving and adapting to the new social and environmental conditions in the area.

**Keywords:** trees, status, herbalists, malaria, remedies

### 1. INTRODUCTION

Malaria is one of the major fatal diseases in the world. The disease is endemic in many countries of the world. Hence more than half of the world population are at risk (World Health Organisation, WHO, 2003). About 350-500 million suffer from the disease annually out of which 1.1 million deaths occur per year (WHO, 2013). Malaria is still an ever-continuing endemic disease that claims hundreds of thousands of lives in the tropical and subtropical countries each year, and the majority of the malarial deaths are due to *Plasmodium falciparum*. The majority of these disease cases and deaths occur in sub-Saharan Africa where the disease is endemic (Greenwood, 2002).

In spite of control programmes in many countries there has been very little improvement in the control of malaria

which leads to both economic and human loses. Control of malaria is complex. Various factors including the appearance of drug resistant strains of *Plasmodium* (Srisilam and Veersham, 2003), the discovering that man may become infested with species of simian (monkey) malaria (Symth, 1994) as well as financial stress. Infact, monetary loss due to malaria in Nigeria is estimated to be about 132 billion Naira in terms of treatment cost, prevention and loss of man-hours (Federal Ministry of Health, 2007). Thus it is important to search for new anti-malarial compounds, either synthetic or natural compounds that kill either the vector or parasite.

The constant evolution of the malaria parasite has rendered the cheapest and most widely available antimalarial treatment ineffective, more so with their

centre ports about increasing resistant of plasmodium falciparum to artemisinin based compounds (Hut, 2009). Literature is replete with ethnobotanical survey and its important in the identification, selection and development of the therapeutic agents for malaria and other diseases. Prakash and Unnikrishnan (2013) reported that the five most frequently cited species were *Piper nigrum* L., *Allium sativum* L., *Leucas aspera* (Willd.) Link, *Azadirachta indica* A. Juss. and *Ocimum tenuiflorum* L. in Karnataka, India.

In Southwestern Nigeria, studies have been carried out to document utilization of phytochemicals for treatment of fevers (Ajaiyeoba et al., 2006). Etkin (1997) also documented antimalarial plant used by the Hausa in Northern Nigeria. But these are not enough as malaria is taking its toll in Kiyawa which suffers from the disease and increasing resistance of *Plasmodium falciparum* against the widely available antimalarial drugs.

Previous ethnobotanical studies confirm the rational use of plant recipes by different people or groups from different communities for medicine (Etukudo, 2003). With increasing global momentum for management of malaria through natural medicines (Prakash and Unnikrishnan, 2013), this study was carried with a view to documenting traditional antimalarial plants in Kiyawa Town, Jigawa State. One of the major advantages of choosing plants as the starting point in drug development through ethnobotanical survey is that the active constituents of such plants which have undergone long-term use by man are likely to be safer than the active compounds isolated from plants with no history of ethnomedical use (Fabricant and Farnsworth, 2001).

## 2. MATERIALS AND METHODS

### 2.1 Study Area

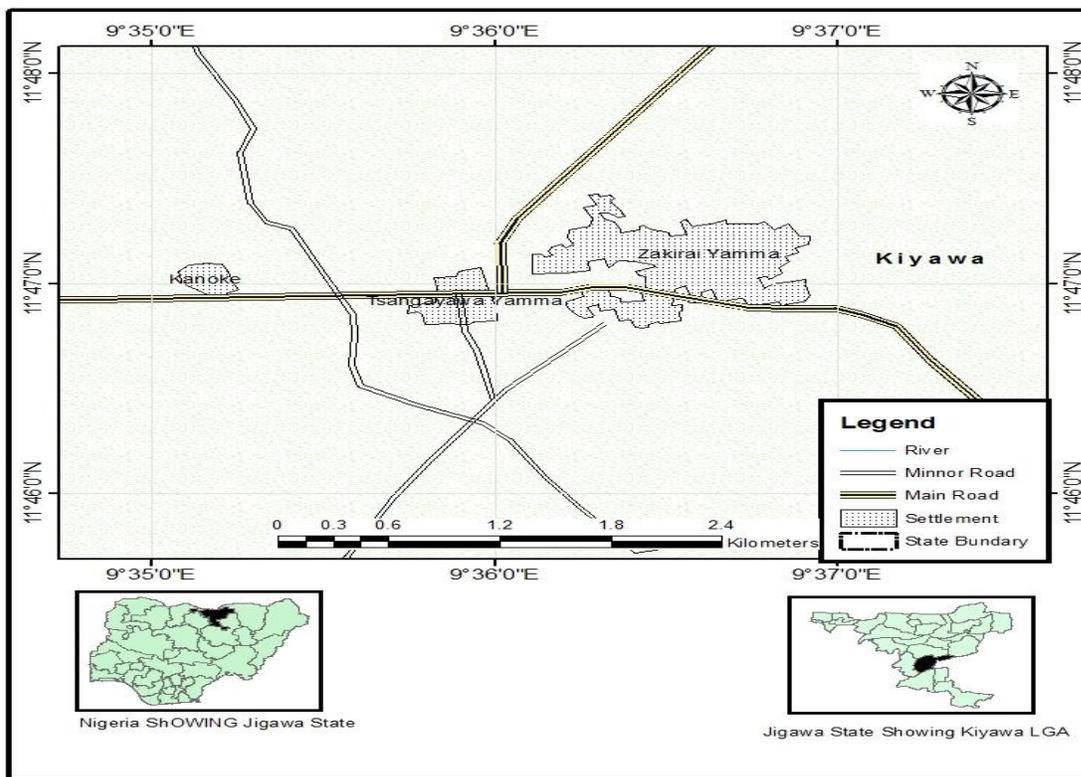
Kiyawa town is located in Jigawa State, Northwestern Nigeria. It is located between Latitude 11°47'05'' and 11°48'02'' and Longitude 9°35'00'' and 9°38'04''. The estimated population of Kiyawa is put at 200,845 inhabitants with the area majorly populated by Hausa and Fulani ethnic groups. Kiyawa has an average temperature

of 34°C and witnesses two major seasons namely wet and dry coded as Aw in the Koppen's classification. Seasonal variation in rainfall is directly influenced by the interaction of two air masses: the relative warm and moist tropical maritime (mT) air mass, which originates from the Atlantic Ocean associated with Southwest winds in Nigeria; and the relatively cool, dry and stable tropical continental (cT) air mass that originates from the Sahara Desert, also associated with the dry, cool and dusty North-East Trades known as the Harmattan (Abaje, Achiebo, and Matazu, 2018). The boundary zone between these two air masses is called the Inter Tropical Discontinuity Zone (ITDZ). The movement of the ITDZ brings about two main seasons which are the dry season, which starts from November of one calendar year to March of the next year and the wet season which starts from April to October.

The natural vegetation of the area is characterized by moderately tall grasses and shrubs and scattered woody trees. Indigenous trees found include *Parkia biglobosa*, *Phoenix dactylifera*, *Adansonia digitata*, *Faidherbia albida*, *Tamarindus indica*, and *Borassus aethiopicum* while *Azadirachta indica* is an exotic species that grow spontaneously and serve many purposes in the area. However, due to high level of human activities, it is difficult to claim the existence of natural vegetation in the area.

### 2.2 Data Collection Procedures

This study is a survey type which involved respondents from traditional healers and herbalists. Snowball sampling technique was used to select nine respondents which comprises of eight males and one female herbalist who has been practising for 29 years. Interview was conducted with the respondents on the wild, cultivated or bought medicinal plants that had been traditionally used in the area for the treatment of malaria, and whether they still use or abandoned them. Local names of the plants and how they are collected, conserved, prepared, and administered were also asked. Verbal discussions with the respondents were carefully recorded and logged. Data collected was sorted, coded and analysed using thematic analysis technique.



Source: Cartography Lab Geography Department BUK(2018)

Figure 1: Map of Kiyawa Town, Northern Nigeria

### 3. RESULT AND DISCUSSION

#### 3.1 Biotic Diversity of Plants Used for the Treatment of Malaria

Diversity here entails varieties of all plants found in the study area. As indicated the study area is endowed with varieties of species used for traditional healing. The use of plants for the treatment of malaria has been established in the area. Seven plants were reportedly used by the respondents for the malaria treatment in Kiyawa Town (Table 1).

Table 1: Locally Available Plants used for the Treatment of Malaria

Plant Type	Location names	Conservation Status
<i>Senna occidentalis</i>	Rai dore	Decreasing
<i>Azadirachta indica</i>	Maina	Stable
<i>Cassia singueana</i>	Runhu	Threatened
<i>Magnifera indica</i>	Magwaro	Stable
<i>Boscia salicifolia</i>	Anza	Threatened
<i>Khaya senegalensis</i>	Madaci	Decreasing
<i>Commiphora kerstingii</i>	Ararrabi	Decreasing

It has been found that traditional herbalists operate closer to the people, taking advantage of the biodiversity of plant species in such areas to cure various diseases and ailments. This shows that not all species but those tested by people as having the potential of curing malaria are used in the area. This finding is in line with Etkin (2002) who reported that *Azadirachta indica* and *Magnifera indica* are commonly used in Hausaland as antimalarial remedy for *Plasmodium falciparum*. Different parts of *Azadirachta indica* and *Khaya grandifoliola* (Meliaceae) are also used in West Africa for traditional preparations to treat malaria (Lifongo et al., 2014). *Azadirachta indica*, *Khaya senegalensis* and *Magnifera indica* have been listed as priority species in the study area. The variations observed in the location found and conservation status of these species provides opportunities for development of varieties of local breeding techniques.

#### 3.2 Methods of Administration of Remedies Used for Malaria Treatment

Several methods are available for preparation of herbal remedies in the study area. It has been noted that various

plants parts have been used through for different indications in the study area. This study found that only bark and leaves are used by people of the area to prepare remedies for malaria (Table 2). These remedies are

administered orally although products such as honey and red potash are added in the decoction/concoction depending on the methods used by the herbalist.

**Table 2: Mode of Administration of Herbal Remedies**

Plant Name	Preparation form	Route of Administration	Part used
<i>Azadirachta indica</i>	Pounded and soaked	Oral	Leaf and bark
<i>Boscia salicifolia</i>	Concoction	Oral	Leaf
<i>Cassia singueana</i>	Concoction	Oral	Leaf
<i>Khaya senegalensis</i>	Boiling	Oral	Leaf and bark
<i>Magnifera indica</i>	Boiling	Oral	Leaf
<i>Senna occidentalis</i>	Boiling	Oral	Leaf
<i>Commiphora kerstingii</i>	Decoction	Oral	Leaf

This study corroborates Davies (1994) which reported that the bark of the *Azadirachta indica* is perceived to be effective in the treatment of malaria in various parts of West Africa. In line with WHO (2008) artemisinin is extracted from the Chinese herbal wormwood plant *Artemisia annua* which is the basis of more effective antimalarial drugs in the world today. Mudi and Bukar, (2011) reported the anti-plasmodia effects of the leaf extracts of *Calotropis procera*. Mohammed, Danjuma, and Abdulkarim, (2015) also reported the use of *Azadirachta indica* to treat malaria in Kano Metropolis.

Oral administration of drugs is found in various studies to be famous among all routes of administering herbal drugs (Shinkafi, Bello, Hassan, and Ali, 2015). In-depth discussions with the traditional healers further revealed that even when the healers prescribe treatment to their patients, only the traditional doctor can prepare it through concoction, boiling, and soaking of leaves and bark to the patients.

### 3.3 Sources Herbal Ingredients

Herbal medicines are mostly obtained from various sources including but not restricted to repositories of herbal practitioners, farms, bush and pharmacy or markets. Findings of this study depicted that the majority of the respondents (about 46 percent) obtained herbal products for medicine forest, only 10 percent obtained products from market (Figure 2). This signifies that most users have much knowledge about the products used in herbal medicine and therefore can source it.

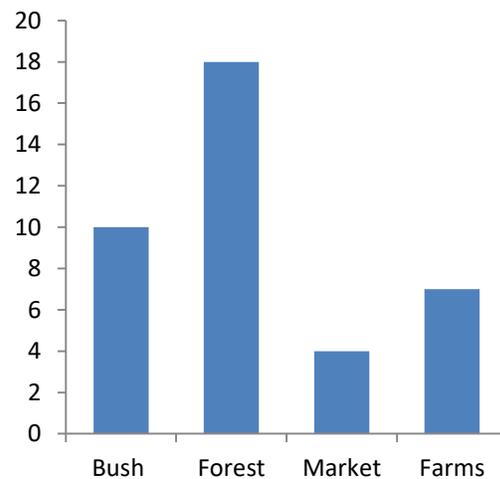


Figure 2: Sources of products for herbal medicine

## 4. CONCLUSION

The following are made from this study;

1. Plants have remained the most affordable and easily accessible source of treatment in the healthcare system of Kiyawa Town.
2. The number of plants used for the treatment of malaria is growing though pharmacopoeia of the town had not been compiled yet.
3. The documentation of traditional medicinal plants used by the people in the study is effective done in the town. Hence, this study concluded that thorough documentation of medicinal plants used by different cultures of the area is necessary.

4. The documentation on medicinal plant uses has concurred with other studies conducted in different cultural setups and locations; hence, it could be a lead for future phyto-chemical and pharmacological studies.

## 5. RECOMMENDATIONS

1. The Ministry of Health should provide uniform training or training in general of traditional medical practitioners with a clearly defined organizational framework within which traditional healers should operate.
2. The study also recommended that screening of all plants be carried out by NAFDAC and related agencies in order to justify their local usage provide future promising phyto-therapeutics for the treatment of malaria.

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