
ASSESSMENT OF SOME TRADITIONAL MEDICINAL PLANTS IN THE RAIN FOREST REGION OF CROSS RIVER STATE, NIGERIA

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Abstract

This study aimed at documenting some plants used for trado-medicinal purposes in the rain forest region of Cross River State. Three local government areas and twelve communities were randomly selected for this study. The data for this study was collected through a semi- structured questionnaire and personal interviews with trado-medicinal plants users in the study area. A random sampling technique was adopted to select respondents within each community. A compiled checklist of these plants including their botanical names, families, parts used, medicinal uses, and local name were documented. The study also identified habitat destruction (59.60%) and over-harvesting (22.2%) as major challenges facing the conservation of medicinal plants in the study area. The study also revealed that 88.15% of respondents used medicinal plants to treat common diseases, mostly malaria (45.74%) and typhoid (26.54%). These plants belong to 65 species and 36 families. The most commonly used plant parts were leaves (34.06%) and barks (32.55%). Decoction (45.41%) and infusion (32.72%) were the most common methods of preparation. Findings of the study showed that the knowledge of trado-medicinal plants is being passed down mainly through family and relatives, and also highlighted the importance of traditional medicinal plants in the healthcare system of the respondents. It is noted that preservation and integration of medicinal plants into the healthcare system, as well as sustainable harvesting and conservation practices will ensure the continuous availability of these valuable resources.

Key words: Traditional medicine, Ailment, Medicinal plants, Medicine.

Introduction

Medicinal plants constitute an effective source of both traditional and modern medicine. These plants have been shown to have genuine utility and about 80% of the rural population depends on them as primary health care (Osuchukwu *et al.* 2017). Plants have been used as sources of remedies for the treatment of many diseases since ancient times and people of all continents especially Africa have this old tradition. Despite the remarkable progress in synthetic organic

medicinal products of the twentieth century, over 25% of prescribed medicines in industrialized countries are derived directly or indirectly from plants. However, plants used in traditional medicine are still understudied (Abera, 2014).

For clear understanding of this concept, the knowledge of ethnobotany is essential. Ethnobotany is the study of how people of a particular region make use of indigenous (native) plants. Since the earliest origins,

humans have depended on plants for their primary needs and existence. The use of medicinal plants plays an important role in daily health care in most rural areas, including many ethnic groups in Nigeria, local plant medicine remains more popular than western medicine (Abera, 2014). Rural communities prefer herbal or traditional medicine to contemporary medicine and rely mainly on herbal medicine for the treatment of various diseases and illnesses.

Currently, many people in developed and developing countries are turning to alternative and/or complementary medicines, which include traditional medicinal plants (TMPs) for treatment and management of their health conditions (Boardman *et al.*, 2020). These conditions range from minor ailments such as coughs and colds to major communicable and non-communicable diseases. The United Nations and other major public health stakeholders have declared Noncommunicable Diseases (NCDs) as a cause for global concern (Adeloye *et al.*, 2021; WHO, 2021). There is a high economic burden resulting from hypertension and associated cardiovascular complications in Nigeria (Adeniji, 2021). This adversely affects developing countries such as Nigeria due to its limited healthcare budgets. Patients, therefore, turn to alternative and/or complementary therapies seeking affordable healing (Ita & Offiong, 2013). Large numbers of diabetic and hypertensive patients use them in addition to their prescribed drugs for management of their diseases (Adeniyi *et al.*, 2021)

Indigenous knowledge involving the use of medicinal plants for healing is progressively fading out because of a lack of proper record-keeping and modernisation (Gakuya *et al.*, 2020). Knowledge is usually transmitted verbally from generation to generation without proper documentation (Gakuya *et al.*, 2020). Contributory threats to erosion of knowledge of some of these valuable herbal plant resources include unscientific mode of collection, lack of sensitisation in harvesting, regulations and conservation, deforestation, uncontrolled exploitation, transferring of herbal healers to other jobs and environmental degradation (Abera, 2014). There is, therefore, the dire need to preserve this endangered and valuable knowledge before they disappear completely by ensuring accurate documentation, preservation and sharing of the traditional knowledge across communities (Kassim *et al.*, 2016). Indigenous knowledge of medicinal plants by traditional healers is significant for healthcare delivery in rural communities, and may serve as leads for the discovery and production of new drugs with alternative mechanisms of action. Hence, proper documentation of indigenous knowledge is vital to help researchers to investigate and characterise herbal plants with active ingredients for treating chronic ailments and for the benefits of humanity (Abera, 2014).

While most urban communities depend on conventional medicine (because of modernisation and civilisation) to meet their health needs, majority of rural communities still depend on traditional medicine (Jimam *et al.*, 2015). This over-reliance on

traditional medicine by local communities is because it is a major component of the custom, ethos or tradition of the people who use it. Secondly, traditional medicine is economical, and many pharmaceutical drugs are not affordable by the majority of poor people in local communities. For example, it is estimated that only about 20% of malaria cases are treated in the primary healthcare centre (PHCs) in Nigeria because primary healthcare facilities for malaria management are very limited in rural areas (Jimam *et al.* 2015). The Primary Healthcare Center is the entry point into the healthcare sector of Nigeria and is aimed at providing healthcare services in rural communities. On the positive side, the diversity and richness of the African flora serve as a reservoir and almost inexhaustible source of therapies for a lot of ailments. Africa has rich biodiversity resources with about 45,000 species of plant, out of which 5000 species are used for medicinal purposes and many remain untapped (Afolayan *et al.*, 2014). Unfortunately, these natural resources and their associated indigenous or traditional ecological knowledge are being threatened by cultural and environmental changes, thus, highlighting the need for the preservation of local knowledge and medicinal plants in the natural ecosystems. This can be achieved partly through studying and documentation of these plants. This study, therefore, sought to explore and document the indigenous knowledge of plants of traditional medicine in the rainforest region of Cross River State, Nigeria.

Materials and methods

The study was carried out in the rainforest region of Cross River State, Nigeria. Cross River State covering four ecological zones namely lowland rainforest, fresh water swamp forest, mangrove forest and montane forest. The rainforest region covers the southern part of the state and characterized by high rain fall, lush vegetation, and high biodiversity. It is the largest of much of the state tropical high forest remaining in West Africa. This region is found in Southern Local Government Areas such as Akpabuyo, Akamkpa, Biase, Calabar South/Municipal and Odukpani etc. For the purpose of this study, three Local Government areas were selected namely Akpabuyo, Akamkpa and Odukpani Local Government Areas. Cross River State is located between latitudes $4^{\circ} 34^1$ and 59.99 North and longitudes $8^{\circ} 24^1$ and 59.99^{11} East (Fig. 1). It is highly endowed with numerous forest reserves and community forests. It has a landmass of $23,000\text{km}^2$ with large expanse of vibrant tropical rainforest and highly fertile soil. It shares boundaries with Benue State to the north, Ebonyi and Abia States to the west, to the east by Cameroon Republic and to the south by Akwa-Ibom and the Atlantic Ocean (Fig.1). The people's main source of livelihood is subsistence agriculture, basically farming of cassava, yams, oil palm trees among others. This region, characterised by its unique geographical, cultural, and socio-economic features, offers a rich context for understanding the factors influencing maternal health practices (Etim & Akpan, 2018). Cultural diversity is a hallmark of this region, with a mosaic of ethnic groups contributing to the vibrant

cultural tapestry (Ojong, 2016). Each community within the state has its distinct customs, traditions, and beliefs, which may significantly impact maternal health

practices. Understanding these cultural nuances is imperative for designing interventions that align with local values and norms (Etim, 2019).

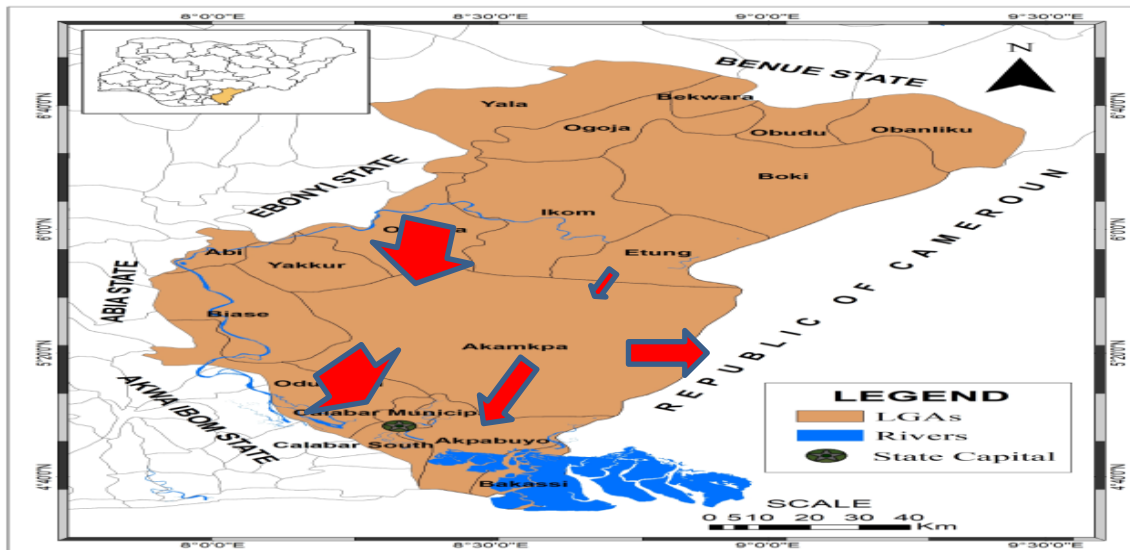


FIG. 1: Map of Cross River State showing the study areas
Source: Nigeria Geological Survey Agency (2024)

Sampling technique

A multi-stage sampling procedure was used for the selection of the studied LGAs, communities and households.

Stage 1: Purposive selection of Local Government Areas: Three Local Government Areas were selected for the purpose of this research and they were Akamkpa, Akpabuyo and Odukpani LGAs.

Stage 2: Random Selection of Communities: In this stage of the sampling process, four communities were selected from each local government area bringing the total number of selected communities to (12) twelve (Table 1).

Stage 3: Selection of Households:

Households were selected using a systemic random sampling technique. Verbal consent was sought from informants in each selected community before administering questionnaires. The attention of the community heads was drawn to the objective of this research and a purposive selection of three traditional medicine practitioners under recommendation from the community heads was done. The study population comprised respondents between the ages of 16 and above 66 years residing in the study areas.

Table 1: Projected population of the selected communities

| Communities | Population (1991) | Estimated population (2024) 2.4% growth rate | Population Proportion | Sample size for Communities (Respondents) |
|-------------|-------------------|--|-----------------------|---|
| Old Ekuri | 905 | 1562 | 0.065 | 39 |
| Iko Esai | 2693 | 4647 | 0.193 | 116 |
| Akor | 2064 | 3561 | 0.148 | 89 |
| Osomba | 680 | 1173 | 0.049 | 29 |
| Ikot Ekpo | 1519 | 2621 | 0.109 | 65 |
| EsukOkon | 591 | 1020 | 0.042 | 25 |
| Ine Ekpo | 247 | 426 | 0.018 | 11 |
| AkwaObutong | 406 | 701 | 0.029 | 17 |
| Atan Eki | 1541 | 2659 | 0.110 | 66 |
| IdimNdom | 901 | 1555 | 0.065 | 39 |
| NdomNwang | 1156 | 1995 | 0.083 | 50 |
| EsukIdot | 1259 | 2172 | 0.090 | 54 |
| | | 24091 | | 599 |

Source: National population commission (2006)

Sample size determination

The sample size for this study was determined by using Cochran's (1963)

The formula stated thus;

$$n = \frac{Z^2 P q}{E^2}$$

$$n = \frac{Z^2 x P x (1 - P)}{E^2}$$

Where:

n = is the required sample size. Z = is the Z-score corresponding to the desired confidence level (1.96 for a 95% confidence level). $P = 84.6\% = 84.6/100 = 0.846$ (Population prevalence proportion of the use of medicinal plants in Cross River State.) E = is the desired margin of error at 0.03 (3%).

Substitute these values into the formula:

$$n = \frac{Z^2 X P X (1 - P)}{E^2}$$

$$n = \frac{(1.96)^2 X 0.846 X (1 - 0.846)}{(0.03)^2}$$

$$n = \frac{3.1523 X 0.154}{0.0009}$$

$$n = \frac{0.4853}{0.0009}$$

$$n = 539.2$$

Approximatel

y, $n = 539$ participants

Non-response Rate (nR) at 10% = $\frac{n}{1-nR} = (10/100 = 0.1)$

$$nR = \frac{539}{1 - 0.1}$$

$$\begin{aligned} &= \frac{539}{0.9} \\ &= 598.89 \sim 599 \\ &= 599 \text{ Respondents} \end{aligned}$$

Sample intensity refers to the proportion of the target population that was sampled. It is calculated using the formula:

$$\begin{aligned} \text{Sample Intensity (\%)} &= \\ &(\text{Sample Size/Total Population}) \times 100 \\ \text{Total Estimated Population (2024):} & 24,091 \\ \text{Total Sample Size:} & 599 \text{ respondents} \\ \text{Sample Intensity} &= (599/24,091) \times 100 = \\ & 2.486 \approx 2.5\%. \end{aligned}$$

Data Collection

Data were collected through face-to-face interviews with traditional medicine users in the study area, respondents were residents in the study area, aged 16 and above. The information gathered included local names of plants, parts of plants used in traditional medicine, perceived ailments treated by residents with traditional medicine, method of preparing traditional medicine, mode of administration and doses etc. The study excluded non-residents of the study area and those who were unwilling to participate. Participants under 16 years old were also excluded, as well as plant species that were not used for medicinal purposes.

Instrument for Data collection (The Questionnaire)

A semi-structured questionnaire with four sections was used to conduct a face-to-face interview and data were collected in line with the objectives of the study. It was used

to obtain the following information: demographics of the respondents, knowledge of traditional medicinal plants, information was obtained on the sources, mode of preparation, method of administration, benefits and side effects. Respondents were also allowed to give multiple responses to open ended questions.

Statistical Analysis

Data collected were analyzed using the Statistical Product and Service Solution (SPSS) version 2.0 and presented using descriptive tables and figures.

Results

Table 2 shows the demographic characteristics of respondents in the study area, which comprised of their religion, gender, age, marital status, level of education, occupation, household size and income.

Some traditional plants used in the treatment of ailments in the study areas

Table 3 shows the diversity of plants used in the treatment of ailments in the study area. Sixty-five (65) different plants were identified and recorded for medicinal purpose, which belonged to 36 taxonomic plants families. The meliceae (7) was the most dominant followed by fabaceae (3) and anacardiaceae (1). Other used plants belonged to families such as zingiberaceae, sapindaceae, lauraceae.

Table 2: Demographic distribution of respondents

| S/N | Variables | Frequency | Percentage (%) |
|----------|------------------------|------------------|-----------------------|
| 1 | Religion | | |
| | Christianity | 514 | 85.8 |
| | Islam | 25 | 4.2 |
| | Others | 60 | 10.0 |
| 2 | Gender | | |
| | Male | 347 | 57.9 |
| | Female | 252 | 42.1 |
| 3 | Age | | |
| | 16-25 | 60 | 10.0 |
| | 26-35 | 188 | 31.4 |
| | 36-45 | 113 | 18.9 |
| | 46-55 | 137 | 22.9 |
| | 56-65 | 83 | 13.9 |
| | 66 Above | 18 | .0 |
| 4 | Marital | | |
| | Single | 69 | 11.5 |
| | Married | 509 | 85.0 |
| | Widow/Widower | 15 | 2.5 |
| | Divorced | 6 | 1.0 |
| 5 | Education | | |
| | Primary | 167 | 27.9 |
| | Secondary | 388 | 64.8 |
| | Tertiary | 18 | 3.0 |
| | None | 26 | 4.3 |
| | | | |
| | Variables | Frequency | Percentage (%) |
| 6 | Occupation | | |
| | Farmer | 399 | 66.6 |
| | Civil Servant | 46 | 7.7 |
| | Trader | 97 | 16.2 |
| | Timber dealer operator | 1 | .2 |
| | Transporter | 12 | 2.0 |

| | | |
|-------------------------|-----|------|
| Hunter | 11 | 1.8 |
| Unemployed | 10 | 1.7 |
| Student | 23 | 3.8 |
| 7 Household size | | |
| 4-6 | 185 | 30.9 |
| 7-9 | 366 | 61.1 |
| 1-3 | 42 | 7.0 |
| Above 10 | 6 | 1.0 |
| 8 Income | | |
| Below 20,000 | 20 | 3.3 |
| 20,000-40,000 | 49 | 8.2 |
| 40,000-60,000 | 180 | 30.1 |
| 60,000-80,000 | 250 | 41.7 |
| above 80,000 | 100 | 16.7 |

Table3: Diversity of plants used for ailments in the study areas

| S/N | Common Name | Scientific Name | Family Name | Parts Used | Ailments |
|-----|-------------|------------------------|---------------|-------------------------|---|
| 1 | Kola Nut | <i>Cola nitida</i> | Sterculiaceae | Bark and Seed | Diarrhea |
| 2 | Guava | <i>Psidium guajava</i> | Myrtaceae | Leaves, Bark and fruits | Diarrhea, Fever, malaria, Low sperm count |
| 3 | Mahogany | <i>Khaya ivorensis</i> | Meliaceae | Bark and leaves | Rheumatism Malaria, headache, typhoid |
| 4 | Astonia | <i>Alstoniaboonei</i> | Apocynaceae | Root and leaves | Snakebite |

| S/N | Common Name | Scientific Name | Family Name | Parts Used | Ailments |
|-----|---------------------|------------------------------|---------------|-----------------------------------|--|
| 5 | Wild sugarcane | <i>Costu safer</i> | Zingiberecea | Root and seed | Chicken and small pox |
| 6 | Otasi | <i>Gongrunematifolium</i> | Asclepiadacea | Leaves, stem | Asthma |
| 7 | Dongoyaro | <i>Azadirachta indica</i> | Meliaceae | Leaves, bark | Malaria, fever, skin infections |
| 8 | African marigold | <i>Aspialatifolium</i> | Compositae | Root, bark and leaves | Fever, headache, stroke |
| 9 | Resurrection plants | <i>Kalanchoe pinnata</i> | Crassulacea | Leaves | Cough |
| 10 | Scent Leaves | <i>Ocimumgratissimum</i> | Lamiaceae | Leaves | Fever, Malariaskin infections, digestive issues, Pile, immune booster. |
| 11 | Lemon | <i>Citrus limon</i> | Rutaceae | Fruit | High blood pressure, common cold |
| 12 | Alligator pepper | <i>Afromommelin gueta</i> | Zingiberaceae | Stem, bark Roor,leaves, seeds. | Stomach pain,cough. |
| 13 | Hot leaf | <i>Piper guineensis</i> | Peperaceae | Seeds | Respiratory problems, coughs, colds, and bronchitis. |
| 14 | African Cedar | <i>Entandrophragma utile</i> | Meliaceae | Fruit | Chest and body pain |
| 15 | Bitter Kola | <i>Garcinia kola</i> | Clusiaceae | Fruits | Cough, cold, anti-bacteria |
| 16 | Moringa | <i>Moringa oleifera</i> | Moringaceae | Root, stem | Stomach upset, blood pressure |
| 17 | Hug plum | <i>Spondiasmombin</i> | Anacardiaceae | Bark and leaves | Diarrhea, relieve pain |

| S/N | Common Name | Scientific Name | Family Name | Parts Used | Ailments |
|-----|---------------------|---|---------------|-------------------------|---|
| 18 | Mango | <i>Mangifera indica</i> <i>L.</i> | Anacardiaceae | Leaves, bark, root | Fever, malaria, Typhoid |
| 19 | Christmas Bush | <i>Alchornea</i> <i>cordifolia</i> | Euphorbiaceae | Leaves, roots | Fever, rheumatism, skin infections, purgative |
| 20 | Wire weed | <i>Sida acuta</i> | Meliaceae | Roots, leaves, bark | Malaria, fever, rheumatism, antidote for poison |
| 21 | Awolowo | <i>Chromolaodor</i> <i>atum</i> | Asteraceae | Bark, leaves | Fever, rheumatism, skin infections, purgative |
| 22 | Pawpaw | <i>Carica papaya</i> | Caricaceae | Leaves, roots, latex | Malaria, fever, measles antidote for poison |
| 23 | Uganda Powder | <i>Citropsis</i> <i>articulate</i> | Rutaceae | Bark, leaves | Fever, rheumatism, skin infections, purgative |
| 24 | Alovera | <i>Aloe barbadensis</i> | Aloeceae | Leaves | Skin infections, wounds, antiseptic |
| 25 | Yellow Harungana | <i>Harungamada</i> <i>gascariensis</i> | Hypericaceae | Bark, leaves | Fever, rheumatism, skin infections, purgative |
| 26 | Azobe | <i>Lophiraalata</i> | Ochnaceae | Bark, leaves | Fever, rheumatism, purgative |
| 27 | African Peach | <i>Naucleadiderrichi</i> <i>i</i> | Rubiaceae | Bark, leaves | Fever, stomach ache |
| 28 | Boundary Tree | <i>Newbouldialaevis</i> | Bignoniaceae | Bark, leaves | Fever, purgative and anti-toxic, anti- malaria |
| 29 | Uda | <i>Xylopiiiaethiopics</i> | Annonaceae | Seeds | infections, womb cleansing |

| S/N | Common Name | Scientific Name | Family Name | Parts Used | Ailments |
|-----|-------------------------------|-------------------------------|---------------|---------------|---|
| 30 | Sweet potato | <i>Ipomea batatas</i> | Convovulceae | Leaves | Hypertension, insomnia, anxiety |
| 32 | Senna | <i>Senna occidentalis</i> | Fabaceae | Leaves, seeds | Constipation, fever, skin infections |
| 33 | Yellow Mombin | <i>Spondiasmombin</i> | Anacardiaceae | Bark, leaves | Fever, rheumatism, skin infections |
| 34 | Goat weed | <i>Ageratum comyzoides</i> | Asceracea | Leaves | Swelling |
| 35 | Fluted Pumpkin | <i>Telfairia occidentalis</i> | Cucurbitaceae | Leaves, seeds | Fever, rheumatism, skin infections |
| 36 | Almond Fruit, Tropical Almond | <i>Terminalia catappa</i> | Combretaceae | Leaves, bark | Dysentery |
| 37 | Ash | <i>Trichiliamonadelpha</i> | Meliaceae | Bark, leaves | Digestive issues, Fever, rheumatism |
| 38 | Bush Banana | <i>Uvariaafzelii</i> | Annonaceae | Roots, leaves | Source of vitamins and minerals. For typhoid and disrrhea |
| 39 | Bitter Leaf | <i>Vernonia amygdalina</i> | Asteraceae | Leaves | fever, malaria, and digestive issues. |
| 40 | Voacanga | <i>Voacangaaficana</i> | Apocynaceae | Roots, leaves | Fever, rheumatism, and mental health issues. |
| 41 | Pumpkin | <i>Telfera occidentalis</i> | cucubritaceae | Leaves | anemia. |
| 42 | African Basil | <i>Ocimumgratissimum</i> | Lamiaceae | Leaves | Cough, Cold |
| 43 | Lemon Grass | <i>Cymbopogon citratus</i> | Poaceae | Leaves | Digestive issues and fever |
| 44 | Ginger | <i>Zingiber officinale</i> | Zingiberaceae | Rhizome | Digestive issues, nausea, and |

| S/N | Common Name | Scientific Name | Family Name | Parts Used | Ailments |
|-----|-------------------------|--------------------------------|---------------|-------------------|---|
| | | | | | respiratory problems. |
| 45 | Turmeric | <i>Curcuma longa</i> | Zingiberaceae | Rhizome | inflammatory conditions, digestive issues, and skin problems. |
| 46 | African Mahogany, Khaya | <i>Khaya grandifoliola</i> | Meliaceae | Bark, leaves | Fever, rheumatism |
| 47 | Iroko | <i>Milicia excelsa</i> | Moraceae | Bark, leaves | Fever, digestive issues. |
| 48 | Honey Tree | <i>Albizia spp.</i> | Fabaceae | Leaves, bark | Respiratory problems. Fever |
| 49 | Cashew | <i>Anacardium occidentale</i> | Anacardiaceae | Leaves, seeds | Fever, digestive issues. |
| 50 | Teak | <i>Tectona grandis</i> | Verbenaceae | Leaves, bark | Fever, rheumatism |
| 51 | African Pear | <i>Dacryodes edulis</i> | Burseraceae | Leaves, bark | Rich in vitamins and minerals. fever and digestive issues. |
| 52 | Bamboo | <i>Bambusa vulgaris</i> | Poaceae | Young shoot | Gonorrhoea |
| 53 | Wonderful kola | <i>Cola nitida</i> | Sterculiaceae | Seed | Boil |
| 54 | Doussie | <i>Azela bipindensis</i> | Fabaceae | Leaves, bark | Fever, rheumatism |
| 55 | Ebony | <i>Diospyros spp.</i> | Ebenaceae | Leaves, bark | Fever, rheumatism, skin infections |
| 56 | Egg plant | <i>Solanum melongena</i> | Solanaceae | Fruits and leaves | Stomach ache |
| 57 | Fever Tree | <i>Anthocleista djaloensis</i> | Gentianaceae | Leaves, bark | Fever |

| S/N | Common Name | Scientific Name | Family Name | Parts Used | Ailments |
|-----|------------------|--------------------------------|------------------|-----------------|------------------------------------|
| 58 | Forest Mahogany | <i>Khaya anthotheca</i> | Meliaceae | Leaves, bark | Fever, rheumatism, skin infections |
| 59 | Soursop | <i>Annona muricata</i> | Annonaceae | Bark and leaves | Malaria, Fever |
| 60 | Garden Egg | <i>Solanum melongena</i> | Solanaceae | Leaves, fruit | Fever and digestive issues. |
| 61 | Gingerbread Plum | <i>Parinari curatellifolia</i> | Chrysobalanaceae | Leaves, bark | Fever, rheumatism |
| 62 | Vinegar | <i>Trichostema lanceolatum</i> | Lamiaceae | Leaves, bark | Diabetes, fever |
| 63 | Groundnut | <i>Arachis hypogaea</i> | Fabaceae | Leaves, seeds | Fever and digestive problems |
| 64 | Water leaf | <i>Talinum fruticosum</i> | Talinaceae | Leaves, stem | Internal heat |
| 65 | Avocado | <i>Persea americana</i> | Lauraceae | Leaves | Fever, rheumatism, skin infections |

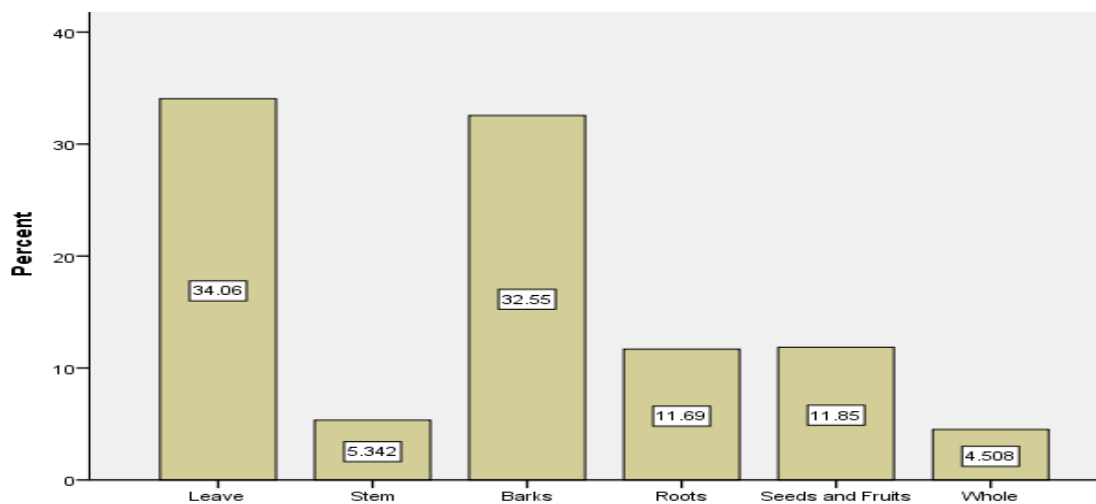


FIG. 2: Plants parts used in traditional medicine in the study area

Method of preparing traditional medicine

Figures 2 and 3 show plants part used in traditional medicine in the study area with leave (34.06), Stem (5.342), Bark (32.55), Roots (11.69) and Whole (4.508) and the methods of preparing traditional medicine in the study area were mostly decoction (45.41%), infusion (32.72 %), maceration (12.35 %), amongst others.

Method of administration

Figure 4 shows the mode of administration of traditional medicine in the study area. The findings of this study revealed that the prepared traditional medicine in the study area were mostly administered orally: 44.74% drinking, 31.89% chewing, 12.52 % fusion, 7.846 % poultice and 3 %, messaging or rubbing on the body.

Figure 5 showed the perceived ailments treated by respondents using traditional medicinal plants in the study area. The recorded medicinal plants were used to treat over 30 different ailments by residents of the study including malaria (45.74%), typhoid (26.54 %), bone fracture (11.02 %), jedi measles (6.01 %), diabetes (4.508 %), injures (2.17 %), chicken pox (1.67 %) and the least was Cholera and STI (0.835 %).

Sources, level of awareness, knowledge and acceptance of traditional medicine

Figure 6 showed the different means respondents' source for traditional medicinal plants. The research findings revealed that most of the respondents (64.61%) sourced for medicinal plants from their surroundings, while 23.37 % through public market and 12.02% through traditional medicine practitioners also known as herbalists.

Figure 7 shows that 92.82% of the respondents were aware of the uses of plants as traditional medicine for the cure of diseases and infection and 7.179 % are not aware of traditional medicine.

Out of the total numbers of the respondents, 52.75 % said they knew about traditional medicinal plants through their families and relatives, 28.21 % through public space and neighborhood, 13.02 % through religion, 3.84% were taught in school and 2.17% knew through online (Figure 8).

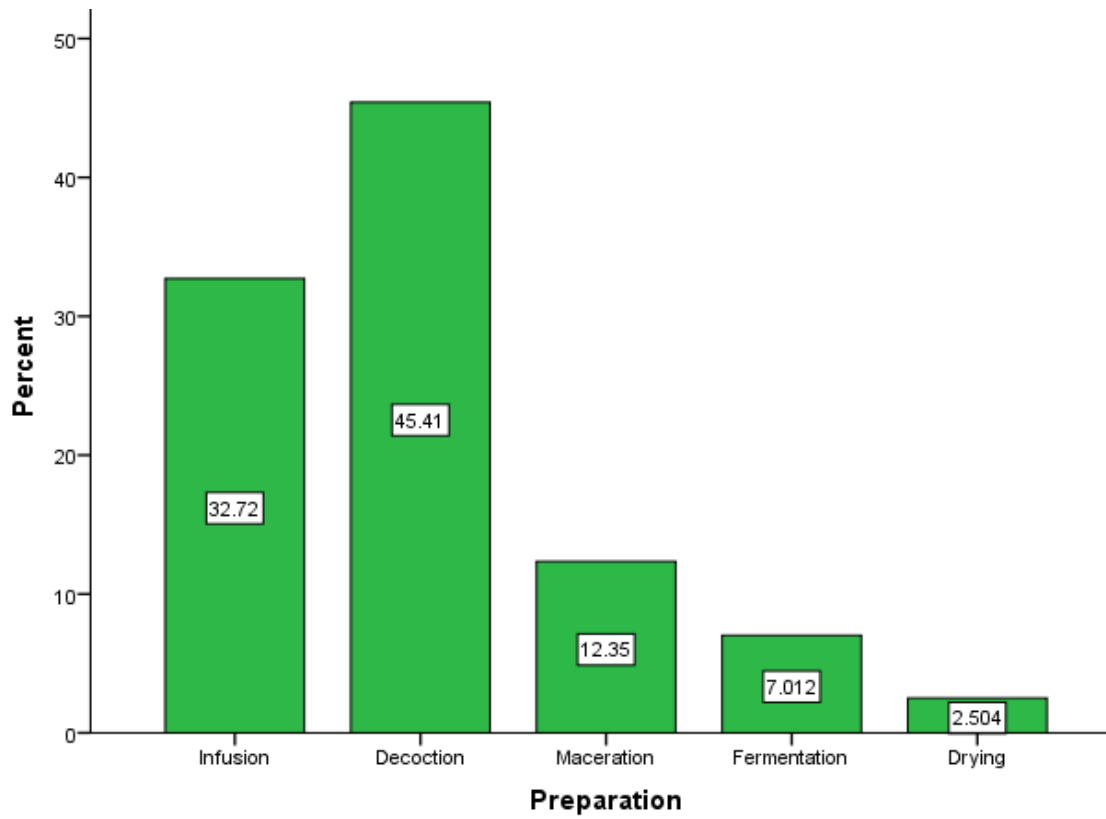


FIG. 3: Methods of preparing traditional medicine in the study area

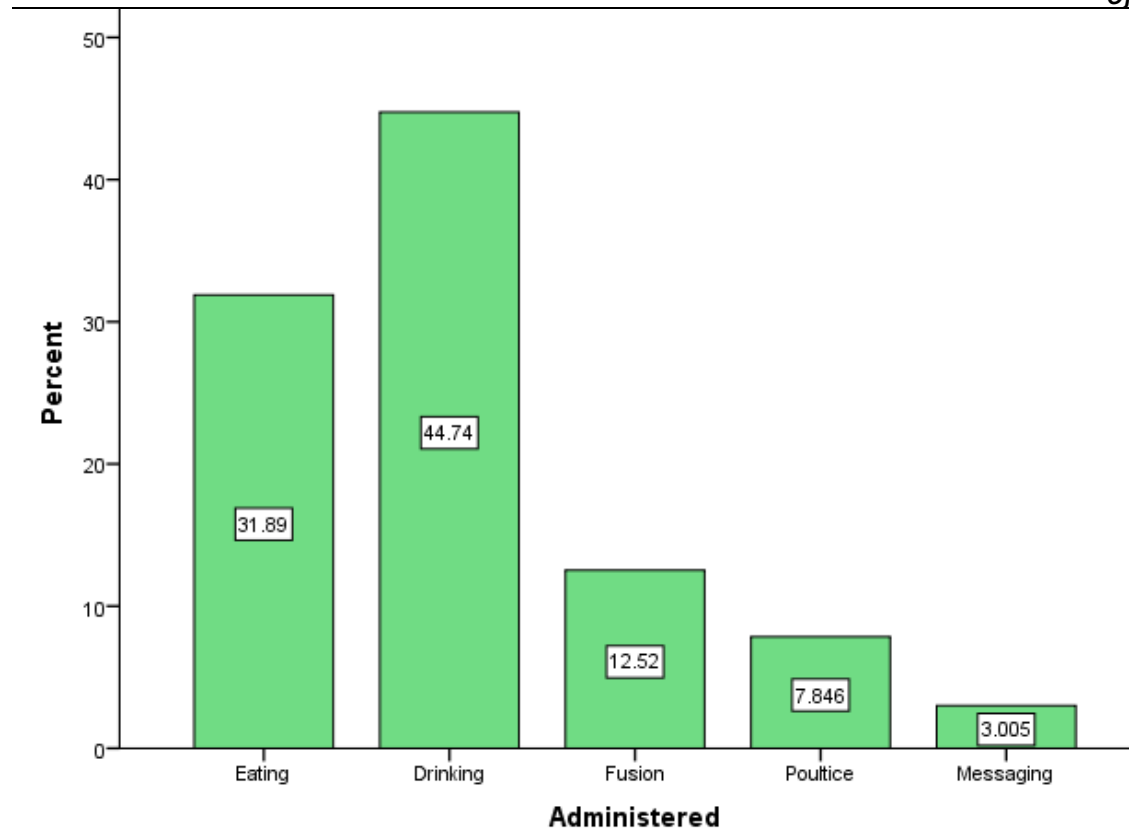


FIG. 4: Mode of administering traditional medicine in the study area

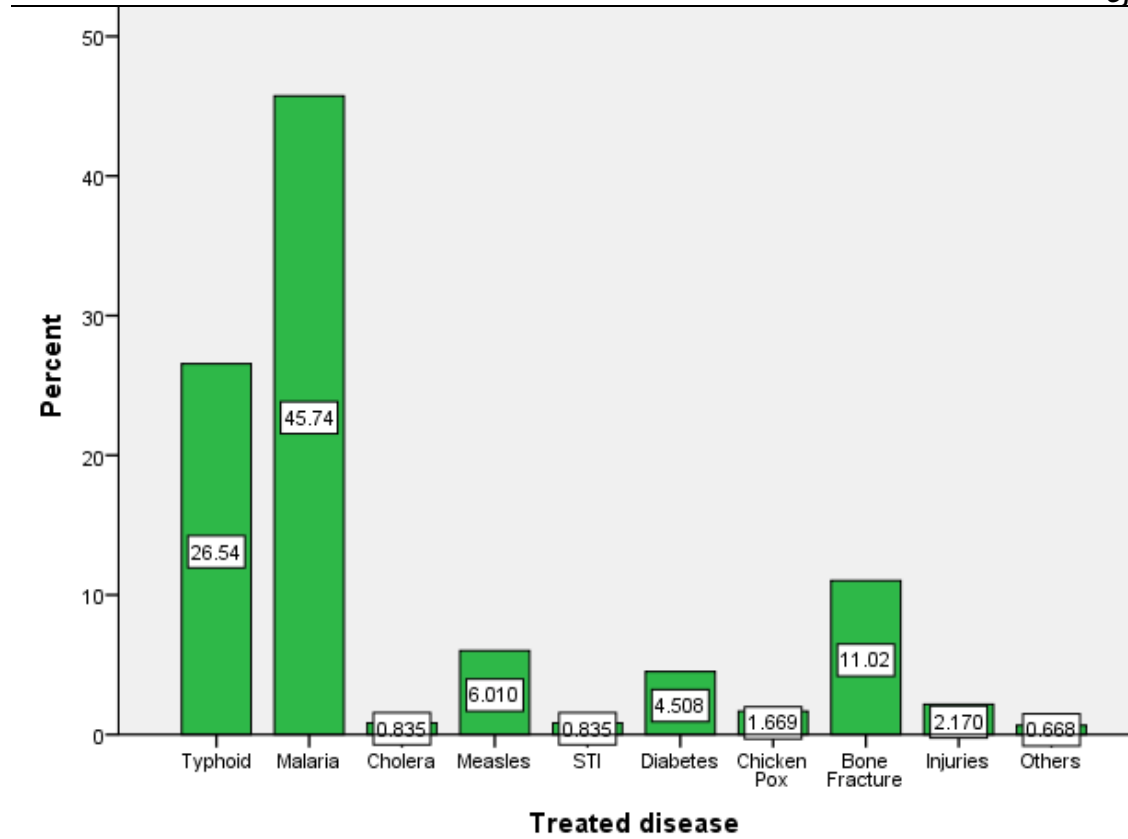


FIG. 5: Perceived ailments treated with Traditional Medicinal plants

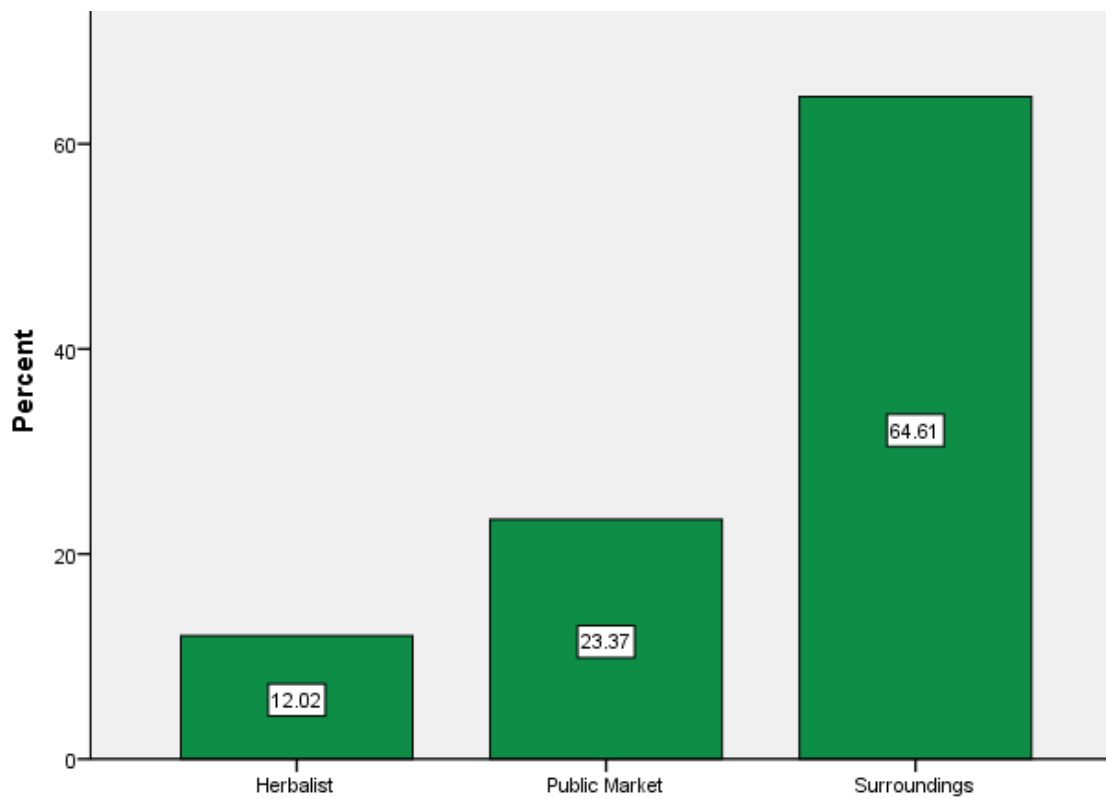


FIG. 6: Sources of traditional medicinal plants in the study area

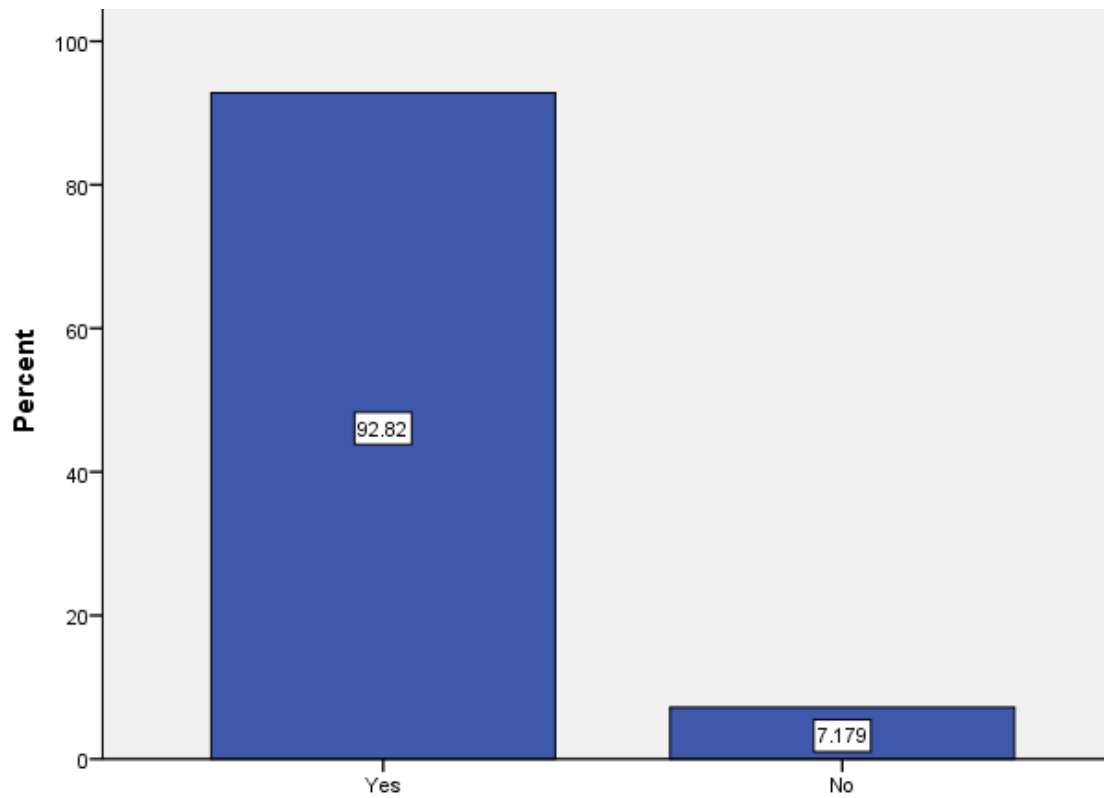


FIG.7: Respondent's awareness of medicine plants in the study area

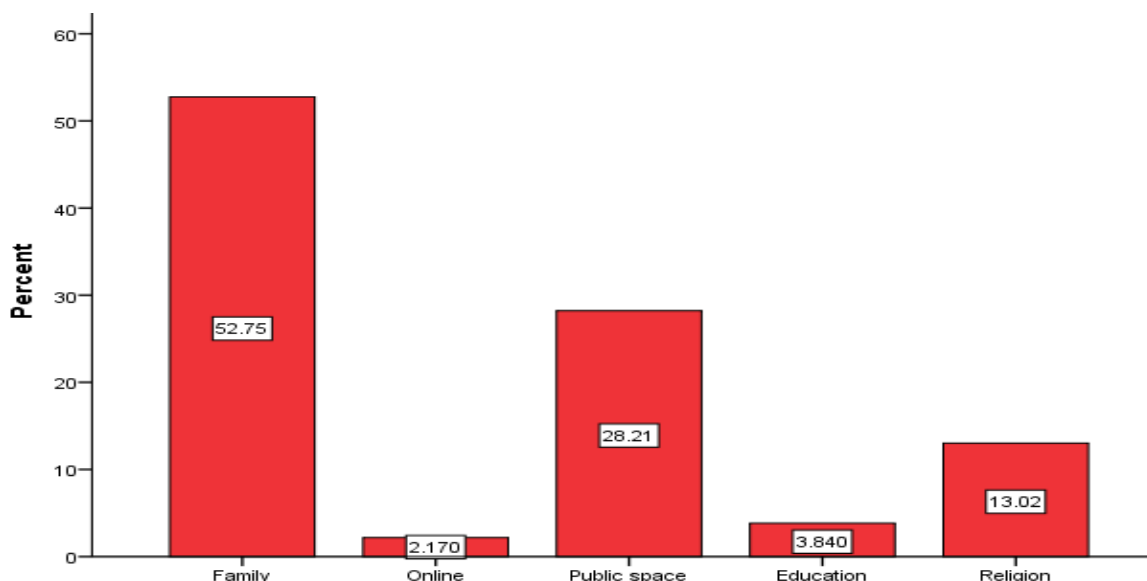


FIG 8: Medium of knowing about plant medicine

Perceived benefits and adverse effects associated with the use of traditional medicinal plants

The result shows that over 47.25 % of the respondents affirmed that traditional medicinal plants are easy to access, low cost (22.87%), cultural significance (20.70 %), effective in treating ailment (7.346 %) while others were 1.836 %. Results also revealed that 87.81% of respondents attested that traditional medicinal plants were effective in the treatment of ailments.

Sustainability and continuous availability of these traditional medicinal plants

The results showed indicated that the majority of the respondents (49.58 %) practice conservation of medicinal plants, 27.38 % cultivate, protection of habitat (9.5 %), seed banking (8.5 %) and others (5 %).

60.59% of the respondents agreed that habitat destruction was a major challenge, follows by over-harvesting (22.2 %), lack of knowledge (10.52 %) and climate change (4.2 %). Also, 20 89% of the respondents were in support of the recommendation of traditional medicine for incorporation into our health care system.

Discussion

The study revealed that sixty-five (65) plant species belonging to thirty-six (36) taxonomic families were utilized for medicinal purposes in the study area, the most dominant was meliaceae followed by fabaceae and anacardiaceae. In the Twelve (12) communities investigated, information documented for each plant included their botanical name, common name, ailments

treated, plant parts used etc. Plants investigated in the study included trees, shrubs, herbs and grasses. Evbuomwan (2023) also reported that melicaceae was the dormant family of medicinal plants used in the treatment of malaria in Kwara State, Nigeria. Adelanwa (2022) reported that the indigenous knowledge among medicine practitioners with regard to their age showed male recorded (82%) and female (18%) and also revealed a good transfer of knowledge from old to the younger ones, who are deeply engaged in the practice.

The results also corroborate Adam *et al.* (2022) who noted a clear trend of rejuvenation of the traditional medicine profession and the return of the society to the use of traditional medicine with a good transmission of its knowledge from the elderly to young. Fatiha *et al.* (2017) also reported that Traditional Medicine Practices are day to day activities carried out by the youths. Male respondents recorded higher at 57.9 %, there was a general notion that traditional healing is dominated by men, as the percentage of male traditional healers is far greater than that of females. This may also be attributed to the fact that males visit health facilities less regularly than females and as a result, tend to subscribe to self-medication with local herbs (Osuchukwu, 2017). Najem *et al.* (2020) reported that traditional medicine is practiced more by the male gender in Morocco. Similarly, Mutie *et al.* (2020) in Kenya, also reported that 66.70% of herbal medicine traders are males. Adam *et al.* (2022) also noted that in Benin, it is the male who pick the Medicinal plants mainly from the forests, truth is that men view

traditional medicine as a business or as a way to make money, Tuku *et al.* (2024).

Parts of plants used in traditional medicine in the study area

Evbuomwan (2023), reported that leaves were the most frequently used plant parts to treat ailments due to less effort required for their use. The dominance of leaves over other plant parts in preparing herbal remedies could be linked to their being the primary site of photosynthetic and other biosynthetic activities in plants, leading to the production and accumulation of photosynthates which contain higher concentrations of bioactive molecules including alkaloids and tannins with rich medicinal properties (Zahoor *et al.* 2017; Fortini *et al.*, 2016). Another reason could be because of the ease of handling them.

Method of preparation and administration of traditional medicinal plants

Results from the study revealed that the method of preparing traditional medicine in the study area included decoction (45.41%), infusion (32.72%), meceration (12.35%), fermentation (7.02%) and drying (2.5%). This corroborates with findings of Babajide *et al.* (2021) who reported decoction as the most common method of preparing traditional medicine in Jos. Decoction is generally utilized as a method of preparing traditional medicine because of the ease of preparation in which the medicinal plants are boiled in solvent such as water, soup and tea. In addition, decoction enhances extraction of bioactive ingredients from the plant parts much more in comparison to cold extraction. However, several factors

including boiling duration, amount of solvent and plant material used may differ which could possibly affect the potency of the herbal preparations. In similar studies, Amjad *et al.*(2020), Danna *et al.*(2022)observed the prevalence of decoction as a method of preparation.The mode of administration by chewing (31.89%), fusion (12.52%), poultice (7.8%) and massaging 3%, in the study areas corroborates with the findings of Babajide *et al.* (2021) who reported oral administration as the most common method of administering traditional medicine. This is also consistent with previous investigations by Bachir&Belhouala K(2021) and Faruque *et al.*(2018). In addition, Sylla *et al.* (2018), also reported that this method of administration is easy to use and since the drugs are in raw form, they are less dangerous orally, because the absorption of the active ingredients takes place in the small intestine.

According to the respondents, preparations are administered to patients differently for different age groups. The dosage prescription for children was mostly lower than for adults. Dosages were estimated using lids, spoons, cups, glasses, pinches or hand full. The amounts of remedy and prescription rates were generally dependent on the degree, duration and severity of the ailments. This is in agreement with findings of Ajuru (2015) who reported that dosages of traditional medicines are not defined and medicines are taken only when symptoms appear and stopped when symptoms disappear unlike orthodox medicine. Yimer (2021) reported that approximate dosages

were used based on gender, age, pregnancy status, and physical appearance of the patient.

Perceived ailments treated by respondents using traditional medicinal plants

Most (45.74%) of the respondents interviewed cited malaria as the most ailment treated with traditional medicinal plants in the study area. This agrees with findings of similar research where malaria was implicated as one of the most prevalent ailments treated using medicinal plants in Annang communities of Akwa Ibom State. Evbuomwan (2023) reported malaria fever as a commonly treated ailment in the Ede communities in Osun State with medicinal plants.

Typhoid fever followed with 26.54%, bone fracture 11.02%, Measles 6.01%, Diabetes 4.508% etc. as shown in Figure 13. Malaria represents at least 20% of the major public health concerns in Nigeria. Respondents that have treated common tropical diseases using traditional medicine, 88.15 % have used traditional medicinal plants to treat diseases while 11.85 % have not used traditional medicine. This agreed with Jimam *et al.* (2015) who reported that a large percentage of rural people still depend on traditional medicine.

Malaria infection remains a global public health challenge, particularly in Africa. Nigeria bears the highest malaria burden globally, with over 51 million cases and 207,000 deaths annually —accounting for 30% of Africa’s total malaria burden (Dawakietal.,2018). Globally,

approximately 214 million malaria cases occur each year, placing 3.2 billion people at risk of infection (WHO, 2015). Additionally, malaria remains widespread, with 97% of Nigerians (approximately 173 million people) at risk of infection (Olubodun *et al.*, 2018).

Sources, awareness and medium of knowing of traditional medicinal plants by respondents

When respondents were asked how they sourced these medicinal plants, 64.61% reported that they were sourced from their immediate surroundings and neighbouring forests while 23.37% sourced theirs from public markets and 12.02% through traditional medicine practitioners also known as herbalists (Figure 15). Rosemary (2022) reported that most of the plants and herbal products used for the treatment of hypertension and diabetes were grown by the locals and mostly obtained from their farms. Van (2018), Noted that medicinal plants are usually sourced from the wild. The findings are also in line with the findings of Adelanwa and Safana (2022) who reported that 70% of the medicinal plants used in Nasarawa state were collected from the wild. Yusufu and Adelanwa (2020) also reported that 80% of the plants collected from Makarfi L. G. A. were from the wild and 20% were cultivated.

On the awareness of traditional medicine, 92.82% of respondents were aware of traditional medicinal plants. This high level of awareness could be as a result of it being in used long before the advent of orthodox medicine. This also agrees with Bonifácio *et al.* (2014) that according to the

WHO's report, 70% to 95% of the people across the world use the herbal drugs for their primary healthcare purposes.

About 52.75 % of the respondents said they knew about traditional medicinal plants through their families and relatives, 28.21 % said through public space and neighborhood, 13.02 % knew through religion, 3.84% were taught in school and 2.17% knew through online. Dawaki *et al.* (2016) noted that following a survey carried out in South Benin that 87.76% of respondents inherited the knowledge of Traditional Medicine Practice from their ancestors. Indeed, the elderly are believed to provide the most reliable information on traditional medicine and have confidence that they hold much ancestral knowledge that has been passed down to younger generation (Holaly *et al.*, 2015).

Perceived benefits and adverse effects associated with the use of traditional medicinal plants by respondents

The most common reasons for the continued patronage of herbal medicines are that, it is more accessible, more affordable, culturally acceptable and above all effective.

Also 47.25 % of the respondents reported that traditional medicinal plants are easy to access, low cost was 22.87%, cultural significance was 20.70 %, effective in treating ailment was 7.346 % while others were 1.836 %. Evbuomwan (2023) reported that most people result to trado-medical personnel for treatment of their problems because it is cheap, available, approachable and accessible. 88.38% attested to the effectiveness of the uses of traditional medicine and 11.62% disagreed. 48.92 %

reported no adverse effect in the uses of traditional medicinal plants while 18.86 % observed adverse reactions such as dizziness. Osuchukwu (2017). reported dizziness, watery stool, abdominal pain and vomiting as the most highlighted adverse effects and also attributed it to adulteration, inappropriate formulation and lack of understanding of plants drug interaction.

Conservation of traditional medicinal plants to ensure continuous availability

Almost 94.82% of the respondents were in support of the conservation of traditional medicinal plants in the study area. Methods recommended include: 49.58% sustainable harvesting, 27.38% the cultivation of these valuable resources, 9.5% habitat protection and 8.5% seed banking in order to ensure their continuous availability. Medicinal plants were mainly sourced from the wild in the study area, which is no longer sustainable and reliable due to over-harvesting and over-exploitation by the plant collectors and herb sellers. Many medicinal plants have been reportedly gone extinct or very scarce to find. Ajuru (2015) advocated for the cultivation of medicinal plants species and the domestication of wild medicinal plants species. 59.60 % of the response agreed that habitat destruction was a major challenge, followed by over-harvesting 22.2 %, lack of knowledge 10.52 %, climate change was 4.2 % while others was 3.5. (89.65 %) recommended the preservation and integration of traditional medicine into our health system. A comprehensive integration of traditional health care practice into the mainstream health care system will help control herbal

medicine and products usage and improve traditional health services safety and reliability.

Summary

This work assessed and explored the use of traditional medicinal plants in rainforest region of Cross River State, Nigeria. The study observed that the use of herbs and herbal preparation is a big business among the indigenous people, they patronize traditional medicine in all ramifications due to its accessibility and affordability. The results revealed that medicinal plants play a vital role in the healthcare system of the respondents, with majority having used traditional medicinal plants to treat diseases such as malaria and typhoid. The study found that the majority of the respondents were aware of the uses of plants as traditional medicine, and they knew about traditional medicine through public spaces, neighborhoods, and relatives. Leaves were the most commonly used part of plants, and decoction was the primary method of preparation. The benefits of using traditional medicinal plants included ease of access, low cost, and effectiveness. The study also documented 65 plants species used as traditional medicinal plants in the study areas. Medicines from plants are obtained from the leaves, bark, stem, fruits and the whole plants are sometimes taken fresh or they are left to ferment for proper extraction, it was also observed that the dosage of the medicine is not defined, and to this end, the medicines are taken when symptoms appear and stopped only when symptoms disappear. The continued depletion of medicinal flora resources not only embodies a challenge for

conservation but more importantly represents a serious threat to the human population.

Conclusion

There is no doubt that traditional medicine remains in the forefront in meeting the health needs of the people especially residents of rural areas in the country in spite the expansion of orthodox medicine. There is a general belief that the healthcare delivery system in Nigeria is very poor. Various reasons adduced for this include inadequate supply of health care professionals, poor distribution of health facilities, poor harnessing of available medical and health system, among others. This has made Nigeria lag behind many other developing countries because a large proportion of Nigerians especially in the rural areas can still not access healthcare.

Since global commercial interest in plants as source of medicine is gaining prominence, and creating opportunities for cultivation, it is desirable that indigenous plant species of medicinal applications should be properly conserved. This is the best way to ensure that knowledge of traditional medicine and their uses is preserved and passed down to younger generations.

Finally, this study has contributed in providing information on the knowledge of traditional medicinal plants amongst people of Cross River State, Nigeria.

Recommendations

The following recommendations are advocated:

1. Promote the standardization of preparation methods—especially decoction, infusion, and maceration—as these were the most common approaches documented.
2. Strengthen knowledge transfer channels—particularly family and community networks, which were the primary sources of awareness—by integrating formal training, public health workshops, and school-based education to ensure accurate and safe medicinal plant use.
3. More emphasis should be placed on conservation of natural terrestrial ecosystems, sustainable harvesting of plant resources for medicine and food and cultivation of some of the plant's species.
4. Encourage community-driven conservation programs to address threats such as habitat destruction and over-harvesting, ensuring the continuous availability of medicinal plant resources.

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