Survey of Plant Species Used in the Treatment of Common Ailments in Hawul Local Government Area, Borno State, Nigeria

*Madu A.H[1], G.A Ajibade[1], V.M Yilwa[1], I.B Mato[1], S.M Jibril[2], B.B Garba[3], M. Nura[4]

[1]Department of Biological Sciences,
Nigerian Defence Academy

[2]Department of Biological Sciences,
Federal University Dutse,
Nigeria

[3]Department of Biological Sciences,
Federal University Gashua,
Nigeria

[4]Department of Science Laboratory Technology,
Bilyaminu Polytechnic
Jigawa,Nigeria

Email: ahmadu@nda.edu.ng

Abstract

To record the locals' knowledge of some of the medicinal plant species in the area, a survey of plant species used for the treatment of common ailments was carried out in Hawul Local Government Area Borno State. A semi-structured questionnaire was used to collect the data. Numerous quantitative indices, including Informant Consensus Factor (ICF), Use Value (UV), Fidelity Level (FL), Shannon Weiner Index, Simpson Index, Relative Frequency of Citation (RFC), and Family Importance Value (FIV), were used to quantify the advantages, significance, and coverage of ethnomedicine. The Jaccard Index (JI) was used to assess the degree of homogeneity between the current study and earlier research as well as within indigenous tribes. A total of fifty-five (55) medicinal plants species, which were distributed under twenty-nine (29) families were documented from one hundred (100) informants. The majority of species that have been identified are tree species, and the most common plant portion used to make ethnomedicines is leaf material. The Fabaceae were the predominate families among the species that had been documented (11 species) Accacia nilotica, Piliostigma thonningii, Detarium microcarpum, Faidherbia albida, Sennia siamea, Prosopis Africana, Parkia baglobosa, Tamarindus indica, Pterocarpus erinaceus, Senna occidentalist, Senna obtusifolia, while the least represented was (1 species) Apocynacea. For digestive system problems, the highest ICF score was 0.77. According to the data gathered from the questionnaires, pile, yellow fever, malaria, typhoid, stomach ache, and ulcer were the most prevalent diseases, in that order. Based on UVs, the two most commonly cited ethnomedicinal plant species in the study area were Khaya senegalensis (0.40), Piliostigma thonningii (0.35) while the least was (0.01) Guinea senegalensis. The most common method of preparation was by decoction and the major route of administration was oral while least cited was sit bath. Phytochemical profiles demonstrated that flavonoids, alkaloids phenols, saponins and tannins were the major

phytochemical component in Khaya. senegalensis and Piliostigma. thonningii leaves. This further justifies the frequent application of these plants in folklore medicine by the traditional herbal practitioners to treat different forms of illnesses. It is stated that due to their physiologically active ingredients and accessibility, herbal medicine will continue to play a significant role in the community's health care delivery system.

Introduction
Many different diseases are routinely treated using plants (Jeddi *et al.*, 2021). Approximately 80 % of Africans use regional flora to meet their essential medical needs (Salhi *et al.*, 2010). Despite the development of modern technology and orthodox medicine as a result of religious enlightenment and western civilization, traditional medicine is still the main means of healthcare delivery in many underdeveloped countries, especially in Africa. According to experts, traditional medicine provides the main healthcare needs for 80% of the inhabitants in Asia, Latin America, and Africa. This assertion is supported by data from the World Health Organisation. Many people in these countries, particularly those who live in rural areas, have no other readily available options besides traditional treatments (Ekeopara *et al.*, 2017).

Phytochemicals are naturally occurring chemical substances that are physiologically active and are found in plants. They are beneficial to human health as food and medicine (Hasler and Blumberg, 2018). They build up in various plant sections, including the roots, stems, leaves, flowers, fruits, or seeds (Coasta *et al.*, 2018). They treat illnesses without endangering people, making them what is known as "man friendly medications" (Banu and Cathrine, 2015). Folkloric knowledge, which was passed down orally through successive generations, has suffered a substantial loss. The major factors that contributed to this loss over the past century were migration, urbanisation, modernisation, and a deeply ingrained embrace of western treatment. Consequently, it is essential that an effort be made to record and preserve this remaining knowledge, because many traditional healers do not keep enough written records for future use. In both rural and urban settings, medicinal plants have been found to be particularly useful in treating illnesses in developing nations. Despite this, due to a lack of understanding of the worth of the plants in their environment, very few individuals pay attention to them (Salisu *et al.*, 2015). Therefore, there is need for having a clear understanding about the plant species around us for their vital traditional medicinal values. Hence this research on the medicinal uses of plant species used in treatment of common ailments in folklore medicine. It is on this background that this study documents the existing plant species used.by the indigenous people of Hawul local government for the treatment of common ailments.

Plants have been used by humans as a kind of defense against numerous diseases for thousands of years. Additionally, plants are effective at producing chemical control agents for different infections, and a sizable portion of pharmaceutical medication is based on substances extracted from plants. Eighty percent (80%) of the population in poor nations relies on medicinal plants for their basic medical needs. In the developed world, there is a significant increase in the usage of medicinal herbs.

Through the progressive transmission of information from one generation to the next, traditional knowledge about these plants was formed. Due to the possibility that elderly individuals who retain this knowledge may pass away without passing it along to the

following generation, this traditional healing practice will eventually become extinct. This research was carried out to collect and document information on the plants used traditionally as medicine by the indigenous people of Hawul local government area of Borno State. This was done to ensure that future generations of Borno State, Northern Nigeria, and Nigeria as a whole have access to at least some of this traditional healing system. This will aid in advancing, enhancing, and enriching Nigeria's herbalist community. The objectives of the study was to collect, identify and authenticate medicinal plants used by traditional healers in Hawul local government area to document the relevant indigenous information on commonly used herbs, to compile information on traditional treatment against various ailments, plant parts used and method of preparation and to undertake phytochemical screening of frequently used plant species for their phytochemical profile.

Materials and Method

Study Area
The study was conducted at Hawul Local Government Area Borno State, Nigeria. It is located in the Southern part of the state and shares boundaries with Biu, Shani, Kwaya Kusar and Bayo local government areas as well as Gombi local government area of Adamawa State. It has a 2,098km² area and roughly 120,000 people according to the 2006 census. It is one of the four local government areas (LGAs) that make up the Biu Emirate, a historical establishment situated in Borno State, Nigeria. Ten (10) districts make up the local government. The area's mean daily maximum temperature ranges from 29.2 °C in July and August to 37.6 °C in March and April. Temperatures are, as might be assumed, generally high. Between 11.7 °C in December and January and 24.7 °C in April and May, the mean daily lowest temperature varies. May to September are the months with the heaviest rainfall, and the humidity levels range from about 37 % to 68 % respectively (Hassan *et al.*, 2013).

Administration of questionnaires
According to Kankara *et al*. (2015), a questionnaire was used to collect ethnobotanical data. In April 2022, an ethnobotanical survey was conducted. The study's target populations were local herbalists, traditional doctors, midwives, herb dealers, farmers, and other elderly individuals who had experience with using therapeutic plants. Parts A and B of the questionnaire were separated into seperate sections. The respondents' demographic data was gathered in part A, while part B's information on plants historically used to treat common maladies were recorded. Ten (10) responses from each district were chosen. The researcher translated the questionnaire into local dialect for people who do not speak English.

Collection and Identification of Plant Species
The research region was visited on a number of field visits where local herbalists helped with the informal identification of the collected plants and their medical use. The Department of Biological Sciences at the Nigerian Defence Academy in Kaduna received prepared herbarium specimens of the freshly obtained plants for authenticity and documentation (Kankara *et al.*, 2015).

Quantitative Phytochemical Analysis
Analysis of Plant Extracts
Khaya senegalensis and *Piliostigma thonningii* leaves were collected, cleaned, washed and air dried (at room temperature (28±2 ⁰C) and ground into powder separately with a clean mortar and pestle. Methanol as employed solvent for the extraction (cold extraction), which involved soaking 30 g of the dry leaves from *K. senegalensis* and *P. thonningii* in 300 ml of methanol for

seven days at room temperature while being vigorously agitated for about 30 minutes each day. The leaf extracts were then filtered using a Whatman filter paper (No. 42) and dried out by evaporating them for a week in an exposed plastic container (Banu and Cathrine, 2015).

Data analysis
A descriptive statistical method using frequencies and percentages was used to analyze the socio-demographic data of the respondents and the results of the ethnobotanical survey were analyzed using different quantitative ethnobotany. Relative Frequency of Citation (RFC), Fidelity Level (FL), Use value (UV), Informant Concensus Factor (ICF), Jaccard Index(JI), Simpson Index(D) and Shannom weiner Index(H) were calculated.

Results and Discussion

Socio-demographic information of the Respondents
The result obtained from the ethnobotanical survey carried out in Hawul Local Government Area, Borno State, Nigeria in Table 3.1, Demographic information revealed that most of the respondents were males (81 %). This may be because most practitioners are by tradition males. This corresponds to the findings of Mudansiru *et al.* (2016) where they found that the majority of the traditional medicinal practitioners (56 % and 83 %) in Biu Local government area of Borno State and Gumel town, Jigawa State respectively, were men. Majority of the respondents don't have basic education which may serve as a contributing factor to the loss of these important traditional healing systems, because majority of them can't keep written document of this knowledge. Most of the respondents were between age 31 to 40. This is an improvement in modern herbal practice, unlike those days when it was very common among aged people.

Table .1: Demographic information of the Respondents in the study area (N=100)

Bio data	Frequency (n)	Percentage (%)
Sex		
Male	81	81
Female	19	19
Age		
20-30	31	31
31-40	20	20
41-50	21	21
51-60	15	15
Above 61	13	13
Education		
None	41	41
Basic	27	27
Secondary	22	22
Tertiary	10	10
Occupation		
Local herbalists	32	32
TBAs	8	8
Herb Sellers	35	35
Farmers	20	20
Civil servants	4	4
House wife	1	1

TBAs = Traditional Birth Attendants

Common Species of plants used by the people of Hawul Local Government Area of Borno State in managing various ailments, their local names, physical form and other

Table 3.2 showed the list of some medicinal plants species found in the study area, local name (in Hausa and Babur Language), common name, scientific name, family, habitat and their relative frequency of citation. Majority of them were trees, very few were herbs and shrubs and two were climbers. *Khaya senegalensis* and *Piliostigma Thonningii* have the highest relative frequency of citation of 0.4, and 0.35 respectively. Fifty-five (55) species of medicinal plants were surveyed and identified in which majority of the plants were trees. This is due to the fact that trees are usually available all seasons and in addition are not affected by seasonal variation as reported by Albuqueque *et al.,* (2007). Majority of the plant species belong to the family Fabaceae with twelve (12) species out of twenty-nine (29) families. This agrees to the findings of Mudansiru *et al.* (2016) where they found out that, the family Fabaceae was the dominant family with twenty-five (25) species out of forty-three (43) families used in the treatment of common ailments by the people of Gumel town, Jigawa State, Nigeria. During the field trips carried out in the surveyed area, a total of fifty-five (55) medicinal plants species were collected, colloquially identified, authenticated, pressed, mounted and properly documented in the herbarium for future use.

Common Species of plants used in managing various ailments.

S/N	Plant Species (Local Name)	Physical Form	Part Used	Diseases Treated	Mode of Preparation	Mode of Administration
1.	Kubewa/Misha	Fruits	Fruits	Aphrodisiac	Boiled and Mixed with Honey	Oral
2.	Dogon yaro	Leaves	Leaves	Typhoid, Yellow fever	Pounding, Boiling	Oral, Steaming
3.	Madaci/Dikir	Barks	Barks	Stomach ache	Infusion	Oral
4.	Gamji/Bwala	Powder	Barks	Pile, stomach disorder	Mix with pap	Oral
5.	Reke/Kila'ufa	Whole Plant	Whole Plant	Hepatitis	Chewing	Oral
6.	Karkashi/Sugwi	Leaves	Leaves	Helps in Digestion	Powder	Oral
7.	Kirya/Mossu	Powder	Leaves or barks	Pile, ulcer	Mix with pap	Oral
8.	Kuka/Kwagu	Powder	Barks	Pile, stomach ache	Mix with pap	Oral
9.	Gwaba	Leaves	Leaves	Typhoid, Yellow fever, dysentery	Decoction	Oral
10.	TafasaNchivi	Leaves	Leaves	Ulcer	Cooking	Eaten as food
11.	Gwanda/Gunda	Leaves	Leaves	Typhoid	Decoction	Oral
12.	Raidore	Leaves	Leaves	Typhoid	Decoction	Oral
13.	Kanya/washna	Powder	Barks	Pregnancy labour	Infusion	Oral
14.	Tsamiya/Mbula	Powder	Young leaves	Bilharzia	Mixed with pap	Oral
15.	Turare	Leaves	Leaves	Typhoid	Boil, add lime	Oral
16.	Dorawa/Nona	Barks	Barks	Pile	Boiling	Sit bath
	angwala	Powder	Barks	Pile, malaria, diarrhea	Mixed with pap or water	Oral
17.	Baure/Kamda	Powder	Barks	Ulcer	Mixed with pap or nono	Oral

No.	Name			Ailment	Preparation	Route
18.	Marke/Sura	Powder	Barks	Cough	Hot or cold water, Tom tom	Oral
19.	Umbrella	Leaves	Leaves	Yellow fever	Boiling	Steaming
20.	Ararrabi/Debiro Bean tree	Powder	Powder	Pile	Infusion	Oral
21.	Dirimi	Powder	Barks	Yellow fever	Infusion	Oral
22.	Zogala/halim	Powder	Leaves	Ulcer, Blood tonic Cold	mixed with milk	Oral
23.	Tazargade	Leaves	Leaves	Malaria, Typhoid	Boiling	Oral
24.	Bagaruwa/Kuvala	Powder	Seeds	Ulcer	Mixed with milk	Oral
25.	Gawo/katha	Barks	Barks	Dandruff	Infusion add Red potash	Oral
26.	Magarya/Huhwi	Powder	Leaves	High blood Pressure	Pound, boil with potash	Oral
27.	Tsintsir maza/Beram	Leaves	Leaves	Infection / Aphrodisiac	Infusion	Oral, Sit bath
28.	Shuwaka	Leaves Powder	Leaves Barks	Stomach Pain Hot Urination	Boiling Decoction	Oral Oral
29.	Lalle	Powder	Leaves	Infection, Skin rashes, Finger ache	Boiling Poultice Poultice	Sit bath Dermal Topically
30.	Garafuni/T-thlali	Leaves	Leaves	Rheumatism	Boiling	Oral
	Kurna	Powder	Leaves	Toothache/ Diarrhea	Infusion	Oral
31.	Gwanda daji/Hibwa	Powder	Barks	Ulcer	Mixed with water and milk	Oral
32.	Faru	Powder	Stem barks	Pile	Mixed with pap	Oral
33.	Yadiya /Thlara	Leaves	Leaves	Wound healing	Pound	Apply on wound
34.	Dinya	Powder	Barks	Pile	Infusion	Oral
35.	Goruba	Powder	Fruit	Stomach ache	Infusion	Oral
36.	Taura/Gwaksa	Powder	Barks	Pile	Decoction	Oral
37.	Lemun tsami	Juice	Fruit	Mouth rashes	Squeezing	Apply to the affected area in the mouth
38.	Tumfafiya/ Mbwathlam	Powder Sap	Root Fruits	Cancer, Ear infection	Grinding	Smear droplets of the extract is applied
39.	Rimi	Powder	Leaves	Diarrhea	Mixed in water or milk	Oral
40.	Sabara /Sura	Powder	Leaves	Pile	Infusion	Oral
41.	Kargo/Puhi	Powder	Barks or roots	Pile/Stomach	Infusion	Oral
42.	Kawari /Kutila	Powder	Barks	Diarrhea	Concoction	Oral
43.	Lemun Zaki	Bark	Leaves	Cough	Infusion	Oral
44.	Madobiya/ Anthamamshi	Barks	Barks	Increase blood	Boil and add small sugar	Oral
45.	Malmo	Barks	Barks	Joint pains	Decoction	Oral
46.	Melaina	Bark/stem	Bark/stem	Malaria	Boil with potash	Oral

Table 3.2 (continued)

S/N	Plant Species (Local Name)	Physical Form	Part Used	Diseases Treated	Mode of Preparation	Mode of Administration
47	Aya/Ntalwa	Seeds	Seeds	Low sperm count	Chewing	Oral
48	Sobo/Gwamblam	Seed/fruits	Seed/fruits	Hypertension	Decoction	Oral
49	Cediya/Iza	Leaves	Leaves	Malaria and yellow fever	Boiling	Steaming
50	Gingiya/Mina	Fruits	Fruits	Cough and shortness of breath	Decoction, eating the fruit	Oral
51	Aduwa/Dadmwa	Powder	Seeds	Liver problem	Mixed with honey	Oral
52	Bini da zugu	Whole plant	Whole plant	Wound healing	Sap	Applying on wound area
53	Kesha	Leaves/ Flower	Leaves/ Flower	Typhoid	Decoction	Steaming

Quantitative Phytochemical Screening.

Khaya Senegalensis and *Piliostigma thonningii* were the most frequently used plants in the area and their quantitative phytochemical investigation revealed the presence of alkaloids, saponins, tannins, phenols and flavonoids, all of which may be used for antiviral and antibacterial activity.

Table 3 Quantitative Phytochemical Screening of methanol extracts *of Khaya senegalensis* **and** *Piliostigma thonningii.*

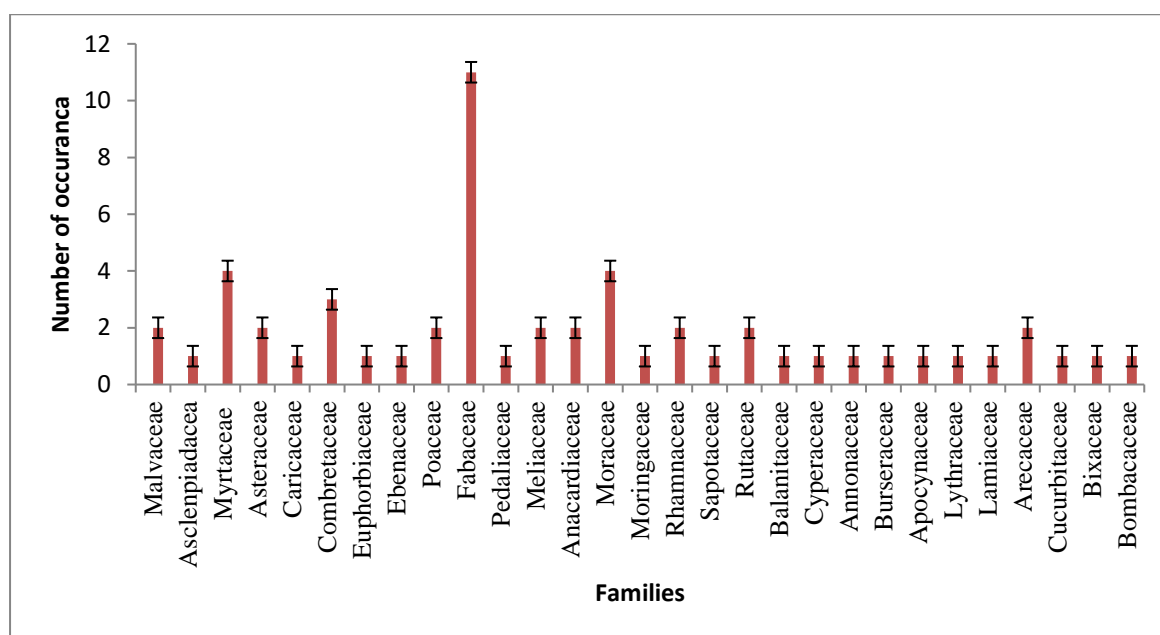| Phytochemical	*Khaya senegalensis*	*Piliostigma thonningii*
Flavonoids	4.52 ± 0.029569	6.25 ± 0.014933
Polyphenol	0.08 ± 0.064042	0.0824 ± 0.043294
Tannins	4.25 ± 0.001155	5.18 ± 0.000577
Alkaloids	1.13 ± 0.001	1.02 ± 0.000577
Saponins	28 ± 0.000577	2.283 ± 0.004041

Figure1: Distribution of plant families used for ethno-medicine in Hawul Local Government Area of Borno State.
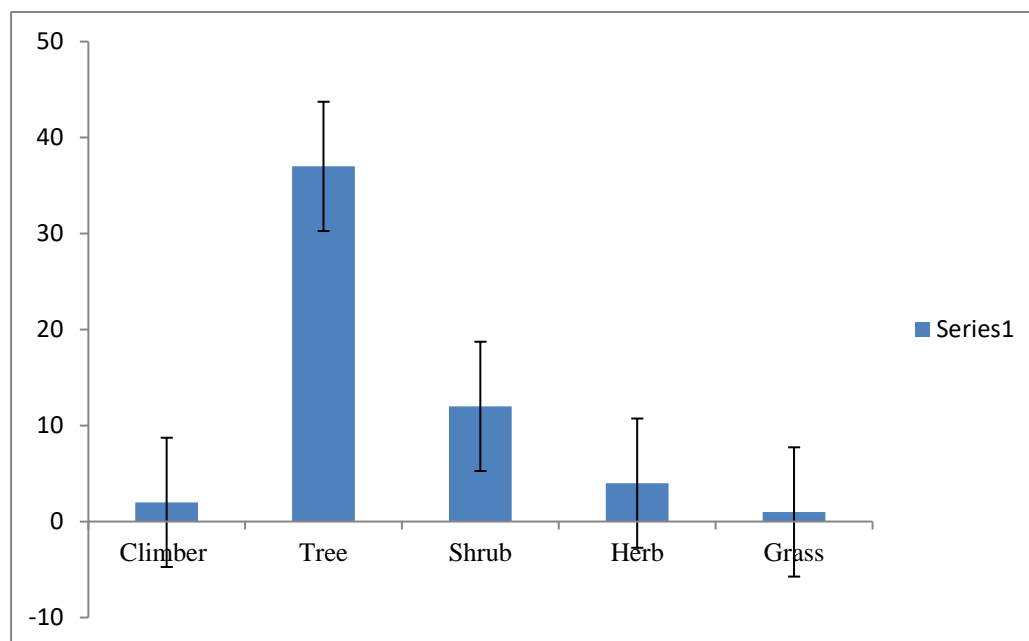
Figure 2: Distribution of plants belonging to their habitat in Hawul Local Government of Borno State

Conclusion and Recommendation.

Some important medicinal plants species used in folklore medicine in Hawul Local Government area were surveyed, identified, collected, pressed, mounted and documented. The indigenous knowledge of these plants was written and properly documented for future use. Different quantitative ethnobotany such as Relative Frequency of Citation (RFC), Fidelity Level (FL),Use value (UV),Informant concensus factor (ICF), Jaccard Index(JI),Simpson Index(D), Shannom weiner Index(H), Barger parkers index were used to analyse the demographic data of the respondents and the results of the ethnobotanical survey .the diversity of medicinal plant species used and the associated indigenous knowledge are of great value to the local community and their conservation and preservation is paramount so phytochemical and pharmacological investigation to reveal their biologically active constituents needs to be assessed, there is need to provide adequate control measure in the usage of the plant species as timber for construction, fuel wood etc. This could be achieved through education and public awareness because such plant is very useful especially to people who cannot afford modern medical care and in case where access to modern health facilities is not easy.

Acknowledgement

References
Akande, O. A., Buochuama Alaye, S.A., Shuaib, A.B., and Mohammed, A.M. (2018). Ethnobotanical Survey of Medicinal Plants amongst Kanti Comm Enzo A.P. (2007). Traditional plants and herbal remedies used in the treatment of diarrheal disease.unity in Mashegu Local Government Area of Niger State, Nigeria. *International Journal of Innovative Biosciences Research* 6(1):20-27.

Akande, O. A., Buochuama, ., Alaye, S.A., Shuaib, A.B., Mohammed, A.M.(2018) Ethnobotanical Survey of Medicinal Plants amongst Kanti Community in Mashegu Local Government Area of Niger State, Nigeria. *International Journal of Innovative Biosciences Research* 6(1):20-27.

Albuqueque, Julio Marcelino Monteiro,Marcelo Alves Ramos(2007) Medicinal and magic plants from a public market in northeastern brazil. *Journal of ethnopharmacology* 110(2007)76-91.

Ampitan, T.A. (2013). Ethnobotanical survey of medicinal plants in Biu local government area of Borno state, Nigeria. *Comprehensive Journal of Herbs and Medicinal Plants*. Vol. 2(1), 7 - 11.

Banu, K.S., Cathrine, L. (2015). General Techniques Involved in Phytochemical Analysis. *International Journal of Advanced Research in Chemical Science* (IJARCS). Volume 2, Issue 4, PP 25-32.

Costa, M.A., Zia Z.Q., Davin, L.B., Lewis, N.G.(1999). Chapter Four: Toward Engineering the Metabolic Pathways of Cancer-Preventing Lignans in Cereal Grains and Other Crops. In Recent Advances in Phytochemistry, vol. 33, Phytochemicals in Human Health Protection, Nutrition, and Plant Defense, ed. JT Romeo, New York.

Ekeopara, C. A.,Ugoha, A. M.I. (2017). The Contributions of African Traditional Medicine to Nigeria's Health Care Delivery System. *Journal Of Humanities And Social Science)*.22(05):32-43

Ghorbani A, Saeedi Y,de Boer HJ (2017) Unidentifiable by morphology: DNA barcoding of plant material in local markets in Iran.Plose one 12(12).*https://doi.org/10.1371/journal pone.0175722.*

Hasler , C. M., Blumberg , J. B. (1999). Phytochemicals: Biochemistry and Physiology. *Journal of Nutrition*. 129: 756S-757S.

Jeddi M, Ouartini ZB, Fokri-Benbrahim K. 2021. Ethnobotanical study of medicinal plants in northern Morocco (Taounate): case of Mernissa. Ethnobotany Research and Applications 21:1-23.

Kadiri, M., Ojewumi, A.W., Kokuma, Y.O. (2013). Ethnobotanical Study of Plants used in Managing Ulcer in AbAbeokuta Metropolis, Ogun State, Nigeria. *Journal of Natural Science, Engineering and Technology*, 12: 76-88.

Kankara S Sani., Mohd H.Ibrahim., Muskhazli Mustapha., Rusea Go *(2015)*Ethnobotanical survey of medicinal plants used for traditional maternal healthcare in Katsina state, Nigeria. *South African Journal of Botany*, pp 165–175.

Mudansiru, A., Zaharaddeen, U., Haidara, A.M.,Ibrahim, S. (2016) . Ethnomedicinal Survey of Some Plants Used for the Treatment of Various Ailments in Gumel Town, Jigawa State, Nigeria. *Journal of Biology, Agriculture and Healthcare*. Vol.6, No.7, pp7

Muhammad , S., Shinkafi. M.A. (2020). Ethnobotanical survey of some medicinal important leafy vegetables in North Western Nigeria. *Journal of Medicinal Plants Research*. Vol. 14(1), pp. 6-8.

Salhi S, Fadli M, Zidane L, Douira A. 2010. Etudes floristique et ethnobotanique des plantes médicinales de la ville de Kénitra (Maroc). Lazaroa 31:133-146.

Salisu, M., Muhammad, N. D., Ishaq, A. A. (2015). Ethnobotanical Survey of Medicinal Plants in Metropolitan Kano, Nigeria. *International Journal of Public Health Research.* Vol. 3, No. 6, pp. 345-351.

Shosan,L.O.,Fawibe,O.O.,Ajiboye,A.A., Abeegunrin, T.A. and Agboola, D.A. *(2014)* Ethnobotanical Survey of Medicinal Plants Used in Curing Some Diseases in Infants in Abeokuta South Local Government Area of Ogun State, Nigeria. *American journal of plant sciences*,5,3258-3268.