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Survey of Medicinal Plants in Home Gardens in Benue State, Nigeria

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ABSTRACT

Little attention has been given to assessing the medicinal plant species in home gardens. Many studies in the past have focused on the socio-economic aspects of home gardens, their structure and composition, organization as well as their nutritional importance with little attention to the medicinal use. This Study seeks to assess the medicinal flora species that are found in home gardens in Benue State. Medicinal plants have played an important role throughout the world in treating and preventing human diseases. Studying medicinal plants helps to understand plant toxicity and protect human and animals from natural poisons. It is imperative to identify and document medicinal plants found in home gardens in Benue State in order to encourage conservation and management of the plant species that have the potency of curing ailments. This research seeks also to identify the ailments/diseases for which home garden medicinal plants are used for treatment. About 74 plant species were identified in Home gardens in Benue State. Home gardens in Vandeikya and Katsina-ala (zone A) had more diverse species with species diversity index of 0.9691 with a total of 67 plant species. Jaccard's Similarity coefficient revealed that home gardens in zone B (Gwer west and Gwer East) had the highest percentage Similarity of 91.3%. Descriptive statistics revealed that 22 plant species are the most frequently used medicinal plants. Home gardens in Benue State have diverse species of plants which have numerous uses ranging from their use as food, shade and medicine.

Keywords: Home-garden, Medicinal plants, Species diversity, Ailments, Similarity

INTRODUCTION

Home-gardens involve the management of multipurpose trees, shrubs, annual and perennial crops, herbs and medicinal plants, birds and animals on the same land unit in a spatial or temporal sequence [1]. It is a traditional land use practice carried out around a homestead consisting of several species of plants that are grown and maintained by the family members with the primary objective of fulfilling the family's consumption needs [2]. They are production systems of diverse crop plants, which are easily accessible and adjacent to household [3].

Home gardens represent land use systems involving deliberate management of multipurpose trees and shrubs in intimate association with annual and perennial agricultural crops and invariably livestock within the compounds of individual houses [4]. For decades home gardens have shown to be significant to rural inhabitants by providing a wide range of useful products such as fruits, vegetables, medicine and building materials [5]. Several studies have emphasized that home gardens are diverse agro-forestry systems and regard them as important *ex situ* conservation sites. Worldwide, home gardens are a community's most adaptable and accessible land resources and important components in reducing vulnerability and ensuring food security [6]. Forest resources such as edible fruits and medicinal plants are harvested from home gardens. Worldwide, growing ethno botanically useful plant species in home gardens has a long tradition in various cultural groups. Growing a number of plant species together in home gardens do not only deal with making resources available for food and medicine but also reveal invisible social mechanisms and related resilience strategies by avoiding risk and reducing vulnerability as may be noticed generally in single crop cultivation [6]. Home gardens consist of a mixture of cultivated fruit trees, medicinal plants, spices, firewood and sometimes also forage crops. Home gardens have the potential to contribute towards increasing food production, reducing malnutrition and ailments in tropical

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countries. It has been a way of life for centuries and is still critical to the local subsistence of economy and food security.

The emergence of new diseases and re-emergence of old diseases has been a great challenge in the use of orthodox medicine. At the moment, the remedies remain elusive. However, it has been proved that higher plants have the potential to provide solutions to these problems.

Pharmaceutical drugs are seen increasingly as expensive and dangerous, yet herbal remedies are seen as less expensive and less toxic. Almost every pharmaceutical drug has side effects. People in tropical countries like Nigeria are increasingly willing to self-treat their medical needs by using medicinal plants and herbal preparations particularly for the treatment of illnesses such as arthritis, diabetes, hepatitis, typhoid, yellow fever, cancer and stroke. Successful management of such ailments is elusive with pharmaceutical drugs. A lot of pathogens have proved resistant to conventional antibiotics [7]. People who suffer such maladies are turning to medicinal plants as alternative for treatments [8]. Many of these herbs are found in home gardens. It is imperative to identify and document the medicinal plants found in and around home gardens in Benue State in order to encourage conservation and management of these wonderful plant species that have the potential of curing ailments. Currently pharmaceutical companies have demonstrated interest in investigating higher plants as sources of drugs. In Brazil, some plants were screened against *Staphylococcus aureus* and *Enteroccocus fecalis*. These microbes are known to cause surgical and post-surgical ailments as well as medical complications in humans. The plants were found to have antimicrobial effect against the microbes [7]. Medicinal plants remains an integral part of human life through the compounds extracted from plants and specific plant parts are worthy of further investigations for their use as potent sources of medicine.

MATERIALS AND METHOD

Study area: Benue State

Benue State is located in the middle belt region of Nigeria with a population of about 4,253,641. The State has an average population density of 99 persons per km^2. It is inhabited predominantly by the Tiv and Idoma people, who speak the Tiv language and Idoma, respectively. There are other ethnic groups, including the Igede, Etulo, Akweya and Nyifon [9]. The capital of Benue is Makurdi. It is a rich agricultural region. Benue State is named after the Benue River and was formed from the former Benue-Plateau State in 1976. Benue State is the 9th most populous State in Nigeria.

Its geographic coordinates are longitude 7°47' and 10°0' E. Latitude 6°25' and 8°8' N; and shares boundaries with five other states namely: Nasarawa State to the north, Taraba State to the east, Cross-River State to the south, Enugu State to the south-west and Kogi State to the west. The state also shares a common boundary with the Republic of Cameroon on the south-east. Benue occupies a landmass of 34,059 km^2. The State experiences two distinct seasons; the wet season and dry season. Temperatures fluctuate between 21-37°C **(Figure 1)**.

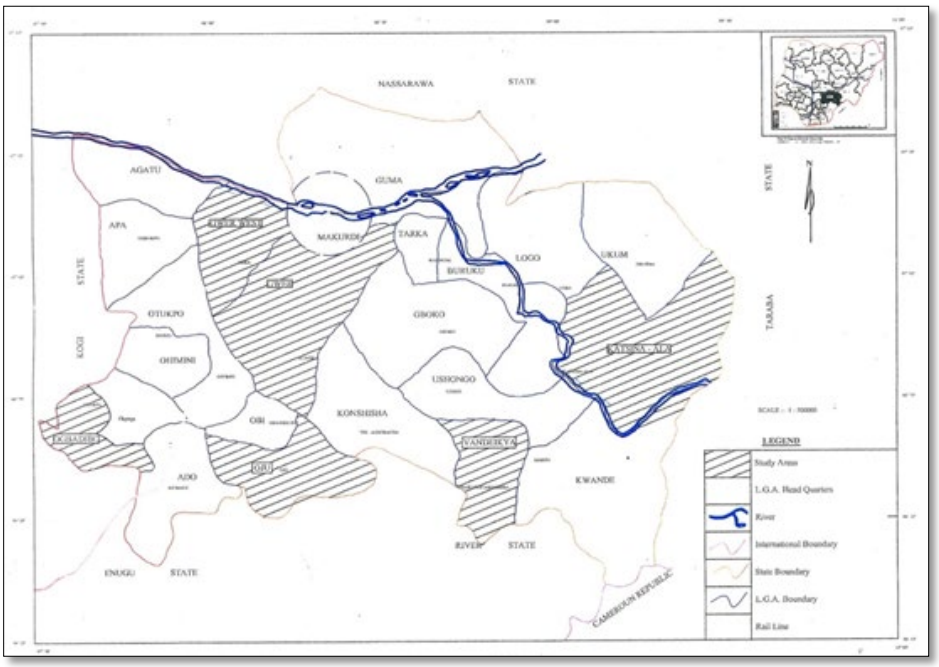

Figure 1. Map of Benue state showing the study areas.

Source: Ministry of Land Survey, 2018

METHODOLOGY

Two local government areas from each of the three (3) geopolitical zones of the State were randomly selected for the study. The local government areas are Vandeikya and Katsina-Ala (Zone A), Gwer west and Gwer-East (Zone B), Ogbadibo, Oju (Zone C). Four (4) Council wards from each Local Government Area were purposively selected for ease of accessibility. In each Council ward, Five (5) compounds with home gardens were visited, making a total of twenty (20) home gardens from each Local Government Area. This means forty (40) compounds with home gardens were visited in each geopolitical zone. Altogether a total of one hundred and twenty (120) home gardens were visited covering the three (3) geopolitical zones. Data were collected by walking through the home gardens and making careful identifications of the plants, listing the plant species and the medicinal uses of such plants. Interviews with home garden owners were conducted using a semi-structured questionnaire based on methodologies. Home garden owners were asked the following questions in order to obtain a list of medicinal plants found in their home gardens:

i. What species of plants in your home gardens are used for medicinal purposes?

ii. What type of sickness or disease are they used for treatment?

iii. What part of the plant is used for medicine?

iv. Which plant species in your home garden is mostly used for medicine?

Five (5) traditional medicine practitioners were also interviewed in each council ward. The traditional medicine practitioners were selected based on how they are considered by their communities as very knowledgeable about medicinal plants. During the interview, the traditional medicine practitioners were allowed to discuss what species of plants in their home-gardens are medicinal, what kind of diseases the plants are used for treatment, what part of the plant is used (stem, roots and leaves).

During the visit to each home garden, the house heads were interviewed to know which among the home garden flora, are medicinal, the type of sickness that home garden medicinal plants cure and what part of the plant is used for treatment. To know which home garden medicinal plants are most frequently used in treating ailments?

After data collection, data were subjected to simple descriptive statistics like frequency and percentage to determine the frequency of use of the medicinal plants. The most frequently used medicinal plants in home gardens in Benue State were then determined.

DATA ANALYSIS

Frequency, percentage and tabular presentations were used to estimate the relative abundance of each species. Simpson Diversity index was used to test the diversity of flora species in home gardens in Benue State. Jaccard's similarity coefficient (JSC) was used for comparing home garden's plant species in two randomly selected local government areas in each geopolitical zone of the State.

$$\text{JSC} = \frac{c}{(c + a + b)} \times 100$$

Where,

a=number of species not found in the study area A

b=number of species not found in the study area B

c=number of species common in both Areas

Simpson diversity Index, $D = 1 - \frac{\sum n(n-1)}{N(N-1)}$

Where,

n=number of individuals of each species

N=Total number of individuals of all species

PRESENTATION OF RESULTS

Table 1 shows the personal attributes of home garden owners. Most of the respondents were males with the percentage of 71.67% while 28.33% were females. Majority of the respondents were within the age range of 50 years and above (50.83%) followed by the age range of between 40-50 years while young people were within the age range of 18-28 years with a percentage of 0.83%. Most of the home garden owners were married (81.70%), widowed (17.50%) while single (0.83%). A greater percentage of the respondents (33.33%) had household size of more than 12 followed by a family size of 7-9 with a percentage of 30.83%. The least family size 1-2 had a percentage of 5.83%. 42.50% of the respondents did not have formal education. 0.83% had degree or HND. 49.17% of the respondents had an annual income of more than ₦ 150, 000.00. The respondents with the least level of income had a percentage of 8.33%.

Table 1. Socio-economic attributes of home garden owners in Benue state.

Variables	Frequency	Percentage (%)
Sex		
Male	86	71.67
Female	34	28.33
Age		
18-28	1	0.83
29-39	11	9.17
40-50	47	39.17
50 and above	61	50.83
Marital Status		
Single	1	0.83
Married	98	81.7
Widowed	21	17.50
Separated	0	0
Divorced	0	0
Household Size		
1-2	7	5.83
4-6	23	19.17
7-9	37	30.83
10-12	13	10.83
More than 12	40	33.33
Educational Status		
No formal education	51	42.50
Primary education	20	16.67
Secondary education	29	24.17
NCE/OND	19	15.83
HND/Degree	1	0.83
Postgraduate	0	0
Level of Income (₦)		
0-30,000	10	8.33
31-60,000	11	9.17
61-95,000	14	11.67
96-120,000	13	10.83
121-150,000	13	10.83
More than 150,000	59	49.17

Source: Field work, 2018

Table 2 shows the distribution of sighted home garden plants species by tribe in Benue state. *Ceiba petandra* was the most frequently occurring plant found in home gardens in Benue State with a percentage of 5.72%. It is also the most abundant plant found in home gardens in the Tiv speaking areas with 65 individuals. In Idoma (Ogbadibo), *Ceiba petandra* had 7 individuals and in Igede (11 idividuals). *Carica papaya* is the second most frequently occurring plant found in Home gardens in Benue State with a percentage of 5.31%. It is the second most abundant plant found in Tiv with 54 individuals, in Idoma (11 individuals) and Igede (12 individuals). The third most frequently occurring plant is *Newbouldia laevis* with a frequency of 5.03%. *Newbouldia laevis* had 47 individuals in home gardens in Tiv and in home gardens in Idoma, it has 14 individuals and in home gardens in Igede, it has 12 individuals. However some plant species were found in only in Tiv areas and were not found in the home gardens that were visited in the other areas (Idoma and Igede). Plant species like *Caesalpinia bondue*, *Borassus aethiopum*, *Commiphora kerstingii*, *Phoenix dactylifera*, *Swartzia madagascariensis*, *Theobroma cacao*, *Lophira lanceolata*, *Eurphorbia hirta*, *Telfairia pedata*, *Strychnos spinosa*, *Nicotina tabaccum* had a percentage of 0.07%. However, some plants like *Pterocarpus santalinoides* was found only in home gardens in Igede (Oju) and was never found elsewhere. *Chrysophyllum albidum* was found only in home gardens in Idoma (Ogbadibo), was neither found in Tiv (Vandeikya, Katsina-Ala, Gwer East and Gwer west) nor Igede. *Irvingia gabonensis* was more abundant in Idoma (Ogbadibo) with 17 individuals and a percentage of 2.21% **(Table 3)**.

Table 2. Decreasing numerical order of the distribution of sighted home garden plants species by tribe in Benue state.

Scientific name	Common name	Tribes			Total Frequency	Percentage (%)
		Tiv	Idoma	Igede		
Ceiba petandra	Kapok tree	65	7	11	83	5.72
Carica papaya	Pawpaw	54	11	12	77	5.31
Newbouldia laevis	Fertility plant	47	14	12	73	5.03
Mangifera indica	Mango	47	12	13	72	4.97
Moringa oleifera	Drum stick tree	45	14	12	71	4.90
Jatropha curcas	Physic nut	48	10	8	66	4.55
Gmelina arborea	Gmelina	40	13	11	64	4.41
Elaeis guineensis	Palm tree	25	15	14	54	3.72
Azadirachta indica	Neem	27	14	12	53	3.66
Anacardium occidentale	Cashew tree	28	18	4	50	3.45
Cymbopogon citratus	Lemon grass	25	10	11	46	3.17
Psidium guajava	guava	26	11	8	45	3.10
Musa sapientum	banana	27	8	8	43	2.97
Cocos nucifera	Coconut tress	18	14	10	42	2.90
Citrus sinensis	Sweet orange	30	4	7	41	2.83
Erythrina senegalensis	Parrot tree	32	5	2	39	2.69
Vernonia amygadalina	Bitter leaf	23	3	7	33	2.28
Irvingia gabonensis	Bush mango	8	17	7	32	2.21
Spondias mombin	Yellow mombin	18	5	8	31	2.14
Parkia biglobosa	Locust bean tree	26	2	1	29	2.00
Ricinus communis	Castor oil plant	22	5	2	29	2.00

Ficus sur	Fig tree	14	2	4	20	1.38
Ceratotheca sesamoides	False sesame	17	2	1	20	1.38
Aloe vera	Aloe vera	12	4	4	20	1.38
Khaya senegalensis	Mahogany	14	3		17	1.17
Cola nitida	Kola nut tree	7	7	2	16	1.10
Dacryodes edulis	African pears	6	4	5	15	1.03
Daniellia oliveri	West African copal	10	4	1	15	1.03
Vitex doniana	Black plum	14		1	15	1.03
Ocimum gratissimum	Green basil	10	3	2	15	1.03
Dracaena smithii	Dracaena	10	4	1	15	1.03
Bambusa vulgaris	Bamboo	10	2	2	14	0.97
Musa paradisiaca	Plantain	7	3	2	12	0.83
Terminalia catappa	Indian almond	7		5	12	0.83
Emilia coccinea	Yellow tassel flower	10			10	0.69
Gossypium arboreum	Cotton	5	2	3	10	0.69
Morinda lucida	Mulberry	6	5	1	9	0.62
Bombax costatum	Red flower silk tree	7		2	9	0.62
Hibiscus sabdariffa	Roselle	6	2		8	0.55
Ocimum basilicum	Curry leaf	6		2	8	0.55
Thevetia neriifolia	Exile oil plant	4	1	3	8	0.55
Ficus polita	Heart leaved fig	4		4	8	0.55
Citrus aurantifolia	Lime orange	3	4		7	0.48
Lawsonia inermis	Egyptian privet	5	2		7	0.48
Pterocarpus santalinoides	Mututi			7	7	0.48
Senna occidentalis	Septic weed	4	2		6	0.41
Prosopis africana	Iron tree	5		1	6	0.41
Chasmanthera dependens	Climbing plant	5			5	0.34
Maranthes polyandra	Exitelia blume	4	1		5	0.34
Anona senegalensis	Custard apple	4	1		5	0.34
Maytenus senegalensis	Spike thorn	5			5	0.34
Citrus jambhiri	Rough lemon	2	2		4	0.28

Sarcocephalus latifolius	African peach	1	1	2	4	0.28
Melicia excelsa	Iroko	3			3	0.21
Burkea africana	Wild syringa	3			3	0.21
Tamarindus indica	Tamarind	3			3	0.21
Delonix regia	Flamboyant flower	1		1	2	0.14
Chrysophyllum albidum	Star apple		2		2	0.14
Vitellaria paradoxa	Shea butter	2			2	0.14
Sterculia setigera	Tropical chestnut	1	1		2	0.14
Lannea schimperiana	Forest lanea	1	1		2	0.14
Kigelia africana	Sausage tree	1			1	0.07
Caesalpinia bondue	Peacock flower	1			1	0.07
Borassus aethiopum	Palmyra palm	1			1	0.07
Commiphora kerstingii	African myrrh	1			1	0.07
Phoenix dactylifera	Date palm	1			1	0.07
Swartzia madagascariensis	Snake bean tree	1			1	0.07
Theobroma cacao	Cacao	1			1	0.07
Lophira lanceolata	Red oak	1			1	0.07
Eurphorbia hirta	Garden spurge	1			1	0.07
Telfairia pedata	Zanzibar olivine	1			1	0.07
Strychnos spinosa	Spiny orange	1			1	0.07
Nicotina tobaccum	Tobacco			1	1	0.07
Tectona grandis	Teak		1	8	1	0.07

Source: Field work, 2018

Table 3. Plant species found in home gardens in Benue state, Nigeria.

Scientific name	**Common name**	**Family**	**Local name**		
			Tiv	**Idoma**	**Igede**
.Spondias mombin	Yellowmombin	Anacardiaceae	Konkuaa	Inchinkla	Okinka
Ceiba petandra	Kapok tree	Malvaceae	Vambe	Ufuenwu	Igwu
Moringa oleifera	Mango	Moringaceae	Jelegede	Gerugedu	Owowo
Carica papaya	Pawpaw	Caricaceae	Mbuer	Ichakpa	Ugboja
Cymbopogon citratus	Lemon grass	Poaceae	Toho gile	Acho-ibo	Ume-okirara
Jatropha curcas	Physic nut	Euphorbiaceae	Gyedan	Omangba	Gbo-gbruma

Irvingia gabonensis	Bush mango	Irvingiaceae	Ogbono	Ijuru	Ono
Azadiractha indica	Neem	Meliaceae	Dogonyaro	Idogonyaro	Idogonyaro
Ocimum basilicum	Green basil	Lamiaceae	Kungureku u kiriki	Anyeba	Ujuju
Psidium guajava	Guava	Myrtaceae	Gova	Gova	Igova
Terminalia catapa	Almond tree	Combretaceae	Fruit	Fruit	Fruit
Newbouldia laevis	Fertility plant	Bignoniaceae	Ashisham	Ogbilichi	Ogrichi
Certotheca sesamoides	False sesame	Pedaliaceae	Nen	Onugbo	Oworo
Aloe vera	Aloe vera	Liliaceae	Barbados	Aloe vera	Aloe vera
Gmelina arborea	Gmelina	Lamiaceae	Malina	Umalina	Malina
Senna occidentalis	Stinking weed	Fabaceae	tsetsa	Onipi	Upu ochiri
Erythrina senegalensis	Parrot tree	Fabaceae	Ishohol	Achie-chie	Eruana
Cola nitida	Kolanut	Malvaceae	Gor	Ngolo	Ugoro
Mangifera indica	Mango	Anacardiaceae	Mungur	Umangolo	Mangoro
Dacryodes edulis	African pears	Buseraceae	Mzembe	Odda	Ujwo
Chasmanthera dependens	Climbing plant	Menispermaceae	Gberachii	Imolimo	
Anacardium occidentale	Cashew	Anacardiaceae	Shashe	Obonuoyibo	Kashu
Vernonia amygdalina	Bitter leaf	Asteraceae	Tyuna	Afolo	Ejijuh
Ricinus communis	Castor oil plant	Euphorbiaceae	Jija	Ochigblo	Egbuja
Daniellia oliveri	West African copal	Caesalpinioideae	Chaha	Aha	Ukpila
Viterallia paradoxa	Shear butter	Sapotaceae	Chamegh	Okume	
Vitex doniana	Black plum	Verbaenaceae	Hulugh	Udu	Okiledu
Khaya senegalensis	Mahogany	Meliaceae	Haa	Opi	Upi
Citrus sinensis	Orange	Rutaceae	Alum	Alemu	Ugboji
Parkia biglobosa	Locust bean tree	Mimosoideae	Nune	Ekinyi	Ochiri
Elaeis guineensis	Palm tree	Arecaceae	Ivile/Ikye	Ali	Ori
Kigelia Africana	Sausage tree	Bignoniaceae	Tyember	Ijele	Orume
Ficus sur	Fig tree	Moraceae	Tur	Owi	Okilendu
Musa sapientum	Banana	Musaceae	Ayaba	Agbo	Ugbo

Dracaena smithii	Dracaena	Asparagaceae	Chilakem	Egbe	Ugblevu
Cocos nucifera	Coco nut tree	Arecaceae	Kyeve	Ikpalikata	Igbiri-obahi
Citrus aurantifolia	Lime orange	Rutaceae	Shangelum	Alemu cicii	Ochiche
Melicia excelsa	Iroko tree	Moraceae	Leke	Iloko	Iloko
Tectona grandis	Teak	Fabaceae	Kpaa	Utiki	
Maranthes polyandra	Exitelia blume	Chrysobalanaceae	Ibua	Odaubu	
Gossypium arboretum	Cotton	Malvaceae	Mou	Owu	Owu
Caesalpinia bondue	Peacock flower	Fabaceae	Libodar	Ongoli	
Chrysophyllum albidum	White star apple	Sapotaceae	Udera		
Borassus flabellifer	Palmyra palm	Arecaceae	Kuugh	Odo	Onwu
Maytenus senegalensis	Spike thorn	Celastraceae	Alom		
Sarcocephalus latifolius	African peach	Rubiaceae	Ikyura u kase	Oya	Ucheose
Ficus polita	Heart-leaved fig	Moraceae	Mua	Oda	
Thevetia neriifolia	Exile oil plant	Apocynaceae	Mule ikyegh	Oke	
Bombax costatum	Red flowered silk cotton tree	Bombacaceae	Genger	Okpokpo	
Tamarindus indica	Tamarinda	Fabaceae	Tsamiya		
Musa paradisiaca	Plantain	Musaceae	Kor-konbu	Ogaku	Ugbouja
Bambusa vulgaris	Bamboo	Poaceae	Msongum	Otacho	Ichacho
Sterculia setigera	Sterculia	Sterculiaceae	Kumendur	Ompla	Upuru
Cissus popunea	Draw soup vine	Vitaceae	Ager	Okoho	Odada
Pterocarpus santalinoides	Mututi	Fabaceae	Uturukpa		
Morinda lucida	Mulberry	Rubiaceae	Akinde		
Burkea Africana	Wild syringa	Caesalpiniaceae	Gbabongum		
Commiphora kerstingii	African myrrh	Burseraceae	Icha avenger		
Swartzia madagascarias	Snake bean tree	Caesalpinioideae	Kormarkye		

Delonix regia	Flamboyant flower	Fabaceae	Faluwa		
Lophira lanceolata	Red oak	Ochnaceae	Kura I nomso		
Anona senegalensis	Custard apple	Annonaceae	Ahur		
Lannea microcarpa	Forest lannea	Anacardiaceae	Ikura I nomso		
Eurphorbia hirta	Asthma plant	Eurphorbiaceae	Gbatsombo		
Hibiscus sabdariffa	Roselle	Malvaceae	Ashe u nyian		
Lawsonia inermis	Egyptian pivet	Lythraceae	Lele		
Telfairia pedata	Zanzibar oil vine	Cucurbitaceae	Ugwu		
Terminalia catappa	Indian almond	Combretaceae	Fruit		
Strychnos spinosa	Kaffir orange	Loganiaceae	Amaku		
Prosopis Africana	Iron tree	Fabaceae	Gbaaye		
Phoenix dactylifera	Date palm	Arecaceae	Debino		
Nicotiana tabacum	Tobacco	Solanaceae	Taav		
Theobroma cacao	Cocao	Malvaceae	Koko		
Citrus jambhiri-	Rough lemon	Rutaceae	Lafruma		

Table 4 shows that the composition of home gardens across the three Geo-political zones varies. Zone A with 67 Plant species was the most diverse plant with Simpson index of 0.9691 followed by Zone C with 46 Plant species and index of 0.9664 and then Zone B (0.9647) with 46 species.

Table 4. Species diversity indices of home gardens across the three geo-political zones of Benue state.

Zones	Total number of plant species	Simpson index
Zone A	67	0.9691
Zone B	46	0.9647
Zone C	55	0.9664

Source: Field work, 2018

Table 5 shows that very high similarity among plant species in home gardens in Zone B Local government areas of Benue. A jaccard coefficient of 0.91 means plant species in home gardens in Zone B were 91.3% similar. Home gardens in Local government areas of Zone C had a Jaccard similarity coefficient of 0.64. That means the plant species in Zone C were 64.0% similar. Jaccard's similarity coefficient 0.52 means the home gardens in Zone A local government areas were 52.2% similar **(Table 6)**.

Table 5. Jaccard's similarity coefficient for plant species across the geopolitical zones of Benue state.

Study Areas	Jaccard's Similarity Coefficient	Percentage Similarity (%)
Zone A	0.52	52.2
Zone B	0.91	91.3
Zone C	0.64	63.6

Table 6. Medicinal uses of home garden flora in Benue state.

Plant species	Ailments treated	Part of Plant used
Carica papaya	Typhoid, menstrual pain, Jedi jedi, yellow fever	Leaves
	Stomach pain, abortion	Roots
	Ulcer, hook worms	Seeds
	Eye pain	Stem
Mangifera indica	Cough, Jedi jedi, Apollo	Leaves
	Diarrhea, Blood shortage	Barks
Psidium guajava	Yellow fever, ulcer, dysentery, tooth ache, purging	Leaves
	Weak erection, abortion	Roots
Moringa oloeifera	Diabetes, body weakness, typhoid, ulcer, malaria, Fever, body ache, hypertension	Leaves
	Ulcer	Seeds
Elaeis guineensis	Hypertension	Leaves (shoots)
	Measles	Palm wine
	Boils	Nut shells
	Obesity	Spikes of flowers
Musa sapientum	Jedi jedi	Leaves
	Weak erection	Roots
Musa paradiasica	Jedi jedi, yellow fever	Leaves
	Hernia	Roots
Citrus sinensis	Typhoid, Jedi jedi	Leaves
	Hernia	Roots
Cymbopogon citratus	Dizziness, gonorrhea, hook worms, cough	Leaves
Azadirachta indica	Fever, yellow fever, malaria	Leaves
Aloe vera	Hepatitis B, stomach pain	Leaves
Ceratotheca sesamoides	Burning sensation in the heart, hypertension, Partial madness, convulsion, chest pain in women	Leaves
Thevetia neriifolia	Fresh wounds	Sap
	Poison for grass cutter	Fruits
Cocos nucifera	Stomach pain, pimples	coconut water
Gmelina arborea	Diarrhea/purging	Barks
Jatropha curcas	Stomach pain, body ache in children	Stem
	Tooth pain, treatment of Navel in Children	Sap
	Hepatitis B, snake bite, treatment of poison	Seeds

Ceiba petandra	Hypertension, partial madness, stomach ache, Mystic diarrhea, difficulty in labor	Leaves
	Fracture	Barks
Spondias mombin	Heart burn, yellow fever, kwashiorkor, Cough	Leaves
	Skin rashes	Barks
Anacardium occidentale	Ulcer	Fruits
	Diarrhea/purging	Barks
Parkia biglobosa	Wounds, stroke, amoebic dysentery, diarrhea	Barks
Morinda lucida	waist pain, impotency	Leaves
Anona senegalensis	Itching in women's private part, yellow fever	Leaves
	Kwashiorkor, yellow	Stems
Maranthes polyandra	Blood shortage	Barks
Dracaena smithii	abdominal obesity, impotency	Stems
Erythrina senegalensis	Body ache in children, vomiting	Stems
Ocimum gratissimum	Cough, headache	Leaves
Vitex doniana	Blood retention	Barks
	Inflammation	Leaves
Vernonia amygdalina	Constipation, hypertension, diabetes	Leaves
Citrus aurantifolia	Jedi jedi	Leaves
	Typhoid, Dysentery, Pimples, Ulcer	Fruits
Chasmanthera dependens	Stomach pain	Stem
Dracaena smithii	Impotency, Abdominal obesity	Stem
Newbouldia laevis	Fever, typhoid, dysentery, Fibroid	Leaves
	Pile	Barks
Kigelia Africana	Menstrual problem	Barks, Leaves
Cocos nucifera	Stomach pain, Dizziness, voice loss, cough	Coconut water
	Heart burns, Gonorrhea	Coconut roots
Senna occidentalis	Stomach pain, headache	Leaves
Eurphorbia hirta	Hepatitis B	Leaves
Ficus asperifolia	Diarrhea, severe waist pain	Leaves
Citrus aurantifolia	Typhoid, Dysentery, pimples	Fruits/juices
Terminalia catappa	Blood retention	Fruits and dried leaves
Ficus polita	Sick animals, internal bleeding in human	Leaves
Hibiscus sabdariffa	Blood shortage	Fruits/Leaves

Gossypium arboreum	Ear pains	Leaves
Sarcocephalus latifolius	Menstrual disorder	Roots
	Measles, fever	Leaves
Citrus jambhiri	Dysentery	Leaves/fruits
Sterculia setigera	Severe stomach pain, menstrual pain	Seeds
Mitracarpus villosus	Eczema	Leaves
Spermacoce octodon	Hepatitis B	Leaves, barks and roots
Maytenus senegalensis	Hernia	Roots
Stereospermum kunthianum	Kwashiorkor	Branches
Vitellaria paradoxa	Arthritis/Rheumatism	Barks
Sida alba	Treatment of poison	Leaves
Commiphora kerstingii	Infertility in women	Leaves

Source: Field work, 2018

Table 7 shows that *Ceiba petandra* is the most frequently used medicinal plant (23.33%) followed by *Moringa oleifera* (15.83%) and *Cymbopogon citratus* (10.00%) found in home gardens in Benue State. *Eurphorbia hirta* and *Citrus aurantifolia* had the least frequency of use (0.42%).

Table 7. Decreasing order of most frequently used medicinal plant species in home gardens in Benue state.

Plant species	Type of Plant	Frequency	Percentage (%)
Ceiba petandra	Tree	56	23.33
Moringa oleifera	Tree	38	15.83
Cymbopogon citratus	Grass	26	10.00
Jatropha curcas	Tree	19	7.92
Erythrina senegalensis	Tree	14	5.83
Carica papaya	Tree	12	5.00
Hibiscus sabdariffa	Herb	11	4.58
Azadirachta indica	Tree	10	4.17
Psidium guajava	Tree	8	3.33
Spondias mombin	Tree	7	2.92
Aloe vera	Herb	6	2.50
Ocimum gratissimum	Shrub	5	2.08
Newbouldia laevis	Tree	5	2.08
Certotheca sesamoides	Herb	5	2.08
Morinda lucida	Tree	4	1.67

Source: Field work, 2018

DISCUSSION

Personal attributes of respondents by sex and age

Table 1 shows that majority of the home garden owners were men (71.67%), women were 28.33%. This implies that the household heads of the compounds visited were mostly men. This is similar to the findings of Melese and Fitamo [10]. Hence men are the heads of the households; they take major decisions in the family and therefore determine what should be planted around their home. This indicates that the choice of plant species (especially trees) grown or conserved in home gardens in Benue State is determined mostly by men. The choice of such plant species is associated with their use as food consumed in everyday life and the use of certain plant species to treat ailments. The choice of such plant species is related to the importance attributed to the plants. This agrees with the findings of others which states that women play significant role in the maintenance of home gardens but the establishment is solely that of men. However the choice of food crops grown in home gardens is usually determined by women. In terms of tree species, it does not apply. Only households with widows (17.50%) have such privilege. In terms of traditional medicine practice, **Table 2** shows that 70.83% of the 120 traditional medicine practitioners who were interviewed were men. While 29.17% were women. The result shows that men were more involved in the practice of plant medicine than women.

Majority of the respondents (50.83%) were in age group of 50 years and above, 39.17% in the age group 40-50 years and a few of them were in the age group of 29-39 years (9.17%). 0.83% was in the age group 18-28 years. This underscores that home garden owners were mostly the elderly people. This agrees with the findings of Agbogidi and Adolor [11] that majority of those involved in home gardening activities are elderly household members who often remain faithful to the conservation and maintenance of useful plants they have inherited from prior generations and Regassa [12] who reported that old aged people are mostly involved in the management of home garden. The result is also similar to the findings of Melese and Fitamo [10]. This result is also contrary to the report of some others which stated that majority of the home garden owners were young and agile.

Marital status of respondents

From **Table 1**, majority of the respondents were married (81.70%). Few were widowed (17.50%) and single (0.83%). This explains that home gardens in Benue State are mostly maintained by married people. This is similar to the report which stated that a greater percentage of the respondents were married. This shows that the respondents were matured adults with marital responsibilities; hence their involvement in the management of home gardens to make ends meet in the family.

Household size of respondents

Out of the 120 households visited, the least family size was in the range of 1-2 with 5.83% while the biggest family size was in the range of 12 and above with 33.33% followed by the family size within the range of 7-9 with 30.83%. The family size with the range of 4-6 had a percentage of 19.17%, family size within the range of 10-12 had 10.83%. This implies that different family sizes are dependent on home gardens for the sustenance of their families. This could be the benefits derived in form of food, income and medicine from the multipurpose trees. This is similar to the findings of Amanda et al. [13] that home garden plants (edible and medicinal plants) contribute largely to the family subsistence.

Educational status of respondents

Out of 120 respondents, 42.50% of the respondents had no formal education, 16.67% had primary education and 24.17% had secondary education, 15.83% had NCE and Diploma, while 0.83% had Degree. This implies that formal education is still low in rural areas in Benue State. Knowledge of the home garden owners affects the development of economically viable and ecologically sustainable home garden with regards to plant conservation [14].

Floristic composition and distribution of home garden plants in Benue state

A Total of 74 plant species belonging to 40 families were identified **(Table 3)**. Not all the plants were grown by the home garden owners. Some plants established naturally in the home gardens but some are maintained by the home garden owners because of the use value. The family Fabaceae had the highest number of eight (8) species. This is similar to the report by Regassa [12]. Followed by Anacardiaceae, Malvaceae and Arecaceae had 4 species each. The families Eurphorbiaceae and Rutaceae had 3 species pieces each. Ten (10) Families had 2 species each. This is similar to the findings of Melese and Fitamo [10]. Twenty-eight (28) families had 1 species each. Table 2 shows the distribution of home garden plant species according to the three major tribes in Benue State. The home gardens in Benue State consist of both cultivated and non-cultivated plants. Some plants were found growing naturally in home gardens. They are maintained by home garden owners because of the several uses such plants provide for them. Some plant species like *Chasmanthera dependens*, *Maytenus senegalensis*, *Spermacoce octodon* were found being cultivated in some home gardens in Benue State. While certain plants were found growing in one home garden and were never found growing in another even among home gardens within the same community. They are unique plants which vary across the six local government areas that were covered in the study. From the result of the study, these unique plant species include *Phoenix dactylifera*

(found only in Vandeikya), *Chrysophyllum albidum* (Only in Ogbadibo), *Pterocarpus santalinoides* (only in Oju), *Theobroma cacao* (only in Vandeikya), *Chasmanthera dependens* (Vandeikya), *Swartzia madagascaris* (Vandeikya). This agrees with the report that unique plants in home gardens varies with ethnicity, culture, religion and spirituality. Tree species such as *Ceiba petandra* (5.72%), *Carica papaya* (5.31%), *Newbouldia laevis* (5.03%), *Mangifera indica* (4.97%), *Moringa oleifera* (4.90%), *Jatropha curcas* (4.55%) and *Gmelina arborea* (4.41%) were the most frequently occurring and most abundant tree species found in home gardens in Benue State. Home gardens in Benue State have diverse plant species. However plant species such as *Caesalpinia bondue*, *Borassus aethiopum*, *Theobroma cacao* and *Phoenix dactylifera* were not abundant with a percentage of 0.07% each. Some plant species found in Tiv speaking areas were not found in either Idoma or Igede areas that were visited during the study. Plant species such as *Emilia coccinea*, *Caesalpinia bondue*, *Borassus aethiopum*, *Theobroma cacao*, *Phoenix dactylifera*, *Swartzia madagascriensis*, *Commiphora kerstingii*, *Lophira lanceolata*, *Eurphorbia hirta* and *Chasmanthera dependens* were not found in both Idoma and Igede areas that were covered in the study **(Table 2)**. Plants species like *Chrysophyllum albidum* (0.14%) was found only in Idoma area but it was not found in Tiv and Igede areas. *Pterocarpus santaliniodes* (0.48%) was found only in Igede but it was not found in Tiv and Idoma areas.

Medicinal plants found in home gardens in Benue state

Various Home garden plant species were identified for medicinal purposes **(Table 6)**. A lot of medicinal plants were found in home gardens in Benue State. Several types of ailments were found to be treated with the home garden medicinal plants. The ailments treated ranges from common ailments like cough, stomach pain to severe ailments like stroke, hepatitis B. Twenty two (22) plant species were found to be the most frequently used medicinal plants in home gardens in Benue State **(Table 7)**. Out of the 22 plants, *Ceiba petandra* had the highest percentage (23.33%) followed by *Moringa oleifera* (15.83%) and *Cymbopogon citratus* (10.00%). These top three plants were selected for phytochemical screening based on their percentage of use. *Ceiba petandra* is used to treat different ailments like hypertension, mystic diarrhea, partial madness and fracture. Its leaves are used as vegetables. *Moringa oleifera* is used to treat ulcer, diabetes, typhoid, body weakness and fever. *Cymbopogon citratus* is used to treat cough, dizziness, hook worms, gonorrhea and stomach upset. *Eurphorbia hirta* and *Citrus aurantifolia* had the smallest percentage (0.42%) each.

CONCLUSION

Home gardens in Benue State have diverse species of plants which have numerous uses ranging from their use as food, shade and medicine. Some of these plant species are naturally established in the home gardens and are being maintained, conserved or protected by home garden owners because of the diverse uses the plants offer. While others are deliberately planted by home garden owners because of how scarce the particular plant species is, especially those of medicinal importance. The most frequently used medicinal plant species include in Home gardens in Benue State include; *Ceiba petandra*, *Moringa oleifera* and *Cymbopogon citratus*. Most of the home garden owners in Benue State are elderly people who have remained faithful to the conservation and maintenance of useful plants they have inherited from forefathers.

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