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SURVEY OF MEDICINAL PLANT SPECIES UTILIZATION IN HOME GARDENS IN JEMA'A LOCAL GOVERNMENT AREA, KADUNA STATE, NIGERIA

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ABSTRACT

Survey of plant species planted in home gardens and their medicinal uses was carried out in Jema' LGA, Kaduna State. Three political zones are: Gwong, Godogodo and Jema'a Central were purposively chosen for the study. Thirty respondents from 30 households with home gardens were purposively selected and visited in each zone; making a total of 90 respondents interviewed. Selection of respondents was based on the presence of home garden and willingness to participate in the study. Data were collected using a semi-structured questionnaire. Frequency of Citation (FC), Cultural Importance Index (CII) of Informant and Consensus Factor (Fic) of plant species were determined. Results showed that respondents were more of males (61.1%) than females (38.9%). A total of 57 plant species belonging to 34 families were found in home garden while plant 41 species belonging to 28 families were identified as medicinal plants with Rutaceae as the most utilized family. Azadirachta indica had the highest FC of 28(31.1%) followed by Moringa oleifera 26(28.9%), Mangifera indica 25(27.8%), Persea americana 22(24.4%), Carica papaya 20(22.2%), Eucalyptus calmadulensis 15(16.7%) and Khaya senegalensis 14(15.6%), respectively. Home garden practices should be encouraged by government as part of greening the human environment, follow-up tests should be administered to patients treated with herbal medicine and nuclear magnetic resonance (NMR) of most utilized medicinal plants in home gardens should be done to ascertain the exact bioactive properties they possess.

Keywords: Medicinal plant species utilization in Home gardens

INTRODUCTION

The importance of home garden gardens in the production of food, medicine and other useful products for human beings is widely recognized (Polegric and Negric, 2010). Home gardens are basic production units contributing to social and cultural well-being in rural areas. These units are becoming dominant and promising land-use system in many part of the tropics that maintain high levels of diversity, productivity, and sustainability endowed with important ecosystem functions (Panwar and Chakravarty, 2010). The realization that the home gardens are also a vital reservoir of unique genetic diversity including the ethno-medicinal plants has recently led to more careful research to understand the role of home gardens as in situ genetic diversity (Panwar and Chakravarty, 2010). The opportunity of using home garden as means for conservation of crop and forest plant genetic diversity as an effective complementary measure to ex situ strategies has been reported (Galluzzi *et al.,* 2010). Many traditional crop species were reported to have medicinal properties which are retained in the traditional knowledge of the local people through home gardens (Tangjang and Arunachalam, 2009). Medicinal plants in home

gardens are either deliberately cultivated or come up spontaneously as wild and weedy species (Gao *et al.,* 2012). They have played a major role in maintaining primary and basic healthcare of rural communities from time immemorial. Home gardens of Cooch Behar are smaller with an average size of 0.61 ha than that of other parts of India or elsewhere but are generally high in native diversity including ethn-omedicinal plants (Panwar *et al.,* 2010). In India, particularly in West Bengal, people living in remote and rural areas are still dependent on traditional medicines for the treatment of various ailments due to lack of modern medical facilities and poor socioeconomic conditions (Kumar *et al* 2007). The majority of the medicinal plants are herbs, followed by shrubs and trees. Therefore, the threats and trends for medicinal plants are similar to those for the forest plant species.

Traditionally plant are reliable sources for the treatment of diseases in different part of the world (Hostettmann *et al.,* 2000). In Kaduna State, Nigeria, many households establish home gardens for the purposes of food, fruits, vegetables, medicines, shade among others reasons. Despite the popularity and importance of home garden in Jema'a Local Government Area of Kaduna State, not much is known and documented on the plant species found in the home garden. Therefore, this study was aimed to investigate plant species established in home gardens in Jema'a and their medicinal use to the people of the area.

MATERIALS AND METHODS
Study Area
Jema'a Local Government Area (LGA) is located in south part of Kaduna State, Nigeria, with the headquarter, at Kafanchan. It has a population of 278, 202 and population density of (271.41 km$_2$) (2006 census). It is inhabited predominantly by Gwong, Nkyob, Fantswam, and Nyaskpa respectively, other ethnic groups including Nindem, Atyap, Bajju and Hausa Tribes. The people of the local government area are predominantly farmers, cultivating cash crops such as Peanut, Ginger and food crop such as corn, millet, sorghum, rice, vegetable and cocoyam which are cultivated in great quantity. The LGA is located between latitude 9^0 11 and 9^0 30^N and Longitude 8^0 00 and 8^0 30^E and shares boundaries with two other state, namely plateau to the east and Nassarawa to the south and four other LGA, Zango Kataf LGA, to the north, Jaba Local government area to the west, Sanga LGA to the south and Kaura local government area to the north-east. Jema'a LGA occupied a landmass of 1,384Km^2. It also experiences two seasons; the wet season and dry season. Temperature is usually 32°C (Figure 1)
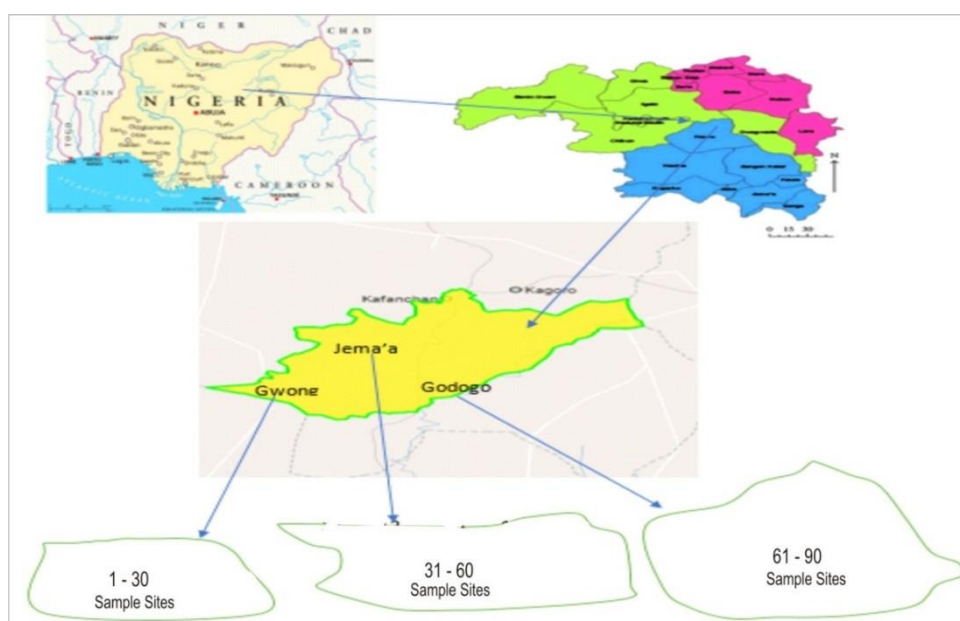

Fig.1 Sample sites of home gardens in three Geo-political zones of Jema`a local government area of Kaduna State

Sampling Techniques

Three political zones of Jema'a LGA were selected for the study. The three political zones are, Gwong, Godogodo and Jema'a Central were purposely chosen for the study. In each of the study locations, thirty (30) household with home gardens were visited, making a total of 90 home garden, covering the three political zones of Jema'a Local Government area, Data were collected using a semi-structured questionnaire to gather information, respondent were selected based on home garden and willingness of participate in the research, high priority was also given in the selection of home gardens. The respondents were told the objective of the study as well as the confidentially of the study during data collection. Interviews were done at farmers, homesteads, home gardens owners were interview individually. The respondents were given great freedom of expression as it offers respondents an opportunity to qualify their answers. Thus, reducing bias due to unlimited response ranges. The study was conducted using both local and English language for the interview. The use of Hausa Language was an advantage for the research, because it is assumed that people who cannot speak English feel comfortable speaking to people in their own general language, thereby giving the survey better reliability. Table 1 show the name of zones in Jema'a LGAs and the frequencies and percentages of respondents sampled for the study.

Table 1: Distribution of Respondents in the study Area by zones

S/No.	Name of Zone	Zone	F	Percentage (%)
1	Gwong	Zone A	30	33.33
2	Jema'a central	Zone B	30	33.33
3	Godogodo	Zone C	30	33.33
	Total	**3**	**90**	**100**

Data analysis
Quantitative Analysis of Data

Quantitative analysis of data collected was determined by the following:

Relative frequency citation (RFC)

Relative frequency citation was calculated by using the following formula: $RFC = FC/N \dots$ (1)
Where:
RFC = Relative frequency citation
FC = Number of informants reporting the use of species
N = Total number of informants participating in the survey (N), without consideration of the use categories.

Cultural Importance Index (CII) –

It is a measure of the importance of a particular plant species to the community. It is derived by dividing the number of separate uses recorded for a plant species by the total number of informants/collaborators.
$$CII = NUR/TNI \dots (2)$$

Where:
NUR = number of use report
TNI = Total number of informants

RESULTS

Table 2 shows results of demography characteristics of respondents. They were more of men (61.1%) than women (38.9%) who were mostly within the ages of 35 – 44 years old (36.7%) and were predominantly civil/public servants (47.8%), traders (27.8%), farmers (18.9%) and security personnel (4.4%). The respondents were majorly Christians (63.3%) followed by Moslems (36.6%) and Traditionalist (1.1%). Most respondents were married (83.3%) whose family size ranged from 3 - 5 (42.2%), 6 - 8 (26.7%), above 9 persons (22.2%) with 0 - 2 (9.9%) as the least. Respondents' level of education was majorly tertiary (43.3%) and post-secondary (28.9%) who resided in town (44.4%), village (20%), city (18.9%) and ward (16.7%).

Table 2: Demographic information of the respondents in Jema'a LGA

Variables	Respondents	
	Frequency	%
Gender		
Male	55	61.1
Female	35	38.9
Total	**90**	**100**
Age		
18 – 24	10	11.1
25 – 34	18	20
35 – 44	33	36.7
45 – 54	16	17.8
55 and Above	13	14.4
Total	**90**	**100**
Occupation		
Farming	17	18.9
Fishing	1	1.1
Trading	25	27.8
Civil/public servant	43	47.8
Security personnel	4	4.4
Total	**90**	**100**
Religion		
Christianity	57	63.3
Islam	32	36.6
Traditional	1	1.1
Total	**90**	**100**
Marital status		
Single	12	13.3
Married	75	83.3
Divorced/Separated	3	3.3
Total	**90**	**100**
Family size		
0 – 2	8	9.9
3 – 5	38	42.2
6 – 8	24	26.7
9 and above	20	22.2
Total	**90**	**100**
Education Level		
Non formal Education	6	6.7
Primary Education	6	6.7
Post primary	6	6.7
Post - secondary	26	28.9
Tertiary	39	43.3
Post Graduate	7	7.8
Total	**90**	**100**
Location of Settlement		
Ward	15	16.7
Village	18	20
Town	40	44.4
City	17	18.9
Total	**90**	**100**

A total of 57 plant species belonging to 34 families were found in home garden in Jema'a LGA (Table 3). *Mangifera indica* was mostly (45.6%) mentioned by respondents followed by *Psidium guajava, Citrus sinensis, Azadirachta indica,* and *Moringa oleifera* (28.9%); *Anacardium occidentale* (26.7%); *Carica papaya* (25.6%); *Parkia biglobosa, Elaeis guineensis* and *Eucalyptus calmadulensis* (21.1%) respectively among others.

Table 3: List of plant species found in home garden in Jema'a LGA

S/No	Family	Botanical Name	Common Name	Local Name (Hausa)	F	%
1.	Anacardiaceae	*Mangifera indica* (L.)	Mango	Mangwaro	41	45.6
2.	Myrtaceae	*Psidium guajava*	Guava	Goba	26	28.9
3.	Rutaceae	*Citrus sinensis*	Sweet orange	Lemun	26	28.9
4.	Meliaceae	*Azadirachta indica*	Neem	Bedi	26	28.9
5.	Moringaceae	*Moringa oleifera*	Moringa	zogale, Bagaaruwar makka	26	28.9
6.	Anacardiaceae	*Anacardium occidentale*	Cashew	Fisa, Kanju	24	26.7
7.	Caricaceae	*Carica papaya* (L.)	Pawpaw	Gwanda	23	25.6
8.	Fabaceae	*Parkia biglobosa* (Jacq.)	Locust bean	Dorowa, Kadai	19	21.1
9.	Arecaceae	*Elaeis guineensis*	Oil palm	Man dabino	19	21.1
10.	Myrtaceae	*Eucalyptus calmadulensis*	*Eucalyptus*	Turare	19	21.1
11.	Rutaceae	*Citrus limon*	Lemon	Tsami	18	20
12.	Lauraceae	*Persea Americana*	Avocado	Giginya	18	20
13.	Musaceae	*Musa sapientum*	Banana	Ayaba.	17	18.9
14.	Arecaceae	*Cocos nucifera*	Coconut	Kwakwar	17	18.9
15.	Meliaceae	*Khaya senegalensis* (Desr.) A. Juss	Mahogany	Madaci	17	18.9
16.	Asteraceae	*Vernonia amygdalina*	Bitter leaves	Shiwaka, Shuwaka	16	17.8
17.	Fabaceae	*Tamarindus indica*	Tamarind	Tsamiya	15	16.7
18.	Annonaceae	*Annona muricate*	Soursop	Fasadarur, Tuwon biri	13	14.4
19.	Zingiberaceae	*Zingiber officinale*	Ginger	Ginger, Ata-ile	13	14.4
20.	Cucurbitaceae	*Cucurbita moschata*	Pumpkin	Kabewa	13	14.4
21.	Lamiaceae	*Gmelina arborea*	Gmelina	Melaina	11	12.2
22.	Zingiberaceae	*Curcuma longa* (L.)	Turmeric	Turmeric, Gangamau	10	11.1
23.	Verbenaceae	*Tectona grandis*	Teak	Faradoka	10	11.1
24.	Lamiaceae	*Ocimum gratissimum*	Scent leave	Dadoya	10	11.1
25.	Malvaceae	*Adansonia digitate* (L.)	Baobab tree	Kuka	9	10
26.	Apocynaceae	*Calotropis procera*	Sodom Apple	Tumfafiya	9	10
27.	Poaceae,	*Saccharum officinarum L.*	Sugarcane	Rake	8	8.9
28.	Combretaceae	*Terminalia catappa*	Indian almond	Eghoin-nofwaledo	7	7.8
29.	Leguminosae	*Acacia nilotica*	Gum arabic tree	Bagaruwa	7	7.8
30.	Euphorbiaceae	*Manihot esculenta*	Cassava	Rogo, karaza,	6	6.7
31.	Poaceae	*Cymbopogon citratus*	Lemon grass	Lemon ciyawa	6	6.7
32.	Liliaceae	*Aloe barbadensis*	Aloe vera		6	6.7
33.	Rutaceae	*Citrus paradisi*	Grape fruit	Garehul	5	5.6
34.	Musaceae	*Musa paradisiaca*	Plantain	Okamu, ayaba, Doodo	4	4.4
35.	Rubiaceae	*Morinda citrifolia* G. Don	Indian mulberry, Noni	Kodudu	4	4.4
36.	Bignoniaceae	*Newbouldia laevis*	Boundary Tree	Aduruku	4	4.4
37.	Sapindaceae	*Blighia sapida*	Ankye, Achee,	Ackee	4	4.4
38.	Amaranthaceae	*Amaranthus cruentus* (L.)	Amaranthus	Alayyahu	3	3.3
39.	Cactaceae	*Cactus sp.*	Cactus	Murtsunguwa	3	3.3
40.	Myrtaceae	*Syzygium guineense*	Water berry	Málmóó	3	3.3
41.	Burseraceae	*Canarium schweinfurthii*	Elemi	Atili	3	3.3
42.	Euphorbiaceae	*Jathropha curcas*	Jathropha	Bini da Zugu	2	2.2
43.	Malvaceae	*Abelmoschus esculentus*	Okra	Kubewa	2	2.2
44.	Solanaceae	*Solanum melongena*	Garden egg	Kwai	2	2.2
45.	Alliaceae	*Allium cepa*	Onion	Albasa	1	1.1
46.	Brassicaceae	*Brassica oleracea*	Cabbage bulb	kabeji	1	1.1
47.	Fabaceae	*Pterocarpus mildraedii*	Oha leaf	Madobiyar rafi	1	1.1
48.	Annonaceae	*Annona reticulata*	Annona		1	1.1
49.	Solanaceae	*Capsicum annuum*	Sweet pepper	Koren tattasai	1	1.1
50.	Malvaceae	*Cola* nitida	Kola		1	1.1
51.	Lamiaceae	*Vitex negundo*	Chaste tree		1	1.1
52.	Fabaceae	*Cassia alata*	Candle bush, craw-craw plant		1	1.1
53.	Araceae	*Colocasia esculenta*	Cocoyam	Gwamba	1	1.1
54.	Arecaceae	*Borassus aethiopum*	African fan palm		1	1.1
55.	Portulacaceae	*Talinum fruticosum*	Waterleaf	Alenyruw-a	1	1.1
56.	Rutaceae	*Citrus aurantiifolia*	Lime orange	Lemun, tsami.	1	1.1
57.	Apiaceae	*Steganotaenia araliacea*	Carrot tree	Hano	1	1.1

Results on general knowledge of perceived plant uses from home garden in Jema'a are presented in Figure 2. Generally, majority of respondents (93.2%) believed the plants in home garden cure diseases, while few others noted that plants were used to prevent diseases (21.6%) and promote human health (5.7%). Similarly, most respondents (94.3%) claimed plants in home garden were used for medicine, while some believed they were used as fruits (26.1%), windbreak or shelter belt (17%%), and woodlots (12.5%).
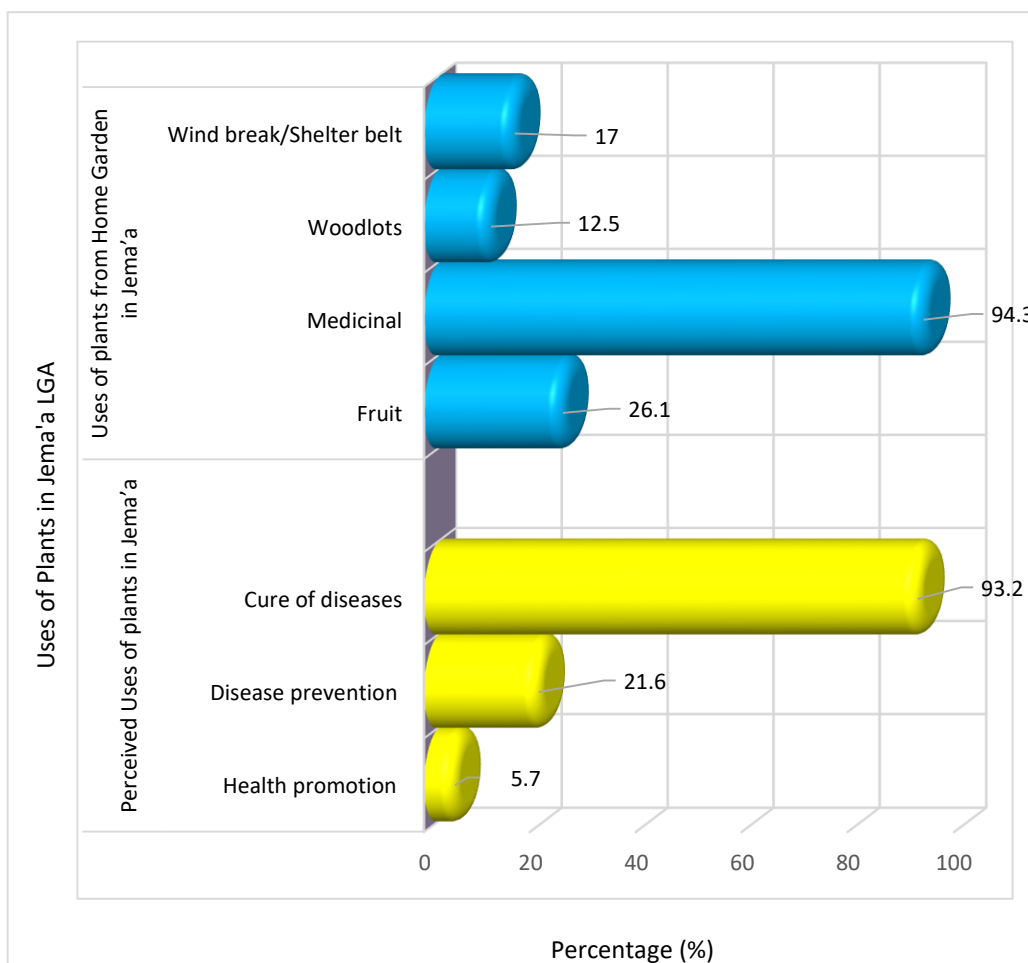

Figure 2: Knowledge of perceived uses of plants in Jema'a and from Home Garden

Table 4 shows total sum of 41 species in 28 families were identified as plants used for medicinal purposes in Jema'a LGA. *Azadirachta indica* had the highest Frequency Citation (FC) and percentage of 28(31.1%) followed by *Moringa oleifera* 26(28.9%), *Mangifera indica* 25(27.8%), *Persea americana* 22(24.4%), *Carica papaya* 20(22.2%), *Eucalyptus calmadulensis* 15(16.7%) and *Khaya senegalensis*14(15.6%), respectively. The part of plants used includes stem bark, bulb, leaves, fruit, flower, seed, tuber, oil, stem. Stomach pain. Of the total 34 families of plant species found in Jema'a LGA, the families of Fabaceae and Rutaceae were most abundant (7.02%) followed by Malvaceae, Myrtaceae, Arecaceae and Lamiaceae (5.26%), respectively. Anacardiaceae, Euphorbiaceae, Musaceae, Lauraceae Annonaceae, Zingiberaceae, Meliaceae, Poaceae and Solanaceae families were next with 3.51% mentioned by respondents (Table 4).

Table 4: Plant species frequently used for medicinal purposes in Jema'a LGA

S/No	Family	Botanical Name	Common Name	PPU	FC	%	RFC
1.	Amaranthaceae	*Amaranthus cruentus* (L.)	Amaranthus	L	2	2.2	0.02
2.		*Mangifera indica* (L.)	Mango	B, L	25	27.8	0.28
3.	Anacardiaceae	*Anacardium occidentale*	Cashew	F, L	10	11.1	0.11
4.		*Musa sapientum*	Banana	F,FL	9	10	0.10
5.	Annonaceae	*Annona muricate*	Soursop	F, L	11	12.2	0.12
6.	Apocynaceae	*Calotropis procera*	Sodom Apple	L	6	6.7	0.07
7.	Araceae	Colocasia esculenta (L.) Schott)	Cocoyam	T	1	1.1	0.01
8.	Arecaceae	*Cocos nucifera*	Coconut	W	5	5.6	0.06
9.	Asteraceae	*Vernonia amygdalina*	Bitter leaf	L	10	11.1	0.11
10.	Bignoniaceae	*Newbouldia laevis*	Boundary Tree	L	3	3.3	0.03
11.	Brassicaceae	*Brassica oleracea*	Cabbage bulb	Bu	1	1.1	0.01
12.	Burseraceae	*Canarium schweinfurthii*	Elemi	L	2	2.2	0.02
13.	Cactaceae	*Cactus sp.*	Cactus	L	3	3.3	0.03
14.	Caricaceae	*Carica papaya* (L.)	Pawpaw	L, S	20	22.2	0.22
15.	Cucurbitaceae	*Cucurbita moschata*	Pumpkin		3	3.3	0.03
16.	Euphorbiaceae	*Musa paradisiaca*	Plantain	F,FL	1	1.1	0.01
17.		*Jathropha curcas*	Jathropha	L	1	1.1	0.01
18.	Fabaceae	*Parkia biglobosa* (Jacq.)	Locust bean	B	10	11.1	0.11
19.		*Tamarindus indica*	Tamarind	T	9	10	0.10
20.	Lamiaceae	*Ocimum gratissimum*	Scent leaf	L	7	7.8	0.08
21.		*Persea americana*	Avocado	F, L	22	24.4	0.24
22.	Leguminosae	*Acacia nilotica*	Gum arabic tree	B	2	2.2	0.02
23.	Liliaceae	*Aloe barbadensis*	Aloe vera	L	10	11.1	0.11
24.	Malvaceae	*Adansonia digitate* (L.)	Baobab tree	L	2	2.2	0.02
25.		*Azadirachta indica*	Neem	L, O	28	31.1	0.31
26.	Meliaceae	*Khaya senegalensis* (Desr.) A. Juss	Mahogany	B, L	14	15.6	0.16
27.	Moringaceae	*Moringa oleifera*	Moringa	L, S	26	28.9	0.29
28.	Myrtaceae	*Eucalyptus calmadulensis*	*Eucalyptus*	L	15	16.7	0.17
29.		*Psidium guajava*	Guava	L	9	10	0.10
30.	Poaceae	*Cymbopogon citratus*	Lemon grass	L	6	6.7	0.07
31.		*Saccharum officinarum L.*	Sugarcane	ST	2	2.2	0.02
32.	Rubiaceae	*Morinda citrifolia* G. Don	Indian mulberry, Noni	L	1	1.1	0.01
33.		*Citrus limon*	Lemon	F, L	11	12.2	0.12
34.	Rutaceae	*Citrus sinensis*	Sweet orange	F, L	3	3.3	0.03
35.		*Citrus paradisi*	Grape fruit	F, L	1	1.1	0.01
36.		*Citrus aurantiifolia*	Lime orange	F, L	1	1.1	0.01
37.	Sapindaceae	*Blighia sapida*	Ankye, Achee,	L	1	1.1	0.01
38.	Solanaceae	*Capsicum annuum*	Sweet pepper	F, L	1	1.1	0.01
39.		*Solanum melongena*	Garden egg	F	1	1.1	0.01
40.	Zingiberaceae	*Curcuma longa* (L.)	Turmeric	Bu	9	10	0.10
41.		*Zingiber officinale*	Ginger	Bu	6	6.7	0.07
Total	**28**	**41**					

Key: PPU = Part of plant used; FC = Frequency citation; RCF = Relative frequency citation; % = Percentage; B – stem bark, Bu – Bulb, L – leaves, F – Fruit, FL - flower, S – Seed, T – Tuber, O – Oil, St – Stem

DISCUSSION

There were more men than women in home garden practices in Jema'a LGA. This agrees with Reyes-García *et al.,* (2010) who reported that home gardens were managed mainly by men in Iberian Peninsula. Labe *et al.* (2019) also reported that most of the home gardens in Benue State were owned and managed by men. This may be due to some traditional taboos as reported by Berhanu and Guye (2022) associated with agroforestry practices or medical plants in rural areas in Nigeria could prevent women folks from assessing such sites. It could also imply that since men are recognized as the heads in many African homes; they may take prominent choices in their families that determines what may in planted in their home gardens. However, Gonzalez-Ball *et al.,* (2022) reported a majority of female as garden owners in their study of

home garden in Heredia, Costa Rica. A study of Palheta *et al.,* (2017) in Brazil also found that female family members were largely responsible for managing urban home gardens in the Amazonian region. In a related study of home garden, Quesada and Lobo (2012) reported most women with knowledge of traditional medicinal in Colombian urban gardens who specialize in medicinal plants. This finding dominance of women in medicinal knowledge seems to the rare in Nigeria

Respondents believed the plants in home garden cure diseases, prevent diseases and promote human health. used as fruits, windbreak or shelter belt and as woodlots. This assertion could imply where there are so many home garden in most homes in Nigeria and particularly in Kaduna State. Of the 57 plant species in 34 families were found in home garden in Jema'a LGA *Mangifera indica* was the most utilized. *Psidium guajava, Citrus sinensis, Azadirachta indica, Moringa oleifera, Anacardium occidentale, Carica papaya, Parkia biglobosa, Elaeis guineensis* and *Eucalyptus calmadulensis* were top most nine species in the communities. The Families Fabaceae and Rutaceae were the most abundant with four species each. This finding corroborates with the reports by Regassa and Labe *et al.,* (2019) who reported Fabaceae

family as the most abundant in their studies on Home garden in Hawassa and Benue State, respectively. Tamokou *et al.,* (2017) reported Rutaceae as a generally known citrus family which has flowering plants and species with approximatively 160 genera. Several Rutaceae are shrubs or small trees that produce fleshy fruit. Out of the 28 families identified as plants used for medicinal purposes in Jema'a LGA had Rutaceae as the most utilized family with four individual species viz: *Citrus limon, Citrus sinensis, Citrus paradise* and *Citrus aurantiifolia.* Panda *et al.,* (2019) reported Rutaceae as traditionally and conventionally known to be popular in ethno-medicine.

CONCLUSION
There were more males than females in home garden practices in Jema'a LGA. A total of 57 plant species belonging to 34 families were found in planted home garden while plant 41 species belonging to 28 families were identified as plants used for medicinal purposes with Rutaceae as the most utilized family with four individual species: *Citrus limon, Citrus sinensis, Citrus paradise* and *Citrus aurantiifolia.* Respondents believed the plants in home garden cure diseases, prevent diseases and promote human health. used as fruits, windbreak or shelter belt and as woodlots.

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