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ETHNOMEDICINAL SURVEY OF ANIMALS AND PLANTS WITH ANTIHYPERGLYCEMIC (ANTIDIABETES) AND ANTIHYPERTENSIVE (ANTIHYPERTENSION) PROPERTIES IN OGUN STATE.

BY

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ABSTRACT

Ethno-medicine is the study or comparison of the traditional medicine with bioactive compounds in plants and animals practiced by various ethnic groups. Estimation of 1.6 million deaths was caused by diabetes before 70 years of age while Hypertension kills around 7.5 million people worldwide every year which was expected to increase in the year 2025. The management of Diabetes and Hypertension are of importance, especially in developing countries. This study, thus aims at documenting the remedy, the parts of plants and animals used, methods of preparation. The target population was the herbs sellers in each 9 selected markets in the three senatorial districts of Ogun State, Nigeria. Data were collected through direct observation and structured questionnaire. Proportional Stratified Sampling method was applied using 20% of the total numbers of the respondents in each market in the study area. Data were analyzed using descriptive statistics, and inferential statistics (ANOVA). This study revealed the plants and animals based remedies adopted by the herbs sellers for the treatment of diabetes and hypertension in Ogun state, Nigeria with their method of preparation, common names and scientific names for easy identification and preparation. The results also revealed that there is significant difference ($P < 0.005$) in utilization level of animals and plants for the treatment of Diabetes and Hypertension across the locations of the respondents. The result finally revealed the different plant base remedies with their frequently used

parts which are; leaf (23% for diabetes, 37% for Hypertension), followed by root (23% for diabetes) and fruit (23% for Hypertension). While for animal products such as; bee honey are common for both ailment with different percentages (50% for High blood pressure and 44% for diabetes).

Key words: Ethno-medicine, Diabetes, Hypertension (HBP), Weighted mean (WM), Gross Arithmetic mean (GAM)

INTRODUCTION

Ethno medicine is a study or comparison of the traditional medicine based on bioactive compounds in plants and animals and practiced by various ethnic groups, especially those with little access to western medicines. It was estimated that about 80% of the world's population which is about six billion people really depends primarily on animal and plant-based medicines as a remedy for diver's ailments. Traditional human populations have a broad natural pharmacopoeia consisting of wild plant and animal species. Ingredients sourced from wild animals and plants are not only used in traditional medicines, but are also increasingly valued as raw materials in the preparation of modern, western medicines and herbal preparations. WHO in 2015 also acknowledged the contributions of traditional healers to the overall health delivery particularly in developing countries. The native healers have contributed to a broad spectrum of health care needs that include disease prevention, management and treatment of non-communicable diseases as well as mental and gerontology health problems.

There are also increasing evidences that traditional medicine (TM) is effective in the management of chronic illnesses (Thorne *et al.*, 2002). In fact, Traditional Medicine is taught as part of school curriculum activities in medical schools in the USA (Wetzel *et al.*, 1998). Perhaps, some important questions to ask are: Why the growing demands for Traditional Medicine (TM) across the world and why the sudden concerns for assessing and evaluating the effectiveness of TM?

A number of factors have been identified as responsible for the widespread of the use of Traditional Medicine and the sudden concern for assessing and evaluating the effectiveness of the medicine across the world. Research has shown that a number of traditional medicines are important and effective therapeutic regimens in the management of a wide spectrum of diseases some of which may not be effectively managed using Western medicines (Swerdlow, 2015). According to (Mander *et al.*, 2007) among South African black population, traditional medicine is thought to be desirable and necessary for treating a range of health problems that Western medicine does not treat adequately. In Nigeria, effective medicinal plants in management of various diseases have been documented (Aiyeloja, 2006) including those used for the treatment of opportunistic infections associated with HIV/AIDS (Ansari *et al.*, 2010). Studies also revealed at least 522 medicinal species of plants that are used in the management of numerous ailments presently in Nigeria (Weintritt, 2007). Why on the other hand Zootherapy (i.e. the uses of animal parts in traditional medicine), But despite the importance of Zootherapy in traditional medicine, studies on the therapeutic uses of animals and their body parts have been less practiced compared to plants based treatment i.e Phytotherapy (Solovan, 2004). Research on medicinal uses of animals and their products should be taken as important as that of plant uses in traditional medicine (Lev, 2013). This is why in this study, the information on the uses of both animal and plant in the treatment of diabetes mellitus and high blood pressure is adopted.

Diabetes is a chronic disorder in the metabolism of proteins, fats, and carbohydrates (Osadebe, 2014). It is described as an increase in blood glucose after any type of meal. Diabetes results from either insulin deficiency or malfunction (Gilan, 2005). The International Diabetes Federation (IDF) estimates that over 5 million people suffer from diabetes in Africa which is expected to increase to 15 million by 2025 (IDF, 2017). In another research carried out by WHO in Lagos, Nigeria among some selected hospital recorded that Nigeria has the greatest number of people living with diabetes in Africa, with an estimated burden of about 1.7 million which will increase to 4.8 million by 2023 (Zimmet, 2003). Meanwhile, epidemiological data has shown that 80% of people with diabetes live in low and middle

income countries in which Nigeria is one of them. However, the increase in incidence rates has been seen to follow the trend of urbanization and lifestyle changes, perhaps most importantly "Western style" diet which is relating to environmental dietary effect, (Cook *et al.*, 2008). In 2015, Nigeria recorded the highest mortality rate from diabetes with 60% of deaths per year out of over one million people suffering from diabetes and over 3.85 million with low glucose. (WHO, 2015).

Hypertension on the other hand, is the commonest among non- communicable diseases which often time serves as opportunistic infections associated with diabetes and HIV/AIDS among others (Enwereji, 2008). It is the leading cause of cardiovasculardisease in the world (Keenan *et al.*, 2002). It is an important public health challenge in both economically developing and developed countries. Many people with hypertension are unaware of their condition, and among those with hypertension, treatment is infrequently inadequate (Asayama *et al.*, 2009). The prevalence of hypertension varies around the world with the lowest prevalence in rural India (3.4% in men and 6.8% in women) and the highest prevalence in Poland(68.9% in men and 72.5% in women). The global prevalence of hypertension has been increasing since year 2000. 972 million people had hypertension with a prevalence rate of 26.4%. These are projected to increase to 1.54 billion affected individuals and a prevalence rate of 29.2% in 2025 (Whelton, 2005). A recent community based study of rural and semi-urban population in Enugu, Nigeria put the prevalence of hypertension in Nigeria at 32.8% (Ulasi *et al.*, 2010). Uncontrolled hypertension is associated with serious organ damage including heart disease, stroke, blindness, and renal disease (Khakurel *et al*., 2009). These serious complications of hypertension can be prevented by adequate blood pressure control (Cuspidi *et al.*, 2000).

So far, different western treatment has been developed to combats the above mentioned ailments (Diabetes and High blood pressure), such as insulin therapy, pharmacotherapy, and diet therapy, have been developed to control Diabetes (Coll, 2015). In the past three decades, despite the significant progress made in the treatment of diabetes, the results of treatment in patients is still far from perfect due to the fact that the treatments have some disadvantages which includes drug resistance (reduction of

efficiency), side effects, and even toxicity (Hemmingsen, 2014)., frequent urination, excessive thirst, low blood pressure, muscle cramps, skin rashes, increased uric acid levels, dizziness, irregular menstrual cycles and erectile problems(Asayama *et al.*, 2009). All these side effects could be a discouraging factor for some Diabetic and Hypertensive patients from complying with their treatment which can cause crisis of these ailments and could eventually leads to their death. Toproffer solution to this, there is a need to look deeper into other alternate therapy which is Traditional Medicine (i.e Phytotherapy and Zootherapy). This research will reveal alternative medicine based remedies from plants and animals for the treatments of Diabetics Mellitus and HBP (hypertension) which will be gotten among the herbs sellers and traditional medicine practitioners across the three senatorial districts in Ogun State, Nigeria.

MATERIALS AND METHODS

Study Area.

Ogun State is a state in southwestern Nigeria. Created in 1976, it borders Lagos State to thesouth, Oyo and Osun states to the north, Ondo to the east and the Republic of Benin to the west. Abeokuta is the capital and largest city in the state. The state's appellation is "Gateway to Nigeria". It was created in February 1976 from the former Western State. The 2006 census recorded a total population of 3,751,140 residents. The state has a total of 20 Local government areas grouped into 3 units that are otherwise known as Senatorial Zone or district. The 3Senatorial districts of Ogun State are: Ogun Central, Ogun East and Ogun West.

Ogun Central Senatorial district: It has 6 Local Government Areas which are: Ifo, Ewekoro, Obafemi/Owode, Abeokuta North, Abeokuta South and Odeda. There is only one Federal Hospital in the State which is Federal Medical Center, Idi Aba, Abeokuta and one paramount State Hospital which is situated at Sokenu road, Ijaye Abeokuta.

Ogun East Senatorial district: It has 9 Local Government Areas which includes: Sagamu, Ikenne, Remo North, Ijebu Ode, Odogbolu, Ijebu North-East, Ijebu North, Ijebu East and Ogun waterside.

Ogun West Senatorial district: It has 5 Local Government Areas which includes: Imeko Afon, Yewa North, Yewa South, Ipokia and Ado-Odo/Ota.

Weather and Topography: Ogun is one of the coldest regions in Nigeria with latitude (6.2^0 to 7^0.09'20.56"N), longitude (3^0.20'42.32"E) and an average daily high temperature of only 32^0C. High humidity and high temperatures are making the weather pleasant at times, but also partly tropical hot and humid simply warm to hot all year round.

Flora and Fauna: The state is rich and blessed with vegetations and different species of animals. The vegetation comprises of rain forest, woodland and tall grass savanna and the following animals can be found in them; Africa civet cat, Flying squirrels, Bush-pig, Bat, Bush buck, Antelopes, Snakes, Grass cutter, Turtles, Crocodile, Giant rat, Alligator, Porto, Giant forest squirrel, Wild dog, Tortoise, Senegal double squirrel francolin, Monkeys, Blue duiker, Long- tailed pangolin, Kob, Brush-tailed porcupine, Fox, Guinea fowl and Giant African giant snail.

People's culture: Furthermore, the state made up of six ethnic groups which are; the Egba, the Ijebu, the Remo, the Egbado, the Awori and the Egun. The language of the majority of the people of Ogun State is Yoruba but this is however broken into scores of dialects

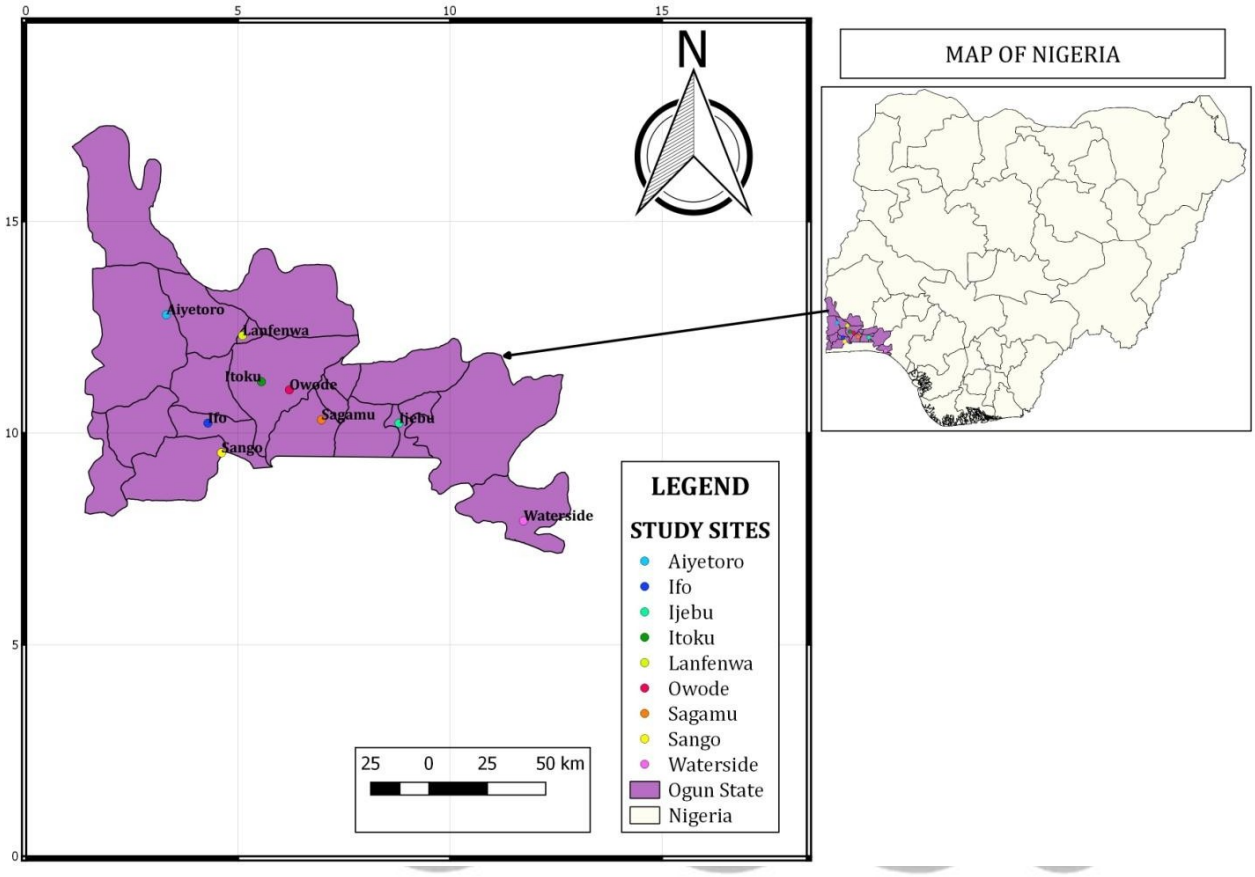


Figure 1: Location of the local government areas in map ofOgun State.

Source: (Field survey, 2018).

Target Population

The Study Population is the herbs sellers in the 9 major different markets of the 3 senatorial districts. The Major Markets are; Ogun Central (Lafenwa, Itoku and Ifo markets), Ogun east (Ijebu Ode, Sagamu and Waterside markets) and Ogun west (Owode, Sango and Aiyetoro markets) were purposefully selected due to presence

of more traditional medicine materials sellers (both herbs and animal parts sellers) in themarkets. A total of 443 respondents in the 9 selected markets were randomly selected based on their wiliness to participate.

Sample size Determination

The sampling size for the respondents in this study was determined using 20% sampling size (Fall, 2016). The formula is stated below, while the table 1 below shows the distribution:

S = N*(P).

S= N*(20/100)

Where:

S =

Rrequired

sample size.

N =

Population

Size.

P =Choosing Population proportion to be 20%.

Table 1: Showing the number of the respondents per market and the requiredsample size for this study.

Markets	**Actual number of Respondents**	**Required numbers**	**Formula**
Itoku	439	88	S = N*(P).
Lafenwa	232	46	S = N*(20/100)
Ifo	94	19	
Ijebu-Ode	435	87	
Sabo	93	19	
Waterside	107	21	
Owode	589	118	
Sango	123	25	
Imeko	98	20	
Total sample		**443**	

Sources: (Fall, 2016)

Plant species identification

Plant species were identified as outlined according to Lowe (1989) and keay (1989).

Animal/insect species identification

Animal species specimens were identified as outlined and described by Jean and Pierre (1990).

The instrument for data collection for this study include self structured questionnaire, direct observation and secondary data. The questionnaire employed for the study was self conducted by me and a research assistance. It consist of the demographic characteristics of the respondents, an open ended table used to retrieve the various animals and plants, parts and methods of preparation the respondents uses for the treatments of Diabetes and Hypertension, While for the sources of the animals and plants recorded, a tick the appropriate table was adopted. This questionnaire was administered randomly to respondents based on their wiliness to participate. Spatial representation of the study locations were achieved using Geographic Information System (GIS).

Statistical Analysis

The analytical techniques employed include descriptive statistics and inferential descriptive statistics. The descriptive statistical tools used include mean, media, mode, frequencies, and percentages. The inferential statistics that were used in testing the hypothesis using one way analyses of variance (ANOVA) with P value set at $P < 0.05$.

RESULTS

Demographic characteristic of sampled herbs sellers in Ogun State, Nigeria.

Table 2 presents the sum up value of the demographic characteristics of sampled herbs sellers in the 9 differen markets (Sagamu, Waterside, Ijebu ode, Ayetoro, Sango, Owode, Ifo, Lafenwa and Itoku) widely distributed within th 3 senatorial districts (Ogun East, Ogun West, and Ogun Central) in Ogun State, Nigeria. It was observed that 4.1% o sampled herbs sellers were males, while the females were 10.2% of the herbs sellers in Ogun State, Nigeria. It wa further revealed that the lowest proportion of the herbs sellers with 0.9% were between the age bracket of 20 – 29 years 2.5% were between age brackets of 30 – 39 years, 4.4% which has the highest percentage are between age bracket 40 - 49, 4.3 were between age bracket 50 – 59, while2.2% of the herbs sellers were 60 years and above. It was also observe

that 2.2% of herbs sellers were single and 10.1% were married, 0.2% were divorced, while 1.8% were widower and widow.

Furthermore, it was observed that very few herbs sellers with 1.2% in Ogun State has no formal education, 7.0% had primary education, 4.5% had secondary education, while 1.6% had tertiary education. Also it was revealed that lager percentage of the herbs sellers with 10.5% in Ogun State practices Islam, 3.5% practice Christianity, while very few with 0.3% practices traditional worshiping. In Ogun State, it was revealed that 0.3% among the herbs sellers were foreigners majorly people from Benne Republic. While the larger proportion 14.5% of the herbs sellers are Nigerians. However, herbs sellers with less than 5 years experience had 0.5%, 0.7% has 5 – 9 years of experience, 1.6% has 10 - 19 years of experience, 4.4 has 20 – 29 years of experience, while, 7.0% which is the largest proportion with 30 years of experience and above.

Instrument for data collection

Table 2: Demographic characteristics of the sampled herbs sellers in Ogun State,Nigeria.

Characteristics	Description	Total Frequency of the respondents in the 9 Markets	Percentage (%)
Gender	Male	107	4.1
	Female	268	10.2

Age(years)	20 – 29	23	0.9
	30 – 39	65	2.5
	40 – 49	116	4.4
	50 – 59	114	4.3
	Above 60	58	2.2
Marital Status	Single	59	2.2
	Married	265	10.1
	Divorced	5	0.2
	Widower/Widow	46	1.8
Education Level	No formal education	32	1.2
	Primary	185	7.0
	Secondary	117	4.5
	Tertiary	41	1.6
Religion	Christianity	91	3.5

	Islam	276	10.5
	Traditional Worshiping	7	0.3
Nationality	Nigerian	368	14.0
	Foreigner	7	0.3
Years of experience	Below 5	12	0.5
	5 – 9	19	0.7
	10 – 19	43	1.6
	20 – 29	116	4.4
	Above 30	185	7.0

Source: (Field survey, 2019)

Plants identified for the treatments of Diabetes and Hypertension in Ogun State, Nigeria.

Table 3, presents the list, combination, scientific names and the methods of preparation of plants identified for the treatment of Hypertension. The plant species and their various combinations recorded were the commonly used plant species with anti-hypertensive properties adopted by the respondents for the treatments of high blood pressure.

Table 3: Plant species recorded for treatment of Hypertension in Ogun State, Nigeria.

S/N	Plant Family	Plants (Botanical Name)	Common Name	Indigenious Name(Yoruba)	Preparation and Uses
1	Burseraceae Fabaceae	*Dacryades edulis* *Daniellia oliveri*	African Pear African Copalba Balsam	Ewe Pear Epo iya	Sliced into pieces, cooked and taken per shot twice daily.
2	Amaryllidaceae Amaryllidaceae Zingiberaceae	*Allium cepa* *Allium sativum* *Zingiber officinale*	Bolb Onion Ginger root Ginger root	Alubosa funfun Ayu Ataale	Grinded in pure honey and taken spoonful day and night.
3	Zingiberaceae Amaryllidaceae Rutaceae	*Zingiber officinale* *Allium sativum* *Citrus medica*	Ginger root Galic Citron	Ataale funfun Ayu Osan wewe	Grinded in lime water and honey. Taken two spoonfuls twice daily.
4	Olacaceae Polygalaceae	*Olax subscorpioidea* *Securidaca longepedunculata*	Olive leaf Violet tree	Itakun Ifon tutu Itakun Ipeta	Cut, soaked in water for 24hrs,take 1shot two times every day.
5	Pedaliaceae Fabaceae	*Sesamum indicum* *Daniellia oliveri*	Bene Bene	EpoIgi Ekudo Epo IgiIya	Cut, cooked in water for 24hrs,take 1shot

					two times every day.
6	Apocyraceae Arecaceae	*Hunteria umbletta* *Cocos nucifera*	Water seed Coconot tree	Eso Abeere Omi Agbon	Seed is powdered and mixed with water. Take1 shot every morning and night.
7	Zingiberaceae Amaryllidaceae Asphadelaceae Guttiferae Rutaceae	*Curcuma longa* *Allium sativum* *Aloe barbadensis* *Garcinia kola* *Citrus medica*	Turmeric Garlic Aloe Vera Bitter Kola Citron	Ataale pupa Ayu Aloe Vera Eso orogbo Omi osanwewe	Grinded together into lime water with original honey of the same proportion. Take two spoonfuls twice a day.
8	Fabaceae Rutaceae	*Parkia biglobosaiana* *Citrus medica*	Locust Bean Citron	Iru Omi osanwewe	Thoroughly wash locust bean, grind with alum, and add lime water and honey.Takebefore breakfast daily.
9	Loranthacea	*Globimetula braunii*	Danser	Ewe Afomo Onishana	Garlic is mashed, cooked with the

	Burseraceae	*Dacryodes edulis*	African Pear	Ewe Pear	leaves and take
	Amaryllidaceae	*Allium sativum*	Garlic	Ayu	per shot every morning and night.
10	Leguminosae	*Dialium guineense*	Velvet Tamarind	Epo Igi amuyan Kaun alabere	They are cooked together with sweet water, potash and drank per shot two times daily.
11	Amaryllidaceae	*Allium sativum*	Garlic	Ayu	Pound and soak with lime and honey for 2 days. A shot is taken twice a day.
	Guttiferae	*Garcinia kola*	Bitter kola	Orogbo	
	Amaryllidaceae	*Allium ascalonicum*	Bulb onion	Alubosaelewe	
	Amaryllidaceae	*Citrus medica*	Citron	Omi osanwewe	
	Rutaceae	*Curcuma longa*	Turmeric	Ataale pupa	
12				Owo eyo tio ni iwo 11	Grind together and used as incision around the abdomen. The patient sleeps with the opposite sex for 3 days.
	Zingiberaceae	*Afromomum melegueta*	Alligators pepper	Ataare 11	
	Crassulaceae	*Bryophyllum pinnatum*	Miracle leaf	Ewe itanna rerinkomi 16	

13	Rutaceae Amaryllidaceae Leguminosae Euphorbiaceae	*Citrus aurantium* *Allium ascalonicum* *Dialium guineese* *Crotom lobatus*	Bitter orange Garlic Velvet Tamarind Prota	Itakun Ijaganyin Alubosa elewe Eso igi amuyan Eso erualamo	They are packed together in 10 ltrs keg full of ordinary water and soak for a whole day. it is drank thrice daily for a full week per shot.
14	Amaryllidaceae Amaryllidaceae Piperaceae Zingiberaceae Rutaceae	*Allium sativum* *Allium ascalonicum* *Piper guineense* *Curcuma longa* *Citrus medica*	Garlic Bulb onion West African pepper Turmeric Citron	Ayu Alubosa elewe Eso Iyere Ataale Pupa Omi osanwewe	Pounded together and mixed with lime water, honey and snail's water. Two spoonfuls is taken two times everyday.
15	Moraceae Cucurbitaceae	*Ficus asperifolia* *Momordica foetida*	Sand papper tree Bitter melon	Ewe Eepin Ewe Ejinrin	They are squeezed together with little salt and sieved. The liquid is drank per shot two times everyday.

Source: (Field survey, 2019)

Animals recorded and Insect Species for the treatment of Hypertension (HBP) in Ogun State, Nigeria.

This table 4 presents the list, combination, scientific names and the methods of preparation of animals identified for the treatment of HBP. Table 4 also shows the animals and their various combinations recorded were the commonly used animals with anti-hypertensive properties adopted by the respondents in Ogun State for the treatment of high blood pressure.

Table 5: Plant species recorded for the treatment of Diabetes in Ogun State, Nigeria.

S/N	Plant Family	Plants (Botanical Name)	Common Name	Indigenious Name(Yoruba)	Preparation and Uses
1	Maliaceae	*Khaya ivorensis*	Mahogany	Epoigioganwo	Washed and cooked with water. Take 1 shot every morning.
	Leguminosae	*Dialium guineense*	Velvet Tamarid	Epoigiamuyan	
	Maliaceae	*Entandrophragma utile*	Sipo Mahogany	Epoigijebo	
2	Arecacease	*Elaeis guineense*	Oil palm	Ororo Adin Dudu	Seeds are powdered in the oil and two spoonfuls is taken twice every day.
	Apocyraceae	*Hunteria umbellatta*	Oliver	EsoAbeere	
3	Apocyraceae	*Hunteria umbellatta*	Oliver	EsoAbeere	The seeds are powdered in pure honey or lime water and the mixture is taken twice every day.
	Rutaceae	*Citrus medica*	Citron	Omi osanwewe	
4	Arecacease	*Elaeis guineense*	Oil palm	Ororo Adin Dudu	The leaf is grinded in the oil and the
	Loranthaceae	*Loranthus sp.*	Loranthos	Ewe etu	

					mixture is taken two spoonfuls every morning.
5	Asphodelaceae Apocyraceae Arecaceae	*Aloe barbadensis* *Hunteria umbellatta* *Coco nucifera*	Aloevera Oliver Coconut	Aloevera EsoAbeere Omi Agbon	Aloe vera is sliced and powdered abeere seeds is mixed for 24hrs and a short is taken two times a day.
6	Amaryllidaceae Zingiberaceae	*Allium sativum* *Zingiber officinale*	Garlic Zinger	Ayu Ataale funfun	They are grinded in pure honey and a spoonful is taken two times every day.
7	Apocyraceae Amaryllidaceae Rutaceae	*Hunteria umbellatta* *Allium sativum* *Citrus medica*	Oliver Garlic Citron	Eso Abeere Ayu Omi Osanwewe	They are grinded in lime water and

					original honey. Two spoonfuls is taken twice a day.
8	Apocyraceae Leguminosae Euphorbiaceae	*Hunteria umbellatta* *Tetrapleura tetraptera* *Bridelia micrantha*	Oliver Aidan fruit Golden leaf	Eso Abeere Itakun Aidontooro Itakun Igbora Igbo	Washed and soaked in a bottle or keg of ordinary water for 24hrs and a shot taken twice a day.
9	Apocyraceae Amaryllidaceae Nohiaceae	*Hunteria umblatta* *Allium sativum* *Aristolochia repens*	Oliver Garlic Ditchman's pipe	Eso Abeere Ayu Itakun Akogun	They are powdered together and used with ordinary water or hot pap early every morning.
10	Zingiberaceae Piperaceae Amaryllidaceae	*Zingiber officinale* *Piper guineense* *Allium sativum*	Ginger root West African pepper Garlic	Ataale Pupa Eso Iyere Ayu	They are soaked together in a

	Malvaceae	*Abutilon mauritianum*	Ashanti pepper	Eso kanaafuuru	keg or bottle full of ordinary water for a whole day and a shot is to be taken every morning and night.
11	Amaryllidaceae	*Hunteria umbellatta*	Oliver	Eso Abeere Omidun	The seeds are powdered with a whole cray fish in the sweet water and a shot is taken twice daily.
12	Apocynaceae	*Alstonia congensis*	Stool wood	Awopa	They are choped together and cooked with ordinary or sweet water and can be
	Zingiberaceae	*Zingiber officinale*	Tumeric and Ginger	Ataale Pupa ati funfun	
	Lythraceae	*Lawsonia inermis*	Henna	Ewe laali	

					taken at anytime of the day.
13	Cucurbitaceae Poaceae	*Momordica foetida* *Sorghum caudatum*	Bitter lemon Greaf millet	Ewe Ejinrin Ewe ati itakun Poroporo	Well-cooked together and put in a keg. Take 1 shot twice daily.
14	Asteraceae Labiatae	*Vernonia amygdalina* *Ocimum gratissimum*	Bitter leaf Sent leaf	Ewe Ewuro Ewe Efinrin	Leaves are juiced. Take 1 shot twice daily or eat the leaves as vegetables Soup
15	Luguminoceae Malvaceae Pandaceae	*Tetrapleura tetraptera* *Abutilon mauritianum* *Microdesmis puberula*	Aidan fruit Ashanti pepper Fruiting branch	Itakun Aidontooro Eso kanaafuuru Eso ariwo	Soaked with Kafura pelebe in water and 1 shot is taken twice daily. It also cures dysentery.
16	Aristolochiaceae	*Aristolochia repens*	Dutchman's pipe	Itakun Akogun	Washed, cut

	Rutaceae	*Zanthoxylum rubescens*	Chewing Stick	Itakun Orin ata	and cooked together.
	Apocyraceae	*Hunteria umbellatta*	Oliver	Eso Abeere	
	Malvaceae	*Abutilon mauritianum*	Bush mallow	Kanaafuuru	Poured into a keg to be taking 1 shot twice daily.
	Piperaceae	*Piper guineenses*	Ashanti pepper	Iyere	
17	Apocynaceae	*Aistonia congensis*	Cheese wood	Ewe Awogba	They are soaked together in water till the following day and taken per shot two times every day.
	Chenopodiaceae	*Chenopodium ambrosioide*	Sweet pigweed	Ewe Arunpale	
	Apocynaceae	*Aistonia congensis*	Cheese wood	Itakun Awogba	
	Commelinaceae	*Cyanetis lanata*	Cyanotis	Itakun itoogbin	
	Caesalpioideae	*Senna alata*	Candle stick	Itakun asunwan (Egba)	
	Apocynaceae	*Strophantu shispidus*	Arrow poison	ItakunSagere	
18	Asteraceae	*Tridax procumbens*	Coatbuttons	Itakun Tuned	They are all cut and soaked together in lime water for 24hrs. 1 shot is taken twice a day.
	Fabaceae	*Dioclea reflexa*	Marbles vine	Epo igi Aren	
	Plumbaginaceae	*Plumbago zeylanica*	Ceylon	Itakun Inabiri	
	Annonaceae	*Uvaria chamae*	Bush banana	Itakun Eruju	
	Plogalaceae	*Securidaca longepeduculata*	Violet tree	Itakun Ipeta	
	Solanaceae	*Nicotiana tabacum*	Night shade	Ewe Kataba	
	Zamiaceae	*Corcho nistridens*	Cycad	Eru Eyo	
	Sapotaceae	*Chrysophyllum*	White starapple	Isu Baka	

	albidum		
Rutaceae	*Citrus medica*	Citron	Itakun Osanwewe

Source: (Field survey, 2019)

Animal and Insect Species recorded for the treatment of Diabetes in Ogun State, Nigeria.

Table 6 presents the list, combination, scientific names and the methods of preparation of animal species identified for the treatment of diabetes. Table 6 also indicated the animals and their various combinations recorded and the commonly used animals with anti-hyperglycemic properties adopted by the respondents (herbs sellers) in Ogun State for the treatment of diabetes.

Table 6 Animals and Insect Species recorded for the treatment of Diabetes in OgunState, Nigeria.

S/N	Family Name	Animals (Scientific Name)	Common Name	Indigenious Name(Yoruba)	Preparation and Uses
1	Achatinidae	*Achatina maginata*	West African Snail	Omi Igbin	Liquid is mixed with wild orange water with same quantity and a full shot of honey. Two spoonfuls is taken twice every day.
	Apidae	*Apis mellifera*	Western honey bee	Oyin Igan	
2	Apidae	*Apis mellifera*	Western honey bee	OyinIgan	Turmeric, garlic, aloevera and madunmaro are soaked in a mixture of lime water with honey for 24hrs.One shot twice daily.
3	Apidae	*Apis mellifera*	Western honey bee	OyinIgan	It is mixed with powdered abeere and lime water and licked with two spoonfuls twice

					every day
4	Apidae	*Apis mellifera*	Western honey bee	OyinIgan	Mixed with grinded garlic and ginger and two spoonfuls is taken every morning and night.
5	Cambaridae	*Procambarus clarkii*	Fresh water crayfish	Ede pupa	Powdered with dried abeere seeds and mixed with honey and sweet water. Two spoonfuls twice daily.
6	Apidae	*Apis mellifera*	Western honey bee	Oyin Igan	Mixed with coconut water and abeere seeds' powder. Taken two spoonfuls twice daily.
7	Chamaeleonid Ae	*Chamaeleo chamaeleon*	Chameleon	Odindin oga gbigbe	Powdered and taken with snail's

					water twice daily.
8	Achatinidae	*Achatina marginata*	West African Snail	Eran Igbin	It is cooked with grinded iyere and the soup is eaten twice every day.
9	Bovidae Bovidae	*Syncerus caffar/* *Bos Taurus*	Buffalo/ Cow's bile	Efan Maalu	Abeere seeds are pawdered in bile liquide and licked twice everyday
10	Achatinidae	*Achatina marginata*	West African Snail	Ikarahun Igbin	Burnt and pounded. Leak with water twice daily.
11	Achatinidae Apidae	*Achatina marginata* *Apis mellifera*	West African Snail Western honey bee	Omi idi Igbin Oyin Igan	They are mixed with powdered abeere. 1 shot twice daily.
12	Muridae	*Mus musculu*	House mouse	Asin	Sundry or burnt and powdered. Leaked with water or pap.

Source: (Field survey, 2019)

Animals and Insect parts utilized by the respondent for the treatment of Diabetesin Ogun State, Nigeria.

Figure 2: This is showing animal parts utilized for the treatment of Diabetes in Ogun state, Nigeria. It was observed that the animal parts adopted by the respondents (herbs sellers) for treatment of diabetes were as follows according to the percentage of their usage; bee honey recorded the highest percentage 44%, followed by Snail fluid (24%,) Snail shell (10%,) Cow/Buffalo has (10%,) Crayfish flesh (8%,) while Chameleon and Mice flesh had the lowest (2%).

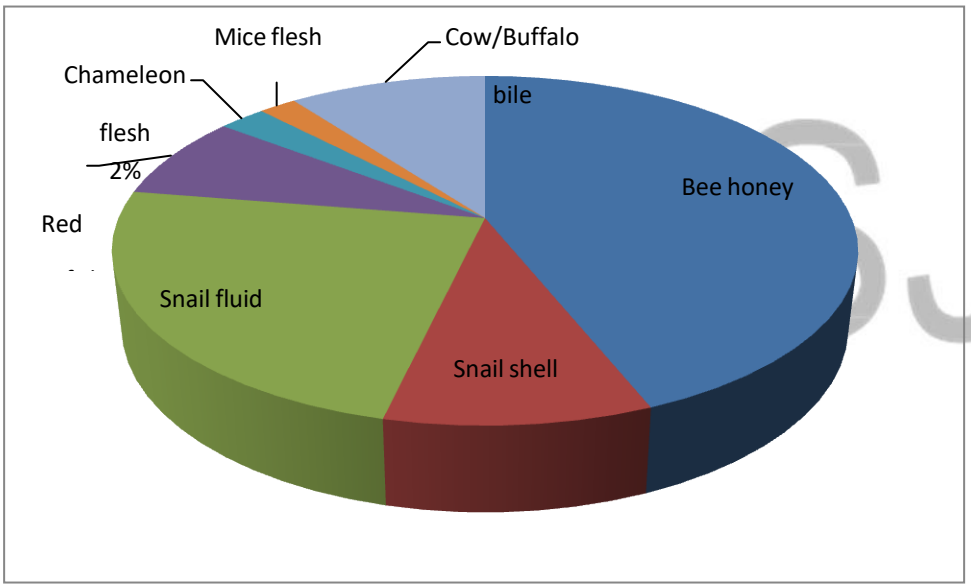
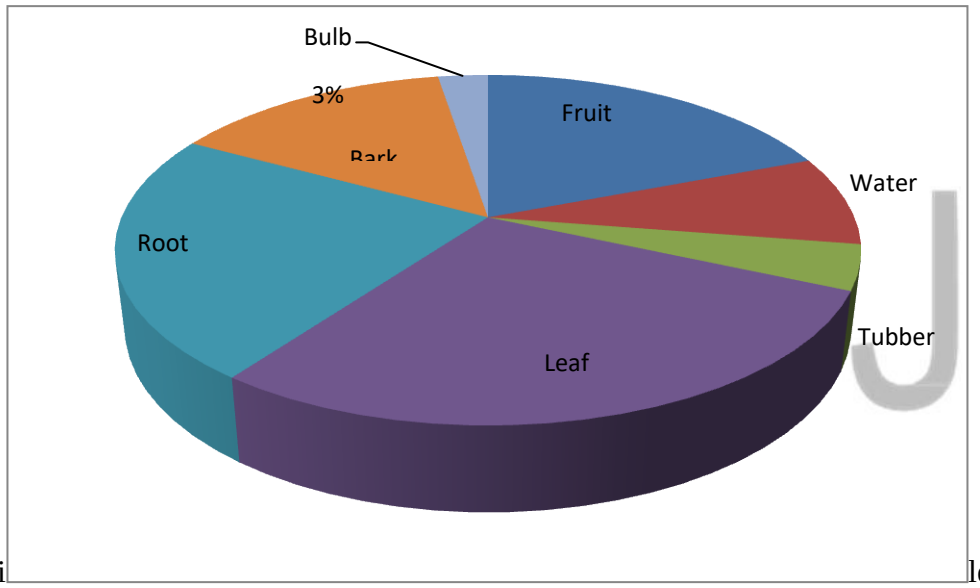


Figure 2: Animal and Insect parts and their percentage of uses for treatments ofDiabetes

Source: (Field survey, 2019)

Plants parts and their percentage of uses for treatments of Diabetes

Figure 3: Shows the plant parts adopted by the respondents (herb sellers) for the treatment of Diabetes. It was observed that the animals parts recorded vary in percentage of usage meaning the respondents knows and uses some parts than the others. In this study, they were recorded as follows according to the degree of usage. Leaf had the highest 28% of usage, followed by Root (23%), Fruits ranked third (19%), followed by Bark (15%), Water from some fruits (e.g lime, coconut) ranked fifth position with 8%, Tubers ranked sixth position with (4%) and Bulbs was the least in the ranking



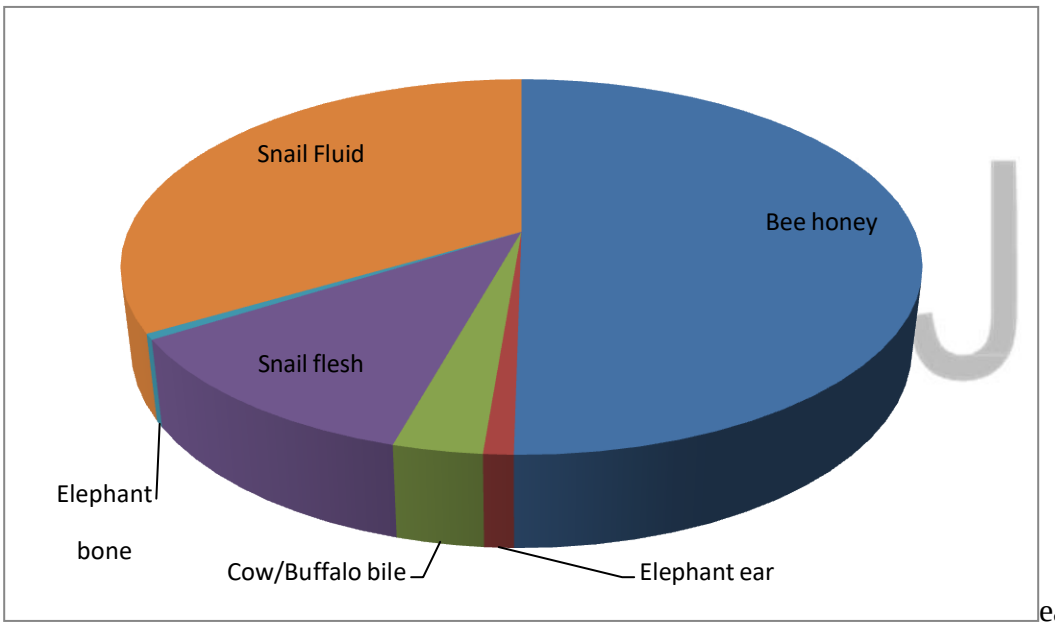
profi le (3%).

Figure 3: Plants parts and their percentage of uses for treatments of Diabetes

Source: (Field survey, 2019)

Animal parts and their percentage of uses for Hypertension (HBP) Treatments

Figure 4: This is showing animal parts utilized for the treatment of Hypertension (HBP) in Ogun state, Nigeria. It was observed that the animal parts adopted by the respondents (herbs sellers) in Ogun state, used for treatment of HBP were as follows according to the percentages of their usage; bee honey had the highest percentage (50%), snail fluid (33%), snail flesh (12%), Cow/Buffalo bile (3%), Elephant



ear with 2%. While Elephant bone was the least (1%).

Figure 4: Animal parts and their percentage of uses for treatement of Hypertension Source: (Field survey, 2019)

Plants parts and their percentage of uses for treatments of Hypertension.

Figure 5: Is showing plant parts utilized for the treatment of Hypertension in Ogun state, Nigeria. It was observed that the plant parts recorded varried in percentage of usage meaning the respondents knows and uses some parts of plants than the others. In this study, they were recorded as follows according to the degree of usage; Leaf had the highest percentage with 37% as recorded in the treatment of diabetes, followed by fruits with 23% which ranked second, tubers and bulbs had the same percentage with 9% which means they were both used equally by the respondents, bark was ranked fourth position with 5% and the least on the ranking profile was liquid from some fruits (e.g lime, coconut) with 4%.

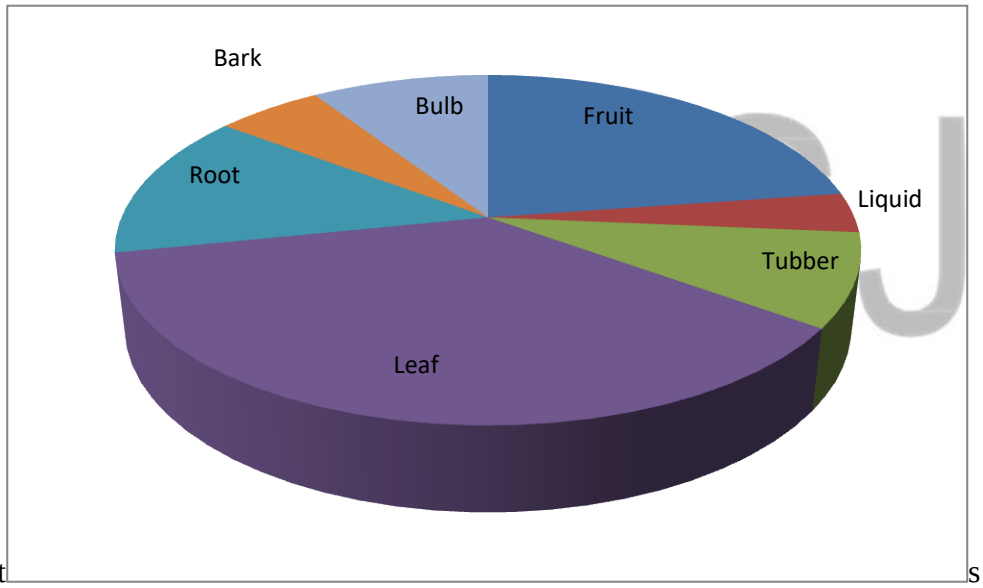


Figure 5: Plants parts and their percentage of uses for treatments of Hypertension Source.

(Field survey, 2019)

The utilization level of animals/Insects and plant species for the treatment of diabetes and HBP do not significantly depend on the locations of the respondents.

Utilization level of animals and plants for the treatment of Diabetes and Hypertension on location of the respondents as shown in Table 7. The utilization level of the respondents in these five (5) markets with superscript [a] varied significantly ($P < 0.05$) with Owode market (24.64 ± 2.20^{d}) recorded the highest utilization level while Ayatoro markets (3.88 ± 0.40^{a}) recorded the lowest value.

Table 7: Utilization level of animals and plants for the treatments of Diabetes andHypertension do not significantly depend on the location of the respondents.

Market	Utilization level
Sagamu	4.17±0.34[a]
Waterside	4.89±0.33[a]
Ijebu-ode	18.40±1.50[c]
Ayetoro	3.88±0.40[a]
Sango	5.53±0.38[a]
Owode	24.64±2.20[d]
Itoku	19.11±1.53[c]
Ifo	4.13±0.31[a]
Lafenwa	9.80±0.64[b]
P value	**0.000**

Mean value ± standard error with different alphabets across colums are significantly different ($P \geq 0.05$)

Source: (Field survey, 2019)

DISCUSSION

Demographic characteristic of sampled herbs sellers in Ogun State, Nigeria.

In this study, It was observed that 4.1% of sampled herbs sellers were males, while the females were 10.2% of the herbs sellers in Ogun State, Nigeria. This conforms to (Jurry and Kadir, 2019) which reported that the role of women in medicinal plants market is positive. It was further revealed that the lowest proportion of the herbs sellers with 0.9% were between the age bracket of 20 – 29 years, 2.5% were between age brackets of 30 – 39 years, 4.4% which has the highest percentage are between age bracket 40 – 49, 4.3 were between age bracket 50 – 59, while2.2% of the herbs sellers were 60 years and above (Peter *et al,* 2018). It was also observed that 2.2% of herbs sellers were single and 10.1% were married, 0.2% was divorced, while 1.8% was widower and widow.

Furthermore, it was observed that very few herbs sellers with 1.2% in Ogun State has no formal education, 7.0% had primary education, 4.5% had secondary education, while 1.6% had tertiary education (Awodele *et al*, 2012). Also it was revealed that lager percentage of the herbs sellers with 10.5% in Ogun State practices Islam, 3.5% practice Christianity, while very few with 0.3% practices traditional worshiping. In Ogun State, it was revealed that 0.3% among the herbs sellers were foreigners majorly people from Benne Republic. While the larger proportion 14.5% of the herbs sellers are Nigerians. However, herbs sellers with less than 5 years experience had 0.5%, 0.7% has 5 – 9 years of experience, 1.6% has 10 – 19 years of experience, 4.4 has 20 – 29 years of experience, while, 7.0% which is the largest proportion with 30 years of experience and above, this is in agreement with (Xutian and Zhang, 2009) which reported that Traditional Chinese medicine (TCM) is an important example of how ancient and accumulated knowledge is

applied in a holistic approach in present day health care. TCM has a history of more than 3000 years.

Determine the animals and plants utilize for the treatment of diabetes and high blood pressure (HBP) in Ogun State, Nigeria;

In this study, 52 plants species was obtained for the treatments of Diabetes which were distributed into 35 families and 6 animals/insects species which were also distributed into 5 families. While for Hypertension treatments, 48 plants species which were distributed into 22 families and 6 animal's species which were distributed into 5 families was also documented in Ogun state, Nigeria. This goes in line with (Ranju and Singh, 2014) that recorded the indigenous plants and animals used among the migratory Tangbetons found in the some areas of Pokhara as remedy for different ailments like B.P, diabetes, arthritis, thyroids, diarrhea, over bleeding, etc. to be 60 plant species with 40 families and animals to be 17 species with 12 families. *Aloe barbadensis, Zingiber officinalae, Allium sativum* are most common for the treatment of Diabetes and Hypertension according to this study. This conforms with (Panel *et al.,* 2015), (Reinhart *et al.,* 2008) which reported that the three plants are being used for high blood pressure and spots on the skin, diabetes, digestive disorder, curing cough and the treatment of boil.

Identify the parts of each animals and plants used in the treatment of diabetes and high blood pressure (HBP) in the study area;

In this study, animal parts utilized by the respondent for the treatment of diabetes in Ogun state, Nigeria, reveals that bee honey users among the respondent as their own remedy for treating diabetes are more. (Tahereh and Moslem, 2013) reported that honey is a natural product

that has been widely used for its therapeutic effects which contain about 200 substances such as amino acids, vitamins, minerals and enzymes. While chameleon and mice flesh has the least percentage this is in line with (Lev, 2013), which reported on the knowledge of the tribe of TamilNadu in India on the traditional therapeutic uses of animal. Hypertension on the other hand, it was established also that honeybee also is the most frequently used animal parts for the treatmentof HBP (Tahereh *et al.*, 2013), while Elephant ear and Elephant bone has the least. This also conforms to (Lev, 2013).

Whereas for plant parts utilized for the treatment of Diabetes, this study showed that leaf was the most utilized part of plants by the respondents which may be because of its potency compare with other parts of the plant. (Carter *et al.*, 2010) established the increased consumptionof green leafy vegetables and that it has been reported to be associated with reduced incidence of type 2 diabetes and associated with decreased serum total cholesterol and low-density lipoprotein-cholesterol in turn preventing Hypertension. Tuber and bulb has the least percentage. This conforms the study by (Adeneye *et al.*, 2007) which established that leaves, root, stem and flowers are frequently used in herbal medicine.

Also for the treatment of Hypertension, it is also revealed that leaf users among the respondent was more (Carter, *et al*, 2010), bark and water from some fruits has the leastpercentage according to (Adeneye *et al*, 2007) which established that leaves, root, stem and flowers are frequently used in herbal medicine.

Utilization level of animals and plants for the treatment of diabetes and Hypertension do not significantly depend on the location of the respondent.

It was reported in this study that the animals and plants based remedy adopted and utilized by the respondents in various markets selected (Sagamu, Waterside, Ijebu ode, Ayetoro, Sango, Owode,Ifo, Lafenwa and Itoku) in the three senatorial districts (Ogun East, Ogun West, Ogun Central) of Ogun state, Nigeria are

location specific i.e the utilization level of different plants and animals with their parts depends on the location of the respondents that uses them in contrast to the set hypothesis that utilization does not depend on location. This conforms to (Ranju and Singh, 2014) which documented the indigenous practice of the Tangbetons area to cure various diseases where the utilization of different 60 species of medicinal plants and 17 species of medicinal animals both wild and domesticated were reported.

CONCLUSION

This study established that the larger number of the Traditional Medicine Materials Sellers in Ogun State, Nigeria is mostly female within their middle age with a lot of years of experience. Also this study has provided information on plants and animals based remedy used in Traditional Medicine practices in Ogun state, Nigeria with the methods of preparation, common names and scientific names for easy identification and preparations which will serve as an alternative therapy for diabetic and hypertensive patients that may come across the publication. Furthermore, the utilization level and the combinations of different plants and animals with their parts is depended on the location of the respondents that uses them.

Finally, honey as a part of insect called honey bee was mostly used with other constituents for the treatments of diabetes and HBP, while leafy part of a plant was also mostly used for both ailments.

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