

Exploratory Survey of Forest Plants in Traditional Treatment of Guinea Worm Infections (GWI) (*Dracunculus medinensis* Linn): Experiences from Nigeria and Ethiopia.

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Abstract

*Traditional medicines using forest plants as the major source of raw materials has been the system of Medicare especially in treating guinea worm (*Dracunculus medinensis* LINN) infections in endemic areas of Africa such as Nigeria and Ethiopia. This system is age long and predates the advents of modern Medicare. With the problems of drug resistances and inability of poor people's access to modern Medicare, traditional medicines could still be the only source of succor. hence the relevance of this study which investigated the forest plants used in the traditional treatment of guinea worm infections (GWI) in some endemic areas of Nigeria and a cross check with the situation in Ethiopia. A total of 92 plant species were recorded representing 68 families. They were, trees (43species), shrubs (18species), herbs (24species) and climbers (7species).Majority of the species were sourced from the wild forests and fallow lands. Different parts of the plants such as roots, leaves, barks, fruits and sometimes whole are prepared and administered in various ways such as oral applications, rubbing, ingestion and therapeutic washing. Twenty nine of these species were found to be available and have similar uses in traditional Medicare in some parts of Ethiopia where water borne*

diseases are endemic. These findings has posed some challenges to African scientists especially in the area of knowledge and products developments .The conclusion was reached that with current rates of deforestation in Nigeria and Ethiopia, these plants could become 'lost crops' before their potentials are realized.

Introduction

Prominent among the things that have affected human life are plant materials from the forest and other related land uses. They provided mans earliest foods and remedies for sickness and diseases. They also symbolize certain of his emotions and psychics. These observations are true with African nations such as Nigeria and Ethiopia. The African forest is endowed with diversities of flora and fauna of noble economic ,social and ecological benefits such as traditional Medicare or trado-medicines.This system has been the only means of healthcare with forest plants materials as the major sources of raw materials even before the advent of modern systems of Medicare especially in the treatment of waterborne diseases such as guinea worm infection (Dracunculiasis) .For instance the fruits of *Balanites aegyptiaca* were found to be lethal to both snails and water fleas which harbor bilharzias and guinea worm respectively in Ethiopia.

The list of forest plants used in the traditional treatments of sickness and diseases have been researched into and documented by different authors such as Adekunle and Oluwalana(2004).Over 1200 plant species from 160 families have been reported used in the treatment of malaria and fever. They include *Annona muricata* ,*Momordica charantia*,*Jatropha curcas*,*Riccinus communis*, *Senna occidentalis*,*Senna tora* and *Cissampelos pareira* .

The use of forest plants as raw materials in the manufacture of orthodox drugs have also been reported. According to Colfer et al (2006) some pharmaceutical products derived from tropical forest species include quinine from *Cinchona spp*, cancer treating drugs from rosy periwinkle (*Catharanthus roseus*) and treatments for enlarge prostrate glands from *Prunus africana*. Traditional healthcare systems are very important these days and are based on significant local knowledge of medicinal plants. This knowledge and information is crucial for African progress and developments and needs to be documented. Hence the relevance of this study which investigated the indigenous uses of forest plants in the treatment and management of dracunculiasis, endemic water borne disease in some African nations such as Nigeria and Ethiopia. This will provide the much needed baseline data on these plants where there has been a dearth of information which could act as a spring board for African university scientists in the development and promotion of the rich plant heritage from the tropical forests.

Materials and Methods

Environment of the Study Area (Ogun State Nigeria)

Ogun state lies between latitude 6° and 8°N and longitude 2.3° and 5°E covering a total land area of about 16,400km² or 1.9% of the total land area of Nigeria which is about 927,000km². The state is bounded in the West by Benin Republic, in the East by Ondo State, in the South by Lagos State and in the North by Oyo state, and divided into 20 local government areas (LGAs). The state has two relief regions that is; the creeks and lagoons in Ijebu east LGA with the altitudes ranging from 0 to 40 meters above sea level. The second type of relief is the coastal plains with elevations increasing northwards from above 40 to 250 meters. There are pockets of

rock outcrops dotting the landscape especially around Abeokuta the state capital.

Ogun state is predominated by the rainforest type of vegetation especially towards the south while the derived savanna is more noticeable in the north. Further descriptions of Ogun state are in line with Adekunle (2005). Farming is the predominating occupation in the state with over 70% of the population involved.

Dracunculiasis in Ogun State, Nigeria.

Dracunculiasis also known as guinea worm infection (GWI) is one of the tropical diseases caused by a parasitic worm known as *Dracunculus medinensis* Linn. It is a water borne disease affecting between 5 and 15million people annually in Africa and Asia (WHO ,1993). Nigeria is One of the highly endemic countries of the world with 39,794 cases reported during the 1994 case searches (Edungbola and Ologe ,1995).The socioeconomic importance of GWI has been reported. It is a debilitating , painful, and sometimes render the sufferer disabled. It is a water borne helminthes disease with adverse multiple effects on health, agricultural productivity, school attendance and overall qualities of life of the affected community(Edungbola and Ologe 1996, Attfield 1996) .

In ogun state GWI was discovered in the early 1950s (Onabamiro, 1950) while the renewed efforts at combating the disease dates back to 1981 as a result of an out break in Yobo village in Ifo/Otta Local government areas(LGA),Ajambata and Pelu villages (Obafe/Owode LGA) (OGS 1990).Institutional activities at local, national and international levels aimed at combating GWI include a workshop in USA in 1992and a national conference in Ilorin Nigeria in 1985. Arising from these was the

dracunculiasis/schistosomiasis awareness campaign of 1987 while the water for sanitation and health (WASH) project was funded by USAID to further enhance the control of these diseases. Included in this control effort is the GWI eradication project of Jimmy Carter of America i.e. Global 2000.

In spite of these initiatives both at the local and international levels GWI is still one of the major health problems in Nigeria. However some constraints were identified such as inadequate funds, political crises, lack of incentives to village based health workers, and inadequate safe drinking water compounded the problems.

Dracunculiasis in Ethiopia.

The Kuraz (Geleb) wereda in the south omo zone of the Southern Nations Nationalities Peoples Regional State is one of the highly endemic areas for GWI in Ethiopia .The Nangytums are the predominating tribe in this area .They were believed to have migrated from Nigeria some one hundred years ago via the northern section of what is now Uganda (Attfield, 1996).Originally nomadic, they now have semi-permanent camps close to the banks of Omo and Kibbish river where the cultivation of sorghum takes place .The settlements consists of clusters of small huts situated a few kilometers away from the east banks of the Kibbish or the west banks of the Omo river. After the rains ,sorghum is raised on the flood plains close to the two rivers necessitating those more dependent on the crop to reside in this area hence more vulnerable to GWI .For instance in the wet season the central plains between the rivers are used for grazing and GWI transmission rates are high as people drink from the unprotected seasonal ponds The other endemic area for GWI in Ethiopia is Dimma wereda in Gambella region where some decline has been reported .However the

likelihood of resurgence cannot be ruled out based on some constraints identified by (Attfield 1996).

Methods of Data Collection from Study Area in Nigeria

Data were collected with aid of pretested and structured open ended questionnaire. A multistage sampling procedure was adopted in the selection of respondents to be interviewed .This involved a random selection of 4 LGAS where more than 10 cases of GWI have been previously reported (MOH ,1990).Four villages each with a population of 200 people and more were there after selected randomly to form the second stage of the sampling.Twenty five respondents were then selected in each of these villages for the questionnaire interview. Apart from the biodata of the respondents, data were collected on the ethnobotanical characteristics of the forest plants used in the traditional treatment of gwi in the study area. these include the local names ,parts used ,sources and plant life forms. Taxonomic texts such Keay (1989) and Gbile (1984) were consulted for the scientific names of the plants and their families.

Ethiopian Experience

Data were collected on the Ethiopian medicinal plants for comparisons from the following sources: Flora of Ethiopia and Eritrea, annual report of Forest Rehabilitation though natural Regeneration Projects in Tigray,Azene Bekele-Tesemma (1993) and Emiru Birhanu *et al* (2006). The data collected were analyzed using simple statistical tools such as frequencies, percentages, means and the results are presented in form of tables for discussions.

Results and Discussion

A summary of the plants recorded used by the respondents in the treatment of GWI in the study area (Nigeria) are shown in table 1. They were ninety two in number representing 68 families with majority of them not cultivated but sourced from the wild forest i.e. 75% of the total. The management implication of this is that with present rate of deforestation this species might no longer be available for use by the respondents. In the same vein about 47% of the species were trees (Table 3) which could be felled for timber or for fuel purposes further compounding the problems of availability to the users. The predominant mode of application was by drinking the prepared materials in form of conction, decoction or infusion. Some of the plant material are also prepared in form of creams, pastes, or balms and applied topically to the affected parts. This constitutes the second most popular methods of use (Table 5).

Twenty nine of these species were found to be available and have the same medicinal uses in some parts of Ethiopia .The details of the species are shown in Table 2. For instance the leaves of *Vernonia amygdalina* was reported used as antimalaria both in Nigeria and Ethiopia .Malaria fever has been described as one of the symptoms of GWI as the patient would start complaining of malaria fever at the on set of GWI. Also the fruits of *Balanite aegyptica* has been found to be lethal to the water fleas and snails implicated as causes of guinea worm and bilharzias respectively (Daba Wirtu 2002).

Conclusion

This study has shown some of the forest plant species crucial to the rural populace in Nigeria and some comparison had been made in Ethiopia especially in the treatment of GWI and water related diseases. However the list of medicinal

plants used in the treatment of GWI cannot be said to be exhaustive because the knowledge of the use of local plants varies between different communities especially in Africa. The implication of these findings are that GWI and some water related diseases must have been a major problem in African societies .Hence man must have been looking for ways to solve this problems before the advent of modern systems of medicare which they were able to find in herbal plants. It can be concluded from this findings that forest plants has great potentials for human and economic development in Africa .It also shows that that indigenous knowledge provides a rich basis for bioprospecting.

Although herbal medicines has been used to treat wide varieties of sickness and diseases in Africa as the one reported in this study because of affordability and relative availability, it is not without some limitations. Some of these limitations are as follows:

Little or no clinical data on the safety and efficacy of these herbal preparations lacks of consensus even among traditional healers and users on which plants, preparations and dosages are the most effective and the variation of concentration of active ingredients in plant species depending on several factors. None the less the limitations are insurmountable .They only posed some challenges to the African scientists especially the university based scientists in the area of research. In this category include ; the forester who must ensure the continue availability of these raw materials, the pharmacist, who must ensure the development of drugs from the raw plants, and the biochemists who must ascertain the clinical safety of the materials.

Table 1. Summary of Forest Plants used in Treating GWI in Ogun State Nigeria.

S/N	Scientific Name	Family	Local Name	Part Used	Sources/Niches
1	<i>Petiveria alliacea</i> Linn S(u)	Phytolcaleae	Awogba	Roots, Leaves	H/Forest, H/Garden
2.	<i>Alchonea cordifolia</i> Schym & Thorn Miellrs T(u)	Euphorbraceae	Eresin	Roots, Leaves	h/forests
3.	<i>Peperomia pelucida</i> H(u)	Piperaceae	Ren ren	Whole Plant	H/gardens
4.	<i>Calotropis pocera</i> S(u)	Asclepdiaceae	Bomubomu	Leaves	H/foret,h/garde, farmland,savanna
5.	<i>Chenopodium ambrosioides</i> H(u)	Chenepodaceae	Arunpale	Leaves,w holeplant	h/garden
6.	<i>Tetrapleura tetraptera</i> T(u)	Leguminosae mimosoideae	Aidan	Seeds, Roots, Bark, Leaves	H/Forest, Farmland
7.	<i>Erythrophleum sauvolens</i> Guil & Perr. T(u)	Caesalpinioideae	Obo	Bark, Leaves	H/Forest
8.	<i>Allium ascalonicum</i> Linn H(c)	Alliaceae	Onion, Alubosa	Bulb, Leaves	H/Garden, Farmland
9.	<i>Allium sativum</i> L S(c)	Alliaceae	Ayu, Garlic	Leaves, Bulbs	H/Forest, H/Garden, Farmland
10	<i>Bryophyllum pinnatum</i> L H(u)	Oxliaceae	Odun odun	Leaves	H/Garden, Farmland
11	<i>Pachejasma tessmannu</i> T(u)	Mimosoideae	Eru	Bark, Leaves	H/Forest, Farmland
12	<i>Cassia alata</i> L., <i>Senna alata</i> T(u)	Caesalpinacceae	Asunarunegbe	Roots, Leaves	H/Garden, Farmland
13	<i>Euphorbia laterifolia</i> S(c)	Euphorbiaceae	Kopire	Leaves, Whole Plant	H/Garden, H/Forest, Farmland
14	<i>Elaeisis guinensis</i> S(c)	Plamae	Ope,	, Bark, Seed,fruits	H/Forest, Farmland
15	<i>Treculia africana</i> T(c)	Moraceae	Afon, African bread fruit	Seed	H/Forest, H/Garden, Farmland
16	<i>Hannoa undulata</i> Guill &Perr H(u)		Oriji	Leaves	H/Garden, Farmland
17	<i>Musa spp</i> T(c)	Musaceae	Ogede. Plantain	Leaves	H/Forest, Farmland

18	<i>Baphia nitida</i> Lodd T(c)	Papilionaceae	Osum	Leaves	H/Forest, H/Garden
19	<i>Uvaria Chamae</i> Welw. <i>P.Beanny</i> S(u)	Annonaceae	Eruju	Leaves	H/Forest, Farmland
20	<i>Antiaris toxicaria</i> Engl T(u)	Moraceae	Oiro	Leaves	H/Forest, Farmland
21	<i>Plumbago zeylanica</i> L H(c)	Plumbaginaceae	Inabiri	Leaves, Roots,	H/Forest, H/Garden, Farmland
22	<i>Vernonia amygdalina</i> Linn S(u)	Asteracea	Ewuro	Leaves	H/Forest, Farmland
23	<i>Paniari congensis</i> Benth	Chrysobalanaceae	Abere, Epo papa	Seed, Root	H/Forest, Farmland
24	<i>Sanseveria liberica</i> Linn H(u)	Liliceae	Itakun	Roots,	H/Forest
25	<i>Desmodium adscanderus</i> G.don S(u)	Lequminoceae Papilionoidaea	Epakun	Roots	H/Forest, Farmland
26	<i>Terminalia superba</i> T(u)	Combretaceae	Afara	Bark	H/Forest
27	<i>Alstonia congensis</i> Engl T(u)	Apolynaceae	Epo Ahun	Bark	H/Forest
28	<i>Jatropha curcas</i> L. S(u)	Euphorbiaceae	Botuje funfun	Roots,ste m,leaves, seeds	H/Garden, Farmland
29	<i>Garcinia kola</i> T(u)	Guttiferaceae	Itakun orogbo	Root, Bark	H/Forest
30	<i>Ocimum gratissium</i> L. T(u)	Labitaceae	Efinrin	Leaves	H/Garden, Farmland
31	<i>Diospyreus albofiavesceus</i>	Ebeneceae	Ewe Esu	Leaves	H/Forest
32	<i>Enantia chlorantia</i> T(u)		Epo Awopa	bark	H/forest
33	<i>Annonan senegalensis</i> S(u)	Annunaceae	Abo	Fruits	H/Forest
34	<i>Milicia excelsa</i> T(u) Welwe	Meliaceae	Epo Iroko	Bark, Leaves	H/forest, farmlan ds
35	<i>Nauclea diderrichii</i> T(c)	Meliceae	Epo opepe	Bark	H/Forest
36	<i>Citrus lunatus (Thumb) mansf</i> H(c)	Cucubitateae	Bara Egunsi	Fruits,see d	
37	<i>Gossypium arborium</i> L. S(c)	Malvaceae	Ero owu		
38	<i>Lapotea aestuans</i> Linn (chev)	Urticaceae	Ojongbodu	Leaves	Farmland
39	<i>Carica papaya</i> L T(c)	Caricaceae	Ibepe	Leaves	H/Garden, Farmland
40	<i>Lecaniodiscus cupanioides</i> T(u)	Sapindaceae	Itakun Arinka	Stem bark,	H/Forest

				Root	
41	Monordica charantna L C (u)	Cucurbitaceae	Ewe Ejinrin	Leaves, Whole plant	Farmlands, H/forest
42	Abrus precatorious Linn H C (u)	Papilionadeae	Beans, Ewa	Seed	Farmland
43	Vigna unguiculata H (c)	Papilionadeae, Leguminosae	Beans, Ewa	Seed	Farmland
44	Cerbera pentandra T (u)	Bombacaceae	Igi Araba	Bark, Leaves	H/Forest, farmland
45	Dialium guinensis T (u)	Caesalpiniaceae	Ewe Awin	Leaves/bark	H/Forest, farmland
46	Aloe battersii L T (u)	Liliaceae	Etin Erin	Rubbing	H/Forest
47	Canna indica L S (u)	Cannaceae	Ewe ido	Leaves	H/Garden
48	Citrus medica L T (c)	Rutaceae	Ewe osan, wewe	Leaves	H/Garden, Farmland
49	Lawsonia inermis Law T (u)	Lathraceae	Ewe lali,	Leaves	H/Forest, Farmland
50	Aframomum melegueta S (u)	Zingiberaceae	Atare	Seed	H/Forest
51	Hibiscus cannabinus S(u)	Malvaceae	Takun Oja koko	Leaves	H/Forest, Farmland
52	Rauwolfia vomitoria T(u)	Apocynaceae	asofeyeje	leaves	H/forest, Farmland
53	Pistia stracheyana L H(u)	Araceae	Oju oro	Leaves	H/Forest
54	Nymphaea lotus L H(u)	Nymphaeaceae	Osibata	Leaves	H/Forest
55	Heptapleuron indicum H(c)	Boraginaceae	Apara	Leaves	H/Forest, Farmland
56	Luffa cylindrica L H(c)	Cucurbitaceae	Erun	Seed	H/Forest
57	Cassia mimosoides Linn H(u)	Mimosaceae	Kiniefimise	Leaves	H/Forest, Farmland
58	Azadirachta africana T(u)	Caesalpiniaceae	Apa	Leaves & bark	H/Forest
59	Celastrus zenkeri Engl T(u)	Ulmaceae	Itagidi	Fruit	H/Forest
60	Newbouldia laevis T(u)	Bignoniaceae	Akoko	Leaves	H/Forest, H/Garden, Farmland
61	Mammea africana H(u)		Ologbojo	Leaves & root	Farmland
62	Chrysophyllum albidum T(u)	Apocynaceae	Agbaluma	Leaves & Bark	Farmland, H/forest
63	Securidaca	Polygalaceae	Ipeta	Leaves	H/Forest

.	longipedunculata Fres T(u)				
64	Cissus populnea Guillet Perr H(u)	Vitaceae	Ogbolo	Stem & leaves	H/Forest, H/Garden
65	Sida acuta L S(u)	Malvaceae	Iseketu	Leave grinding	Farmland
66	Croton penduhflorus Hutch T(u)	Euphorbiaceae	Aworoso	Leaves & root	Farmland
67	Cynomelha manii H(u)		Aka	Root	H/Garden
68	Cucummeropsis manii H(u)	Cucurbitaceae	Egunsi, Melon	Fruit,see ds	Farmland
69	Chrysophyllum deleron Engl T(c)	Sapotaceae	Baka	Leave	H/forest
70	Bridelia micrantha T(u)	Euphorbiaceae	Igi Assasa	Bark	Savanna/farmland
71	Albizia glaberrima Macbride T(u)	Mimosaceae	Ayunre	Bark	Farmlands,savanna
72	Spilanthes filcanlia H(u)		Awerepepe	Seed, leaves, Leaves & Root	Farmland
73	Croton lobatus C(u)	Euphorbiaceae	Eru Alamo	Seed	H/Garden, Farmland
74	Senecio abyssinicus H(u)		Amunimuye	Leaves	H/Garden, Farmland
75	Argemone mexicana Linn H(c)	Papaveraceae	Omom Mafowokan	Leaves & bark	H/Garden
76	Cochorus Olitorus L H(c)	Taliaceae	Ewedu	Leaves	H/Garden, Farmland
77	Piliostigma thomningii T(c)	Caesalpiniaceae	Abafe	Leaves & root	H/Forest, H/Garden
78	Piper gunnensis H(u)	Piperaceae	Iyere	Seed & root	H/Forest
79	Croton zambesicus T(u)	Euphorbiaceae	Ajeobale	Leaves	H/Garden, Farmland
80	Amblygenecarpus andagensis S(u)		Aridan papa	Leaves	H/Garden, Farmland
81	Deinbellia pinata Schum & thorn S(u)	Sapindaceae	Ekun	Leaves	H/Forest
82	Citrus aurantium L T (c)	Rutaceae	Oronbo egun	Leaves	H/Garden, Farmland
83	Alstonia boonei T(u)	Apocynaceae	Epo ahun	Bark	H/Forest, Farmland
84	Solanum ethiopicum S(u)	Solanaceae	Ewe ogbagba	Leave	Farmland
85	Colocasia esculentum L H (c)	Araceae	Ewe koko	Leave	Farmland

86	<i>Bassea alba</i> H(u)		Fejemu	Root	
87	<i>Parquetina nigresceus</i> (afzel) C(u)	Periplocaceae	Ewe ogbo	Leaves	H/Garden
88	<i>Spondias mombin</i> Linn Oliv	Anacardaceae	Epo iyeye	Back	H/Garden, Farmland, h/forest
89	<i>Rinorea wlewitschii</i> (Oliv)	Violaceae	Ewe impart	Leaves	Farmland
90	<i>Vitex doniana</i> Surllet T(u)	Verbanaceae	Ewe oriri	Leaves	H/Forest
91	<i>Irvingia gabonensis</i> T (c) <i>Balanites aegyptica</i> T(u)	Irvingiaceae Balanitaceae	Epo apon	Bark Roots, fruits, bark	H/Forest savannah

C---cultivated 23; U---uncultivated 59; h /forest—high forest, h/garden--home gardens

Table 2. List of some the Species common to Ethiopia and Nigeria in Medicinal Values.

S/N	SCIENTIFIC NAME	FAMILY	LIFEFORM	LOCAL NAME
1	<i>Calosotropis procera</i>	asclepiaceae	shrub	Ginda(amh)
2	<i>Piperomia pelucida</i> L.	Piperaceae	herb	Tmz(amh)
3	<i>Chenopodium ambrosioides</i> L.	Chenopodiaceae	herb	Et'sefaris(amh)
4	<i>Allium sativum</i> L.	Alliaceae	herb	Nech,shinkut (amh)
5	<i>Vernonia amygdalina</i> Linn.	Asteraceae	shrub	Grawa(amh)
6	<i>Terminalia superba</i> L.	Combretaceae	tree	Abalo(amh)
7	<i>Jatropha curcas</i> L.	Euphorbiaceae	shrub	Anthamlou(som)
8	<i>Annona senegalensis</i> Pers.	Annonaceae	tree	Gishta(amh)
9	<i>Milicia excelsa</i> Wel.	Meiaceae	tree	Gonji(kf)
10	<i>Citrus lunatus</i>	Cucurbitaceae	Climbingherb	Feylefej(amh)
11	<i>Gossypium arborium</i> L.	Malvaceae	shrub	Tit (amh)
12	<i>Carica papaya</i> L.	Caricaceae	tree	Papaya(amh)
13	<i>Mormodica charantia</i> L.	Cucurbitaceae	climbingherb	Yekurkareg(amh)

14	<i>Ceiba pentadra</i>	Bombacaceae	tree	Yeferashtit(amh)
15	<i>Vigna unguiculata</i> L.	Papilionaceae	herb	Bakela(amh)
16	<i>Lawsonia inermis</i> Law.	Lathraceae	tree	Hina(amh)
17	<i>Citrus medica</i> L.	Rutaceae	tree	Tiringo(amh)
18	<i>Hibiscus cannabinus</i>	Malvaceae	herb	Tsegot(amh)
19	<i>Pistia stratiotes</i> L.	Araceae	herb	Mechaara(or)
20	<i>Nymphaea lotus</i> L.	Nymphaeaceae	herb	
21	<i>Securidaca longipendunculata</i> L.	polygalaceae	shrub	Sie menahe(amh)
22	<i>Sida acuta</i> L.	Malvaceae	herb	Karaba(amh)
23	<i>Bridelia micrantha</i> Hochest.	Euphorbiaceae	Shrub	Derkedum(amh)
24	<i>Piliostigma thonningii</i>	Cacalpinaceae	tree	Yekollawanga(amh)
25	<i>Piper guineensis</i> Schum&Thorn	Piperaceae	shrubbyherb	Zengeble(amh)
26	<i>Argemone mexicana</i> Linn	Papaveraceae	herb	Dandir(amh)
27	<i>Citrus aurantium</i> L.	Rutaceae	shrubbytree	Baherlomin(amh)
28	<i>Solanum aethiopicum</i> L	Solanaceae	Herb	Eggplant(amh)
29	<i>Balanites aegyptica</i> L.	Balanitaceae	tree	BedAno(tyg)

Amh. Amhric ; or-Oromia; Tyg- Tigriyan; ks- Konsogna; Som-Somalgyna;

Table 3. Life forms of forest plants used to treat gwi in the study area.

Plant life form types	No of species	% of total
t---trees	43	46.7
s---shrubs	18	19.57
h---herbs	24	26.4
c----climbers	7	7.7
total	91	100.0

Table 4 Sources of Forest Plants used by the Respondents to treat GWI.

Sources of forest plants	No of species
high forest	52
fallow/farmland	59
home garden	31
others(savanna)	2

Table 5 Methods of Application of Herbal Preparations.

Methods of Applications	No of Species
drinking(oral application)	63
bathing(therapeutic washing)	21
eating(ingesting)	8
rubbing(topical application)	53

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