



Ethnobotanical Survey of Medicinal Plants Used in the Treatment of Cough in Akinyele Local Government Area, Oyo State, Nigeria

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Authors' contributions

This work was carried out in collaboration among all authors. Author OCA designed the study, performed the statistical analysis, wrote the protocol and wrote the first draft of the manuscript. Authors MBU, MMO and MOA managed the analyses of the study. Authors RS, OSA, AJA and OBO managed the literature searches. All authors read and approved the final manuscript.

Article Information

DOI: 10.9734/EJMP/2020/v31i830263

Editor(s):

- (1) Dr. Naseem A. Qureshi, National Center for Complementary and Alternative Medicine, Saudi Arabia.
(2) Prof. Marcello Iriti, University of Milan, Italy.

Reviewers:

- (1) Peter I. Oni, Federal University Wukari, Nigeria.
(2) Gilmar Franzener, Federal University of Fronteira Sul, Brazil.

Complete Peer review History: <http://www.sdiarticle4.com/review-history/56747>

Original Research Article

Received 10 March 2020

Accepted 15 May 2020

Published 26 May 2020

ABSTRACT

Majority of people in developing countries rely on Traditional Medical Practitioners (TMPs) or herbalist, hunters and community elders for the treatments of various diseases and illness due to their vast knowledge of medicinal plant usage. There is need to protect the flora and fauna and also the knowledge database often stored in the memories of elders, ancestral and traditional healers. Ethnobotanical study of medicinal plants used in the treatment of cough was carried out in Akinyele Local Government with the aim to document plants and indigenous knowledge of local people in the treatment of cough. Eight villages were selected purposively due to the relics of forest in those villages. The villages are Ijaye, Onidundu, Otunagbakin, Moniya, Idi- ose, Apapa, Aroro and Olanla. Respondents were stratified into 2 strata in each of the villages, namely Traditional Medical Practitioners (TMPs) or herbalist and hunters. Within each stratum, a random selection of 10

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respondents were carried out thereby making 20 respondents in each village and total number of 160 respondents as sample size. Semi structured questionnaire was used to obtain information from the respondents. The interview was conducted one-on-one using the local language (Yoruba). The data collected were analysed using descriptive statistics. The result showed that a total number of 16 plants belonging to 13 families were recorded and enumerated along with their botanical name, family and local name. Information on methods of preparation of the recipes, plant part used, form in which plant part is used, mode of administration, dosage and shelf life were also documented. There is need for domestication and conservation of these plants to prevent their extinction. The bioactive compound in some of these plants can be synthesized together to produce conventional drugs for cough. Further studies should also be carried out on these plant species to obtain more information on their bioactive properties.

Keywords: Medicinal plants; Traditional Medical Practitioners (TMPs); hunters; cough; conservation.

1. INTRODUCTION

Millions of people in the third world countries like Nigeria use herbal and traditional remedies for their wellness. Traditional medicines are recognized by World Health Organisation (WHO) as essential building block for primary health care, especially in developing country where qualified doctors and other medical staff have not reached especially in remote rural areas [1]. It has been realized that there is need to preserve the enormous trove of wisdom and traditional knowledge and also the cultures associated with them. There is need to protect the flora and fauna and also the knowledge database often stored in the memories of elders and traditional healers.

Traditional Medicine is used globally and is rapidly growing in economic importance [2]. It is still recognized as the preferred primary health care system in many communities, with over 60% of the world's population and about 80% in developing countries depends directly on medicinal plants for their health related issues [3]. In developing countries, Traditional Medicine is often the only accessible and affordable treatment available. The WHO reports that Traditional Medicine is the primary health care system for important percentage of the population in developing countries. This is due to a number of reasons including affordability, accessibility and low cost [4].

Plants have been used in traditional medicine for several thousand years [5]. From the time immemorial, human civilizations have been exploring and using various plants and plant products to cure the lethal diseases [6]. Different plants species and their uses as medicine are greatly well-known to indigenous communities in different parts of the world. Local people are specialist for mounting inventive practices and

products from their surrounding environment particularly, the plant world [7,8]. Many drugs are of plant origin, and several plants are currently undergoing investigation to ascertain their therapeutic efficacies [9,10]. The knowledge about the use of traditional herbal medicines gradually perishes, although some of the traditional tribal communities and some human beings which believed in the usage of herbal medicines are still practicing the art of herbal healing effectively [11].

Herbal or botanical medicine, or phytotherapy, was defined as "the use of plant materials to prevent and treat ill health or promote wellness" [12]. The use of herbs as medicine is the oldest form of healthcare known to humanity and has been used in all cultures throughout history [13]. Herbal medicine is widely practiced throughout the world from time immemorial. These medicines are safe and environment friendly. The indigenous traditional knowledge of medicinal plants of various ethnic communities, where it has been transmitted orally for centuries is fast disappearing from the face of the earth due to the advent of modern technology and transformation of traditional culture [14]. In the last few decades there has been an increasing interest in the study of medicinal plants and their traditional use in different parts of the world. The traditional healers are dwindling in number and there is a grave danger of traditional knowledge disappearing soon since the younger generation is not interested in the knowledge and conservation. Therefore, it becomes the responsibility of the scientific community to unravel the information and to document it for availability to the whole world for the benefit of human beings.

Several ethnobotanical studies focusing on medicinal plants and traditional medicine have been documented all over the world

[15,16,17,18] and also in Nigeria [19,20,21,22]. Reports from literature have showed some of the plants that are used in the treatment of cough are also used to treat other diseases and illness. For instance, [1] reported that the stem bark powder of *Acacia nilotica* is given orally at bed time 10-12 days regularly to cure asthma. The leaves of *Pergularia daemia* mixed with the seeds of *Trachyspermum ammi* are boiled with water; the extract is given orally for 7 days for quick relief against cough and asthma. The dried rhizome powder of *Zingiber officinale* is used as medicine for chest disease while the fresh juice of the rhizome is mixed with honey and given orally for 7 - 10 days to cure dry cough. [23] also reported that the flower of *Acacia nilotica* is used to cure Asthma. The leaves of *Agerantum conyzoides* is used to cure cold and coughs [24]. The fruits of *Psidium guajava* are used to cure Old cough, bronchitis and chronic whooping cough [25]. *Bryophyllum pinnatu* is used to treat cough, ear infection and baby navel [26,27]. Infusion of leaf of *Bryophyllum pinnatum* is used to treat cough [22]. *Elaeis guineensis* is used to treat poison and cough, *Aframomum melegueta* is used to treat fever and to induce labour. It can also act a decongestant to dry cough when taken with the fruits of *Garcinia kola* [22].

Traditional medicine is generally transmitted orally through a community, family, or individuals. However, such knowledge is scarcely documented in developing countries and this may result in distortion or loss of the entire knowledge. To the best of our knowledge, no previous ethnobotanical study had been conducted specifically to document the indigenous knowledge and medicinal plants used in the treatment of cough in the study area. In view of this, it is paramount to document some medicinal plants used in the treatment of cough in the study area. This study aimed at providing additional baseline information on medicinal plants used in the treatment of cough. The new information gained from this study might initiate further studies to aim at exploring the anti-cough potentials of the plants, supporting the sustainability of traditional herbal medicine in the study area, and conserving plants diversity.

2. METHODOLOGY

2.1 Description of the Study Area

The research was carried out at Akinyele Local Government Area of Ibadan Oyo State, Nigeria. It is one of the eleven local governments that

make up Ibadan metropolis. Its headquarters is located at Moniya. It has latitude of 7°28' and 7°31' and longitude 3°53' and 3°57' [27]. The Local Government Area is five hundred and seventy five square kilometres (575km²) with twelve poling wards and a projected population of 297, 600 as at 2016 from the 2006 national population census [28]. It is located in the rain forest zone and grassland of South Western Nigeria. The area has a tropical climate, which is characterised by two distinct seasons; the raining season and the dry season. The raining season begins in April and last till October while the dry season commences in November and last till March. The average annual rainfall is about 1200mm and ecological zone type is forest savanna. Akinyele Local Government is highly heterogeneous and metropolitan in nature especially areas like Ojoo, Orogun, Sasa, Moniya and Akinyele where Nigerians from different tribes and foreign nationals reside. The major occupations of the people residing in the area are farming, carpentry, trading, marketing, food processing as well as carving work. Crop such as oil palm, cassava, maize, yam, pepper, cucumber, water melon, tomatoes, plantain and okra are mostly grown in the area [29,27].

2.2 Data Collection and Sampling Techniques

The ethnobotanical survey of this study was collected from April to December, 2017 using semi-structured questionnaires amidst informal conversation [30]. The survey was carried out in eight different villages of Akinyele Local Government. The villages were selected purposively due to the relics of forest in those villages. The villages are Ijaye, Onidundu, Otunagbakin, Moniya, Idi-ose, Apapa, Aroro and Olanla. Respondents were stratified into 2 strata in each of the village, namely Traditional Medical Practitioners (TMPs) or herbalist and hunters. Within each stratum, a random selection of 10 respondents were carried out thereby making 20 respondents in each village and total number of 160 respondents as sample size. Interviews were conducted individually to 160 respondents which comprise of 80 traditional medical practitioners (TMPs) or herbalist and 80 hunters. During the survey, the indigenous knowledge of the respondents as related to medicinal plants used in the treatment of cough, local names of the plant, plant parts used and the form in which it is used, methods of preparation and mode of administration, dosage and shelf life of the herbal recipes were collected from the respondents and

documented. The information collected was later harmonised and only the information confirmed by three or more respondents were reported.

3. RESULTS AND DISCUSSION

The study revealed that 16 plants belonging to 13 families are used in the treatment of cough in the study area. Among them, 3 are climbers, 5 are herbs, 1 is shrub, and 7 are trees (Table 1). This showed that tree had the highest number of species used. This may be attributed to the fact that trees are always available all season due to their perennial life existence and mostly not affected by seasonal variations [31]. The plants reported used in the treatment of cough from this study are *Abrus precatorius*, *Aframomum melegueta*, *Agerantum conyzoides*, *Bryophyllum pinnatum*, *Cocos nucifera*, *Elaeis guineensis*, *Erythrophleum africanum*, *Ficus exasperata*, *Garcinia kola*, *Musa nana*, *Paullinia pinnata*, *Pergularia daemia*, *Psidium guajava*, *Spondias mombin*, *Vitellaria paradoxa* and *Zingiber officinale* (Table 1). [1] reported that the leaves of *Pergularia daemia* mixed with the seeds of *Trachyspermum ammi* are boiled with water; the extract is given orally for 7 days for quick relief against cough and asthma. The dried rhizome powder of *Zingiber officinale* is used as medicine for chest disease while the fresh juice of the rhizome is mixed with honey and given orally for 7 - 10 days to cure dry cough [1]. The leaves of *Agerantum conyzoides* is used to cure cold and coughs [24]. The fruits of *Psidium guajava* are used to cure old cough, bronchitis and chronic whooping cough [25]. It was reported by [26] and [22] that *Bryophyllum pinnatum* is used to treat cough, ear infection and baby navel. Infusion of leaf of *Bryophyllum pinnatum* is used to treat cough [22]. *Elaeis guineensis* is used to treat poison and cough, *Aframomum melegueta* is used to treat fever and to induce labour. It can also act a decongestant to dry cough when taken with the fruits of *Garcinia kola* [22].

The various plant parts form for various preparations used in the treatment of cough by the traditional medicine practitioners or herbalist and hunters in the study area include the leaves, fruits, seeds, bark and roots (Tables 1 and 2). This agrees with the findings of [32] which stated that several ailments may be treated effectively with the roots, bark, leaves, fruits and flowers of plants. *Ficus exasperata* and *Bryophyllum pinnatum* had more than one part being used in the treatment of cough. This agrees with the

findings that the active ingredients of medicinal and aromatic plants can be found in the roots, leaves, stems, flowers or barks [33,21]. Leaves of 4 plant species, roots of 4 plant species, seeds of 2 plant species, fruits of 2 plant species and bark of 3 plant species are used in the preparation of the herbal medicine (recipes) for the treatment of cough in the study area (Table 1). This showed that leaves and roots of plants are commonly used in the treatment of cough. This was followed by bark, seed and fruits. This is in line with the finding of [21] which stated that leaves were found to be the most used plant part for the preparation of various recipes taken for medication. [19] reported that the leaves of plant are important ingredient in traditional treatment of various ailments as it featured more as a component in many herbal preparations. Leaves are the photosynthetic organ of the plant and it is well known to contain pharmacological bioactive compound than other plant parts [34].

The reason for the widespread use of leaves may be due to the ease of obtaining them. The leaves remain lush and abundant for most parts of the year since the State receives rainfall for about seven months of the year. Leaves have been observed as the most widely used plant part in many ethno botanical studies [35,36,37]. Harvesting leaves for medicinal use ensures plant survival unlike the roots that may threaten its continuity [38,39], unless a sustainable harvesting strategy has been developed [40]. Feather of *Corvus albus* (*kanakana*) bird, honey from bees, water from coconut, oil palm, salt, shear butter oil, local eggs, ripe fruits of banana (*Musa nana*) are also used in the preparation of recipes (Table 2). The plant parts used can be fresh or dried; however, respondents affirmed that both forms of plant materials are efficient in herbal preparation. This agreed with the findings of [21]. The most common method of preparation of the recipes was by grinding the herbal materials followed by squeezing for juice extraction, decoction, soaking and burning to ashes (Table 2). However, decoction was reported as the most prevalent method of preparation of herbal materials for the treatment of diseases in Babungo, Cameroon and Rivers state, Nigeria [41,20]. The recipe was mostly administered orally. This may be related to the method of preparation of the recipes since all the methods used are usually administered orally. The recipes were prepared in crude form, lacking standardized dosage and quality control. This agrees with finding of [42] and [43].

Table 1. Plants used in the treatment of cough in the study area

S/n	Botanical names	Family name	Form	Common names	Local name	Plant part and form used	Habitat, Cultivation, Abundance (Rare/ common), Native/ Introduced
1	<i>Abrus precatorius</i> Linn.	Fabaceae	Climber	Jumble beads, Crab eye	Oju-ologbo	Dried seed	Secondary forest, wild, common, indigenous, native
2	<i>Aframomum melegueta</i> K. Schum	Zingiberaceae	Herb	Alligator peper	Atare	Dry seed (Bunch)	Forest/ farmland, cultivated, common, native.
3	<i>Agerantum conyzoides</i> (L.) L	Asteraceae	Herb	Goat weed	Arunsansan Imiesu	Fresh leaves	Savanna, farmland. Wild, common, native
4	<i>Bryophyllum pinnatum</i> (Lam.) Oken	Crassulaceae	Herb	Resurrection plant	Abamoda Odundun	Fresh root and leaves	Savanna, plantation crop, farm settlement., wild, rare, introduced
5	<i>Cocos nucifera</i> L.	Arecaceae	Tree	Coconut	Agbon	Coconut water	Farmland, cultivated, common, introduced
6	<i>Elaeis guineensis</i> Jacq.	Arecaceae	Tree	Palm tree	Ope	Oil	Both secondary forest and derived savanna. Cultivated, common, introduced
7	<i>Erythrophleum africanum</i> (Benth.) Harms	Fabaceae	Tree	African blackwood	Epo Obo	Fresh bark	Forest, Rare, Native, wild
8	<i>Ficus exasperata</i> Vahl	Moraceae	Tree	Sand paper	Epin, Ipin	Fresh or dry roots epin Fresh tender leaves of epin	Forest, common wild, native
9	<i>Garcinia kola</i> Heckel	Guttiferae,	Tree	Bitter kola	Orogbo	Dry fruits	Forest, Common, Native, not cultivated
10	<i>Musa nana</i> Lour.	Musaceae	Herb	Banana	Ogede omini	Matured ripe fruit	Savanna, cultivated, common, introduced, introduced
11	<i>Paullinia pinnata</i> Linn	Sapindaceae	Climber	Sweet gum	Kakansela	Fresh root	Forest, wild, rare, indigenous
12	<i>Pergularia daemia</i> (Forssk.) Chiov.	Apocynaceae	Climber	Pergularia, Trellis-vine	Koleorogba	Fresh or dry leaves	Farmland, savanna, rare wild, native
13	<i>Psidium guajava</i> Linn.	Myrtaceae	Shrub	Guava	Grofa	Fresh bark	Both secondary forest, savanna and farmland, cultivated, common, introduced
14	<i>Spondias mombin</i> Linn	Anacardiaceae	Tree	Hog plum	Iyeye	Fresh bark	Both forest and savanna, farmland, around towns and villages, wild, Common, native
15	<i>Vitellaria paradoxa</i> C.F. Gaertn.	Sapotaceae	Tree	Shear butter oil	Ori	Oil	Savanna, cultivated, common, native
16	<i>Zingiber officinale</i> Roscoe	Zingiberaceae	Herb	Ginger	Ata ile	Fresh root of ginger	Farmland, savanna, cultivated, common, introduced

Habitat (Forest= 9, Savanna= 9, Farmland= 7), Abundance (Rare= 3, Common= 13), Cultivated= 8, Wild= 8, Native= 9, Introduced= 7

Source: Field survey, (2017)

Table 2. Mode of plants preparation and dosage

S/n	Method of preparation of recipes	Mode of administration dosage and shelf life
1	Collect plenty feather of <i>Corvus albus</i> (<i>kanakana</i>) bird, one bunch of dry Aligator pepper and ten or more dry fruits of bitter kola. Burn all to ashes and put inside honey.	Lick the honey once a day by 6 pm. When it finishes
2	Grind the fresh bark of <i>Erythrophleum</i> that was peeled with stone into powder, and mix it with water from 3 coconuts, shear butter oil and honey in a container and put it inside sun for the shear butter oil to melt. Mix it properly	Take one teaspoon by 6 am in the morning. Half teaspoon for a child. Take it every three days. When it finishes
3	Grind the leaves of <i>Pergularia daemia</i> and mix with palm oil (red oil)	Lick it regularly When it finishes
4	Cut the root of of <i>Ficus exasperata</i> into pieces and put it in plastic bottle with water. Squeeze fresh tender leaves of <i>Ficus exasperata</i> in water	Drink half stainless cup twice daily. When it finishes
5	Eat fresh or dry root of ginger and swallow the water. Also chew the fresh tender leaves of ginger and swallow the water.	Do it regularly
6	Squeeze the steam leaves of <i>Agerantum conyzoides</i> , add palm oil and salt and lick it regularly. For high temperature, do not add salt, use it to rub	Lick it regularly Four days
7	Boil the root of <i>Bryophyllum pinnatu</i> thoroughly in water or put the leaves on hot object for five minutes, squeeze and drink the extract.	Drink regularly Five days
8	Chew the fresh root of <i>Zingiber officinale</i> and swallow the liquid	Do it regularly
9	Chew the fresh root of <i>Paullinia pinnata</i> and swallow the liquid against cough.	Do it regularly
10	Mix palm oil with pure honey	Lick regularly. When it finishes
11	Cook the bark of <i>Spondia mombin</i> and bark of <i>Psidium guagava</i> together with water.	Drink half stainless cup three times daily. When it finishes
12	One or two fruits of <i>Musa nana</i> with one or two local egg (“ <i>eyin ororo</i> ”), palm oil, honey and shear butter (<i>ori</i>). These are squeezed and mix together.	The liquid is licked regularly Two weeks
13	The dropped leaves of <i>Ficus exasperata</i> are collected, grinded, mixed with honey Or cook the dropped leaves of <i>Ficus exasperata</i> with “ <i>ogede omini pupa</i> ” (<i>Musa nana</i>).	Lick regularly When it finishes Drink 3 times daily Five (5) days
14	Grind the dry seeds of <i>Garcinia kola</i> into powder and add little salt to it, mix the powder with honey	Lick it regularly When it finishes
15	Shade dry the leaves of <i>Abrus precatorius</i> , grind it into powder and mix it with honey or palm oil and shear butter in equal quantity Also you can cook the leaves and drink 3 times daily.	Lick it regularly When it finishes

Source: Field survey, (2017)

Abrus precatorius is used to treat Asthma and cough. It has a pharmacological effect of Anti-allergic and Mast cell stabilizing effect in egg albumin induced de-granulation of mast cells [44,45]. Root contains glycyrrhizin and alkaloids like abrasine and precasine besides abrine and related bases [46]. The seeds yield alkaloids, steroids, lectine, flavonoids, and anthocyanins [47]. The root is considered emetic and alexiteric. The watery extract is useful in relieving obstinate coughs [47].

Zingiber officinale has a pharmacological effect of anti-asthmatic anti-inflammatory [48,49]. All major active ingredients of Ginger, such as zingerone, gingerdiol, zingibrene, gingerols and shogaols, are known to possess anti-oxidant activities [50]. Common phytochemicals in *Aframomum melegueta* includes Flavonoids, Phenolic compounds, Alkaloids, and Tannins [51,52]. The ethanolic leaf extract contains phytochemicals such as tannins, alkaloids, saponins, steroids, cardiacglycoside and terpenoids. The ethanolic extract of *Aframomum melegueta* has a broad spectrum of antimicrobial activity [53].

The mature plant of *Ageratum conyzoides* is used for its haemostatic, anti-inflammatory, antispasmodic, antiasthmatic, properties for the treatment bacterial infections [54]. The phytochemical in *Ageratum conyzoides* are Monoterpenes and sesquiterpenes, Benzofuran, Chromene, Chromone and coumarin, Flavonoids and alkaloids, Triterpenes and steroids. The pharmacological properties includes Analgesic activity, Antimicrobial activity and wound healing effects, Anti-inflammatory activity, Spasmolytic effects, Gamma radiation effects, Anti-cancer, anti-radical scavenging activity and gastric properties, Anti-malarial properties, Anticoccidial activity, Schistosomicidal activity, antioxidant property, Allelopathic property, Insecticidal property [55].

Numerous chemical constituents and secondary metabolites of the *Bryophyllum pinnatum* have been documented in which the most significant are bufadienolides and flavonoids [56]. The presence of alkaloids, saponins, glycosides and tannins has been confirmed in the plant [57]. Phytochemical screening of the root showed the occurrence of different flavonoids and steroids [58]. The presence of different flavonoids, polyphenols, triterpenoids and other chemical constituents in the plant are responsible for its

various therapeutic activities such as anti-nociceptive, anti-inflammatory, anti-bacterial and anti-diabetic effects [59]. The leaves of *Erythrophleum africanum* contain tannins, saponins, sterols, terpenoids, alkaloids, flavonoids and cardiac glycoside [60].

The leaves of *Ficus exasperata* are used for treatment of coughs [61]. It contains flavonoids, tannins and saponins polyphenols and anthraquinones [61]. Extracts of various parts of *Garcinia kola* are used extensively in traditional African medicine [62], especially for the preparation of remedies for the treatment of cough [63]. [64] documented the phytochemical constituents of *Garcinia kola* seeds which include saponins, tannins, flavonoids, proteins, glycosides, reducing sugar, starch, sterols and triterpenoids, with flavonoids predominating.

Various parts of *Paullinia pinnata* are used in traditional medicine for treating various diseases. In South West Nigeria, the leaf juice of *Paullinia pinnata* is used for the treatment of sore throat [65]. The roots are also chewed for coughs [66]. The phytochemical screening of the plant *Paullinia pinnata* revealed the presence of flavonoids, alkaloids, tannins, saponins, glycosides, steroids, phenol and terpenoids [67].

The dried roots, shoots and latex of *Pergularia daemia* are used to treat cough and whooping cough [68, 69]. Phytochemical constituents of *Pergularia daemia* consists of alkaloids, flavonoids, glycoside, steroids, carbohydrates steroid, tannins and reducing sugar [70]. The pharmacological profiles includes anti-fertility activity of alkaloidal fraction, amelioratory effect of flavonoids, anti-inflammatory, analgesic and antipyretic activity, central nervous system depressant activity, hepatoprotective activity, antioxidant activity, anticancer activity, antidiabetic activity, antibacterial activity, antiurolithiatic activity, phytomedicine characteristics [69,71,72,73,74,75].

Spondias mombins has been traditionally noted for its medicinal values. The leaves exhibit antimicrobial, leishmanicide, anti-viral, antifungal, antiedematogenic, hypoglycemic and antioxidant properties [76,77,78,79,80]. It is used for the treatment of several topic and systemic diseases like inflammation of the mouth and throat [77]. Quantitative phytochemical screening revealed the presence of saponins, alkaloids, flavonoids,

tannins and cyanogenic glycosides, and phenol, steroids, terpenoids [81].

The root, leaves and bark of *Vitellaria paradoxa* contains the following phytochemical constituents, tannin, saponin, flavonoids, alkaloids, steroid, terpene, philoban, cardiac glycoside, phlobatannin and anthraquinone [82]. Studies have shown that triterpene alcohols extracted from shea butter possess anti-inflammatory activity [83].

According to the respondents 13 plant species used in the treatment of cough are common in the study area and can easily be sourced from the surroundings and from herb sellers. Another 3 are rare and cannot easily be sourced. [84] stated that globally 4,160 to 10,000 medicinal plants are endangered by habitat losses or overexploitation in areas where rural families traditionally collected them. This raises concern about the need for both short and long term intervention strategies to save the species from extinction. 8 species are found in the wild, this showed that the wild habitats are important for local communities in terms of basic needs. [85] also pointed to the importance of wild habitats for people's livelihood in a rural community of Mexico and found a greater diversity of plant uses in wild habitats than in managed environments. Eight of the plants species used in the treatment of cough are cultivated in the study area. [85] also reported that relatively few medicinal and aromatic plants species are cultivated. The greater majority of medicinal plants are still collected from the wild [86,87]. In terms of habitat, 9 species can be found in both forest and savanna while 7 other plant species are found on farmland; however the habitat of some species overlaps (Table 1). 9 species are native and 7 species are introduced.

4. CONCLUSION

The study has helped to identify important plants and plant parts used in the treatment of cough in the study area. The documentation of these plants and their uses will go a long way in preserving the traditional knowledge of plants commonly used in the treatment of cough from one generation to another. Some of the plants utilized by the respondents for cough are rare and from the wild, therefore there is need for domestication and conservation of these plants to prevent their extinction. The bioactive compounds in some of these plants can be

synthesized together to produce conventional drugs for cough management. Further studies are required on these plant species both for their conservation and pharmaceuticals.

CONSENT

As per international standard or university standard, respondents' written consent has been collected and preserved by the authors.

ETHICAL APPROVAL

As per international standard or university standard written ethical approval has been collected and preserved by the authors.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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