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# Ethnobotanical survey of traditional medicinal plants used in treatment of gastrointestinal disorders in Lusaka, Zambia

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**Abstract**
The prime objective of this study is to present a database on the medicinal plants used for gastrointestinal disorders in Lusaka, Zambia by local traditional healers. A survey on the name of the plants used, the used parts and method of preparation was obtained from traditional healers, herbalists and hawkers using a structured questionnaire. 45 plants from 27 families were found to be used in the treatment of variety of gastrointestinal disorders in this study that conducted during the period of 2019-2020. The Rutaceae family was represented by four, Solanaceae represented by four plants followed by Fabaceae, Combretaceae (3 species each), Malvaceae, Arecaceae, Cucurbitacea, Rosaceae, Myrtaceae (2 species each) while other families (1 species each) were found to be used medicinally by the local communities. Of these plants, 11(24%) different plants were indicated for diarrhea, 10 (22%) treat indigestion,9 (20%) treat stomach aches, 5 (11%) treat constipation, vomiting, ulcers, dysentery 4 (8%). The roots were the mostly commonly used parts from the plants obtained while decoction and infusion were the most widely methods of preparation used. The traditional healers are in Lusaka province possess rich ethno pharmacological knowledge and depends largely on naturally growing plant species. The documented medicinal plants can serve as a basis for further phytochemical and pharmacological studies.

**Keywords:** Ailments, Medicinal plants, traditional healers, traditional medicine, ethno botanical survey

## Introduction
Gastrointestinal tract, a part of the human digestive system, it is an important organ that is vulnerable to disorders contributing substantially to morbidity and mortality rates worldwide, including in Zambia. Gastrointestinal disorders include symptoms like abdominal pain, acidity, constipation, dyspepsia, indigestion, flatulence, bleeding, bloating, diarrhea, heartburn, incontinence, nausea and vomiting, pain in the belly, swallowing problems, weight gain or lose etc.., caused by eating indigestible, excessive or irregular foods, imbalanced and spicy diets, and adulteration of food and contamination of drinking water [1]. The conditions of digestive disease associated with the gastro intestinal disorders may range from mild to serious, common problems include; cancer, irritable bowel syndrome and lactose intolerance, gallstones, cholecystitis and cholangitis, esophagus problems, such as stricture and achalasia and esophagitis, stomach problems, including gastritis, gastric ulcers usually caused by *Helicobacter pylori* infection and cancer, rectal problems include anal fissure, hemorrhoids, proctitis, and rectal prolapse, liver problems include, hepatitis B and C, cirrhosis, liver failure and autoimmune and alcoholic hepatitis, pancreatitis and pancreatic pseudo cyst, intestinal problems, such as polyps and cancer infections, celiac diseases, crohn disease, ulcerative colitis, diverticulitis, malabsorption, short bowel syndrome and intestinal ischemia, gastro esophageal reflux disease, peptic ulcer disease and hiatal hernia [2].

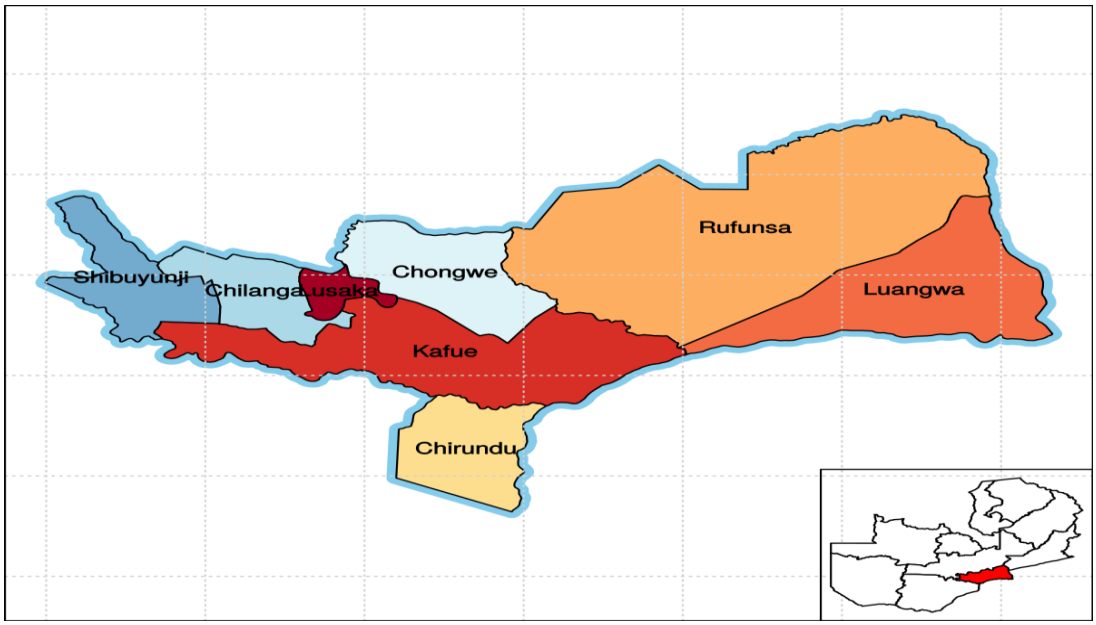
For many years, human population across the world has utilized elements of their environment, in particular, plants, to treat themselves. To date and even with the spectacular progress accomplished in the field of science, an estimate of 66% - 85% of the world's population, especially from developing countries, depends directly on plants as medicines [3]. The interest and the research in the field of indigenous knowledge have increased since the past years especially after the Rio conference in 1992. Medicinal plants, defined as plants having one or more bioactive compounds that could be precursors for the synthesis of useful drugs [4], and their utilization represent a part in field of ethno botany. A significant number of developing countries, up to 80%, depend on plants to treat themselves against a variety of diseases [5]. Throughout the world, human population has been using the knowledge of medicinal plants to fight diseases. Africans have been using natural therapies based on herbal medicine for long and for sure amongst the oldest folk medicine currently practiced [6]. Many studies have been conducted in Africa about the usage of the medicinal plants and herbal

products [7]. Documentation of the local knowledge through ethno botanical studies is important for the conservation and utilization of biological resources [8]. For this reason, ethno botanical studies have become increasingly valuable for the development of healthcare and conservation programs in the world and of specific Zambia. The majority of the people in Zambia still use local medicinal plants to treat these ailments, these mostly include: constipation, diarrhea, gastritis and ulcers, intestinal wound, nausea, gastralgia and indigestion. This study aimed at reviewing the past and actual knowledge about the medicinal plants used to treat gastrointestinal disorders by Zambian people in Lusaka.

## 2. Methodology

### 2.1 Study Area

Lusaka is the study area and capital city of Zambia. It is located in south central Zambia at 15°25′S 28°17′E, on a plateau at 1300 m (4265 ft) in altitude. It has a population of 1,084,703 (2000 census). It is being the central province of Zambia, this naturally makes it the most densely populated and the most tribally diverse region.




Map of Lusaka province showing the study area

### 2.2 Data collection

Data collection was done between October 2019 and March 2020. For data collection Jovel *et al*., (1996) method was used [9], information was compiled through general conversations with the informants, while structured questionnaires [Table 1] were used to obtain additional information about the methods of treatment, scientific name of the plant, family name, local name, their local uses, parts of the plants used, medicinal uses of the plant and methods of preparation were recorded in the information. A total of 60 informants including 34 females and 26 male (Table 3), comprising thirty four traditional healers, nine herbalists, and 17 elderly villagers were interviewed. Plant specimens were collected from the informants and were identified by their common names.

**Table 1:** structured questionnaire

| S, no | Parameter | Information |
|---|---|---|
| 1 | Interviewees details | Name : _____<br>Gender: _____<br>Age: _____<br>Occupation: _____<br>Location : _____ |
| 2 | Questions | How long have you been a traditional healer?<br>Which medicinal plant have you been using traditional medicine to cure gastro intestinal disorders?<br>Which part of the plant do you use?<br>How do you prepare the medicinal plant for use? (Tea /infusion)<br>How is the preparation administered?<br>How long do you have to take the preparation for? |

### 2.3 Ethical consideration

During interviews, the informants are duly informed about the purpose of this research. With verbal agreement that this research shall not be used commercially but to educate and document medicinal plants used in gastrointestinal disorders.

### 2.4 Data representation

Bar charts, Tables and pie charts were used for data representation.

## 3. Results

### 3.1Analysis of data

A total of 45 plant species distributed in 27 families were found to be used locally for treating various gastrointestinal disorders including diarrhea, dysentery, abdominal cramps, gut disturbances, stomach disorders, upset and aches. The plants are arranged in alphabetical order. Plant names are followed by family names then local names and plant part(s)

used and their methods of preparations. The results are summarized in Table 2. The *Rutaceae* family was represented by four, *solanaceaea* represented by four plants followed by *Fabaceae, Combretaceae* (3 species each), *Malvaceae, Arecaceae, Cucurbitacea, Rosaceae, Myrtaceae* (2 species each) while other families (1 species each) were found to be used medicinally by the local communities. Of these plants, 13 (28%) different plant were indicated for diarrhea, 10 (22%) treat indigestion,9 (20%) treat stomach aches,5 (11%) treat constipation, vomiting, ulcers, dysentery 5 (11%). Of these 45 plants, most plants showed multipurpose efficiencies by been used in three or four conditions, *Aconitum Amorphophallus,campanula heterophyllum* can be used for diarrhea, indigestion, vomiting and throat pains, *Amorphophallus camanulaus blyme* used for indigestion, menstruation and expelling gases, *Ananas comosus mill* used for constipation, indigestion, sore throat, worms, *capsicum annum* used for gastric stimulant, ulcers, stomach pain, *Cinnamomum zeylanicum breyn* used for gases, nausea, vomiting, gastric irritation, diarrhea, *Citrus medica* used for indigestion, expelling gases, dysentery, *Pseudocedrela caudatum* Sprague used for cold, stomach ache, diarrhea, dysentery, ulcers, *Psidium guajava* used for gastroenteritis , diarrhea, indigestion, *Pyrus malus* used for indigestion, vomiting, nausea, dysentery, menstruation. In different communities, many plants are given different names. Many of these plants, eventually, have more than one local name. These plants are prepared and mostly administered orally in different ways to treat gastrointestinal and its associated disorders. In their preparations for therapeutic purposes, whole plants as well as various parts of each plant species were either used singly or in combined forms. Parts used also depend on the plant under consideration and severity of ailments. Roots constituted most of the uses with 24% followed by fruit and leaves 22%, 17% the bark the whole plant had 15%, seed 11%, rhizome 4% stem, tuber and underground corm 2%.The results are shown in Figure1. Kankaramba and umusokasoka been suggested by 5 traditional herbalist showing its effectiveness in treatment of gastrointestinal disorders. The details of the plants including local name of the plant, parts used, uses and method of preparation is mentioned clearly in Table 4.

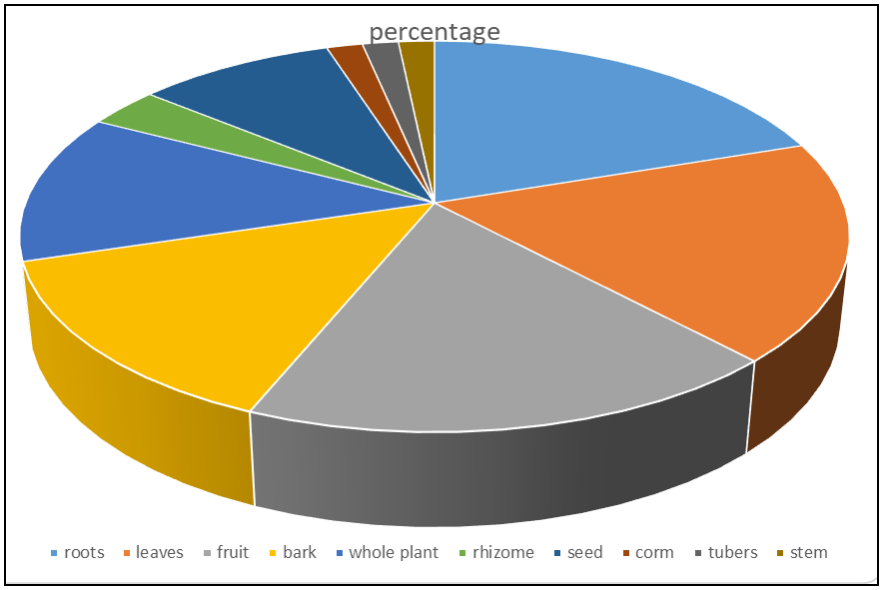



**Fig 1:** chart showing the percentage allocated to each part of the plant used

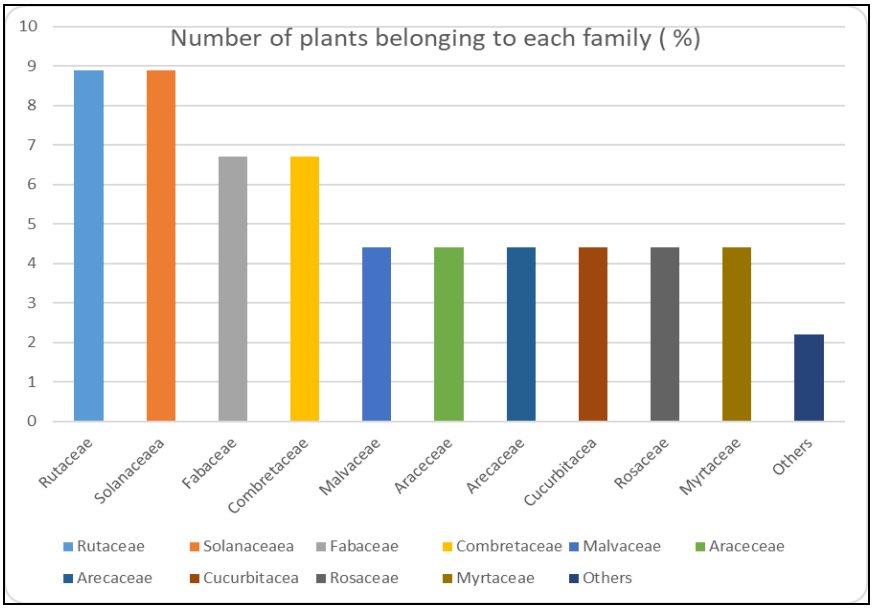



**Fig 2:** Chart showing the frequency of the number of plants belonging to a particular family

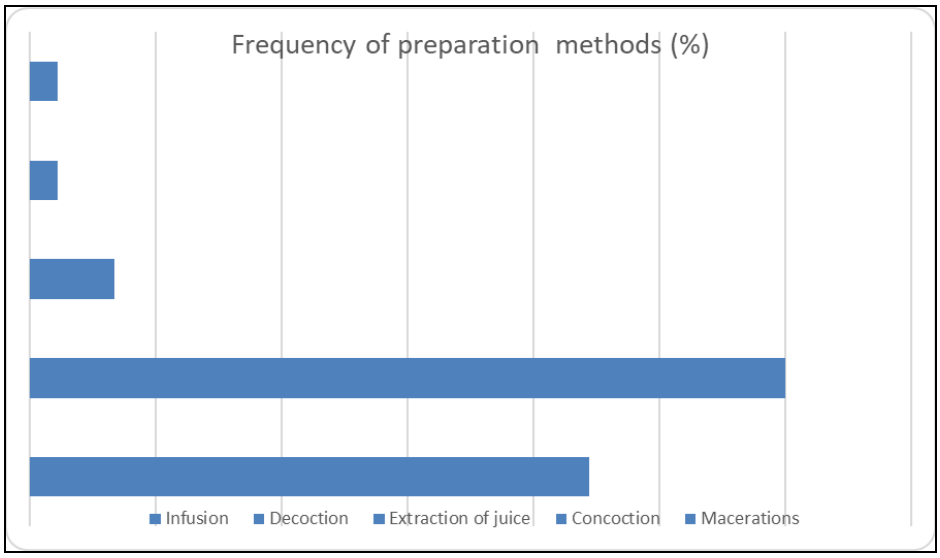



**Fig 3:** Chart showing the frequency of preparation method of each plant

**Table 2:** Table showing the plant, family, local name, used part, uses and method of preparation.

| | Plant | Family | Local Name/Common Name | Used Part | Uses | Preparation |
|---|---|---|---|---|---|---|
| | *Abelmoschus esculentus* | *Malvaceae* | Okra | Fruit | Gasses, constipation | Infusion of the fruit |
| 1 | *Acacia dulcis* | *Fabaceae* | Mukona | leaves | Problems during child birth | Infusion of the leaves |
| 2 | *Acacia catechu* | *Mimosaceae* | Cutch tree | Bark | Diarrhea | Decoction of the bark |
| 3 | *Achillea millefolium* | *Asteraceae* | Blood wort | Whole plant | Cold, influenza | Infusion of the leaves or decoction of the roots and barks |
| 4 | *Aconitum heterophyllum* | *Ranunculaceae* | Aconites | Underground stem and roots | Diarrhea, indigestion, vomiting, throat pain | Decoction of the stem and roots |
| 5 | *Acorus calamus* | *Acoraceae* | Sweet flag | rhizome | Stomach aches | Decoction of the rhizome |
| 6 | *Aegle marmelos* | *Rutaceae* | Holy fruit tree | Fruit | Constipation | Extraction of the juice |
| 7 | *Amorphophallus campanulatus blume* | *Araceae* | Ichikasa cha n'gombe | Underground corm | Indigestion, promotes menstruation, expelling gas from stomach | Decoction of the underground corm |
| 8 | *Ananas comosus mill* | *Bromeliaceae* | ichinanazi | The leaves, ripe or unripe fruit | Constipation, digestion, sore throat, expels worms, kills intestinal parasites | Infusion of the leaves, extraction of the fruit |
| 9 | *Berlinia paniculata* | *Fabaceae* | umutondo | Bark | Diarrhea | Decoction of the bark |
| 10 | *Brachystegia boehmii* | *Fabaceae* | Mubombo or musaba | barks | Dizziness and diarrhea | Decoction of the barks |
| 11 | *Brassica oleracea* | *Brassicaceae* | Cabbage | Plant and seed | Gastric, duodenal ulcers, destroys intestinal worms | Decoction of the bark, roots and seeds |
| 12 | *Capsicum annuum* | *Solanaceae* | Impilipili | Fruit | Gastric stimulant, ulcers, stomach pain | Infusion of the fruit |
| 13 | *Capsicum annuum* | *Solanaceae* | Paprika | seeds | Digestion | Concoction |
| 14 | *Carica papaya* | *Caricaceae* | Pawpaw | Leaves | Cold | Infusion of the leaves |
| 15 | *Cinnamomum zeylanicum Breyn* | *Lauraceae* | cinnamon | The bark | Gas, nausea, vomiting, gastric irritation, diarrhoea | Decoction the bark or infusion of the powered plant |
| 16 | *Citrus aurantium* | *Rutaceae* | cungwa | Juice | Strengthens the stomach | Extraction o juice |
| 17 | *Citrus medica* | *Rrutaceae* | indimu | Rind of the fruit and lemon juice | Indigestion, expelling gas, dysentery | Decoction of the rind, extraction of juice |
| 18 | *Cocos nucifera* | *Arecaceae* | Amalasha or activated charcoal | Coconut shelves | Gases, diarrhea | Infusion of the powder |
| 19 | *Coffea arabica* | *Bubiaceae* | Kofi | seeds | Diarrhea | Infusion of the powder |

| | | | | | | |
|---|---|---|---|---|---|---|
| 20 | *Combretum zeyheri* | *Combretaceae* | Muzyula | roots | Diarrhoea , dysentery | Decoction of the leaves |
| 21 | *Cucumis sativus* | *Cucurbitaceae* | Ichipushi | Fruit | Constipation, stomach pains | Infusion of the peels |
| 22 | *Cucurbita pepo* | *Cucurbitaceae* | ichipushi | Seeds | Indigestion | Decoction of the seeds |
| 23 | *Cynodon dactylon* | *Gramineae* | ichani | plant | Vomiting | Infusion of the plant |
| 24 | *Daucus carota* | *Apiaceae* | karota | plant | Stomach aches | Decoction of the whole fruit |
| 25 | *Diplonychus condylocarpon* | *Belostomatidae* | Munto | Leaves and roots | Stomach aches, cough. | Decoction of roots, infusion of the leaves |
| 26 | *Diplorlgychus condylocarpon* | *Apocynaceae* | muto | plant | Stomach pains | Decoction of the plant |
| 27 | *Fragaria vesca* | *Rosaceae* | strawberry | plant | Diarrhea, indigestion | Macerations or direct eating |
| 28 | *Hibiscus sabdariffa* | *Malvaceae* | Lukukwa | leaves | Cough | Infusion of the leaves |
| 29 | *Lannea schweinfurthii* | *Anacardiaceae* | mubumbu | Barks and leaves | Dysentery, diarrihoea | Decoction of the bark, infusion of the leaves |
| 30 | *Phoenix dactylifera* | *Aaracaceae* | Palm tree | Fruits and seeds | Constipation, indigestion | Infusion of the fruit and seeds |
| 31 | *Pseudocedrela caudate Sprague* | Meliaceae | Umupundu | Bark, roots, root barks | Cold, stomach ache, diarrhea, dysentery, ulcers | Decoction of the bark, roots, root barks |
| 32 | *Psidium guajava* | *Myrtaceae* | Guava | Roots, bark and leaves | Gastroenteritis, diarrhea, indigestion | Decoction of the roots, barks and leaves |
| 33 | *Pyrus malus* | *Rosaceae* | Appy | Bark, fruit | Indigestion, vomiting, nausea, dysentery, menstruation, diarrihoea | Infusion of fruit, decoction of the bark |
| 34 | *Ricinus communis* | *Euphorbiaceae* | Imono | Roots and leaves | Constipation vomiting | Decoction of the roots, infusion of leaves |
| 35 | *Schinziophyton rautanenii* | *Euphorbiaceae* | Munnongo | Roots | Stomach pains | Decoction of the roots |
| 36 | *Solanum melongena* | *Solonaceae* | impwa | plant | Ulcers | Decoction of the plant |
| 37 | *Solenum tuberosum* | *Solanaceae* | potato | tubers | Stomach acidity, stomach ulcers | Decoction of the tubers |
| 38 | *Syzygium guineense* | *Myrtaceae* | Sicisu | leaves | Abdominal pain | Infusion of the leaves |
| 39 | *Terminalia sericea* | *Combretaceae* | kalunguti | roots | Stomach pains | Decoction of the roots |
| 40 | *Terminalia stuhimannii* | *Combretaceae* | mukonono | roots | Release a retained placenta | Decoction of the roots |
| 41 | *Uapaca kirkiana* | *Phyllanthaceae* | busuku | roots | Indigestion | Decoction 0f the roots |
| 42 | *Ximenia caffra* | *Olacaceae* | munomba | leaves | Stomach pains | Infusion of the leaves |
| 43 | *Zanthoxylum chalybeum* | *Rutaceae* | Pupwe | Roots | Cough, stomach pains and nightmares | Decoction of the roots |
| 44 | *Zingiber officinale* | *Zingiberaceae* | ginger | rhizome | Indigestion, bowel movement | Decoction of rhizome |

**Table 3:** Showing the frequency in percentage of people who were interviewed

| Sex | frequency | percentage |
|---|---|---|
| **F** | 34 | 56.6 |
| **M** | 26 | 43.3 |
| **Grand Total** | 60 | 100 |

**Table 4:** showing the local names of plants, parts used, uses and method of preparation

| Local name | Used Parts | Uses | Method of preparation |
|---|---|---|---|
| Umufuka | leaves | Cold | Infusion of leaves |
| Umukonfya | roots | Cold | Decoction of roots |
| Umutondo | bark | Diarrhea | Decoction of bark |
| Umusokasoka | roots | Constipation | Decoction of roots |
| Umulundeni | roots | Child birth | Decoction of roots |
| Umusalya | leaves | Stomach ulcers | Infusion of leaves |
| Umwenge | branhes | Stomach pain | Decoction of branches |

| | | | |
|---|---|---|---|
| Ebungano | roots | Period crumps | Decoction of roots |
| Umusongwa | barks | Diarrhea and stomach pains | Decoction of barks and roots |
| Umukonya | roots | Cold | Decoction |
| Kankaramba | roots | Constipation | Decoction of roots and infusion of leaves |
| Kalimbe kantu | roots | Period pains and stomach pains | Decoction of roots and infusion of leaves |

## 4. Discussion

Over the years, ethno botany has evolved into specific discipline that looks at the relationship people and plants have in numerous ways this has included ecology, economic botany, pharmacology and public health. The international markets have been flooded with drugs that are made from natural herbs which have expressed different pharmacological actions. However it is fair enough to give attention to traditional medicine, their use of low profile and less known medicinal plants should be documented and disseminate their therapeutic efficacy to prove the way for preparation of acceptable medicine [10].

In Lusaka, Zambia, up to 60% of the population consults traditional healers especially in low cost areas like Mutendele, kamanga and Soweto market. Traditional healers are numerous and accessible than high cost areas like chelston. The traditional healers in these areas where found in short distances and familiar with the culture and way of life in those areas. From experiences told by traditional healers the knowledge about plants was passed down to them and they too plan on passing them to the other generation, while these system has been working for centuries now it is also vital to keep in mind that with the increase in population, agricultural expansion and deforestation been widely reported, documentation of these indigenous knowledge has become important to preserve even in cases where this knowledge has failed to be passed from one generation to the other. Ethno botanical studies encourage the continuous search for natural products for use as medicines. Ethno botanical surveys have been found to be one of the reliable approaches of discovering new drugs and new drug development [11].

In this study, the number of indicated plants and their important applications in the treatment of gastrointestinal disorders shows a rich ethonomedicinal knowledge in Lusaka Zambia. The survey showed that medicinal plants still remains the main source of phytomedicine for a large majority of people. The use of different plants could be attributed to cultural acceptability, efficacy, physical accessibility and economic affordability as well as playing a major role in the treatment of gastroinstinal disorders in comparison to modern medicine. Due to difficulties in distinguishing between diarrhea and dysentery by local people plants have been discovered to cure more than one condition while this has been done unknowingly it is important to know exactly which works. From the study it showed that some 8% of the plants can work on dysentery even works on diarrhea showing multipurpose of the plants.

The prevalence of the use of leaves and roots for the preparation of traditional herbal remedies as shown in this study corresponds with earlier reports in other studies [12-15]. While the use of more than one plant or plants‟ parts in herbal preparations could be attributed to the additive or synergistic effect that extracts from the different plants are thought to have during treatment [16], Gessler *et al*. (1994) indicated that the use of concoctions suggests that the traditional medicines may only be active in combination due to the synergistic effects of several compounds that are acting singly [17]. On the contrary, the use of bark, roots or uprooting the whole plant of a given species could be destructive means of obtaining the herbal remedies. These unfavorable extraction methods will eventually contribute to the loss of the forest trees.

The methods of preparing these medicinal plants vary, decoction and infusion methods are highly reputed and are valued by the traditional healers in Lusaka Zambia, and another method is by directly extracting the juice from the fruit like cungwa (orange), indium (lemon). Most if not all of the plants are preferred taken orally been thought of been the most effective than rubbing or putting in porridge. Decoction of a part of or combination of different parts could be more effective as more active phytochemicals are likely to be extracted by boiling. In agreement with Nanyingi *et al*. (2008) and Bekalo *et al*. (2009), there is a lack of standardization and quality control in orally administered traditional medicine. Against these parameters, oral dosages are estimated using lids, spoons, cups, pinches and handfuls while most preparations are often prescribed through estimation in terms of a full, half or one-fourth of a cup, depending on the age, physical condition of the patient being treated, severity and type of infection.

## 5. Conclusion

Traditional knowledge of medicinal plants and their uses by indigenous cultures are not only useful for conservation of cultural traditions and biodiversity but also for community healthcare and drug development in the present and future. In this study, 45 plant species consisting of 27 families were used as ethno medicines for gastrointestinal disorders in the Lusaka, Zambia. These plants treated diarrhea, dysentery and various stomach problems. Reasons for the choice of these plants, plants‟ parts used and methods of preparations were indicated. Since traditional healers harvest roots and barks of some of these medicinal plants, there is need to educate them about the looming danger of wiping out some of the plant species if overexploited. Further investigation of ethno pharmacology is worthwhile to affirm their antimicrobial activities against bacteria in diarrhea and dysentery, isolate the plants‟ active chemical compounds, and decipher their modes of action.

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## Conflict of interest

The authors declare that they have no conflict of interest.

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