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# Documentation and Phytochemical Screening of Most Commonly used Nutri-Medicinal Plants by Pregnant Women in Kyeizooba, Bushenyi District, Western Uganda

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## Abstract

Nutri-medicinal plants are widely used as a remedy for some ailments among pregnant women worldwide. There are different medicinal plants used by pregnant women in Uganda depending on the culture and knowledge of these medicinal plants. A cross sectional study was carried out on 135 women in Kyeizooba sub county Bushenyi District from September 2016 to March 2017. Medicinal plants used by pregnant women were identified and documented, and phytochemical screening of the frequently used nutri-medicinal plants was done and their effects were studied comparing with the available literature. Fidelity levels, Informant consensus factor and use values were used to obtain the most frequently used medicinal plants. Lamiaceae and Asteraceae families presented the highest number of medicinal plants used by pregnant women. The phytochemicals analyzed in the herbs were saponins, alkaloids, flavonoids, reducing compounds, phenols and steroids which were found to exist in some nutri-medicinal plants with varying intensities. Herbal medicines contain important phytochemicals which if standardized and the dosages prescribed could present therapeutic advantages to the users.

**Keywords:** Pregnancy • Traditional birth attendants • Nutri-medicinal plants • Phytochemicals

## Introduction

The use of medicinal plants for treatment of ailments continues to increase though interventions to improve health care have been put in place. WHO reports 80% usage of herbal medicines worldwide [1] with higher percentages reported in developing countries. The prevalence of use is equally traced in developed countries where health care facilities are in place and up to date for example in the USA [2]. In Africa, the prevalence of use of herbal medicine was estimated at 80% [3]. A large population of pregnant women uses herbal medicines for ailments like gastro intestinal disorders, nausea and vomiting, inducing labor and infections. Herbal medicines are extracts of naturally occurring plants which may be taken in its crude or in processed form without any form of prescription or dosage, exclusively made from plants and is administered in different forms of solution, boiled or powdery form. In developed countries like China, herbal medicines are taken as decoctions or as granules. The extracts are of defined parts of the plants which include floral parts, areal parts or the whole plant. Preparation of these herbs usually is by steaming, roasting, boiling or extracting their juice by squeezing or by pounding [4,5].

The most commonly used herbs in Europe, America, and Australia were ginger (*Zingiber officinale* Roscoe), cranberry (*Vaccinium macrocarpon* Aiton), valerian (*Valeriana officinalis* Linn), Echinace (*Echnacea angustifolia* L.), chamomile (*Matricaria chamomilla* L. and raspberry (*Rubus idaeus* L.) for treatment of nausea, vomiting and colds among pregnant women [6]. In USA, *Zingiber officinale* (ginger) was the most commonly used in the treatment of nausea and vomiting in the first trimester [7]. The most commonly used herbs in Iran are Ammi visnaga for Nausea and Vomiting

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and gastro intestinal problems, and heart burn, Saatar (*Oreganum syriaca* L.) for nausea and vomiting, pepper mint (*Mentha piperita* L.) for gastrointestinal problems, chamomile (*Matricaria chamomilla* L.) for relaxation and liquorice (*Glycyrrhiza glaba* Linn) for common colds [8]. In a clinical trial, ginger was found to treat prenatal nausea and vomiting [9]. A randomized controlled trials which were conducted about the efficacy of ginger showed a significant improvement in the severity of both nausea and vomiting of pregnancy among the experimental group compared to those that were taking a placebo [10,11]. Gingerols and 6-shagoal a poly phenolic component was found to inhibit the action of neurotransmitter acetylcholine and increase gastric motility which greatly reduces nausea, vomiting and abdominal pain [12]. Fischer Rasmussen found it particularly effective for hyperemesis gravidarum a condition characterized by severe nausea, vomiting, and weight loss and electrolyte disturbance common in about 3% of the pregnant women, when compared to placebo. Some herbal medicines like *Zingiber officinale* were used for morning sickness and short term use of *Echinacea angustifolia* for colds and flu in pregnant women [2]. Different cultures use different herbal medicines as remedies for particular illnesses during pregnancy mostly during the third trimester [13].

In Kenya, about 20% of pregnant women used herbal medicine alongside western medicine for ailments like indigestion, respiratory tract infections and boosting immunity [14,15] states four major nutri-medicinal herbs used by pregnant women in his study carried out in Egypt. These include Garlic (*Allium sativum* L.), ginger (*Zingiber officinale*), green tea (*Camellia sinensis* L.) and peppermint (*Mentha piperita* L). Garlic (*Allium sativum* L) was used as an antibacterial and antifungal remedy, and was an ideal nutrient to consume particularly during pregnancy to raise immunity of the expecting mother. Green tea (*Camellia sinensis* L.) contributed to regulation of blood sugar, cholesterol, and blood pressure levels, helps speed up the body's metabolic rate and provided a natural source of energy. Peppermint (*Mentha piperita* L) had been used to treat gastrointestinal (GI) disorders, common cold and respiratory conditions, muscle pain, headache, and neuralgia during pregnancy. Fenugreek (*Trigonella foenum-graecum* L.) seeds contain oxytocin which stimulates uterine contractions and fastens labor process thus is helpful in inducing childbirth, however could lead to miscarriages if not well prescribed [15]. Ginger is well known remedy for gestational sickness particularly morning sickness and nausea [12].

In Uganda, Seventy-five medicinal plant species and one fungal species mainly toadstool mushrooms in the family Tricholomataceae were recorded as being used to induce labor during child birth in western Uganda [5]. The main reasons for the use of these herbal medicines are for treatment of syphilis, inducing labor, increasing appetite, and treatment of stomach pains and prevention of ante-partum hemorrhage.

Some of the herbal medicines were reported to treat bacterial and fungal infections during pregnancy. Steam distillation of fresh leaves of *O. gratissimum* showed that eugenol (54%) was the most abundant essential oil which was found to have an antibacterial activity. In vitro experiments showed that eugenol had an effect on *Cryptococcus neoformans*. *Plectranthus argentatus* also called *Coleus forskolii* contained an active ingredient of forskolin which was found to stimulate enzymes and was also found to treat abdominal pains and upper respiratory tract disorders [16]. A study by Asiimwe and Savina [4] indicated that most plant species possess radical scavenging properties due to the presence of compounds like saponins, tannins, alkaloids. These compounds boost immunity and fight fungal infections like *Candida albicans*.

In Kyeizooba, medicinal plants are commonly used during pregnancy even with the presence of health centre III where antenatal care services are provided. The most commonly used medicinal plants were *E. tomentosa*, *C. vitellinum*, *O. gratissimum*, *Z. officinale* and *S. princeae*. The synergistic use of *E. tomentosa* and *C. vitellinum* is high among the women in this area. Most women took medicinal herbs to treat gastro intestinal disorders, vomiting, nausea and obstructed labor and the most common route of administration was oral. Use of herbal medicines however could be useful in treating some conditions. Valuable information about medicinal plants for women's reproductive health needs to be documented so that these plants of therapeutic advantage could be conserved [17,18]. The increase in the use of herbal medicines among pregnant women, therefore requires in-depth scientific studies about their safety and efficacy so that they can be integrated into health care systems [18]. There is need for more studies about the efficacy, proper dosages and concentrations to be used if these herbal medicines were to be effectively used in treatment of pregnancy related ailments. Thus this research thus documented the medicinal plants used by pregnant women in Kyeizooba Sub County and to identified the phytochemical content in the nutri-medicinal plants which are commonly used by pregnant women and this could be a basis for programmed health education.

## Methods

### Research design

A cross sectional study was conducted in Kyeizooba Sub county, Igara East constituency, Bushenyi District where 135 women participated in the study. Both qualitative and quantitative methods of data collection were used with both structured and unstructured questions. Participants were elderly women and the traditional birth attendants who were presumed to be knowledgeable about the medicinal plants used. Purposive and snow ball sampling was used to select respondents in the area. Information about nutri-medicinal plants used, plant parts used, methods of preparation and administration of the herbal medicines were mentioned by the respondents who were mainly the pregnant women. Medicinal plants were collected, identified and documented by the researcher. Chemical analysis of selected herbs was done and the effects of the phytochemicals present were studied using the available literature. The study was conducted between September 2016 and March 2017.

### Data collection methods and instruments

In depth interviews were used for data collection about medicinal plants used, plant parts used and the method of preparation. Field visits were also carried out to identify the local names of the medicinal plants. They were asked to mention the type of herbs administered during pregnancy,

the ailments the herbs were treating, how they were administered, methods of preparation and conservation status.

### Collection of medicinal plants and treatment

The herbs mentioned were collected and identified during the field visits. Plant samples were collected just before noon and before the flowering stage since the nutrient concentration was considered maximum in this period. The samples were collected from plants just before the flowering stage. The family names and scientific names were determined by use of a herbarium and the International Plant Names Index [19]. The women were asked about the uses of each of the herbs that were mentioned. The herbs that had many uses as determined by calculating their fidelity levels and informant consensus factor [4], were selected for chemical analysis. Experimental investigation was done at Mbarara University pharmaceutical laboratory where the phytochemistry of the selected herbs was analyzed. The selected herbs were collected and dried under roof at room temperature, ground to obtain powder and extracted by hot maceration method. The liquid extracts were dried under room temperature to obtain the samples which were used in phytochemical screening. Qualitative chemical tests were done on herbs to identify presence of saponins, alkaloids, flavonoids, tannins, phenols, steroids, and reducing compounds.

### Phytochemical screening methods

**Saponins:** The froth formation test: To 2 cm<sup>3</sup> of each extract, 2 cm<sup>3</sup> of distilled water were added and the mixture shaken. This test was for identification of the saponins. Froth that lasted for 15 minutes indicated the presence of saponins [20].

**Alkaloids:** They were tested by using Dragendorff's reagent. To 2 cm<sup>3</sup> of each extract, 2-3 cm<sup>3</sup> of the reagent was added. Formation of an orange-red precipitate indicated the presence of alkaloids [20,21].

**Flavonoids:** To 2 cm<sup>3</sup> of each extract, equal volume of sodium hydroxide was added. Formation of a yellow precipitate or solution indicated the presence of flavonoids [20].

**Tannins and the phenols:** To 2 cm<sup>3</sup> of each extract, 2 cm<sup>3</sup> of 5% Iron III chloride was added. A deep blue or black precipitate indicated presence of tannins and phenols [20].

**Steroids:** To 2 cm<sup>3</sup> of each extract 2 cm<sup>3</sup> of acetic anhydride solution was added and then heated in a water bath for about 5 minutes and cooled. A few drops of concentrated sulphuric acid was added. Presence of steroids were indicated by a blue precipitate [20,21].

**Reducing sugars:** Reducing sugars were tested by addition of 2-3 cm<sup>3</sup> of Benedict's solution to 2 cm<sup>3</sup> of the herbal extract and then heated in water [22].

Levels of intensity of the phytochemical were determined by the intensity of the color changes and how fast these colors were forming. The phytochemical components were then studied and compared with the available literature to obtain their health impacts on pregnant women and the fetus

### Data analysis and presentation

Most commonly used herbs were obtained by calculating the informant consensus factor (FIC), fidelity levels (FL) and use value. The category of medicinal plants that presented greater importance were obtained by calculating their informant consensus factor [23,24].

$$F_{ic} = \frac{N_u - N_h}{N_{u-1}}$$

Where  $N_u$  represents number of uses of a particular herb for a particular ailment.  $N_h$  is the number of medicinal herbs used for a particular ailment by all informants. High values of informant consensus factor showed that the herb presented greater importance to the respondents. High  $F_{ic}$  values were used to highlight particularly interesting species for the search of bioactive compounds. To obtain the importance of the individual species,

fidelity levels of the most mentioned herbs were calculated. This indicated the percentage of respondents claiming the use of a plant species for the same major purpose.

$$FL = \frac{N_p \times 100}{N}$$

Where  $N_p$  is the number of informants that claimed the use of a species to treat a particular disease, and  $N$  is the number of informants that used the plants as a medicine to treat a particular disease. Increasing values of  $FL$  for a species indicated its uniqueness to treat a particular ailment. The fidelity level was limited to five citations for a particular illness category.

The use value shows the relative importance of plants known locally. It is calculated as follows;

$$\text{Use value} = \frac{\sum U_i}{N}$$

Where  $\sum U_i$  is the total number of citations per species, and  $N$  is the total number of informants.

The data was then presented in form of tables, texts and figures and this formed the basis of interpretation, conclusion and recommendations.

## Results

### Nutri-medicinal plants used by pregnant women:

39 herbs were cited in the study, for treatment of gastro intestinal disorders, inducing labor, treatment of respiratory infections, syphilis, and prevention of miscarriages. Herbs that belonged to the Lamiaceae family were mostly used with seven citations under this family, followed by family Asteraceae which had six citations (Table 1). Some herbs like *Solanum nigrum*, *Solanum indicum*, *Cymbopogon citratus* and *Zingiber officinale* are taken both as medicines and as foods for provision of food nutrients and boosting appetite.

Herbs in the Lamiaceae family (n=7) were most mentioned, then

Asteraceae (n=6) and Solanaceae (n=3) while each of the other families were mentioned once or twice. The most common growth habit of the mentioned plants were the herbs (n=20), and shrubs (n=7), a few were climbers (n=4) and trees (n=3). The commonest method of preparation and administration was boiling parts of the plant in water and drinking and only a few herbal medicines were applied externally. Two herbs that were mentioned for application directly in the vaginal canal were *Ipomoea batatas* for normal deliveries and *Ocimum sanctum* for neutralizing bad odor. Leaves (n=25) were the commonest plant part used and then the roots (n=4). Some medicinal plants were cultivated (n=8), some plants were growing wildly (n=15) while others were both wild and cultivated (n=10). The herbal medicine that had the highest fidelity level was *Spermacoce princeae* with 87.5% followed by *Zingiber officinale* with fidelity level of 71.4% (Table 2). Medicinal plants for inducing labor had the highest fidelity levels followed by those that were treating gastro intestinal disorders. The most reported ailment was gastro intestinal disorders with informant consensus factor of 0.8, followed by loss of appetite and nausea with informant consensus factor of 0.74 (Table 3). The most mentioned medicinal plants were for treatment of gastro intestinal disorders and the least mentioned used herbs are those of inducing labor as calculated from the use values (Figure 1).

### Phytochemistry of selected herbs

200 cm<sup>3</sup> of the liquid extract in each sample was dried and the percentage yield of the herbal extracts were; *Erlangea tomentosa* (24%), *Crassocephalum vitellinum* (23%), *Zingiber officinale* (10.25%), *Ocimum gratissimum* (20%), *Spermacoce princeae* (11.25%) and *Plectranthus argentatus* (28.5%) which presents with the highest percentage yield. *Zingiber officinale* had the least percentage yield. Results from phytochemical screening were obtained and saponins, alkaloids, steroids, tannins, phenols and reducing compounds were present in the extracts in varying amounts (Table 4). All the screened herbs contained traces of phytochemicals that were tested except for ginger which lacked saponins, tannins and the steroids and *Spermacoce princeae* which lacked the saponins. Reducing sugars were the most abundant in all the extracts.

Flavonoids were highest in *Z. officinale* and *O. gratissimum*, saponins

**Table 1:** Local herbs mentioned and their traditional uses.

Family	Scientific name	Local name	Growth habit	Habitat	Plant part used	Use	Method of preparation and Administration
Alliaceae	<i>Allium cepa</i>	Obutunguru	Herb	C	Leaves	Heals after birth pain	Pound and mix with cold boiled water (at room temperature) and drink or chew with sugar cane
Apiaceae	<i>Steganotaenia araliacea</i> Hoscht	Omuhanurankuba	Shrub	W	Leaves	Induces labor	Mix powder in cold boiled water and drink
Asteraceae	<i>Bidens pilosa</i>	Enyabarashana	Herb	W	Leaves	Induces labor, gastro intestinal disorders, stops heart burn, increases blood content in the body.	Put leaves in boiling/hot water and Drink
Asteraceae	<i>Ageratum conyzoides</i> Sieber ex Steud	Ebutabuta	Herb	W/C	Leaves	Gastro intestinal disorders, stops flow of water during pregnancy	Boil and drink or bathe
Asteraceae	<i>Crassocephalum vitellinum</i>	Esuununu	Herb	W	Leaves	Gastro intestinal disorders, prevents miscarriage, treats syphilis, appetite, fixes fetus in right position and cleans baby in the womb	Boil in water and drink
Asteraceae	<i>Erlangea tomentosa</i>	Ekyoganyanja	Herb	W	Leaves	Treats syphilis, gastro intestinal disorders, cleans baby, appetite, prevents miscarriages, prevent bleeding during pregnancy.	Boil in water and drink
Asteraceae	<i>Vernonia lasiopis</i>	Omujuma	Shrub	W	Leaves	Gastro intestinal disorders	Pound and mix with cold boiled water and drink
Asteraceae	<i>Senecio hadiensis</i> Forssk	Omuziranfu	Herb	W/C	Leaves	Prevents bleeding while pregnant, treats syphilis, for gastro intestinal disorders, cleans baby.	Boil in water and drink
Basellaceae	<i>Basella alba</i>	Enderema	Climber	W/C	Leaves	Gastro intestinal disorders, appetite, stops heart burn, softens bones for easy delivery.	Steam, squeeze to obtain liquid and drink

Bignoniaceae	<i>Spathodea campanulata</i>	Bwizibwingi	Tree	W	Bark	Gastro intestinal disorders and uterine infections.	Boil in water or dry and obtain powder and mix with hot water and drink
Capparaceae	<i>Cleome</i>	Enshogi	Herb	W/C	Roots	Induce labor pains	Chew
Convolvulaceae	<i>Ipomoea batatas</i>	Ebitakuri	Herb	C	Leaves	Softens bones for easy delivery.	Pound leaves, put in cold water and sit in the mixture for 30 minutes
Cucurbitaceae	<i>Zehneria scabra Sond</i>	Akabindizi	Climber	W	Leaves	Treats diseases like syphilis and treats stomach pains, treats itching private parts during pregnancy.	Boil in water and bathe in private parts or drink
Curcubitaceae	<i>Luffa cylindrical</i>	Ekyangu	Climber	W	Leaves	Inducing labor	Pound and mix with cold Boiled drinking water (at 25 °c)
Dioscoreaceae	<i>Dioscorea composita Hemsl</i>	Ebitekyere,	Runner	C	Leaves	Reduces constipation, induces labor	Cut leaves in vegetables boil and eat, roast the roots
Dracaenaceae	<i>Dracaena fragrans Ker Gawl</i>	Omugorora	Shrub	W	Roots	Inducing labor	Pound and mix with boiled drinking water and drink or chew
Euphorbiaceae	<i>Phyllanthus capillaris Schumac &amp; Thonn</i>	Omuturuka	Herb	C	Leaves	Stops flow of fluids in breasts during pregnancy/prevents miscarriage	Pound and mix with boiled water, leave outside overnight in a pot and drink
Fabaceae	<i>Cajanus Cajan</i>	Entondigwa	Shrub	C	Leaves	Appetite, induces labor, gastro intestinal disorders	Boil in hot water
Flacoutiaceae	<i>Trimeria grandifolia Hochst</i>	Omwatanshare	Shrub	W	Leaves	Stops bleeding during pregnancy and prevents miscarriage	Squeeze to obtain liquid and mix with porridge and drink
Lameaceae	<i>Ocimum sanctum angustifolium Benth</i>	Nyabwenyi	Herb	W	Leaves	Stops bad odor from the vagina	Pounded and insert in vaginal canal
Lamiaceae	<i>Hoslundia opposita Vahl</i>	Esitimwa	Shrub	W	Leaves	Gastro intestinal disorders, treats syphilis and infections of the womb	Boil in water and drink
Lamiaceae	<i>Leonotis nepetifolia</i>	Ekicumucumu	Herb	W	Leaves	Stomach upsets, reduces labor pains	Chew or boil in water and drink
Lamiaceae	<i>Plectranthus prostrates Guerke</i>	Maizimarungi	Herb	C/W	Leaves	Stomach upsets, induces labor	Steam eat and squeeze to obtain liquid and drink
Lamiaceae	<i>Ocimum gratissimum Forssk</i>	Omwenyimushaija	Shrub	C/W	Leaves	Gastro intestinal disorders, stops vomiting, for morning sickness and nausea, appetite, treats heart burn	Chew, put leaves in hot water and cover and drink
Lamiaceae	<i>Plectranthus argentatus</i>	Ekizera	Herb	C	Leaves	UTIs, gastrointestinal disorders, boosts appetite, cough, treats constipation,	Dress leaves in vaginal canal, pound and mix with cold boiled water and drink
Lamiaceae	<i>Solenestemon latifolius</i>	Marwa	Herb	C	Leaves	Gastro intestinal disorders, treats syphilis	Boil and drink
Poaceae	<i>Cymbopogon citratus Stapf</i>	Omuteete	Herb	C/W	Leaves and Roots	Gastro intestinal disorders, cough and respiratory infections, appetite,	Boil leaves in water and drink, roast the roots and chew
Rubiaceae	<i>Tarenna pavettoides</i>	Omunywamaizi	Tree	W	Leaves	Cleans baby and stops the of water during pregnancy	Boil in water and drink
Rubiaceae	<i>Spermacoce princeae (K.Schum) Verdc</i>	Kishakimwe	Herb	W	Leaves	Induces labor	Boil in water and drink or mix powder in jelly and smear the belly
Rutaceae	<i>Zanthoxylum gilletii</i>	Omutatembwa	Tree	W	Bark/Root	Induces labor	Pound and mix with cold boiled drinking water and drink or chew
Solanaceae	<i>Physalis minima</i>	Akatuutu akakye	Herb	C/W	Leaves	Minimizes on labor pains, gastro intestinal disorders, for appetite.	Boil in hot water and drink or pound and mix with cold boiled water and drink.
Solanaceae	<i>Solanum indicum</i>	Obutura,	Herb	W/C	Fruit	Boosts appetite	Steam heat and eat
Solanaceae	<i>Solanum nigrum Sendtn</i>	Enshwiga	Herb	W/C	Leaves	Appetite, increases blood content, reduces constipation	Steam heat and eat
Urticaceae	<i>Urtica massaica Mildbr</i>	Engyenyi	Climber	W	Roots	Induce labor	Pound and mix with cold boiled water and drink
Vitaceae	<i>Cyphostemma</i>	Omumara	Tree	W	Leaves	Treats syphilis, cleans baby, and for gastro intestinal disorders	Boil in water and drink
Zingiberaceae	<i>Zingiber officinale</i>	Entangahuzi,	Herb	C	Roots	Treats heart burn, flue, cough, controls vomiting and morning sickness	Chew or add to hot water and drink

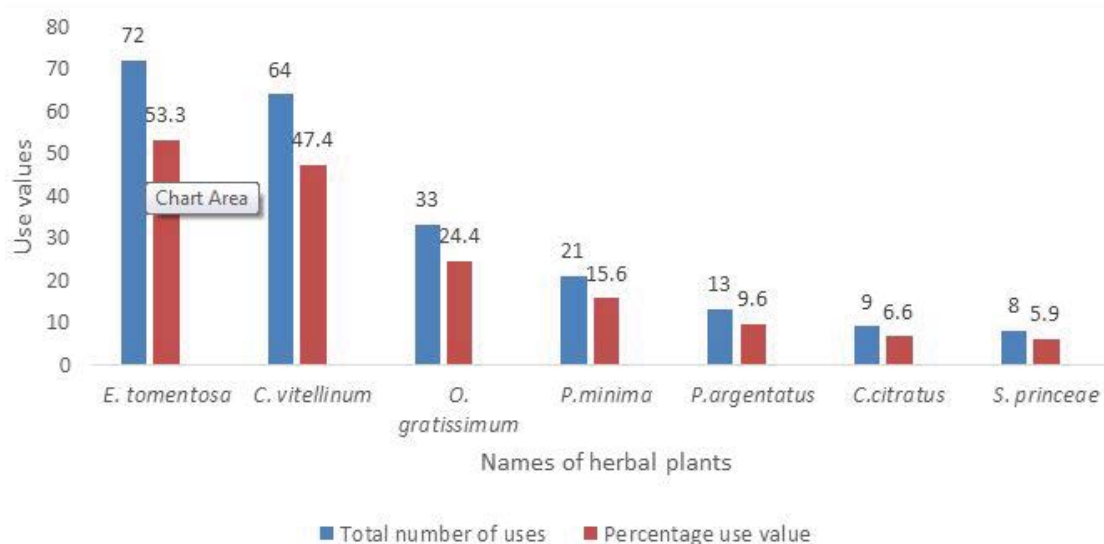
Key: W=wild, C=cultivated

**Table 2:** Fidelity levels of commonly mentioned medicinal plants.

Family	Plant species	Uses	Number of uses (Np)	Total number of informants (N)	Fidelity levels (FI)
Asteraceae	<i>Crassocephelum vitellinum</i>	Gastro intestinal disorders	29	64	45.3
Asteraceae	<i>Erlangea tomentosa</i>	Gastro intestinal disorders	38	72	52.8
Lamiaceae	<i>Ocimum gratissimum</i>	Gastro intestinal disorders	16	33	48.5
Lamiaceae	<i>Plectranthus argentatus</i>	Gastro intestinal disorders	6	13	46.2
Rubiaceae	<i>Spermacoce princeae</i>	Inducing labor	7	8	87.5
Solanaceae	<i>Physalis minima</i>	Inducing labor	9	21	42.9
Zingiberaceae	<i>Zingiber officinale</i>	Nausea and vomiting	5	7	71.4

**Table 3:** Informant consensus factor of the herbal medicines.

Ailment category	Number of plant species for a particular ailment	Number of use reports	Informant consensus factor (Fic)
Gastro intestinal disorders	25	119	0.8
Loss of appetite and nausea and vomiting	11	39	0.74
Infections and syphilis	18	61	0.71
Softening and increasing elasticity of cervical muscles	6	13	0.58
Bleeding during pregnancy	7	12	0.45
Induction of labor	17	26	0.36
Respiratory infections	3	4	0.33

**Figure 1.** Graph showing percentage use value for the most mentioned herbal medicines.**Table 4:** Phytochemical compounds in the different herbal extracts.

Compound Herb	Saponins	Alkaloids	Tannin	Steroids	Reducing sugars	Phenols	Flavonoids
<i>E. tomentosa</i>	++	++	++	++	+++	++	++
<i>C. vitellinum</i>	+++	++	++	+	++	++	++
<i>Z. officinale</i>	-	+	+	-	++	++	+++
<i>O. gratissimum</i>	++	++	+	++	+++	+	+++
<i>S. princeae</i>	-	+++	++	+	+++	+	+
<i>P. argentatus</i>	++	++	+	++	+	++	++

Key: (+) presence of the phytochemical, (+++) high concentration, (++) Medium, (+) Trace, (-) shows absence of the phytochemical

were more in *C. vitellinum*, alkaloids were highest in *S. princeae*, tannins and phenols were averagely in all the herbs tested, and reducing sugars were the most abundant in *E. tomentosa*, *S. princeae* and *O. gratissimum*.

## Discussion

### Nutri-medicinal plants used

Most herbs from the Lamiaceae and Asteraceae families are medicinal

since they were the most mentioned. This study agrees with [4], where the most commonly utilized herbal medicines were from the family of Asteraceae with Lamiaceae taking the third position after Fabaceae. These herbs were mostly growing wildly yet were highly used by the respondents for example *E. tomentosa* and *C. vitellinum*. These may be at risk of extinction yet could be of great importance in the pharmaceutical world and our herbal medicine heritage, however, some of the other species were being cultivated [5]. This shows there is an attempt to conserve the rare species though it may still need more input especially with the most important species. The most

common plant part used were the leaves, this means that they could be harvested and used without destroying the whole plant which makes it easy to conserve such species. Most plants used were herbaceous which indicates that at certain times of the year in the dry season these herbs may not easily be accessed, thus there is need to grow these herbs all year round for easy accessibility.

### Phytochemistry of nutri-medicinal herbs

*E. tomentosa*, *C. vitellinum* and *P. argentatus* were found to contain saponins. According to a study by [4], saponins contain radical scavenging properties which are important in increasing immunity. Saponins boost immunity and fight fungal infections like *Candida albicans* [4]. These herbs were mentioned by the respondents for treatment of infections like syphilis and skin diseases. The radical scavenging properties confirm their ability to increase immunity among pregnant women for several infections like respiratory infections, urinary tract infections and sexually transmitted diseases like syphilis.

Tannins and flavonoids were studied and found to contain antifungal, antioxidant and detoxification properties. These compounds were identified in plant extracts of all the tested herbs in this study. This justifies their use for treatment of infections like syphilis, skin diseases, urinary tract infections, gastro intestinal disorders and for boosting immunity. Flavonoids boost immunity by increasing white blood cell count, and mostly they are also found in most vegetables and fruits [25].

These phytochemical compounds mentioned are important in the buildup of tissues and provision of energy in addition to increasing immunity especially the saponins, flavonoids and tannins which have been reported to act as radical scavengers, [4]. They were found to decrease oxidative stress with anti-fungal and anti-bacterial properties. The shagaoals are a constituent of the polyphenols which were found to increase gastric emptying, and reduce nausea and vomiting. In this research, ginger was found to contain phenols and is used mostly in the first and second trimesters when nausea and vomiting are the most prevalent ailment in pregnant women. *Zingiber officinale* was also mentioned in a study in USA and was mentioned for its effectiveness in the treatment of nausea, vomiting and morning sickness. Polyphenols however were reported to cause the constriction of the *ductus arteriosus* which may affect the fetus [25] if used in excess.

Steroids were found in all the samples that were tested except in *Z. officinale*. In other experiments carried out, steroids prevent miscarriages [26]. They act by decreasing the percentage natural killer cells which are found in the uterus of every pregnant woman and are responsible for most miscarriages. Specifically, *E. tomentosa* and *C. vitellinum* which also contain the steroids could be a reason they have been widely used by pregnant women specifically for preventing miscarriages. Reducing compounds are also reducing sugars which are carbohydrates thus can provide energy though in small quantities. However tannins in excess are not recommended for pregnant women as they were found to cause miscarriages. Alkaloids in excess were found to truncate the development of fetuses in an experiment done on pregnant rats. Therefore herbs with a high percentage of alkaloids could be fetotoxic if taken in excess by the pregnant women.

Most women claimed that the use of herbs prevented infections in the uterus and on the fetus. In a focus group discussion, women reported that babies born of women taking herbal medicines were less likely to contract skin diseases and infections than those whose mothers had not taken herbal medicines during pregnancy, however this is subject to research. Probably the bioactive chemicals like flavonoids, saponins and tannins were responsible for increasing the immunity of the mother and the baby which prevented infections in babies [4].

39 herbs were reported to be of therapeutic importance during pregnancy of which some were cutting across foods and medicines. Some herbs were mentioned to boost appetite, increase blood and reduce constipation.

These include all species under solanaceae family like *Solanum indicum*, *Solanum nigrum* and *Physalis minima*. Fruits of *S. indicum* and *P. minima* are of great importance in providing vitamins and iron. Vitamins are well known for increasing appetite a reason they are included in the diet of man. Those that prevent and treat constipation are usually taken as vegetables for example *S. nigrum* which contains some mineral salts like magnesium, sodium and potassium and fatty acids like linoleic and linolenic acids [27] which are important body nutrients. The phytochemical composition test done indicated that reducing sugars which are soluble carbohydrates were present in all tested herbs and provide energy to living tissues. The scavenging properties of saponins and tannins [4] present in most of the herbs investigated result into increasing the body's immunity which is an indicator of the important nutritional values in these herbs. Other herbs like *Z. officinale* and *C. citratus* are used as spices in tea.

### Conclusion

Commonly used nutri-medicinal herbs used were for the treatment of gastro intestinal disorders which presented the highest use values and informant consensus factor. Medicinal plants in the family of Asteraceae and Lamiaceae were most commonly mentioned for treatment of infections among pregnant. Most of the phytochemicals found in the tested herbs were found to be important in pregnant women. The saponins, tannins, phenols and flavonoids were found to boost immunity, however some of the phytochemicals if taken in excess have some negative effects on pregnancy like the alkaloids which are fetotoxic. Steroids prevent miscarriages as reducing sugars provide energy. Using nutri-medicinal plants with proper administration and dosages could be helpful in treatment of some ailments during pregnancy considering that most phytochemicals present in them are of importance in improving health.

### Recommendation

Future studies could carry out nutritional studies on these nutri-medicinal herbs and more controlled trials need to be carried out to test for the efficacy of these nutri-medicinal plants to the mother and the fetus, while testing the dosage so that complications associated with using excess herbs could be avoided. There is need for the pharmaceutical industry to process herbal medicines, concentrate them and prescribe appropriate dosages for safe use by the pregnant women. There is need to conserve these medicinal plants especially those that are growing wildly to avoid extinction due to high usage and increased human activities which affect wild habitats.

### Limitations of the Study

This was limited to obtaining respondents conveniently since it was done during the time of weeding, most of them were out in the morning hours. But this was overcome later when afternoons were programmed for the interview sessions though this prolonged the time frame in which data collection was supposed to be done. Some respondents in the focus group discussions were not free to share openly their views thus leaving the discussion for the few who dominated throughout. At times the TBAs did not feel like sharing the information deeply especially about the uses of particular herbs. But this was overcome through the rapport that was created over time in the course of the study.

### Ethical Considerations

Ethical procedures were followed. All the participants were presented with informed consent forms which were explained to them signed and then days for interviews were set. Privacy and confidentiality was assured to the participants by assigning identification numbers throughout the study.

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## Conflicts of Interest

Authors have declared that no conflicts of interest exist.

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