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Ethnobotanical Studies on the Use of Medicinal Plants among Forest Fringe Communities around the Kasewe Forest in Moyamba District, Southern Sierra Leone

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Abstract

Forests are home to many flora and fauna species. Forest flora have been very important to man and sustainability of forest ecosystem. Forest flora provides provisional, regulatory, protective and cultural services. These services have been the foundation of civilization and development. Local communities depend on these natural resources for livelihood generation and cultural services. Local communities have been using medicinal plants to cure different ailments. In this study, an ethnobotanical survey was conducted to document medicinal plants diversity and use in forest fringe communities. The study adopted a method used by Martin in 1995 on Ethnobotanical reviews of medicinal plants. Ethnobotanical information was gathered through structured questionnaires administered to 57 inhabitants constituting key informants, community leaders, and household heads who are believed to have vast indigenous knowledge of medicinal plants. The snowball technique was used to identify respondents in communities around the Kasewe forest. For the diversity of medicinal plants use and associated indigenous knowledge, a plot of size 25 m × 25 m was demarcated with a linear tape and ranging poles in the different habitat types in the study area. Sampling was stratified based on the size of habitat types. A total of 10 sample plots comprising of 4 plots in the closed forest; 3 plots in disturbed areas, 2 plots in farmland, and 1 plot in the grassland were studied. A total of 3377 individual plant stems were docu-

mented comprising of 84 individual species belonging to 53 families and 78 genera. Of the 84 individual plant species, 42 were medicinal. The most dominant family was Malvaceae. Tree species were the most dominant life form representing 32.14% followed by shrubs 30.5, herbs 26.8% and climbers 10%. Majority of the plant species are of little conservation concern and few have been categorized as endangered and vulnerable that need special conservation attention. Species with the highest density was *Chromolaena odorata* 110 m^2, while Xylopia *quintais* 0.1 m^2 had the least density per hector. The Shannon-wiener index recorded 1.236 as the highest in plot 3 while plot 10 in the grassland was considered as the lowest with 0.757. The finding revealed that 92.98% of respondents around the Kasewe forest in the Moyamba district used medicinal plants to treat therapeutic ailments. At the same time, a very limited proportion depends on other medication sources to treat therapeutic ailments. 98.25% of the respondents, mostly older people, know medicinal plants to treat therapeutic ailments. All parts of the plant were indicated to be used for treatment of different ailments. However, the root (43.8%), bark (36.8%) and leaves (35%) are the most common plant parts used to treat different therapeutic ailments. 96.49% of the respondents have knowledge on administering prepared herbal medicine.

Keywords

Ethnobotanical, Medicinal Plants, Forest Fringe Community

1. Introduction

Medicinal Plants in Sierra Leone and other parts of the world play viable role in maintaining biodiversity and healthy ecosystems and livelihood of inhabitants of forest-fringe communities. Medicinal Plants offer range of ecosystem services and economic benefits, including provisioning, regulating, aesthetic, and spiritual values [1]. Medicinal plants in the forest ecosystem of Sierra Leone are beneficial to local people for a diverse range of benefits. They serve as a source of therapeutic ailments across all cultures, traditions, and spiritual rites of all the ethnic groups in the country, with specificity to the Sande and Poro societies widely practiced by the mendes, kissi and other ethnic groups in the country [2]. The use of plants as medicines is not only peculiar to Sierra Leone but represents, by far, the most significant human use of the natural resources in the world with more than 50,000 species reported to be of medicinal value. Medicinal plants are used by residents of forest fringe communities for livelihood generation, treatment for therapeutic ailment, cultural and spiritual norms [1] [2]. Over the years, medicinal plants have frequently been the primary source of drugs for preventing and treating different kind of diseases among local people and manufacturing conventional drugs use by modern health centers [2]. The use of plants as medicines to treat illness among rural people has a long history. Several plant

species in Sierra Leone are of medicinal value to the citizens in the country, especially at the Kasewe forest. [1] investigated that medicinal plants such as *Garcinal kola*, *Nauclea Diderrichii*, *Ceiba Pantandra*, *Ipomoea Involculture* are used by the inhabitants of forest fringe communities and traditional herbalist for allopathic medicine for the treatment of common sickness. Findings from [3] also noted that medicinal Plant has been a regular source of substances for treating various diseases, especially in rural areas. Many studies [1] [2] [3] [4] have also discovered and documented more than 200 medicinal plant species used to cure more than 100 diseases and illnesses in Sierra Leone.

According to [5], 85% of the medicine used for primary healthcare is derived from plants, which indicates that the chemical and genetic constituents of these plants are increasingly explored by pharmaceutical companies for profit and human benefit. Worldwide, there is an increasing interest in medicinal plants' use due to the growing public awareness of medicinal plants pharmacologically active compounds. In Canada, about 70% of the population used medicinal plants as therapeutic aliments for the citizens [6]. Another finding in England indicated that 47% of the population used medicinal plant for disease treatments [7].

The Kasewe forest is a storehouse of precious medicinal plants and other species that are economically viable. The Kasewe Forest is one of the single most essential storehouses of terrestrial biological diversity in Sierra Leone. Inhabitants around the Kasewe forest highly depend on the natural ecosystem and resources for livelihood generation, such as traditional herbal medicine for the treatment of both human and livestock diseases and source of protein from wildlife [1] [2]. More recently, [8] broadly defined ethnobotanical as human evaluation and manipulation of plant materials, substances, and phenomena in societies, and [9], related it as the study of how people make use of plants. However, [3] described ethnobotany as the entire realm of the beneficial relationship between Plant and man. These definitions emphasize a connection between people of a given community or society, the environment, and the plant diversity in that particular community. The importance of indigenous knowledge is overwhelming. [10] valued it as the sum of the experience that forms the basis for decision making for familiar and unfamiliar problems and challenges in a local community. [11] indigenous knowledge represents an immense valuable database that provides mankind with an insight into how numerous forest fringe communities have interacted with the changing environment, providing local solutions for local problems and suitable ways for coping with challenges posed by specific conditions. They provide a wide range of amenities to people residing around the forest and more beneficial to forest fringe communities. Medicinal plants play a vital role in supporting human primary health care to forest fringe communities proximate to a forested region globally, especially developing countries like Sierra Leone where the country is still struggling to improve its health care system for rural people. Medicinal plants in a forest ecosystem and woody flora help support many other organisms and have created the ambience for multifa-

ceted mechanisms to maintain high levels of genetic and biological diversity in a forest ecosystem and promote livelihood sustenance for rural people. Like in the Himalayas, medicinal plants are harvested in large magnitudes in some regions by large amounts of people, for whom this action of collecting medicinal Plant from forests provides a considerable share of their income [12]. The livelihood remunerations of medicinal plants trade have been studied in Nepal, where an estimated 323,000 - 470,000 households (2.6 million people) are engaged in collecting wild medicinal plants for sale. The over-dependence on traditional herbal medicine results from unaffordability and lack of modern restorative services around the Kasewe forest reserve [1] [2]. The natural ecosystem and genetic resources are heavily depleted due to increased population, lack of awareness, technical know-how, and poor regulation of herbalists in Sierra Leone. To maintain these communities' ecosystem health, research to quantify medicinal plants diversity and uses is needed. Detailed ethnobotanical information on medicinal plants in the Kasewe forest is also needed, as noted by [1] [2]. Due to the aforementioned challenges and inaccessibility of contemporary health facilities, especially in Sierra Leone, and most people are still forced to use medicinal plants for their common day ailments, there is a high need to document traditional knowledge and uses of Plant for posterity. It was from this backdrop this research was conducted to determine local people's interactions with medicinal plants and document current medicinal in the Kasewe Forest Community from this background. Therefore, the study aimed to assess medicinal plant species used to manage human ailments and indigenous knowledge.

2. Materials and Methods

2.1. Description of Study Area

Kasewe forest is located in hills along the Freetown-Bo highway in the Moyamba District, south of Sierra Leone. It was designated as a forest reserve in 1914 and contains semi-deciduous and evergreen forests covering 1224 km^2 (2306.8 ha). It is made up of volcanic rocks, and the hills stand about 500 m above the country's interior plains [13]. The study area is gradually deforested with some open patches due to anthropogenic activities carried out by inhabitants of these communities for livelihood sustenance (**Figure 1**).

2.2. Data Collection Technique

The data used were primary and secondary. Secondary data were obtained from related internet journal sources. The study adopted a method used by [14] on Ethnobotanical reviews of medicinal plants. The primary data was collected using survey and field measurements. Structured questionnaires were administered to selected categories of people who are believed to have vast indigenous knowledge of medicinal plants. The snowball technique was used to identify respondents in communities around the Kasewe forest. Questionnaires were asked on demographic, kind of Plant used, part and ailment treated.

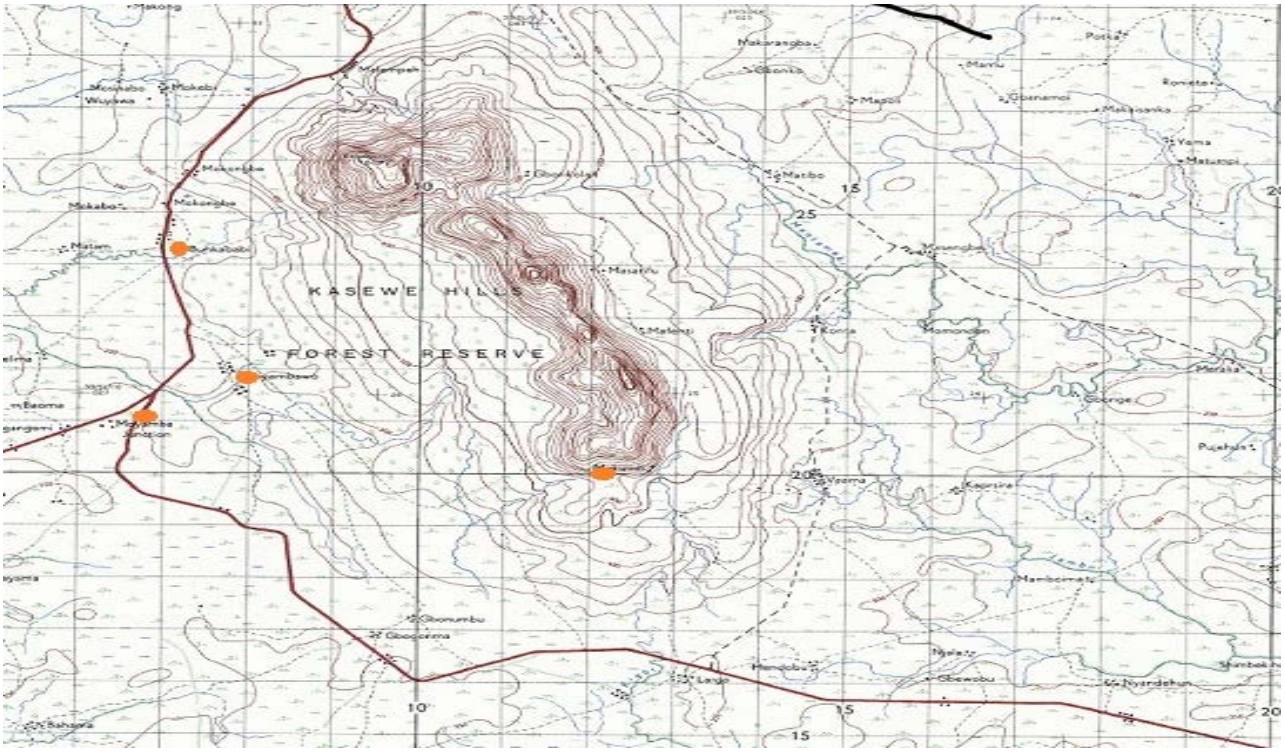

Figure 1. Map of the study area.

2.3. Plant Diversity Studies on Medicinal Plants

A Sample plot of size 25 m × 25 m was demarcated with a linear tape and ranging poles in the different habitat types in the study area. Sampling was stratified based on the size of habitat types. A total of 10 sample plots were created during the plant diversity studies at the Kasewe forest reserve (4 plots in the closed forest; 3 plots in disturbed areas, 2 plots in farmland around the Kasewe forest; and 1 plot in the grassland). All plants, including trees, shrubs, climbers, and herbs, were identified within each plot. Plant identification was achieved in the field with the assistance of an experienced taxonomist, two forest guards and six persons were selected from the forest fringe communities and reserve for the identification of medicinal plants. Species that were difficult to identify in the field were compared with already identified specimens at the herbarium to confirm the field plant identification.

2.4. Sampling Technique

Respondents were sampled randomly from six forest fringe communities around the Kasewe forest reserve. A total of 57 well-informed respondents, including herbalists, community leaders, and household heads, were interviewed. The sampling technique was gender-sensitive, and both genders participated in the study (Table 1).

2.5. Data Analysis

Data from ethnobotanical studies of medicinal plant species were analyzed using

Table 1. Number of communities around the Kasewe forest interviewed.

No	Community Name	Number of Persons Interviewed
1	Bongorla	10
2	Bonkababay	14
3	Koilu Moyambawo	9
4	Vaama Kasewe	9
5	Moyambawo	8
6	Mor sheriff	7
Total		**57**

Microsoft Excel, and the results obtained were presented in graphs, pie charts, and tabular forms as appropriate.

2.5.1. Calculation of Ecological Indices of Plant Species

Density, relative density, frequency, percentage frequency, relative frequency, and species diversity were calculated using the formulae given below by [15]:

1) $\text{Density} = \dfrac{\text{Total Number of individuals of a plant species in all sampled plots}}{\text{Total number of sampled plots}}$

2) $\text{Relative density of a species A}(\%) = \dfrac{\text{Total Number of individual of Species}}{\text{Total number of individuals of all species}} \times 100$

3) $\text{Frequency of a species} = \dfrac{\text{Number of quadrats sampled in which a species occurred}}{\text{Total number of quadrats sampled}}$

4) $\text{Relative frequency of species A} = \dfrac{\text{Number of the frequency of species}}{\text{The total frequency of all species}} \times 100$

5) $\text{Frequency}(\%) = \dfrac{\text{number of quadrants in which a species occurred}}{\text{Total number of quadrats sampled}} \times 100$

2.5.2. Species Distribution Patterns

The distribution of individuals of a population may be one of three patterns: random, uniform, and aggregate [10]. According to [16], individuals are randomly distributed when the variance mean ratio is 1 but aggregated when the ratio is greater than 1. On the other hand, when the ratio is less than 1, individuals are uniform. The distribution patterns of the species sampled within the study sites were classified into mainly random and aggregated patterns, and the analysis was conducted using Biodiversity pro.

2.5.3. Species Diversity

A diversity index is the measure of species diversity in a given community. Diversity was measured by recording the species' number (species richness) and their relative abundance in the different plots.

2.5.4. Shannon Diversity Index

Shannon-Weaver diversity index (H') is a commonly used diversity index that considers both the abundance and evenness of species present in the community. It is explained by the formula below [17]. The species diversity and richness of the forest were calculated using Simpson's and Shannon Wiener's diversity index. Shannon Wiener diversity index is given as:

$$\text{Shannon Index}\left(H\right) = -\sum_{i=1}^{s} p_i \ln p_i$$

The Shannon index is an information statistic index, which means it assumes all species are represented in a sample and randomly sampled. In the Shannon index, p is the proportion (n/N) of individuals of one particular species found (n) divided by the total number of individuals found (N), ln is the natural log, Σ is the sum of the calculations, and s is the number of species.

3. Results and Discussions

3.1. Social Demographic Information of Respondents

Fifty-seven (57) respondents were interviewed in six communities around the Kasewe forest in Moyamba district. Most of the respondents were above 50 representing 38.56%. This finding indicates that elderly people have more knowledge on medicinal plants than the younger generation. Similar finding was reported [18] where he found that majority of traditional knowledge and ethnobotanical information can be retrieved from the elderly population who are engaged into medicinal use. This implies that, the passing away of these elderly practitioners connotes the loss of this precious traditional knowledge particularly in cases where such wealth of knowledge has not been passed on to other younger generations. [19] also found that older people knew more about medicinal uses for native plants than younger people, but there was no difference in knowledge levels about non-native plants. Females constituted the majority (54%) of the people interviewed. Women around the Kasewe Forest are more involved in the use of medicinal plants as compared to men. Other studies have also accentuated that female are more involve in using medicinal plants for the treatment of different therapeutic ailments especially in rural areas [20] [21]. [20] reported that "women" in Katsina State, Nigeria have been using medicinal plants to cure various ailments associated with maternal health since time immemorial. This finding may help support women involvement in medicinal plants and the idea that medicinal plant knowledge increases over time.

3.2. Floristic Composition of Species

The total number of individual Plant stems counted was 3377, comprising 84 unique species from different vegetative zones comprising 52 families belonging to 78 genera. Out of these 81 unique species, 42 species were classified as medicinal plants and used by inhabitants of the forest fringe communities around the Kasewe forest in Sierra Leone. These species were classified to treat different therapeutic ailments and are listed in (**Table 2**). The life forms of composition

Table 2. Plants encountered in the Kasewe forest.

Scientific name	Family Name	Life Form	Conservation status
Adenia lobata	Passiforaceae	Climber	Unknown
Aframomum spp	Zingiberaceae	Herb	Unknown
Allium ascalonicum	Amaryllidaceae	Herb	Unknown
Alchornea cordifolia	Euphorbiaceae	Shrub	Least concern
Albizia zygia	Leguminosaceae	Tree	Not Threatened
Anisophyllea laurina	Rhizophoracea	Tree	Unknown
Ananas Cosmosus	Bromeliaceae	Herb	Unknown
Beilschmiedia Mannii	Lauracea	Shrub	Unknown
Capsicum annuum	Solanacea	Herb	Least concern
Cassia siberrianna	Fabaceae	Shrub	Least concern
Caraca papaya	Meliaceae	Tree	Least concern
Carapa Procera	Meliaceae	Tree	Least concern
Cercestis afzelii	Araceae	Climber	Unknown
Ceiba Pantandra	Bombacaceae	Tree	Least concern
Chlorophoro regia	Moraceae	Tree	Unknown
Chromolaena Odorata	Asteraceae	Herb	Unknown
Citrus aurantifolia	Rutaceae	Tree	Unknown
Clerodendron scandens	Verbenaceae	Climber	Unknown
Costus afer	Zingiberaceae	Herb	Unknown
Corchorous olitorius	Malvaceae	Herb	Unknown
Desmodium adscendens	Papilionaceae	Herb	Least concern
Dialium guineense	Fabaceae	Tree	Unknown
Diodia scandens	Rubiaceae	Herb	Unknown
Diospyros heudelotii	Ebenacea	Shrub	Unknown
Fiscus exasperata	Moracea	Shrub	Unknown
Garcinia Kola	Clusiacea	Tree	Vulnerable
Gmelina Arborea	Verbenaceae	Tree	Least concern
Gosspium spp.	Malvacea	Herb	Unknown
Guibourtia Copalifera	Fabaceae	Tree	Unknown
Harungana madagascariensis	Hypericaceae	Shrub	Least concern
Hibiscus esculentus	Malvaceae	Herb	Unknown
Hibiscus physaloides	Malvaceae	Shrub	Unknown
Hippocratea Iotricha	Celastracea	Climber	Unknown

Continued

Hymenocardia Acida	Euphorbiaceae	Shrub	Least concern
Impoea involucrate	Convolvulaceae	Herb	Unknown
Lantana camara	Verbenaceae	Herb	Unknown
Lannea	Anacardiacea	Tree	Least concern
Mareya Micrantha	Euphorbiaceae	Shrub	Least concern
Mangifera indica	Anacardiaceae	Tree	Data Deficient
Manihot esculenta	Euphorbiaceae	Herb	Data Deficient
Mimosa pudica	Fabaceae	Herb	Least concern
Morinda germinata	Rubiaceae	Shrub	Unknown
Musanga cecropiodes	Moraceae	Tree	Unknown
Musa paradisiaca	Musaceae	Tree	Unknown
Musa sapientum	Musaceae	Tree	Unknown
Nesogordnia papaverifera	Malvacea	Tree	Vulnerable
Newboudia laevis	Bignoniaceae	Shrub	Unknown
Nuclea diderrichii	Rubiaceae	Shrub	Unknown
Nuclea latifolia	Rubiaceae	Shrub	Unknown
Ochthocosmus africnas	Ixonanthaceae	Shrub	Unknown
Ocimum viride	Labiatae	Herb	Unknown
Ouratea flava	Ochnacea	Tree	Unknown
Oryza sativa	Gramineae	Herb	Least concern
Panicum afzelli	Gramineae	Herb	Unknown
Parinari excelsa	Chrysobalanaceae	Tree	Least concern
Paullinia pinnata	Sapindaceae	Climber	Unknown
Pennisetum purpureum	Malvaceae	Herb	Least concern
Phyllantus discoideus	Euphorbiaceae	Shrub	Unknown
Phoenix reclinta	Araceaae	Climber	Unknown
Picralima elliotti	Apocynacea	Tree	Unknown
Piptadeniastrum africanum	Fabaceae	Tree	Unknown
Placodiscus Splendidus	Spindaceae	Tree	Unknown
Psidium guajava	Myrtaceae	Shrub	Unknown
Tabernacmontana crassa	Apocynacea	Shrub	Unknown
Terminalia superba	Combretaceae	Tree	Least concern
Tetracera potatoria	Dilleniaceae	Climber	Unknown
Triclisia patens	menispermacea	Climber	Unknown
Trilepis pilosa	Cyperaceae	Herb	Unknown

Continued

Santira trimera	Burseraceae	Shrub	Unknown
Scleria barteri	Cyperaceae	Herb	Unknown
Spondias mombin	Anacardiaceae	Tree	Least concern
Sporobolus dinklagei	Gramineae	Unidentified	Unknown
Solanum torvum	Solanaceae	Shrub	Unknown
Sorindeia Juglandifolia	Anacardiaceae	Shrub	Least concern
Sterculia tragacantha	Malvaceae	Shrub	Least concern
Strychnos nuxvomica	Loganiaceae	Herb	Unknown
Urera oblongifolia	Urticaceae	Climber	Unknown
Uvaria Chamae	Annonacea	Shrub	Unknown
Vangueriopsis discolor	Rubiaceae	Shrub	Unknown
Vernonia amygdalina	Compositae	Shrub	Unknown
Vitex cuneata	Lamiaceae	Tree	Unknown
Xylopia aethiopica	Annonaceae	Tree	Least concern
Xylopia acutiflora	Annonaceae	Shrub	Least concern
Xylopia quintais	Annonaceae	Tree	Unknown

plant species form in the different vegetative zone were Tree, Shrub, Herb, and Climber. Tree species were the most dominant life form representing 32.14% followed by shrubs 30.5, herbs 26.8%, and climbers 10%. The species conservation status of the different individual plant species at Kasewe forest was determined by the IUCN list [22], and species conservation status was divided into four groups: unknown species, least concern species, vulnerable species, and data deficient species. Based on the IUCN conservation listing, fifty-seven plant species were rated as unknown at the study namely: *Adenia lobata*, *Cercestis afzelii*, *Chlorophoro regia*, *Dialium guineense*, *Diodia scandens*, *Hibiscus physaloides*, *and Hippocratea Iotricha*, *etc*. *while Alchornea cordifolia*, *Capsicum annuum*, *Cassia siberrianna*, *Parinari excelsa*, *Pennisetum purpureum*, *Xylopia Aethiopica and Xylopia acutiflora*, *etc*. were rated as least concern species. In contrast, *Garcinia Kola and Nesogordnia Papaverifera* rated as vulnerable plant species, and *Mangifera indica* and *Manihot esculenta* were also rated as data deficient species in the study area (**Table 2**). The most predominant families, comprising of two or more individual species considered as the same family, were Malvaceae 13.5%, Rubiaceae 9.6%, Fabaceae 9.6%, Euphorbiaceae 9.6%, Anacardiaceae 7.7%, Verbenaceae 5.8%, Meliaceae 5.8%, Annonaceae 5.8%, Zingiberaceae 3.8%, Apocynaceae 3.8%, Araceae 3.8%, Musaceae 3.8% and Cyperaceae 3.8% and thirty-nine families having one species each in the study area including the following: *Beilschmiedia Mannii*, *Ceiba pentandra*, *Desmodium adscendens*, *Impoea involucrate*, *Newboudia Laevis*, *Parinari excelsa* with other families species grouped.

3.3. Density and Spatial Distribution of Species at the Study Area

The density and spatial distrubtion of plant species were determined as presented in Table 3. Species with the highest densities at the study area were *Chromolaena odorata*, 110 m^2, while *Xylopia quintais*, 0.1 m^2, had the least density recorded per hector. *Corchorus olitorius* 6.6 m^2, *Diodia scandens* 6 m^2, *Hymenocardia acida* 5.8 m^2, *Lantana camara* 5.5 m^2, *Manihot esculenta* 5 m^2, *Mimosa paudica* 5 m^2, *Sterculia tragacantha* 5.6 m^2, *Nesorgordnia papaverifera* 4.5 m^2, and *Vernonia amygdalina* 4.4 m^2 per hector were the common species found in the study area. The spatial distribution of plant species across the closed canopy, disturbed areas, farmland, and grassland revealed that 75 plant species were considered to be aggregated and 9 different individual species were random species within the study area, as shown in Table 3.

3.4. Diversity of Species

Shannon-Wiener index (H) was used to determine the plant diversity in the different vegetative zones studied as shown in Table 4. A diversity index is the measure of species diversity in a given community. Diversity indices provide more information than merely the number of species. They serve as valuable tools that enable biologists to quantify diversity in a community and describe its numerical structure [17]. A high value of the Shannon Index (H) would represent a diverse and equally distributed community, and lower values represent a less diverse community. An ecosystem with an H value greater than 2 has been regarded as medium to high species diversity [16] [17]. Considering the Shannon diversity index, the diversity of plant species in each plot never varies greatly although there was a significant difference noted in biodiversity between plots 2, 3, 4 in the closed canopy habitat. Meaning, the plots have common dominance plants from the closed forest canopy to the grassland. However, the diversity of plant species in plot 3, at the closed forest canopy, recorded the highest diversity of 1.236 while plot 10, in the grassland, was considered the lowest with 0.757. The low biological diversity noted in some plots could be explained by the fact of the presence of human activities within the area and the dominance of *Scleria barteri*. Several natural causes such as soil type, rainfall trends, anthropogenic action, land-use change, encroachment, and climate change, and introduction of the invasive pest could also explain the variations in the degree of diversity between the studied plots.

3.5. Ethnobotanical Information

3.5.1. Medicinal Plants Used by Respondents

Medicinal plants mentioned by respondents and identified during the ethnobotanical study are represented in Table 5. 71 medicinal plants were named and documented that are used to treat different therapeutic ailments. Fabaceae and Euphorbiaceae were the predominant families and both representing 18.42% while Rubiaceae 15.78%, Malvaceae 10.52%, and Verbenaceae 7.89%. This research finding supports [23] [24] who reported that most of the medicinal plants

Table 3. Density, frequency, and species aggregation of plants sampled.

Scientific name	Occur	D	Rde	F %	RFr	% F	Category
Aframomum spp	4	0.4	0.118	0.1	0.29	10	Aggregated
Anisophyllea Laurina	19	1.9	0.562	0.4	1.37	4	Aggregated
Alchornea cordifolia	84	8.4	2.487	0.4	6.1	40	Aggregated
Albizia zygia	7	0.7	0.207	0.1	0.5	10	Aggregated
Allium ascalonicum	24	2.4	0.71	0.2	1.74	20	Aggregated
Ananas Cosmosus	21	2.1	0.621	0.2	1.52	20	Aggregated
Adenia lobata	16	1.6	0.473	0.2	1.16	20	Aggregated
Beilschmiedia Mannii	14	1.4	0.414	0.3	1.01	30	Aggregated
Caraca papaya	18	1.8	0.533	0.3	1.3	30	Aggregated
Capsicum annuum	25	2.5	0.74	0.3	1.81	30	Aggregated
Cassia sieberiana	8	0.8	0.236	0.2	0.58	20	Aggregated
Carapa Procera	9	0.9	0.266	0.4	0.65	40	Random
Cercestis Afzelii	2	0.2	0.059	0.2	0.14	20	Random
Ceiba Pentandra	6	0.6	0.177	0.2	0.43	20	Aggregated
Chlorophoro regia	10	1	0.296	0.2	0.72	20	Aggregated
Chromolaena Odorata	1100	110	32.573	0.6	79.88	60	Aggregated
Citrus aurantifolia	5	0.5	0.148	0.1	0.36	10	Aggregated
Clerodendron scandens	9	0.9	0.266	0.1	0.65	10	Aggregated
Costus afer	14	1.4	0.414	0.2	1.01	20	Aggregated
Corchorous olitorius	66	6.6	1.954	0.3	4.79	30	Aggregated
Desmodium adscendens	10	1	0.296	0.1	0.72	10	Aggregated
Dialium guineense	7	0.7	0.207	0.2	0.5	20	Aggregated
Diodia scandens	60	6	1.776	0.2	4.35	20	Aggregated
Diospyros heudelotii	11	1.1	0.325	0.3	0.79	30	Aggregated
Fiscus exasperata	4	0.4	0.118	0.1	0.29	10	Aggregated
Garcinia kola	5	0.5	0.148	0.4	0.36	40	Random
Gmelina Arborea	37	3.7	1.095	0.3	2.68	30	Aggregated
Gosspium spp.	2	0.2	0.059	0.1	0.14	10	Random
Guibourtia copalifera	122	12.2	3.612	0.6	8.85	60	Aggregated
Harungana madagascariensis	14	1.4	0.8	0.414	0.2	1.01	Aggregated
Hibiscus esculentus	21	2.1	0.621	0.5	1.52	50	Aggregated
Hibiscus physaloides	8	0.8	0.236	0.2	0.58	20	Aggregated
Hippocratea iotricha	7	0.7	0.207	0.3	0.5	30	Random

Continued

Hymenocardia acida	58	5.8	1.717	0.2	4.21	20	Aggregated
Lantana camara	55	5.5	1.628	0.1	3.99	10	Aggregated
Lannea	11	1.1	0.325	0.4	0.79	40	Aggregated
Mareya micrantha	6	0.6	0.177	0.3	0.43	30	Random
Mangifera indica	5	0.5	0.148	0.3	0.36	30	Random
Manihot esculenta	50	5	1.48	0.3	3.63	30	Aggregated
Mimosa pudica	50	5	1.48	0.2	3.63	20	Aggregated
Morinda germinata	8	0.8	0.236	0.2	0.58	20	Aggregated
Musanga cecropiodes	10	1	0.296	0.1	0.72	10	Aggregated
Musa paradisiaca	4	0.4	0.118	0.3	0.29	30	Random
Musa sapientum	6	0.6	0.177	0.2	0.43	20	Aggregated
Nesogordnia papaverifera	45	4.5	1.332	0.2	3.26	20	Aggregated
Newboudia laevis	16	1.6	0.473	0.2	1.16	20	Aggregated
Nuclea diderrichii	27	2.7	0.799	0.3	1.96	30	Aggregated
Nuclea latifolia	131	13.1	3.879	0.5	9.51	50	Aggregated
Ochthocosmus africnas	19	1.9	0.562	0.3	1.37	30	Aggregated
Ocimum viride	5	0.5	0.148	0.1	0.36	10	Aggregated
Ouratea flava	99	9.9	2.931	0.5	7.18	50	Aggregated
Oryza sativa	100	10	2.961	0.2	7.26	20	Aggregated
Oxyanthus tenuis	20	2	0.592	0.2	1.45	20	Aggregated
Panicum afzelli	22	2.2	0.651	0.2	1.59	20	Aggregated
Parinari excelsa	10	1	0.296	0.2	0.72	20	Aggregated
Paullinia pinnata	3	0.3	0.088	0.2	0.21	20	Random
Pennisetum purpureum	2	0.2	0.059	0.1	0.14	10	Random
Phyllantus discideus	12	1.2	0.355	0.2	0.87	20	Aggregated
Phoenix reclinta	3	0.3	0.088	0.1	0.21	10	Aggregated
Picralima elliotti	13	1.3	0.384	0.2	0.94	20	Aggregated
Piptadeniastrum africanum	11	1.1	0.325	0.2	0.79	20	Aggregated
Placodiscus Splendidus	3	0.3	0.088	0.1	0.21	10	Aggregated
Psidium guajava	4	0.4	0.118	0.2	0.29	20	Random
Tabernacmontana crassa	32	3.2	0.947	0.4	2.32	40	Aggregated
Terminalia superba	8	0.8	0.236	0.2	0.58	20	Aggregated
Tetracera potatoria	11	1.1	0.325	0.1	0.79	10	Aggregated
Triclisia patens	19	1.9	0.562	0.3	1.37	30	Aggregated
Trilepis pilosa	10	1	0.296	0.1	0.72	10	Aggregated

Continued

Santira trimera	7	0.7	0.207	0.1	0.5	10	Aggregated
Scleria barteri	430	43	12.735	0.4	31.22	40	Aggregated
Spondias mombin	14	1.4	0.4141	0.2	1.01	20	Aggregated
Sporobolus dinklagei	11	1.1	0.325	0.1	0.79	10	Aggregated
Solanum torvum	20	2	0.592	0.1	1.45	10	Aggregated
Sorindeia Juglandifolia	16	1.6	0.473	0.3	1.16	30	Aggregated
Sterculia tragacantha	56	5.6	1.658	0.2	4.06	20	Aggregated
Strychnos nuxvomica	14	1.4	0.414	0.3	1.01	30	Aggregated
Urera oblongifolia	20	2	0.592	0.1	1.45	10	Aggregated
Uvaria Chamae	14	1.4	0.414	0.2	1.01	20	Aggregated
Vangueriopsis discolor	34	3.4	1.006	0.3	2.46	30	Aggregated
Vernonia amygdalina	44	4.4	1.302	0.3	3.19	30	Aggregated
Vitex cuneata	15	1.5	0.444	0.2	1.08	20	Aggregated
Xylopia Aethiopica	4	0.4	0.118	0.2	0.29	20	Aggregated
Xylopia acutiflora	2	0.2	0.059	0.1	0.14	10	Random
Xylopia quintais	1	0.1	0.029	0.1	0.07	10	Random

D (density), Rde (relative density), F (frequency), % Rf (relative frequency), % F (frequency %).

Table 4. Diversity values by index.

Plots	Shannon H
1	0.791
2	1.036
3	1.236
4	1.142
5	0.795
6	0.79
7	0.876
8	1.136
9	0.913
10	0.757

Table 5. Medicinal plants harvested and used by respondents from the communities.

Local Names	Scientific names	Family names
nGobei	*Abrus precatorius*	Fabaceae
Aligeta pepe	*Aframomum melegueta*	Zingiberaceae

Continued

nJekoi	*Alchornea cordifolia*	Euphorbiaceae
Garlic	*Allium sativum*	Alliaceae
Kandie	*Anisophyllea laurina*	Rhizophoracea
Pineaple	*Ananas comosus*	Bromeliaceae
Bush-ataya	*Aspalathus linearis*	Linearis
Gbengba	*Cassia siberrianna*	Fabaceae
Sekou-Toure	*Cassia siamea*	Leguminosae
Mbelei	*Canarium schweinfurthii*	Burseraceae
Pawpaw	*Caraca papaya*	Meliaceae
Tambei	*Calamus deeratus*	Arecaceae
nGuwei	*Ceiba pantandra*	Bombacaceae
Lem	*Citrus aurantifolia*	Rutaceae
Hona-Wuli	*Clerodendron scandens*	Verbenaceae
Nyele	*Craterispermum laurinum*	Rubiaceae
Kola	*Cola nitida*	Sterculiaceae
Lemon grass	*Cybopogen citratus*	Gramineae
Kolei	*Detarium senegalense*	Fabaceae
Am-pentakeli	*Dichrostachy glomerata*	Chailletiaceae
nGogbei	*Erythrophleum invorense*	Fabaceae
So-Wuli	*Fagana macrophylla*	Ruaceae
Kamaama	*Fiscus exasperata*	Moracea
Bitter-kola	*Garcina kola*	Clusiacea
Yamami	*Gmeline arborea*	Verbenaceae
Sawawa	*Gouania longipetala*	Rhamnaceae
Koboi	*Guibourtia copallifera*	Fabaceae
Blood Tick	*Harungana madagascariens*	Hypericaceae
Gonellevei	*Hibiscus physaloide*	Malvaceae
Korwei	*Hibiscus sterculifolius*	Malvaceae
Okara	*Hibiscus esculentus*	Malvaceae
Kagbalkantha	*Hymencardia lyrate*	Euphorbiaceae
nDondonqui	*Impoea involucrata*	Convolvulaceae
Telei	*Imerata cylindrica*	Gramineae
Cassava leaf	*Manihot esculenta*	Euphorbiaceae
Mangoi	*Mangifera indica*	Anacardiaceae

Continued

Badobrup	*Mezoneurum benthamianum*	Leguminosae
Tolugbele	*Milletia rhodantha*	Fabaceae
Sensitive/Gba-Gbema	*Mimosa pudica*	Fabaceae
Moringa	*Moringa oleifera*	Moringaceae
nJasui	*Morinda germinata*	Rubiaceae
Banana	*Musa sapientum*	Musaceae
Ka-fen fen/nGolo-Hema	*Napoleona heudelotii*	Lecythidacea
Kojaagei	*Nesogordinia papaverifera*	Malvacea
Pomamgbei	*Newbouldia laevis*	Bignoniaceae
Bundui	*Nuclea diderrichii*	Rubiaceae
Yumbuyambei	*Nuclea latifolia*	Rubiaceae
Rice	*Oryza sativa*	Gramineae
Tombei	*Oxyanthus tenuis*	Rubiaceae
Am-fent	*Paullina pinnata*	Sapindaceae
nDawei	*Parinari excelsa*	Chrysobalanaceae
Tijo	*Phyllanthus discoideus*	Euphorbiaceae
Kamajovondo	*Premna hispidia*	Verbenaceae
Gogboi	*Protemeagabaria stapfiana*	Euphorbiaceae
Guava	*Psidium guajava*	Myrtaceae
Gbolei	*Ricinodendron heudelotii*	Euphorbiaceae
Pondolivai	*Scaparia dulcis*	Plantaginaceae
Dengbe-wuli	*Scytopetalum tieghemii*	Scytopetalaceae
Mandei	*Sesamum indicum*	Pedaliaceae
Gobji	*Spondais mombin*	Anacardiaceae
nDopanei	*Tetracera potatoria*	Dilleniaceae
Nenii	*Thaumatococcus daniellii*	Marantaceae
Foklobe	*Triclisia paten*	Cyperaceae
An-thombo	*Urera oblongitofolia*	Urticaceae
Negbojei	*Uvaria chamae*	Annonacea
Totengi	*Vengueriopsis discolor*	Rubiaceae
Kokoei/coco-yam	*Xanthosoma sagitifolium*	Arecaceae
am-pos/Huwei	*Xylopia aethiopica*	Annonaceae
Ginger	*Zingiber officinale*	Zingiberaceae

that were identified by the respondents belong to the Fabaceae (22.52%). During the ethnobotanical studies, the respondents' predominately use shrubs representing 38.8%, followed by trees with 30.55%, while other life forms were herbs representing 16% and 11% for climbers. These plant parts are used used to treat many therapeutic ailments among the inhabitants of forest fringe communities around the Kasewe forest.

3.5.2. Sources of Medicinal Plants

A very high proportion of residents harvest plants from the Kasewe Forest as shown in **Figure 2**. The finding revealed that about 73.68% noted that they harvest plants from the primary forest for use as medicine. In comparison, secondary forest is 12.28% and 10.53% harvest plants from their respective farm closer to their communities and 1.75% from their garden. The findings from this research conforms with [25] that majority of species of medicinal plants use by forest fringe communities around the world are harvested in the wild rather than cultivated by the inhabitants. However, [8] reported that medicinal plants were collected from farmland converted from forest to cropland.

3.5.3. Distance Covered

The distance covered by respondents' in harvesting traditional medicine is presented in **Figure 3**. The majority of the respondents covered 10 - 20 km to harvest medicinal plants from different habitats while some communities are just a few

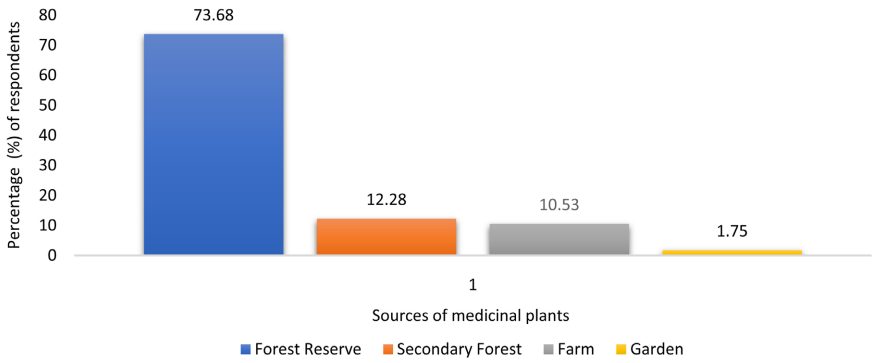

Figure 2. Sources of medicinal plants use.

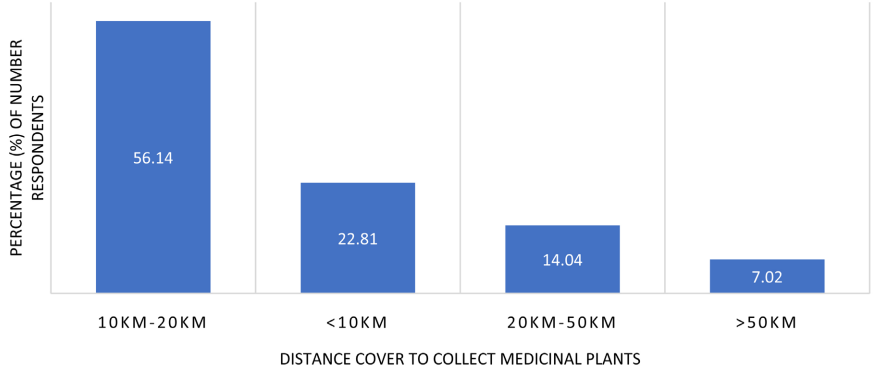

Figure 3. Distance covered to harvest medicinal plants.

kilometers away from the forest. An implication of these findings is that the inhabitants could easily access medicinal plants because they reside around the forest. The easy accessibility to medicinal plants can promote intense use and consequently unsustainable harvesting with the possibility of overexploitation.

3.5.4. Reasons Why People Used Medicinal Plants to Treat Therapeutic Ailments

This study revealed that respondents used medicinal plants over modern drugs to treat therapeutic sicknesses due to numerous challenges faced in acquiring modern drugs. The lack of financial resources to purchase conventional medicine, distance of health centers, the causes of the ailments and efficacy of conventional medicine were the most reasons cited for the reliance on medicinal plants. Of views, lack of financial resources, about 50.88%, was the highest while 17.54% of the respondents reported the long-distance covered to nearby health centers for treatment, and 12.28% of respondents said due to slow efficacy of conventional medicine. The finding of this study area is analogous to the view of [26] [27], that diverse cultures around the world describe the motives of using medicinal plants for the treatment of different therapeutic ailments among inhabitants of rural communities in different ways and perceptions, and also that ailment is caused by the wickedness of necromancers, wizards. Forest fringe communities around the Kasewe forest in the southern part of Sierra Leone are in remote areas that are cut off in terms of infrastructure with one health center with low economy activities. Most of inhabitants can't afford to buy conventional medicine because they are heavily involved in subsistence farming and burning of charcoal for livelihood; therefore, they instead used medicinal plants to treat their children, relatives, and friends, because nurses at the hospital prescribed drugs for them to purchase at different dispensaries centers where the hospital is situated.

3.5.5. Medicinal Plants Used by Respondents

Medicinal plants mentioned by respondents and identified during the ethnobotanical study on forest fringe communities around the Kasewe forest in Moyamba district are represented in **Table 6**. Out of the total eighth three (84) plant's species enumerated in the Kasewe, thirty-six (36) medicinal plants species mentioned by the respondents by inhabitants of forest fringe communities proximate to Kasewe forest were enumerated during the plant diversity at the Kasewe forest representing 43.3% the plant species documented at Kasewe forest. The species validified by respondents during the ethnobotanical studies predominately to be shrubs representing 38.8% followed by trees with 30.55% while other life forms were herbs representing 16% and 11% for climbers. These medicinal plants ascribed by the respondents during the ethnobotanical studies are respectively used to treat many therapeutic ailments among the inhabitants of forest fringe communities around the Kasewe forest. Majority of the respondents reported that medicinal plants collected from the forest are used for the treatment of

Table 6. Medicinal use by communities around the kasewe forest reserve in the southeren part of Sierra Leone.

Local Names	Scientific names	Family names	Therapeutic ailments
nGobei	Abrus precatorius	Fabaceae	infertality,
Aligeta pepe	Aframomum melegueta	Zingiberaceae	back pain,
nJekoi	Alchornea cordifolia	Malvacea	headache, eye problem, gonorrhea, dysentry, diarrhoea, Ulcer
Garlic	Allium sativum	Alliaceae	Impotency, Ulcer
Kandie	Anisophyllea laurina	Rhizophoracea	Eye Problem, Dysentry
Pineaple	Ananas comosus	Bromeliaceae	Malaria, Fever
Bush-ataya	Aspalathus linearis	Linearis	Impotency, Fever
Gbengba	Cassia siberrianna	Fabaceae	stomach pain, fever, malaria, back pain, diarrhoea
Sekou-Toure	Cassia siamea	Leguminosae	Headache, Fever, Headache
Mbelei	Canarium schweinfurthii	Burseraceae	Pile, Dysentry
Pawpaw	Caraca papaya	Meliaceae	Fever, Dysentry, Diarrhea, Malaria
Tambei	Calamus deeratus	Arecaceae	Cough, Menstrual Pain
nGuwei	Ceiba pantandra	Bombacaceae	Cough, Stomach pain
Lem	Citrus aurantifolia	Rutaceae	Cold, Fever, Diarrhoea, Fatigue
Hona-Wuli	Clerodendron seandens	Verbenaceae	Ulcer, Menstrual Pain
Nyele	Craterispermum laurinum	Rubiaceae	Cough, Stomach pain, Malaria
Kola	Cola nitida	Sterculiaceae	Headache, Fever, Dysentry, Diarrhoea
Lemon grass	Cybopogen citratus	Gramineae	Cough, Malaria, Fever, Fatigue
Kolei	Detarium senegalense	Fabaceae	Cough
Am-pentakeli	Dichrostachy glomerata	Chailletiaceae	Pile
nGogbei	Erythrophleum invorense	Fabaceae	Cough
So-Wuli	Fagana macrophylla	Ruaceae	Ulcer
Kamaama	Fiscus exasperata	Moracea	Infertality, Eye problem
Bitter-kola	Garcina Kola	Clusiacea	Fever, Dysentry, Diarrhea, Impotency, Malaria, Headache, Back Pain
Yamami	Gmeline arborea	Verbenaceae	Malaria, Cough, Ulcer, Fever, Headche
Sawawa	Gouania longipetala	Rhamnaceae	Menstrual Pain,
Koboi	Guibourtia copallifera	Fabaceae	Cough, Headache
Blood Tick	Harungana madagascariens	Hypericaceae	dysentery, infertality
Gonellevei	Hibiscus physaloide	Malvaceae	Malaria, Fever
Korwei	Hibiscus sterculifolius	Malvaceae	Pile
Okara	Hibiscus esculentus	Malvaceae	Ulcer

Continued

Kagbalkantha	Hymencardia lyrate	Euphorbiaceae	Dysentry
nDondonqui	Impoea involucrata	Convolvulaceae	Cough, Malaria, Fever, Stomach Pain, Headache, Back Pain, Impotency
Telei	Imerata cylindrica	Gramineae	Dysentrary,
Cassava leaf	Manihot esculenta	Euphorbiaceae	Diarrhoea, Dysentary, Eye Problem, Wound
Mangoi	Mangifera indica	Anacardiaceae	diarrhoea, fever,
Badobrup	Mezoneurum benthamianum	Leguminosae	Stomach Pain, Ulcer, Fatigue
Tolugbele	Milletia rhodantha	Fabaceae	Impotency
Sensitive/Gba-Gbema	Mimosa pudica	Fabaceae	Pile, Dysentry
Moringa	Moringa oleifera	Moringaceae	Fever, Malaria, Stomach Pain, Menstrual Pain, Diarrhoea, Headache
nJasui	Morinda germinata	Rubiaceae	Stomach Pain, Malaria, Fever Headche
Banana	Musa sapientum	Musaceae	Dysentry, Ulcer
Ka-fen fen/nGolo-Hema	Napoleona heudelotii	Lecythidacea	Back pain, Stomach Pain
Kojaagei	Nesogordinia papaverifera	Malvacea	Cough
Pomamgbei	Newbouldia laevis	Bignoniaceae	Dysentary, Diarrhoea, Headache, Ulcer
Bundui	Nuclea diderrichii	Rubiaceae	Fever, Malaria, Stomach Pain, Menstrual Pain, Cough, Diarrhoea, Headache, Fatigue
Yumbuyambei	Nuclea latifolia	Rubiaceae	Cough, Malaria, Fever, Stomach Pain, Headache, eye problem, Back Pain
Rice	Oryza sativa	Gramineae	Pile
Tombei	Oxyanthus tenuis	Rubiaceae	Cough
Am-fent	Paullina pinnata	Sapindaceae	Pile, Ulcer
nDawei	Parinari excelsa	Chrysobalanaceae	pregnancy Pain, diarrhoea, dysentery, infertality
Tijo	Phyllanthus discoideus	Euphorbiaceae	Headache
Kamajovondo	Premna hispidia	Verbenaceae	Back pain, Dysentry, Malaria
Gogboi	Protemeagabaria stapfiana	Euphorbiaceae	Headache
Guava	Psidium guajava	Myrtaceae	Dysenatary, Diarrhoea, Cough, Stomach Pain, Ulcers
Gbolei	Ricinodendron heudelotii	Euphorbiaceae	Cough
Pondolivai	Scaparia dulcis	Plantaginaceae	Back pain, Fatigue
Dengbe-wuli	Scytopetalum tieghemii	Scytopetalaceae	Diarrhoea, Dysentary,
Mandei	Sesamum indicum	Pedaliaceae	Eye Problem
Gobji	Spondais mombin	Anacardiaceae	Headache
nDopanei	Tetracera potatoria	Dilleniaceae	Cough
Nenii	Thaumatocoecus daniellii	Marantaceae	Menstrual Pain,

Continued

Foklobe	Triclisia paten	Cyperaceae	Cough, Back pain, Stomach Pain, Fatigue, Malaria
An-thombo	Urera oblongitofolia	Urticaceae	Back Pain, Dysentry, Stomach Pain, Malaria, Headache
Negbojei	Uvaria chamae	Annonacea	Dysentry
Totengi	Vengueriopsis discolor	Rubiaceae	Dysentry,
Kokoei/coco-yam	Xanthosoma sagitifolium	Arecaceae	Malaria
am-pos/Huwei	Xylopia aethiopica	Annonaceae	Cough, Menstrual Pain
Ginger	Zingiber officinale	Zingiberaceae	Cough, Fever, Malaria, Headche, Fatigue

malaria, because nowadays in the country, and the world in the 21st century, malaria is a problem to human health and has caused more death in the developing countries.

3.5.6. Sources of Traditional Medicine Knowledge

Knowledge of medicinal plants comes from different sources. The respondents' sources of traditional medicine knowledge are presented in Table 7. Oral communication was the most source of traditional medicine knowledge. Only a few people acquired their knowledge from dreams, which represents 3.5% of the respondents. This makes it difficult for information to be retained and is often lost over the years since it not documented. The study revealed that 98.25% of the respondents with medicinal plants' knowledge for treating illnesses are older people while 1.75% are middle age. This means elders are more knowledgeable about medicinal plants harvest and use to treat different therapeutic ailments. Many other researches have reported similar findings that elderly people in rural communities worldwide are more knowledgeable on medicinal plants' uses in treating various therapeutic diseases [28] [29] [30] [31].

[30] reported that in Eastern Desert Region of Egypt, many knowledgeable elders provide the other community members with traditional knowledge on medicinal plants' uses to treat different illnesses among members of the rural community. Sharing traditional information in treating different sicknesses using medicinal plants in rural communities is essential because, in isolated communities, knowledge disappears gradually since it is orally pass on by indigenous old people to the younger generation. In addition, medicinal plant knowledge may be more difficult to acquire than other types of ethno-botanical knowledge, such as edible plants, firewood, or building materials, because of the more complex nature of medicinal plant remedies and the lower frequency of learning events.

3.5.7. Level of Quantity Harvested

Figure 4 presents the level of harvesting medicinal plants from the forest. The majority of the respondents' harvest plant parts moderately, representing 54%,

whereas 39% harvest low and 7% harvest a lot. This finding indicates that most of the respondents don't want the medicinal Plant to be eroded from the forest because some medicinal plants in the study area are scares to harvest from different habitats around the forest reserve.

3.5.8. Method of Harvesting Plant Parts

The respondent used different methods for harvesting medicinal plants from the forest and other habitats around the Kasewe forest as shown in Figure 5. The most method used is bark slashing while very limited proportion use tree falling especially for *Xylopia aethiopica*. The method most used by inhabitants is unsustainable and it pose serious conservation threats. According to [32], "method

Table 7. Source of knowledge on traditional herbs.

Source of knowledge	Percentage (%)
Learned from parents	66.67
Learned from friends	26.32
Learned from herbalist	1.75
Learned from dreams	3.5

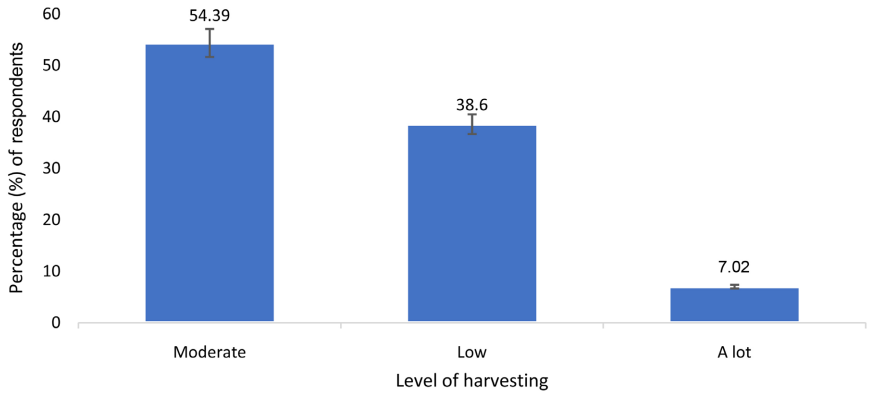

Figure 4. Level of plant parts harvested.

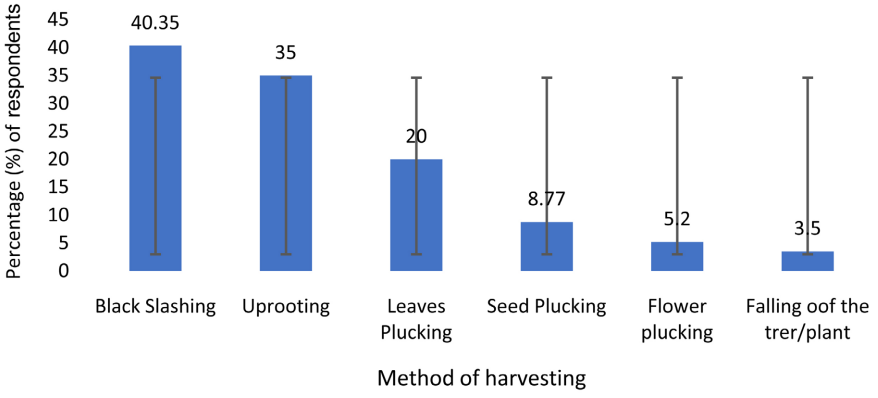

Figure 5. Method of harvesting plant species.

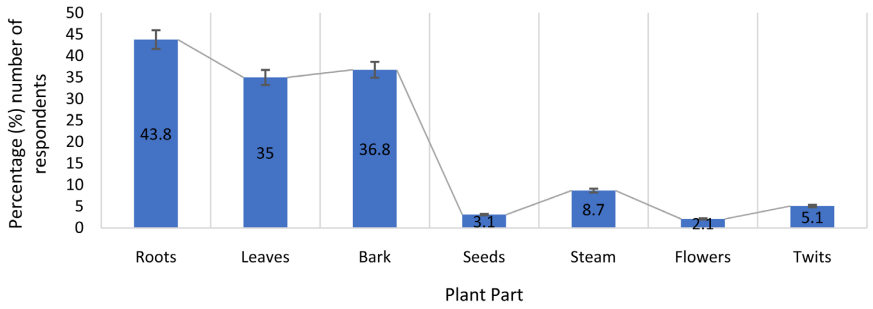

Figure 6. Diversity of plant parts used in traditional medicine in the communities.

of harvesting is related to the plant parts' predilection for the preparation of medicines to treat different therapeutic ailments." Harvesting methods can impact conservation because some types of harvesting are more sustainable than others. For example, harvesting leaves may be more bearable because of the rejuvenation of leaves in contrast with the bark, which may not be fully regenerated over a long period due to the slashing. Harvesting bark and tree species' roots may pose a threat to sustainable harvesting [25]. The high demand of medicinal plants in developing countries has led to indiscriminate harvesting [4]. This has resulted in many plant species becoming extinct and some endangered [7] [29] [31] [32].

3.5.9. Measure of Plant Parts Used in Traditional Medicine in the Communities

The measure of plant parts used to treat ailment is presented in **Figure 6**. There was diversity in the plant part use to treat ailments. The predominant plant part used in the study area to treat therapeutic ailments was the Plant's root (43.8%) while 36.8% use the bark, and 35% use leaves. According to [25], diverse parts of plants from bark root, leaves, and stems, flowers, seeds, and twit are used for the preparation of medicinal plants for the treatment of different therapeutic ailments. 43.8%, scientific research in the past has facilitated the discovery of many phytochemicals from plant roots, some of which are now in clinical use, and many others are in numerous stages of preclinical and clinical studies. The enormous diversity of plants on the planet gives an auspicious expedition ahead in the quest for knowledge and cure for many diseases. The part of the Plant used and the growth and reproductive characteristics of the Plant will have significant implications in the timing for harvest and its susceptibility to overexploitation [6].

4. Conclusion and Recommendation

The Kasewe forest in the southern part of Sierra Leone is one of the biodiversity hotspots in the country and it has different tree species of ecological and economical value to the inhabitants of communities. Documentation of plant diversity and the human uses of important medicinal plants are counted viable to conservation and sustainable use of these flora species for the future generations

in Sierra Leone. The total number of individual plant stems counted 3377, comprising 84 individual species belonging to 53 families from different vegetative zones. The most dominant family at the Kasewe Forest was Malvaceae and the species with the highest density was *Chromolaena odorata* 110 m^2, and *Xylopia quintais* was the least density of species recorded at the study area representing 0.1 m^2 per hector. The diversity among species is low. The closed or dense forest canopy recorded the highest diversity of species with an index of 1.236 and farmland 0.757. A total of seventy-one (71) medicinal plant were recorded during the study period used by the local people to treat different therapeutic ailments. The root, stem and bark are most use parts for treating ailments. However, the Kasewe Forest is under pressure from anthropogenic activities, such as medicinal plant harvesting, agriculture, poaching and settlement. These processes are affecting the ecological and biological components and ecosystem services of the forest making it prone to degradation. Majority of the inhabitants depend on medicinal plants from the forest to treat different ailment with very limited alternative. Although there is abundance of medicinal plants, the method of harvest and frequency of use pose a serious risk of extinction. Being a biodiversity hotspot and a home to prominent medicinal plants, there is need for conservation actions. Medicinal plants for the treatment of common illness in isolated communities located around forested region in Sierra Leone will continue to play a significant role in the local health care system because of different traditional believes and the lack of access to conventional medical care.

It is recommended that the government should implement medicinal plant conservation strategy and invest in conservation, standardization of measurements and hygiene of the medicinal plants preparation and use, documentation of traditional medicine knowledge, education, research and value chain market. Numerous medicines have been derived from the knowledge of tropical forest people. Therefore, there is the need to conserve medicinal plants and protect threatened species by introducing systematic cultivation of medicinal plants necessitated by continuous demand. Government should also encourage local communities to cultivate the medicinal plants through *in-situ* and *ex-situ* management approaches and organized programs for traditional herbalist.

Further inventory of plants should be carried out in the area in order to eventually capture all species present there. In doing so, new or endangered species may be identified which might be relevant to conservation.

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Conflicts of Interest

The authors declare no conflicts of interest regarding the publication of this paper.

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