RJMP Research Journal of Medicinal Plants

OPEN ACCESS

# Medicinal Value of Neglected and Underutilized Food Crops in Sierra Leone

[1]Sahr Foday, [2]Richard Wadsworth, [3]Tamba S. Sonda and [2]Samuel Maxwell Tom Williams
[1]Njala University Hospital, Njala University, Moyamba District, Sierra Leone
[2]Department of Biological Sciences, Njala University, Moyamba District, Sierra Leone
[3]Institute of Food Technology, Nutrition and Consumer Studies, Moyamba District, Sierra Leone

## ABSTRACT

**Background and Objective:** Neglected and underutilized food crops (NUFCs) could play a significant role in food security and nutrition in rural communities. Despite their potential, NUFCs remain largely undervalued due to shifting dietary preferences, limited research, and inadequate policy support. This paper assesses the uses, knowledge, and perceptions of NUFCs in the Bo and Kenema Districts, highlighting their role in healthcare. **Materials and Methods:** A cross-sectional study was conducted in Bo and Kenema Districts using mixed methods. Data were collected through semi-structured questionnaires and guided field walks. A total of 492 respondents were selected using stratified random sampling, ensuring representation across age, gender. The data were analyzed using SPSS version 26.0, employing descriptive and inferential statistics. A significance level of 0.05 was used for all statistical tests. **Results:** Ethnobotanical findings revealed that 48 NUFCs are regularly used to treat 25 ailments, with *Moringa oleifera*, *Nauclea latifolia*, and *Manihot esculenta* exhibiting high use value and frequency of citation. Commonly mentioned diseases are malaria, typhoid, and anemia. Leaves were the most frequently utilized plant part, reflecting both the bioactive compound concentration and ease of harvest. Demographic factors like age and gender did not significantly influence NUFC use, whereas educational attainment and marital status did. While modern healthcare facilities were preferred for their dosage accuracy and efficacy, traditional herbal remedies remained crucial due to affordability and availability, especially in rural areas. **Conclusion:** The study underscores the importance of preserving ethnobotanical knowledge and integrating validated traditional practices into healthcare systems.

## KEYWORDS

Neglected and underutilized food crops, ethnobotany, traditional medicine, Sierra Leone, medicinal plants



## INTRODUCTION

Throughout history, an estimated 40,000-100,000 plant species have been utilized for various purposes, representing approximately 5% of the World's total plant diversity[1,2]. Among these, around 30,000 species have been identified as edible[3], with nearly 7,000 species cultivated or gathered for food at some point in time[1]. The green revolution led to the widespread replacement of many traditional and locally adapted crop species with high-yielding staple cultivars developed through modern breeding programs, reducing the diversity of crops grown for food[4].

ISSN: 2151-7924 (Online)
ISSN: 1819-3455 (Print)
https://doi.org/10.3923/rjmp.2025.12.24

Received: 16 Mar. 2025
Accepted: 20 May, 2025
Published: 21 May, 2025

Neglected and underutilized food crops (NUFCs) could play a crucial role in traditional medicine, particularly in developing countries where modern healthcare is often inaccessible. In Sierra Leone, NUFCs represent a significant part of indigenous knowledge systems, serving both nutritional and therapeutic purposes[5]. These crops include various fruits, leaves, seeds, tubers, and medicinal plants that have been historically used to treat various ailments. NUFCs remain under-researched and underutilized despite their potential benefits due to a lack of awareness, commercialization, and scientific validation[6].

Traditional medicine in Sierra Leone heavily relies on plant-based treatments, with many communities using NUFCs to manage diseases such as malaria, anemia, gastrointestinal disorders, and skin infections[7]. Among these, plants such as *Moringa oleifera*, *Nauclea latifolia*, and *Psidium guajava* have been widely cited for their medicinal properties[7]. These species contain bioactive compounds, including alkaloids, flavonoids, and tannins, which exhibit antimicrobial, anti-inflammatory, and antioxidant properties. The continued reliance on NUFCs underscores their cultural and medicinal significance, yet there is a growing need to integrate traditional knowledge with scientific research to maximize their health benefits.

Despite their benefits, the lack of market access, extension services, and research investments has hindered the widespread adoption and commercialization of these crops[8]. Many of these crops have been overshadowed by staple foods such as rice and cassava, leading to a decline in cultivation and usage. Recent ethnobotanical studies suggest that promoting NUFCs could enhance both biodiversity conservation and community health by providing cost-effective, locally available remedies[9].

As global health priorities shift towards sustainable and integrative medicine, there is an increasing need to explore the therapeutic potential of NUFCs through rigorous scientific research and policy support. This study seeks to assess the medicinal values of NUFCs in Sierra Leone, examining their ethnobotanical applications, frequency of use, and the potential for their incorporation into modern healthcare systems. By documenting indigenous knowledge, this research aims to contribute to the broader discourse on sustainable health solutions in Africa.

## MATERIALS AND METHODS

**Study area and duration:** The study was conducted in Bo and Kenema districts in Sierra Leone (Fig. 1), which are known for their agricultural activities and rich biodiversity. The study was conducted from August, 2023 to March, 2024. Bo District, located in the Southern Province, is one of the country's largest and most economically significant areas, with agriculture being a key livelihood source[10]. The selected chiefdoms, Kakua, Selenga, Bongor, Tinkoko, Jaima, Gbo, and Bumpe represent diverse ecological zones and farming communities where NUFCs play a vital role in both nutrition and traditional medicine. These chiefdoms are characterized by a mix of subsistence farming and small-scale commercial agriculture, making them ideal locations for studying the medicinal applications of NUFCs.

Kenema District, situated in the Eastern Province, is similarly known for its fertile lands and reliance on traditional agricultural practices. The study covered seven chiefdoms: Malegohun, Nongowa, Small Bo, Simbaru, Lower Bambara, Simbaru, and Kandu Leppiam. These areas are home to various indigenous plant species frequently used in traditional medicine. The selection of these chiefdoms reflects the diversity in land use patterns, cultural reliance on medicinal plants, and the widespread knowledge of NUFCs within local communities. By studying these two districts, the research provides a comprehensive understanding of the ethnobotanical significance of NUFCs across different geographical and cultural landscapes in Sierra Leone.

**Data collection:** Semi-structured interviews were developed before data collection, following methodologies outlined by Cunningham[11], and Martin[12]. A combination of pre-determined (closed) and spontaneously generated (open) questions allowed for flexibility and depth in responses. These interviews

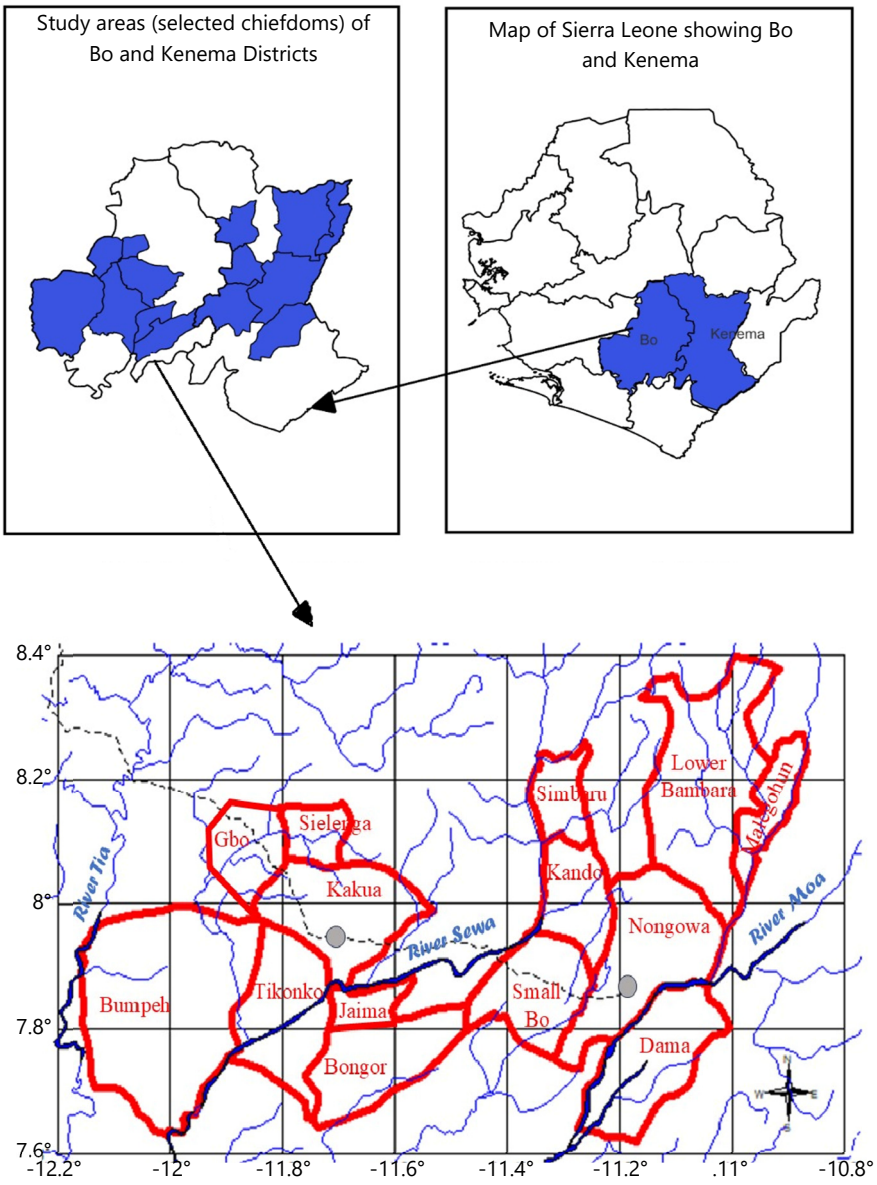


Fig. 1: Map of the study areas showing the chiefdoms in Sierra Leone

underutilized food crops. Observations on public and individual perceptions of NUFCs were documented to provide a comprehensive understanding of their role in local ethnobotany. The study also involved taking field notes to record the variety of vegetable crops available in local markets, identifying commonly consumed crops, and assessing alternative food sources during periods of scarcity. The research team ensured that the documentation process was culturally sensitive and accurately reflected the knowledge shared by indigenous communities.

**Statistical analysis:** In the statistical analysis of this study, the structured questionnaire responses were cleaned, coded, and analyzed using Microsoft Excel and SPSS version 26.0. Descriptive statistics, including frequencies, percentages, and means, were used to summarize key variables related to the utilization of NUFCs for medicinal and dietary purposes. Inferential statistical tests, such as logistic regression analysis, were applied to examine the factors (e.g., age, gender, education level) that influence the use of NUFCs for medicinal purposes. A significance level of 0.05 was used for all statistical tests.

Furthermore, the importance of each plant was calculated based on two attributes: Frequency of citation (FC), and utility value (UV)[13]:

$$FC = 100 \times \frac{NS}{NT}$$

Where:
NS = Number of times a particular species was mentioned
NT = Number of times that all species were mentioned

$$UV = \frac{X}{N}$$

Where:
X = Number of uses mentioned by the informants for a given species
N = Total number of informants interviewed

## RESULTS

The ethnobotanical study sampled 492 respondents across Bo and Kenema Districts, highlighting the significance of NUFCs in traditional medicine. In Bo District, Kakua and Selenga chiefdoms had the highest (15.50%) representation, and Bumpe chiefdom had the lowest representation 13.4%. In Kenema District, Malegohun (17.70%) and Nongowa (17.30%) had the most respondents, while Small Bo (13.9%) had the fewest.

**Sociodemographic characteristics of the respondents:** The sociodemographic results highlight regional variations in agricultural engagement and the role of NUFCs across Bo and Kenema Districts. From Table 1, most participants fall within the 20-40 years age range, highlighting the active involvement of young and middle-aged individuals in agriculture. This group, representing the most productive workforce, plays a crucial role in NUFC cultivation, given their ability to adopt new farming practices and contribute to food security. The slight female dominance among respondents underscores the vital role of women in subsistence farming and household nutrition, as they are often the primary custodians of indigenous food crops. The near gender balance also suggests a shift in agricultural roles, with women increasingly participating in both production and decision-making related to NUFCs.

Table 1: Socio characteristics of respondents

| | | n (%) | | |
|---|---|---|---|---|
| | Row labels | Bo (n = 238) | Kenema (n = 254) | Grand total (n = 492) |
| Age groups (years) | <20 | 36 (15.1) | 21 (8.1) | 57 (11.6) |
| | 20-40 | 109 (45.8) | 102 (39.5) | 211 (42.9) |
| | 41-60 | 71 (29.8) | 103 (39.9) | 174 (35.4) |
| | >60 | 22 (9.2) | 28 (10.9) | 50 (10.2) |
| Gender | Female | 123 (51.7) | 141 (54.7) | 264 (53.7) |
| | Male | 115 (48.3) | 113 (43.8) | 228 (46.3) |
| Educational level | Illiterate | 122 (51.3) | 137 (53.1) | 259 (52.6) |
| | Primary | 50 (21.0) | 46 (17.8) | 96 (19.5) |
| | Secondary | 56 (23.5) | 59 (22.9) | 115 (23.4) |
| | Tertiary | 10 (4.2) | 12 (4.7) | 22 (4.5) |
| Marital status | Living with partner | 153 (64.3) | 157 (60.9) | 310 (63.0) |
| | Living alone | 85 (35.7) | 97 (37.6) | 182 (37.0) |
| How long have you lived in this community? | 1 to 5 years | 44 (18.5) | 69 (26.7) | 113 (23.0) |
| | 6 to 10 years | 54 (22.7) | 111 (43.0) | 165 (33.5) |
| | >10 years | 140 (58.8) | 74 (28.7) | 214 (43.5) |
| Have you ever lived anywhere else? | No | 126 (52.9) | 110 (42.6) | 236 (48.0) |
| | Yes | 111 (46.6) | 143 (55.4) | 254 (51.6) |

Marital and residential stability further influence NUFC utilization. The high percentage of married respondents (61.0%) indicates that household decision-making significantly affects food production and agricultural practices. Married couples tend to prioritize household food security, increasing the likelihood respondents (48.0%) have lived in their communities long-term, reinforcing their connection to traditional agricultural practices and local biodiversity. This stability supports the preservation and transmission of indigenous knowledge on NUFCs. Meanwhile, respondents with migration experience may introduce new farming techniques and ideas, fostering innovation in NUFC utilization. These demographic trends highlight the interplay between social structures and agricultural resilience, emphasizing the importance of NUFCs in sustaining food systems and promoting nutrition security in rural Sierra Leone.

**Ethnobotanical uses of plants**

**Common diseases that are treated with NUFC in youths and adults:** Table 2 illustrates the ethnobotanical uses of various plants for treating diseases in youths and adults. Notably, *Moringa oleifera* exhibits the highest frequency of citation (FC = 14.6) and a significant use value (UV = 0.016), indicating its paramount importance in traditional medicine. It is utilized across a spectrum of ailments, including malaria, typhoid, fever, cough, and stomach ache, with the leaf, root, and stem being the primary plant parts employed. Similarly, *Nauclea latifolia* demonstrates a high FC (12.6) and UV (0.014), highlighting its broad application in treating malaria, typhoid, fever, constipation, skin rash, body pain, and sores using its leaf, bark, root, and stem. *Manihot esculenta* also shows a substantial FC (7.6) and UV (0.008), being cited for its use in treating malaria, body pain, constipation, and snake bites, with the leaf as the primary part.

Several other plants are frequently cited for treating common ailments. *Psidium guajava* (FC = 5.3, UV = 0.008) is used for cough, fever, constipation, and diarrhea, utilizing its leaf and stem. *Momordica balsamina* (FC = 3.9, UV = 0.004) is employed for malaria and fever, with the leaf being the primary part. *Cymbopogon citratus* and *Cajanus cajan*, both with FC = 2.8, are used for fever and various conditions including cough, chicken pox, and skin rash, respectively. *Ocimum tenuiflorum* also has an FC of 2.8 and is used for skin rash and body pain. These plants, while not as versatile as *Moringa oleifera* or *Nauclea latifolia*, are still crucial for addressing prevalent health concerns.

Conversely, a considerable number of plants exhibit very low FC values (0.3), indicating infrequent use. These include *Amaranthus spinosus*, *Dichrostachcys glomerata*, *Eryngium foetidum*, *Mangifera indica*, *Mushroom* spp., *Parinari curatellifolia, and Solanum macrocarpon*. Despite their diverse applications in treating anemia, deworming, malaria, and asthma, their low FC values suggest that they are either less effective, less accessible, or less preferred compared to other remedies. The use values for these plants are also low (0.002), reinforcing their limited importance in the local ethnobotanical practices.

The study also reveals a strong preference for leaves in traditional medicinal practices, with leaves being the most frequently utilized plant part across various species. This prevalence underscores the accessibility and ease of preparation associated with leaf-based remedies. However, other plant parts such as roots, stems, bark, and fruits, are also employed, indicating a diversified understanding of plant properties. Roots and bark, for instance, are often cited for their potent medicinal compounds, while fruits contribute to both nutritional and therapeutic applications. The use of multiple plant parts in species like *Moringa oleifera* and *Nauclea latifolia* highlights the comprehensive utilization of these plants in addressing a wide array of health conditions.

**Factors that influence the ethnobotanical uses of NUFC:** The analysis of factors influencing the ethnobotanical use of neglected and underutilized food crops (NUFCs) in Sierra Leone (Table 3) revealed that age and sex did not significantly impact their medicinal usage. Specifically, age groups, including under 20 years (OR = 0.353, p = 0.181), 20-40 years (OR = 1.125, p = 0.814), and 41-60 years

Table 2: Diseases and plants used for treatment in youths and adults

| No. | Scientific name | Part | Disease | FC | UV |
|---|---|---|---|---|---|
| 1 | *Abelmoschus esculentus* | Leaf, fruit | Ulcer | 1.1 | 0.002 |
| 2 | *Aloe barbadensis* Mill | Leaf, fruit | Skin rash, diarrhea | 0.6 | 0.004 |
| 3 | *Amaranthus spinosus* | Leaf | Anemia | 0.3 | 0.002 |
| 4 | *Anacardium occidentale* | Leaf | Ulcer, toothache | 0.6 | 0.004 |
| 5 | *Ananas comosus* | Leaf, bark, fruit | Malaria, typhoid | 0.8 | 0.004 |
| 6 | *Artocarpus altilis* | Leaf | Heart disease | 0.6 | 0.002 |
| 7 | *Cajanus cajan* | Leaf | Cough, chicken pox, skin rash, small pox | 2.8 | 0.008 |
| 8 | *Carica papaya* | Leaf, fruit | Malaria, constipation, stomach ache, diabetes | 2.5 | 0.008 |
| 9 | *Celosia argentea* | Leaf | Anemia | 0.8 | 0.002 |
| 10 | *Citrus aurantifolia* | Leaf, fruit | Vomiting | 0.8 | 0.002 |
| 11 | *Citrus sinensis* | Leaf | Sore | 0.6 | 0.002 |
| 12 | *Cucurbita moschata* | Leaf, fruit | Appendicitis, constipation | 2.2 | 0.004 |
| 13 | *Cymbopogon citratus* | Leaf | Fever | 2.8 | 0.002 |
| 14 | *Dialium guineense* | Leaf | Cough | 1.4 | 0.002 |
| 15 | *Dichrostachys glomerata* | Leaf, bark | Deworm | 0.3 | 0.002 |
| 16 | *Eryngium foetidum* | Leaf | Malaria | 0.3 | 0.002 |
| 17 | *Hibiscus sabdariffa* | Leaf | Cough, fever, body pain | 2.0 | 0.006 |
| 18 | *Hypolepis punctata* | Leaf | Diarrhea | 0.3 | 0.002 |
| 19 | *Ipomoea batatas* | Leaf | Boil, anemia | 2.2 | 0.002 |
| 20 | *Justicia insularis* | Leaf | Malaria, typhoid, anemia | 1.1 | 0.006 |
| 21 | *Mangifera indica* | Bark | Malaria | 0.3 | 0.002 |
| 22 | *Manihot esculenta* | Leaf | Malaria, body pain, constipation, snake bite | 7.6 | 0.008 |
| 23 | *Momordica balsamina* | Leaf | Malaria, fever | 3.9 | 0.004 |
| 24 | *Moringa oleifera* | Leaf, root, stem | Malaria, typhoid, fever, anemia, cough, cold, diarrhea, toothache | 14.6 | 0.016 |
| 25 | *Musa paradisiaca* | Leaf | Malaria, diabetes, ulcer | 1.4 | 0.006 |
| 26 | *Musa sapientum* | Leaf, fruit | Eye sight, constipation | 0.8 | 0.004 |
| 27 | Mushroom spp. | Leaf | Asthma | 0.3 | 0.002 |
| 28 | *Nauclea diderrichii* | Leaf, root, stem | Malaria, constipation, head ache | 7.6 | 0.006 |
| 29 | *Nauclea latifolia* | Leaf, bark, root, stem | Malaria, typhoid, fever, constipation, skin rash, body pain, sore | 12.6 | 0.014 |
| 30 | *Ocimum tenuiflorum* | Leaf, stem | Skin rash, body pain | 2.8 | 0.004 |
| 31 | *Parinari curatellifolia* | Bark | Malaria | 0.3 | 0.002 |
| 32 | *Piper umbellatum* | Leaf | Skin rash | 2.2 | 0.002 |
| 33 | *Psidium guajava* | Leaf, stem | Cough, fever, constipation, diarrhea | 5.3 | 0.008 |
| 34 | *Salacia senegalensis* | Leaf, root | Malaria, body pain | 1.4 | 0.004 |
| 35 | *Schizophyllum commune* | Leaf | Body pain, constipation | 0.6 | 0.004 |
| 36 | *Senna siamea* | Leaf | Malaria, constipation | 0.8 | 0.004 |
| 37 | *Solanum lycopersicum* L. | Leaf | Skin rash | 1.1 | 0.002 |
| 38 | *Solanum macrocarpon* | Leaf | Malaria | 0.3 | 0.002 |
| 39 | *Solanum melongena* | Leaf | Skin rash | 0.6 | 0.002 |
| 40 | *Spondias mombin* | Leaf, stem | Constipation | 0.6 | 0.002 |
| 41 | *Sterculia tragacantha* Lindl. | Leaf | Boil | 2.2 | 0.002 |
| 42 | *Tamarindus indica* | Leaf | Cough, constipation | 1.4 | 0.004 |
| 43 | *Triumfetta cordifolia* | Leaf | Pile | 0.6 | 0.002 |
| 44 | *Uvaria chamae* | Leaf, root | Body pain | 0.3 | 0.002 |
| 45 | *Vernonia amygdalina* | Leaf, stem | Boil, sore, skin rash, body pain, diarrhea | 2.2 | 0.008 |
| 46 | *Voacanga africana* | Leaf, root | Malaria, stomach ache, chicken pox | 1.4 | 0.006 |
| 47 | *Xylopia aethiopica* | Leaf, fruit | Cough, fever, stomach pain | 0.8 | 0.006 |
| 48 | *Zingiber officinale* | Leaf, root | Cough, cold, fever | 2.0 | 0.006 |

(OR = 1.239, p = 0.673) years, showed no significant difference compared to those over 60 years. Similarly, sex did not demonstrate a significant influence, with males showing a non-significant odds ratio (OR = 0.799, p = 0.444) compared to females. This suggests that the use of NUFCs for medicinal purposes is relatively consistent across different age and gender demographics, indicating a widespread cultural acceptance and practice. However, a notable exception was observed with education level. People with no formal education and those with a primary level of education had a significant lower odd of using NUFCs medicinally (OR = 0.258, p = 0.016, and OR = 0.239, p = 0.023, respectively) compared to those with tertiary education, suggesting a potential link between formal education and the recognition or acceptance of traditional plant-based remedies.

Table 3: Factors that influenced the use of NUFCS for medicinal purposes (multilinear logistics regression)

| | Factors | p-value | OR (95% CI) |
|---|---|---|---|
| Age group | <20 years | 0.181 | 0.353 (0.077; 1.624) |
| | 20-40 years | 0.814 | 1.125 (0.423; 2.994) |
| | 41-60 years | 0.673 | 1.239 (0.458; 3.349) |
| | >60 years[b] | - | - |
| Sex | Male | 0.444 | 0.799 (0.45; 1.419) |
| | Female[b] | - | - |
| Educational level | Illiterate | 0.016 | 0.258 (0.086; 0.777) |
| | Primary school | 0.023 | 0.239 (0.07; 0.82) |
| | Secondary school | 0.192 | 0.472 (0.153; 1.458) |
| | Tertiary school[b] | - | - |
| Marital status | Living alone | 0.682 | 1.13 (0.629; 2.031) |
| | Living with a partner[b] | - | - |
| Duration of residence? | 1-5 years | 0.661 | 1.175 (0.571; 2.418) |
| | 6-10 years | 0.509 | 0.802 (0.416; 1.544) |
| | >10 years[b] | - | - |
| Have you ever lived anywhere else? | No | 0.326 | 1.341 (0.747; 2.41) |
| | Yes[b] | 0.181 | - |

Reference category is: Yes and b: This parameter is set to zero because it is the standard at which the others are compared

Table 4: Preferred healthcare facility types (traditional herbal or modern)

| | | Type of health care | | |
|---|---|---|---|---|
| No. | Reasons | Modern care | Traditional care | Total |
| 1 | Availability | 18 | 25 | 43 |
| 2 | Cost | 0 | 22 | 22 |
| 3 | Dosage | 102 | 0 | 102 |
| 4 | Efficacy | 208 | 12 | 220 |
| 5 | Knowledge | 8 | 0 | 8 |
| 6 | No side effects | 0 | 7 | 7 |
| 7 | Reliable | 78 | 7 | 85 |
| Grand total | | 414 | 73 | 487 |

Further statistical analysis indicated that marital status, length of residence, and previous relocation history did not significantly influence NUFC medicinal use. Marital status, with individuals living alone showing a non-significant odds ratio (OR = 1.13, p = 0.682), did not demonstrate a strong correlation. Likewise, length of residence, with those residing for 1-5 years (OR = 1.175, p = 0.661) and 6-10 years (OR = 0.802, p = 0.509), showed no significant differences compared to those residing longer than 10 years. Previous relocation history also did not significantly influence usage, with those never relocated showing a non-significant odds ratio (OR = 1.341, p = 0.326). These findings suggest that reliance on NUFCs for medicinal purposes is not strongly affected by personal circumstances or mobility, indicating a deep-rooted and widely disseminated cultural practice.

**Preferred healthcare facility types (traditional herbal or modern):** The study highlights a clear division in the preference between traditional herbal remedies and modern healthcare, with distinct factors driving the choices of respondents (Table 4). Traditional herbal remedies are still highly favored by a significant portion of the population, particularly in rural areas, due to their availability (25 respondents) and affordability (22 respondents). In many remote settings, traditional medicine remains the most accessible healthcare option, as formal healthcare facilities are often sparse or too costly. The widespread use of indigenous plants for medicinal purposes reflects centuries of cultural knowledge passed down through generations, offering practical solutions for treating common illnesses. This continued reliance on traditional remedies also underscores the importance of preserving ethnobotanical knowledge and promoting the sustainable harvesting of medicinal plants, especially in communities with limited access to formal healthcare.

The overwhelming preference for modern healthcare due to its perceived efficacy (208 respondents) and dosage accuracy (102 respondents) and indicates a growing shift towards formal medical interventions. This shift reflects the increasing trust in modern healthcare systems, which are seen as more reliable, particularly in terms of precise treatment and successful outcomes. Modern medicine, with its scientifically tested treatments and standardized protocols, offers clear advantages, especially in managing complex or acute conditions where traditional remedies may be insufficient. The emphasis on efficacy suggests that as education and healthcare access improve, more people are likely to turn to modern healthcare for the treatment of illnesses, potentially diminishing the role of traditional medicine in certain contexts.

## DISCUSSION

Neglected and underutilized food crops (NUFCs) hold significant potential to address food and nutrition security challenges in Sierra Leone. Despite their adaptability to local environmental conditions and their rich nutritional profiles, these crops remain largely overlooked in favor of commercial staples and imported alternatives. The NUFCs, such as *Amaranthus spinosus*, *Hibiscus sabdariffa*, and *Luffa aegyptiaca*, have traditionally played an essential role in rural diets, providing vital nutrients and enhancing dietary diversity. Changing dietary preferences, urbanization, and a lack of institutional support have contributed to their decline. This discussion explores the cultivation areas, seasonal availability, and factors contributing to the decline in the utilization of NUFCs. It also examines the ethnobotanical and socio-cultural significance of these crops, along with their mineral composition and nutritional value. By leveraging the untapped potential of NUFCs, Sierra Leone can enhance resilience against food insecurity and promote sustainable agricultural practices.

The findings from this study reveal that NUFCs play a significant role in traditional medicine, with various plant species being used to treat a wide range of diseases. The medicinal use of leafy vegetables like *Celosia argentea*, *Ipomoea batata*, and *Amaranthus spinosus* for anemia is consistent with their high iron and folate content, essential nutrients for red blood cell production and hemoglobin synthesis[14-16]. In communities with limited access to conventional treatments, these nutrient-dense plants provide an affordable and natural remedy for anemia, reducing dependency on pharmaceutical supplements[17]. Similarly, *Cajanus cajan* (pigeon pea) is widely used for treating constipation, an application supported by its high dietary fiber content, which aids digestion and promotes bowel regularity[18,19]. *Psidium guajava*, another frequently cited plant, is traditionally used to manage diarrhea, with its leaves and fruit containing bioactive compounds such as tannins and flavonoids known for their antidiarrheal properties[20].

*Moringa oleifera*, with the highest FC (14.6) and UV (0.016), is recognized for its diverse therapeutic applications, including the treatment of malaria, typhoid, anemia, and cough. This aligns with previous research indicating that *Moringa oleifera* is rich in bioactive compounds such as flavonoids, alkaloids, and terpenoids, which exhibit antimicrobial, anti-inflammatory, and immune-boosting properties[21,22]. Similarly, *Nauclea latifolia* (FC = 12.6, UV = 0.014) and widely used in traditional medicine, particularly for its antimalarial, analgesic, and gastrointestinal benefits[7]. The high citation rate of *Moringa oleifera* underscores its extensive ethnomedicinal use in treating malaria, typhoid, constipation, body pain, fever, and deworming, which is supported by studies demonstrating its potent antimicrobial and anti-inflammatory effects[7,23]. The widespread reliance on these plants reflects the rich traditional knowledge of Sierra Leonean communities in managing prevalent health conditions through locally available plant-based remedies.

*Carica papaya*, with an FC of 2.5, is particularly valued for addressing digestive disorders such as constipation and diabetes, likely due to its high fiber content and enzyme-rich composition, including papain, which aids digestion and metabolic processes[24]. Similarly, *Piper umbellatum* (FC = 2.2) is used for skin-related ailments, reflecting its traditional dermatological applications. The plant contains flavonoids

and alkaloids known for their antimicrobial and anti-inflammatory effects, which may contribute to its therapeutic role in treating skin infections and irritations[25]. The variation in FC and UV values across different plant species suggests a complex interplay of factors, including local availability, traditional knowledge, and perceived efficacy in treating specific ailments.

The study highlights the predominance of leaves as the most frequently utilized plant part in traditional medicine, followed by roots, stems, bark, and fruits. The preference for leaves can be attributed to their abundance, ease of collection, and the high concentration of bioactive compounds they contain. Medicinal plants such as *Moringa oleifera*, *Psidium guajava*, *Piper umbellatum*, *Celosia argentea*, and *Cymbopogon citratus* are widely used for treating ailments ranging from fever and cough to skin infections and digestive disorders. Leaves are rich in secondary metabolites such as flavonoids, alkaloids, tannins, and terpenoids, which possess antimicrobial, anti-inflammatory, and antioxidant properties[26]. Their frequent use in herbal medicine underscores the deep-rooted reliance on plant-based remedies in Sierra Leonean communities and suggests their potential for further pharmacological exploration.

In addition to leaves, roots, and stems are also commonly utilized, particularly in managing chronic illnesses such as malaria, typhoid, and gastrointestinal disorders. Plants like *Moringa oleifera* and *Nauclea latifolia* are known for their medicinal applications, with roots and stems often decocted to extract potent therapeutic compounds. These plant parts contain bioactive constituents such as saponins, alkaloids, and glycosides, which contribute to their efficacy in treating persistent infections and inflammatory conditions[27]. The significant reliance on roots and stems highlights the necessity of sustainable harvesting practices to ensure the continued availability of these valuable medicinal resources. The widespread use of leaves, roots, and stems reinforces the ethnopharmacological importance of these plants and calls for further scientific validation to integrate their medicinal properties into modern healthcare systems.

This study's findings indicate that demographic factors such as age and gender do not significantly influence the use of NUFCs for medicinal purposes, which is similar[28] to the study of traditional knowledge about ethnomedicinal use of plants in the Rift Valley of Ethiopia. This suggests that traditional medicinal practices involving NUFCs are widespread across different age categories, likely due to their accessibility and affordability. Similarly, gender differences were not significant, this finding aligns with previous research indicating that medicinal plant use is culturally ingrained and not necessarily dictated by biological differences but rather by household roles and traditional knowledge dissemination[29-31].

Educational attainment emerged as a significant predictor of NUFC medicinal use. Illiterate individuals were considerably less likely to use NUFCs than those with tertiary education, suggesting that education influences awareness, perception, and integration of traditional medicine with modern healthcare approaches[32]. These findings highlight the role of education in shaping perceptions and usage patterns of NUFCs, potentially bridging the gap between indigenous knowledge and modern scientific validation.

The absence of significant associations between marital status, length of residence, and relocation history suggests that NUFC usage for medicinal purposes is deeply entrenched within the local cultural framework rather than being dictated by individual social conditions. The non-significant odds ratios across these variables indicate that migration and household structures do not substantially alter medicinal plant usage patterns, reinforcing the notion that traditional plant-based remedies are ingrained in communal knowledge systems rather than being contingent on personal circumstances[33]. This resilience of ethnobotanical practices points to the broader importance of cultural continuity and oral knowledge transmission in preserving the use of NUFCs despite shifts in social dynamics. However, further qualitative research could provide deeper insights into potential hidden influences, such as local belief systems, economic constraints, and access to formal healthcare, which might subtly shape NUFC utilization patterns.

The study observes the preference for healthcare facility types among respondents, revealing a complex interplay between modern healthcare systems and traditional remedies. Modern healthcare facilities emerged as the preferred option for many, driven by their scientifically tested treatments, precise diagnostic tools, and regulated practices. However, traditional herbal remedies remain an essential part of healthcare for a significant portion of the population, especially in rural areas.

The study highlights a significant preference for modern healthcare facilities, which is primarily attributed to factors such as dosage accuracy and efficacy. A total of 102 respondents emphasized dosage accuracy, while 208 cited efficacies as the primary reason for choosing modern healthcare. This preference mirrors global trends in health-seeking behaviors in resource-limited settings, where modern healthcare is increasingly trusted due to its structured and scientifically validated approach[34-36]. Modern healthcare facilities offer precise diagnostic tools, standardized dosing, and evidence-based treatment protocols, which are critical for managing complex illnesses such as malaria, typhoid, and sexually transmitted infections (STIs)[36]. As education and healthcare literacy improve, people are more likely to rely on the reliability and effectiveness of modern healthcare systems, underscoring their role in delivering consistent and successful health outcomes.

Ongoing initiatives to strengthen healthcare infrastructure and promote its utilization support modern healthcare's prominence. Campaigns led by the Ministry of Health and Sanitation and Non-Governmental Organizations have increased awareness about the advantages of modern medical practices while simultaneously addressing challenges such as affordability and accessibility. These efforts are particularly relevant in rural areas, where healthcare disparities are most pronounced. By fostering trust and improving access to modern healthcare, these initiatives contribute to the gradual shift away from traditional remedies, signaling a transformation in public health dynamics.

Traditional herbal remedies remain a crucial component of healthcare, particularly in rural and underserved areas where access to modern facilities is limited. Among the respondents, 25 out of 43 cited availability, and all 22 mentioned affordability as the key reason for preferring traditional medicine. These findings underscore the practicality in communities where socio-economic and geographic barriers make modern healthcare inaccessible or prohibitively expensive. Traditional healers and herbalists are often the first point of contact for many health issues, offering culturally relevant treatments rooted in the use of plants like neem (*Azadirachta indica*) and moringa (*Moringa oleifera*)[37]. These plants, known for their medicinal properties, provide effective remedies for common ailments such as diarrhea, fever, and respiratory infections, and are often viewed as both accessible and affordable solutions[38].

The NUFC herbal remedies play a vital role in healthcare, particularly in rural areas where modern medical facilities are inaccessible or costly. The NUFC plants like *Celosia argentea* and *Vernonia amygdalina* exemplify the therapeutic value of indigenous flora, showcasing a range of pharmacological benefits. *Celosia argentea* is notable for its potential to manage anemia and various conditions due to its anti-inflammatory, antioxidant, anticancer, and antimicrobial properties[38]. Similarly, *Vernonia amygdalina*, commonly known as bitter leaf, is widely used for its anti-inflammatory, nutritional, and healing properties, addressing conditions such as arthritis, wounds, and gastrointestinal disorders while enhancing immunity and preventing malnutrition[39,40]. The rich bioactive compounds and nutritional content of these plants highlight their dual role in medicine and nutrition, emphasizing the need to preserve ethnobotanical knowledge and promote the sustainable use of medicinal plants.

In addition to their practical advantages, traditional herbal remedies carry significant cultural and spiritual value. In the study, these NUFC herbal remedies address not just physical ailments but also the emotional and spiritual dimensions of health, offering a holistic approach to well-being that modern medicine often overlooks. Furthermore, traditional medicine plays an essential role in preserving ethnobotanical

knowledge, which has been passed down through generations. This preservation is critical for biodiversity conservation and sustainable harvesting of medicinal plants, ensuring their availability for future generations[41]. As modern healthcare systems evolve, integrating scientifically validated traditional practices into public health strategies may enhance overall healthcare access and efficacy.

## CONCLUSION

This study highlights the vital role of NUFCs in traditional medicine and their potential contribution to food security and healthcare in Sierra Leone. Despite their rich nutritional value, NUFCs remain underutilized due to changing dietary habits and limited institutional support. The findings confirm their widespread use for treating ailments, particularly in rural areas, emphasizing the need for further research and policy integration. Leaves are the most commonly utilized plant parts, and demographic factors like education influence usage patterns. Strengthening pharmacological research and sustainable harvesting will support their integration into national healthcare frameworks, preserving ethnobotanical knowledge for improved health outcomes.

## SIGNIFICANCE STATEMENT

This study discovered the extensive ethnobotanical knowledge and medicinal uses of Neglected and underutilized food crops (NUFCs) that can be beneficial for enhancing food security and primary healthcare systems in rural Sierra Leone. It revealed that despite limited institutional support, NUFCs such as *Moringa oleifera* and *Nauclea latifolia* are widely used for treating common ailments like malaria and anemia. The study also identified key socio-demographic influences on NUFC usage, emphasizing the role of education and marital status. This study will help the researchers to uncover the critical areas of traditional plant-based healthcare integration that many researchers were not able to explore. Thus, a new theory on ethnobotanical utilization and policy integration may be arrived at.

## ACKNOWLEDGMENTS

We extend our heartfelt thanks to the students, Community Health Officers (CHOs), and Community Health Assistants (CHAs) from Njala Sierra Leone University's Department of Community Health Sciences (2024/2025 academic year) for their support in data collection. Special gratitude goes to Mr. Momoh Sesay and the National Herbarium staff for their invaluable expertise in identifying the underutilized and neglected food crops, ensuring the accuracy of our research.

## REFERENCES

1. IPGRI, 2002. Neglected and Underutilized Plant Species: Strategic Action Plan of the International Plant Genetic Resources Institute. International Plant Genetic Resources Institute, Rome, Italy, ISBN 92-9043-529-1, Pages: 27.
2. Asfaw, Z. and M. Tadesse, 2001. Prospects for sustainable use and development of wild food plants in Ethiopia. Econ. Bot., 55: 47-62.
3. Arora, R.K., 2014. Diversity in Underutilized Plant Species-An Asia-Pacific Perspective 1938. Bioversity International, New Delhi, India, ISBN: 978-92-9255-007-3, Pages: 234.
4. Ebert, A.W., 2014. Potential of underutilized traditional vegetables and legume crops to contribute to food and nutritional security, income and more sustainable production systems. Sustainability, 6: 319-335.
5. Bélanger, J. and D. Pilling, 2019. The State of the World's Biodiversity for Food and Agriculture: FAO Commission on Genetic Resources for Food and Agriculture. 1st Edn., FAO, Rome, Italy, ISBN: 978-92-5-131270-4 Pages: 570.
6. Padulosi, S., B. Mal, O.I. King and E. Gotor, 2015. Minor millets as a central element for sustainably enhanced incomes, empowerment, and nutrition in rural India. Sustainability, 7: 8904-8933.
7. Johnny, J., A. Lebbie and R. Wadsworth, 2022. Ethnobotanical survey of medicinal plants utilized by forest edge communities in Southern Sierra Leone. J. Med. Plants Res., 16: 11-25.

8. Chivenge, P., T. Mabhaudhi, A.T. Modi and P. Mafongoya, 2015. The potential role of neglected and underutilised crop species as future crops under water scarce conditions in sub-Saharan Africa. Int. J. Environ. Res. Public Health, 12: 5685-5711.
9. Bharucha, Z. and J. Pretty, 2010. The roles and values of wild foods in agricultural systems. Phil. Trans. R. Soc. B Biol. Sci., 365: 2913-2926.
10. Berchoux, T., G.R. Watmough, C.W. Hutton and P.M. Atkinson, 2019. Agricultural shocks and drivers of livelihood precariousness across Indian rural communities. Landscape Urban Plann., 189: 307-319.
11. Cunningham, A.B., 2001. Applied Ethnobotany: People, Wild Plant Use and Conservation. 1st Edn., Routledge, England, UK, ISBN: 9781853836978, Pages: 320.
12. Martin, G.J., 1995. Botany. In: Ethnobotany: A Methods Manual, Martin, G.J. (Ed.), Springer, Boston, MA, ISBN: 978-1-4615-2496-0, pp: 27-65.
13. Tardío, J. and M. Parod-de-Santayana, 2008. Cultural importance indices: A comparative analysis based on the useful wild plants of Southern Cantabria (Northern Spain). Econ. Bot., 62: 24-39.
14. Ayodele, J.T. ands O.S. Olajide, 2011. Proximate and amino acid composition of *Celosia argentea* leaves. Niger. J. Basic Appl. Sci., 19: 162-165.
15. Bouis, H.E., C. Hotz, B. McClafferty, J.V. Meenakshi and W.H. Pfeiffer, 2011. Biofortification: A new tool to reduce micronutrient malnutrition. Food Nutr. Bull., 32: S31-S40.
16. Koné, W.M., A.G. Koffi, E.L. Bomisso and F.H.T. Bi, 2012. Ethnomedical study and iron content of some medicinal herbs used in traditional medicine in Cote D'Ivoire for the treatment of anaemia. Afr. J. Tradit. Complementary Altern. Med., 9: 81-87.
17. Peter, E.L., S.F. Rumisha, K.O. Mashoto and H.M. Malebo, 2014. Ethno-medicinal knowledge and plants traditionally used to treat anemia in Tanzania: A cross sectional survey. J. Ethnopharmacol., 154: 767-773.
18. Pal, D., P. Mishra, N. Sachan and A.K. Ghosh, 2011. Biological activities and medicinal properties of *Cajanus cajan* (L) Millsp. J. Adv. Pharm. Technol. Res., 2: 207-214.
19. Sharma, S., N. Agarwal and P. Verma, 2011. Pigeon pea (*Cajanus cajan* L.): A hidden treasure of regime nutrition. J. Funct. Environ. Bot. 1: 91-101.
20. Gutiérrez, R.M.P., S. Mitchell and R.V. Solis, 2008. *Psidium guajava*: A review of its traditional uses, phytochemistry and pharmacology. J. Ethnopharmacol., 117: 1-27.
21. Chi , A., P.A. Noubissi, O.L. Pop, C.I. Mure an and M.A.F. Tagne *et al*., 2024. Bioactive compounds in *Moringa oleifera*: Mechanisms of action, focus on their anti-inflammatory properties. Plants, Vol. 13. 10.3390/plants13010020.
22. Divya, S., V.K. Pandey, R. Dixit, S. Rustagi and T. Suthar *et al*., 2024. Exploring the phytochemical, pharmacological and nutritional properties of *Moringa oleifera*: A comprehensive review. Nutrients, Vol. 16. 10.3390/nu16193423.
23. Bezerra, J.J.L., A.A.V. Pinheiro and D. Dourado, 2023. Antimalarial potential of *Moringa oleifera* Lam. (Moringaceae): A review of the ethnomedicinal, pharmacological, toxicological, and phytochemical evidence. J. Venomous Anim. Toxins Incl. Trop. Dis., Vol. 29. 10.1590/1678-9199-JVATITD-2022-0079.
24. Aravind, G., D. Bhowmik, S. Duraivel and G. Harish, 2013. Traditional and medicinal uses of *Carica papaya*. J. Med. Plants Stud., 1: 7-15.
25. Menon, D.N., I. de Almeida Balduino Leite, M.T. de Alencar Ramsdorf, L. dos Santos Chagas and S.A. Arroyo *et al*., 2023. Effect of ethanolic extracts from *Piperaceae* leaves on the reduction of skin necrosis and wound healing in an animal model of degloving injuries. Acta Cirúrgica Bras., Vol. 38. 10.1590/acb387223.
26. Roy, A., A. Khan, I. Ahmad, S. Alghamdi and B.S. Rajab *et al*., 2022. Flavonoids a bioactive compound from medicinal plants and its therapeutic applications. BioMed Res. Int., Vol. 2022. 10.1155/2022/5445291.
27. Vergara-Jimenez, M., M.M. Almatrafi and M.L. Fernandez, 2017. Bioactive components in *Moringa oleifera* leaves protect against chronic disease. Antioxidants, Vol. 6. 10.3390/antiox6040091.

28. Wendimu, A., W. Tekalign, E. Bojago and Y. Abrham, 2024. Traditional ethnobotanical knowledge and ethnomedicinal use of plants in the Tropical Rift Valley of Ethiopia. Heliyon, Vol. 10. 10.1016/j.heliyon.2024.e27528.
29. Alum, E.U., 2024. The role of indigenous knowledge in advancing the therapeutic use of medicinal plants: Challenges and opportunities. Plant Signaling Behav., Vol. 19. 10.1080/15592324.2024.2439255.
30. Eshete, M.A. and E.L. Molla, 2021. Cultural significance of medicinal plants in healing human ailments among Guji semi-pastoralist people, Suro Barguda District, Ethiopia. J. Ethnobiol. Ethnomed., Vol. 17. 10.1186/s13002-021-00487-4.
31. WHO., 2013. WHO Traditional Medicine Strategy: 2014-2023. World Health Organization, Geneva, Switzerland, ISBN-13: 9789241506090, Pages: 76.
32. Bodeker, G. and F. Kronenberg, 2002. A public health agenda for traditional, complementary and alternative medicine. Am. J. Public Health, 92: 1582-1591.
33. Shackleton, C.M., S. Ruwanza, G.K.S. Sanni and S. Bennett *et al*., 2016. Unpacking pandora's box: Understanding and categorising ecosystem disservices for environmental management and human wellbeing. Ecosystems, 19: 587-600.
34. Mosadeghrad, A.M., 2014. Factors influencing healthcare service quality. Int. J. Health Policy Manage., 3: 77-89.
35. Udeme, V.U. and U.C. Orumie, 2021. Patients' preferences of healthcare facilities for quality healthcare services in Akwa Ibom State: A game theory approach. Am. J. Oper. Res., 11: 181-198.
36. WHO, 2012. Prevention and Control of Noncommunicable Diseases: Guidelines for Primary Health Care in Low Resource Settings. WHO, Geneva, Switzerland, ISBN: 9789241548397, Pages: 68.
37. Abubakar, I.B., S.S. Kankara, I. Malami, J.B. Danjuma and Y.Z. Muhammad *et al*., 2022. Traditional medicinal plants used for treating emerging and re-emerging viral diseases in Northern Nigeria. Eur. J. Integr. Med., Vol. 49. 10.1016/j.eujim.2021.102094
38. Divya, B.J., M.J. Sravani, J.H. Chandana, T. Sumana and K. Thyagaraju, 2019. Phytochemical and phytotherapeutic activities of *Celosia argentea*: A review. World J. Pharm. Pharm. Sci., 8: 488-505.
39. Asante, D.B., G.A. Wiafe, K.M. Tsegah and N.K. Domey, 2024. Therapeutic benefits of *Vernonia amygdalina* in the treatment of inflammation and its associated diseases. Clin. Complementary Med. Pharmacol., Vol. 4. 10.1016/j.ccmp.2023.100122.
40. Edo, G.I., P.O. Samuel, A.N. Jikah, F.O. Onoharigho, L.I. Idu *et al*., 2023. Biological and bioactive components of bitter leaf (*Vernonia amygdalina* leaf): Insight on health and nutritional benefits. A review. Food Chem. Adv., Vol. 3. 10.1016/j.focha.2023.100488.
41. Tilburt, J.C. and T.J. Kaptchuk, 2008. Herbal medicine research and global health: An ethical analysis. Bull. World Health Organ., 86: 594-599.