

Article

Intergenerational Shifts in Ethnobotanical Knowledge of Wild Edible Plants: Why Conservation Matters?

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Abstract

Wild edible plants play a crucial role in supporting rural livelihoods, yet knowledge about their use remains under documented, particularly among younger generations and across gender lines. This study examined the distribution of ethnobotanical knowledge of wild edible plants across age and gender groups in four municipalities of the Vhembe District, South Africa. Data were collected through semi-structured interviews conducted with 160 participants, primarily in the Venda region. Gendered patterns emerged, where women were more familiar with wild vegetables, while men demonstrated greater knowledge of wild fruits. Promisingly, some female youth demonstrated greater knowledge than older women and male participants. Voucher specimens of the cited plants were verified at the University of Venda Herbarium, and data were analysed using qualitative methods and generalised linear models. Results of this study suggest the need to document and conserve Indigenous knowledge, promote intergenerational knowledge transfer, and empower women and youth in traditional food systems to enhance food security and cultural heritage. The study further provides a foundation for future research on knowledge transmission pathways and supports the development of targeted, community-based conservation and educational initiatives to enhance food security and cultural heritage.

Keywords: ethnobotany; foodways; intergenerationally; genderedness; Vhembe

1. Introduction

This study investigates the ethnobotanical knowledge of wild edible plants among different age and gender groups in the Vhembe District Municipality, aiming to understand the distribution of knowledge and to inform strategies for education, knowledge exchange, and, hence, their conservation. One can ask why study the conservation status of the ethnobotanical knowledge of wild edible plants. The most significant fact is that traditional or wild edible plants were vital then and remain vital now for food security and nutrition. However, most ethnobotanical survey results focus on elders' knowledge, leaving younger generations underrepresented. Indeed, the lack of documentation raises concerns about the potential disappearance of valuable ethnobotanical knowledge if no action is taken [1]. The use of wild foods is declining globally, not only in Africa but worldwide [2]. For example, studies by [3,4] echo the rapid erosion of indigenous knowledge of wild edible plants, including vegetables. On the other hand, some reports from Brazil showed significant knowledge loss among younger generations [5]. Key drivers of this decline,



Academic Editor: Svein Øivind Solberg

Received: 13 March 2026

Revised: 11 May 2026

Accepted: 30 June 2026

Published: 23 July 2026

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as outlined by [6,7], include the abandonment of traditional practices, land-use changes, deforestation, urbanisation, and cultural shifts. Historically, under the apartheid era, the Venda people were confined to the Republic of Venda, a nominally independent Bantustan created in 1979 as part of South Africa's policy of separate development [8]. The Bantustan system was underpinned by extensive land dispossession, territorial fragmentation, and the restructuring of customary land governance, which restricted access to arable land and undermined subsistence-based agrarian livelihoods [8,9]. In Venda, these changes weakened everyday interaction with local landscapes and reduced reliance on indigenous plant resources, contributing to the erosion of intergenerational knowledge related to traditional food plants and their management [10].

1.1. Significance of Conservation of Wild Edible Plants Use Knowledge

Food insecurity, which is characterised by limited access to protein- and energy-rich diets, remains a global challenge [11]. Neglecting wild edible plants, of which many are rich in protein and micronutrients, contributes to widespread malnutrition [11]. Rising food prices primarily affect cultivated crops [12]; however, wild edible plants offer an affordable alternative. These plants are resilient in harsh conditions [13,14] and could help address undernutrition, which affects 223 million people in Sub-Saharan Africa [15]. Conservation of indigenous knowledge is therefore critical to prevent food shortages and sustain traditional diets.

1.2. Food Insecurity and Historical Disruptions in South Africa

Food insecurity in South Africa persists despite national food sufficiency, with rural households in Limpopo, the Eastern Cape, and KwaZulu-Natal being particularly vulnerable due to poverty, unemployment, and climate variability [16,17]. Diets in food-insecure households remain dominated by staple crops such as maize, contributing to micronutrient deficiencies and poor dietary diversity [16,18]. However, Indigenous knowledge systems historically supported food security in South Africa by utilizing wild edible plants such as *Amaranthus* spp. (morogo), *Sclerocarya birrea* (marula) and *Colocasia esculenta* (amadumbe), which are nutrient-dense and well adapted to local agro-ecological conditions [19,20]. Indigenous vegetables provide essential micronutrients, including iron, calcium, and provitamin A, making them crucial for addressing hidden hunger in rural communities [21].

Consequently, food insecurity in South Africa is deeply rooted in historical processes of land dispossession and agricultural restructuring that began under colonial rule and were intensified during apartheid [22,23]. Colonial interventions systematically undermined indigenous land tenure systems and disrupted subsistence-oriented food practices, replacing them with racially exclusionary agricultural and economic arrangements that marginalised African farmers [24]. These processes were further entrenched through apartheid-era policies, particularly the creation of Bantustans, which confined Black South Africans to ecologically constrained and economically marginal territories [8,9].

In regions such as Venda, incorporation into the bantustan system restricted access to arable land, promoted labour migration, and weakened everyday reliance on locally governed food systems [8]. As households increasingly depended on wage labour and market-based food sources, routine interaction with indigenous food plants declined, limiting opportunities for intergenerational transmission of food-related ecological knowledge [10]. These historical disruptions continue to shape contemporary food insecurity, particularly in rural areas, where diminished access to land and erosion of indigenous food knowledge constrain household resilience and dietary diversity [22,25]. The consequences of failure to conserve ethnobotanical knowledge heighten vulnerability to food insecurity and malnutrition by reducing dietary diversity and adaptive capacity [17,20,26].

1.3. Recent Records on Intergenerational Ethnobotanical Knowledge

Recent studies across South Africa and the broader southern African region have increasingly documented the importance of wild edible plants as integral components of indigenous food systems, contributing to household nutrition, cultural identity, and livelihood resilience [27,28]. Despite this recognised importance, ethnobotanical knowledge associated with wild edible plants is experiencing measurable erosion, driven by urbanisation, formal education systems, changing lifestyles, and diminishing intergenerational knowledge transfer [29,30]. Empirical research conducted in Limpopo Province has shown that knowledge of wild edible plants is unevenly distributed across age and gender groups, with older individuals often possessing greater species knowledge than youth [27]. However, emerging evidence suggests that this pattern is not uniform, as some younger community members—particularly women—continue to retain or acquire substantial ethnobotanical knowledge under specific social and cultural contexts [28,31]. These findings highlight the need to move beyond assumptions of linear knowledge loss and to examine localised patterns of knowledge retention.

In the Vhembe District and surrounding regions, recent ethnobotanical surveys have documented a high diversity of wild edible vegetables and fruits, alongside detailed knowledge of plant identification, edible parts, preparation methods, seasonal availability, and associated conservation practices [32,33]. At the same time, studies have reported growing disinterest among formally educated youth in certain indigenous foods, often linked to perceptions of wild foods as outdated or inferior, underscoring the influence of social attitudes on knowledge transmission [27,29].

Additionally, more findings of scholars [34,35] highlighted the critical role of wild edible plants and associated ethnobotanical knowledge systems in advancing biocultural conservation, food security, and sustainable livelihoods across African landscapes. Studies emphasise that community-based and participatory conservation approaches are particularly effective in safeguarding wild edible plant resources, as they integrate local ecological knowledge, cultural values, and intergenerational knowledge transmission into conservation planning [34,35]. Evidence from dryland and rural contexts further illustrates that intergenerational ethnobotanical knowledge gaps, shifting cultural practices, and weak policy implementation pose significant threats to the long-term sustainability of wild edible plant systems, highlighting the need for locally grounded interventions [36]. Biocultural conservation frameworks have also been shown to strengthen conservation outcomes by explicitly linking biodiversity protection with cultural heritage, traditional food systems, and community well-being [37]. Collectively, these studies argue that understanding how ethnobotanical knowledge related to wild edible plants is distributed within communities is essential for designing effective conservation strategies. However, while the Conservation literature provides strong conceptual and practical guidance, finer-scale empirical evidence on age- and gender-differentiated knowledge distribution at the local level remains limited, thereby reinforcing the need for site-specific studies such as the present research. Despite all the efforts exerted, limited understanding of how specific dimensions of ethnobotanical knowledge is distributed across generations and genders within local contexts such as Vhembe. Addressing this gap is essential for informing targeted conservation, education, and revitalisation strategies aimed at sustaining indigenous knowledge systems and supporting food security in rural South African communities.

1.4. Gender-Based Differentiation in Ethnobotanical Knowledge

This phenomenon is often shaped by socio-cultural roles and economic responsibilities within households and communities. In many rural contexts, women are primarily responsible for household food provisioning, preparation, and nutrition, as well as the

collection and processing of leafy vegetables from nearby environments, which may contribute to their richer knowledge of wild vegetable species, edible parts, and preparation techniques [38,39]. Conversely, men's activities, including livestock herding, seasonal movement, hunting, and engagement with markets, typically involve greater spatial mobility and repeated interaction with fruit-bearing trees and forested landscapes, potentially facilitating deeper knowledge of wild fruits and their uses [27,30]. These gendered divisions of labour, combined with culturally regulated access to spaces and resources, can result in differentiated yet complementary bodies of ethnobotanical knowledge within communities [40]. Recognising these socio-cultural dynamics provides an important framework for examining how knowledge of wild edible plants is distributed across gender groups in the study area.

Accordingly, this study seeks to address the following core research question: How is knowledge of wild edible plants differentiated across gender groups, and what socio-cultural factors shape these patterns within the study community? To answer this question, we adopt an ethnobotanical research approach combining semi-structured interviews, free-listing, and field observations to document species knowledge, use patterns, and knowledge distribution among men and women. By explicitly examining gender-differentiated knowledge systems, this study contributes empirical evidence to ongoing debates on biocultural conservation and indigenous food systems. The findings are significant for informing locally appropriate conservation strategies, strengthening intergenerational knowledge transmission, and supporting gender-responsive policies aimed at safeguarding wild edible plants and the cultural knowledge associated with them.

2. Materials and Methods

2.1. Study Area

This study was conducted in the Vhembe District Municipality, Limpopo Province, South Africa. The district covers approximately 2771 km² at an average altitude of 400 m above sea level [41] and lies between 22°56' S and 30°28' E [42]. It comprises four local municipalities: Makhado, Mutale, Musina, and Thulamela (Figure 1). These four local municipalities were selected using a purposive, criteria-based sampling strategy. These municipalities were chosen because they are the only four local municipalities in the Vhembe District. Four villages were also purposively selected to capture substantial ecological and socio-cultural diversity within the region, including differences in vegetation types, settlement patterns, and levels of proximity to urban centers. Importantly, all four municipalities are characterised by a continued reliance on wild edible plants for household consumption and cultural purposes, making them suitable for examining indigenous ethnobotanical knowledge. Within each municipality, the VhaVenda communities were selected based on (i) the presence of active wild edible plant use, (ii) accessibility for fieldwork, and (iii) willingness of community members to participate in the study. This approach was not random; rather, it intentionally focused on communities where traditional knowledge of wild edible plants is still practiced and transmitted. While this sampling strategy does not aim for statistical representativeness, it is appropriate for ethnobotanical research seeking in-depth, context-specific understanding of knowledge distribution and use patterns.

Annual rainfall ranges from 378 mm to 810 mm [43], supporting diverse vegetation types such as north-eastern mountain bushveld, mixed bushveld, sour mixed bushveld, and mopane bushveld within the savanna biome [44,45]. Woodlands along the Soutpansberg mountain range include thickets and patches resembling Afromontane forests [44,45]. Musina Municipality, located in the far north, features vegetation types such as Limpopo Ridge bushveld (185,786.8 ha), Musina Mopane bushveld (550.824 ha), Soutpansberg Mountain bushveld (2827.5 ha), and subtropical alluvial vegetation (18,020.4 ha) [46].

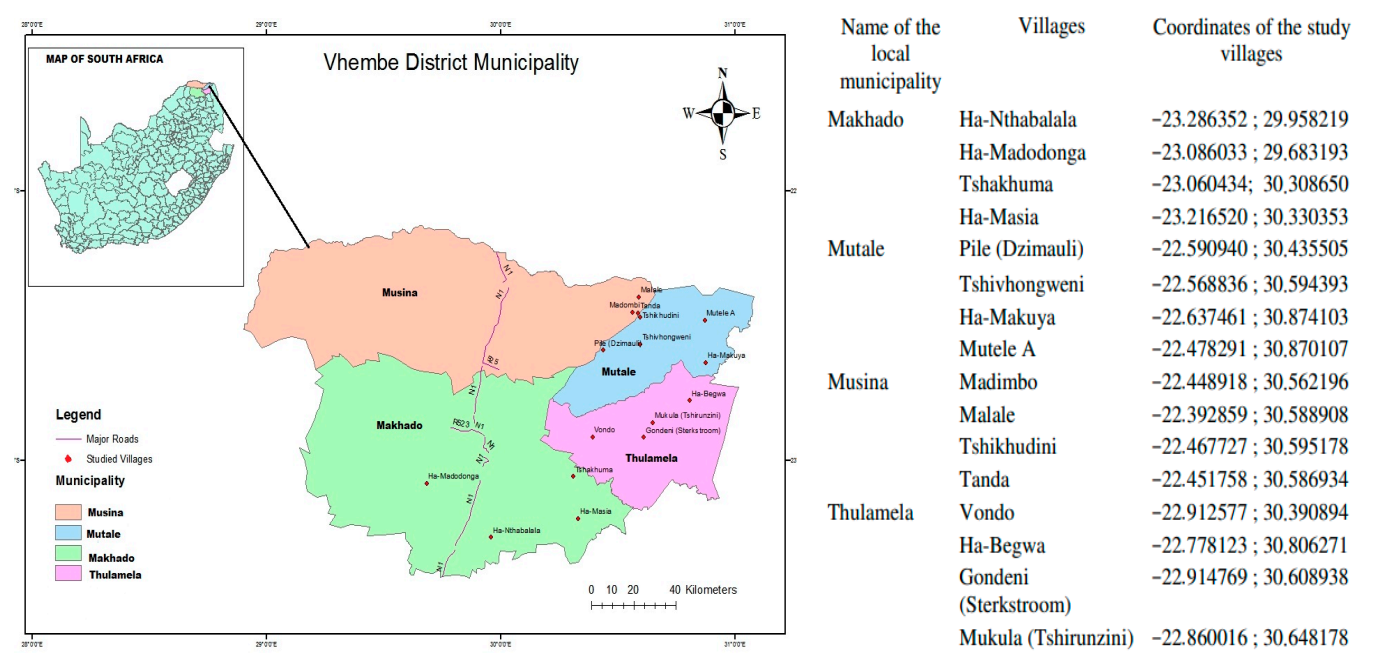


Figure 1. Vhembe District Municipality and its local municipalities [32,43,46].

2.2. Conceptual Framework of the Data Collection

Ethnobotanical data were gathered through semi-structured interviews [5] using standardised questionnaires to ensure comparability. Participants of different ages and genders provided information on local plant names, edible parts, preparation methods, seasonal availability, conservation practices, and taste preferences. The semi-structured interview guide was initially developed in English and subsequently translated into Tshivenda to accommodate participants who were not fluent in English. The Tshivenda version of the questionnaire was reviewed by an independent bilingual Tshivenda–English speaker to ensure conceptual clarity and consistent phrasing of questions. Minor discrepancies were discussed and resolved prior to data collection to maintain equivalence across language versions. Interviews were conducted in the language preferred by participants, thereby ensuring that culturally nuanced concepts related to indigenous food practices and knowledge were effectively communicated.

Fieldwork was conducted over 12 months (June 2018–June 2019) across all four local municipalities. Plant specimens cited by participants were collected in situ with the assistance of local guides to confirm Tshivenda vernacular names and usage. Collected samples were subsequently verified and taxonomically identified at the University of Venda Herbarium, where voucher specimens were prepared and deposited. Botanical identification was carried out using standard southern African taxonomic literature, including *Flora of Southern Africa*, *Plants of Southern Africa* (SANBI), and regionally relevant field guides [47,48]. Where necessary, specimen identifications were cross-checked against herbarium reference collections, and current nomenclature was verified using the SANBI *Plants of Southern Africa* (POSA) database. This multi-reference approach ensured consistency with accepted botanical classifications (Figure 2). Furthermore, Worldflora online (<https://www.worldfloraonline.org/>) [49] was used for the final taxonomic verification of the collected specimens.

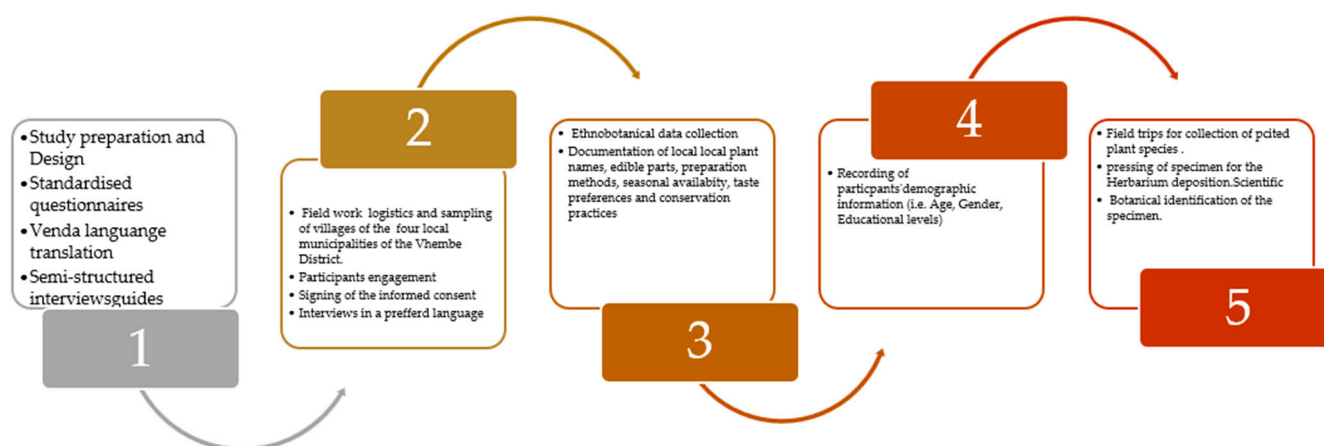


Figure 2. Ethnobotanical data collection methods.

2.3. Data Analysis

Qualitative analysis considered all reported plant names, uses, and parts consumed. For quantitative analysis, species counts per participant were modelled using a generalised linear model (GLM) [5]. Data were initially organized in Microsoft Excel (2010), which was used for summary statistics, graphical representation, and Pearson’s correlation analysis. Inferential statistical analyses were conducted using dedicated statistical software. A Generalized Linear Model (GLM) was employed to examine relationships between socio-demographic variables and the number of plant species cited per participant. Because the response variable is count data, the GLM was specified with a Poisson error distribution and a log link function. Model assumptions were assessed prior to the interpretation of results. Therefore, Pearson’s correlation coefficient was applied to assess the relationship between respondents’ age and ethnobotanical knowledge.

Furthermore, the collected data were analyzed descriptively using the Relative Frequency of Citation (RFC). This ethnobotanical index was achieved by using the formula: $RFC = (FC/N) \times 100$, wherein FC is the number of times the participants mention a traditional plant species, and N is the total number of participants [50,51]. The RFC was preferred because this study primarily focused on exploring ethnobotanical knowledge transfer, which can be initially assessed by recording participants’ ability to cite wild edible plants. Ethnobotanical knowledge was quantified using citation counts, a commonly applied metric in ethnobotanical research. In this study, a “citation” is defined as the spontaneous mention of a unique wild edible plant species by a participant during free listing within semi-structured interviews. Participants were first asked open-ended questions to freely recall wild edible plants known and used in their community. Each distinct plant species named without prior prompting was counted as a single citation. Importantly, species recognition or confirmation that occurred after interviewer prompts or probing questions was used only for verification and clarification purposes and was not included in citation counts. Citation frequency, therefore, reflects participants’ freely recalled knowledge rather than assisted recall, allowing for a more conservative and comparable measure of individual and group-level ethnobotanical knowledge.

3. Results

3.1. Citations of Wild Edible Plants by Different Genders and Age Groups

Most participants were youth aged 18–35 ($n = 74/160$), followed by adults aged 36–60 ($n = 47/160$), and, lastly, adults aged 61 and older ($n = 39/160$). Female informants ($n = 107/160$) were more than male informants ($n = 53/160$). The participants’ ages fell into three age groups: A, 18–35 (73); B, 36–60 (47); and C, 61+ (40). Of 160 participants,

the oldest was a female aged 97, and the oldest male was aged 80. The study's aim was to gather most of the indigenous knowledge from elderly participants; however, in this regard, the old woman and man mentioned 5 and 3 wild edible vegetables, respectively, and 4 and 5 wild fruit plants. These numbers are lower than those mentioned by some youth members.

The fact that some youth members were highly knowledgeable about wild edible plants and their uses provides strong support for Shava's [52] report, which found that youth members contributed the majority of the indigenous knowledge during the survey. The observation showed that elderly females cited vegetables most frequently (23 times), indicating strong ethnobotanical knowledge and reliance on wild vegetables. The opposite prevailed for elderly males, who showed a higher preference for fruits (14 citations) than for vegetables (8 citations) (Figure 3). On the other hand, the youth groups (both male and female) reported fewer wild edible plants overall, suggesting a potential decline in the transmission of traditional knowledge. This observation is further supported by the finding that female youth cited vegetables more than fruits, while male youth had the lowest citation frequency across both categories.

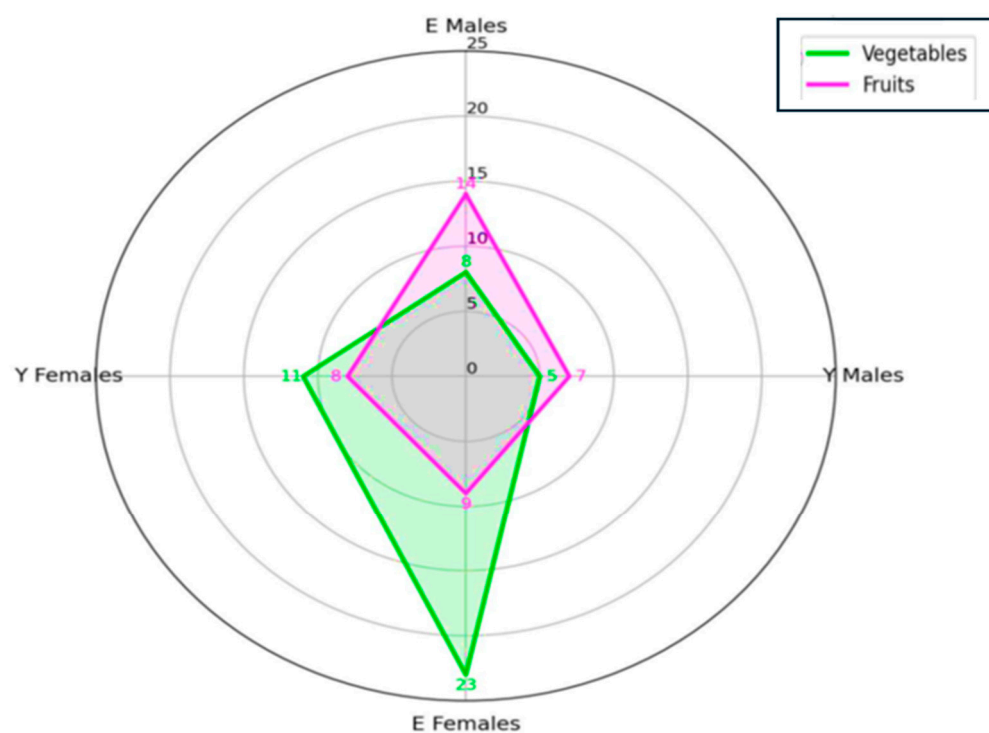


Figure 3. Frequency of citation of wild edible plant species group (E Males = Elderly males; E Females = Elderly females; Y Males = Young males; Y Females = Young females).

Generally, female participants mentioned far more wild edible vegetables than wild edible fruit plants. It is not surprising to obtain this kind of result, as women are found to play a major role in the collection and preparation of wild edible vegetables [53]. The male participants demonstrated more knowledge of wild edible fruit plants, as they spend most of their time in the wild as herdsman. This pattern aligns with findings from recent ethnobotanical studies that emphasise the role of elderly women in preserving and transmitting traditional plant knowledge. For instance, Mabhaudhi et al. [54] highlight that older women in rural South Africa are key custodians of Indigenous food systems, particularly wild vegetables.

The lower citation rates among youth members of the Vhembe District may be attributed to urbanisation, changing dietary preferences, and reduced interaction with natural

environments [55]. Moreover, the gendered differences in plant knowledge are consistent with those found by [56], who discovered that women often possess more detailed knowledge of edible plants due to their roles in food preparation and caregiving. Recent studies have confirmed the existence of age and gender disparities in ethnobotanical knowledge. For example, ref. [27] found that elderly participants in Limpopo Province listed significantly more wild edible plant species than youth, with knowledge primarily acquired through oral tradition and family transmission. It is worth noting that all male participants, across both youth and older generations, mentioned *Sclerocarya birrea* (A.Rich.) Hochst. subsp. *caffra* (Sond.) Kokwaro as a useful indigenous fruit plant. This notion accentuates its popularity, and it is echoed by the findings of [57], which highlight its nutritional significance and potential to combat food insecurity. Other scholars, such as [58], inventoried 70 wild edible plants used by the Batswana, with a notable preference for fruits, accounting for 58.1% of the usage, followed by leaves and tubers. Their findings support the observed gendered preferences, wherein women are more engaged in vegetable use and preparation. Alarmingly, the imbalance in indigenous knowledge, which spans different age groups and genders, requires meticulous attention and consideration. Alarmingly, ethnobotanical knowledge of wild edible plants is unevenly distributed across age groups and genders, highlighting the need for deliberate strategies to address its decline. In response to this challenge, Mbhatsani et al. [57] developed a model aimed at promoting indigenous vegetable consumption among schoolchildren, emphasising the importance of educational and behavioural interventions in sustaining traditional food knowledge among younger generations. Similarly, Olowo et al. [59] showed that the cultivation of indigenous fruits and vegetables significantly improved rural livelihoods in Nigeria, demonstrating that revitalising traditional plant use can yield both nutritional and socioeconomic benefits.

3.2. Correlation Between Age and Knowledge

The results of the current study revealed an extremely weak positive correlation between knowledge of wild edible vegetables and male respondents aged 18–35 years (Figure 4). In contrast, knowledge of wild edible fruit plants among the same group showed a weak negative correlation. These results indicate that younger men possessed limited knowledge of both wild vegetables and fruits. Previous research by Bvenura and Afolayan [60] suggests that men's knowledge of wild vegetables may be influenced by taste preferences, particularly for bitter vegetables that are perceived as healthy and medicinal. However, in the present study, the expectation that men, especially those assumed to spend more time in natural landscapes through herding, would demonstrate greater knowledge of wild fruit plants was not strongly supported. This suggests that factors such as changing livelihoods, reduced engagement with traditional practices, and lifestyle shifts may be constraining opportunities for experiential learning through trial-and-error in the landscape.

Further analysis revealed clear demographic differences in the use of vegetables and fruit trees. Female participants aged 36 years and older showed the strongest positive correlation with vegetable usage ($r = 0.413$), indicating that older women are more actively involved in cultivating or consuming vegetables. This pattern likely reflects women's traditional roles in food preparation and home gardening [61]. In contrast, male participants aged 18–35 years exhibited the weakest association with vegetable use ($r = 0.008$) and a negative correlation with fruit tree use ($r = -0.114$), suggesting minimal engagement. This pattern may be linked to urbanisation, changing lifestyles, and declining interest in home-based food production among younger men [62,63].

Across all demographic groups, vegetable citation showed a moderate positive correlation (mean $r = 0.222$; $SD = 0.167$), suggesting that variability is influenced by cultural practices and socioeconomic conditions. Fruit tree citation, however, displayed a weak

overall association (mean $r = 0.072$), with older men showing slightly higher engagement ($r = 0.154$) than other groups. These findings are consistent with recent studies showing that age and gender play a significant role in shaping dietary behaviour and engagement with traditional food systems. Women and older adults generally demonstrate greater involvement in fruit and vegetable use, while younger men remain the least engaged demographic group [62–64]. Indeed, these trends highlight the need for targeted interventions to improve nutrition literacy, strengthen engagement with indigenous food plants, and promote sustainable food practices among youth and men, who are increasingly disconnected from traditional ecological knowledge systems [63].

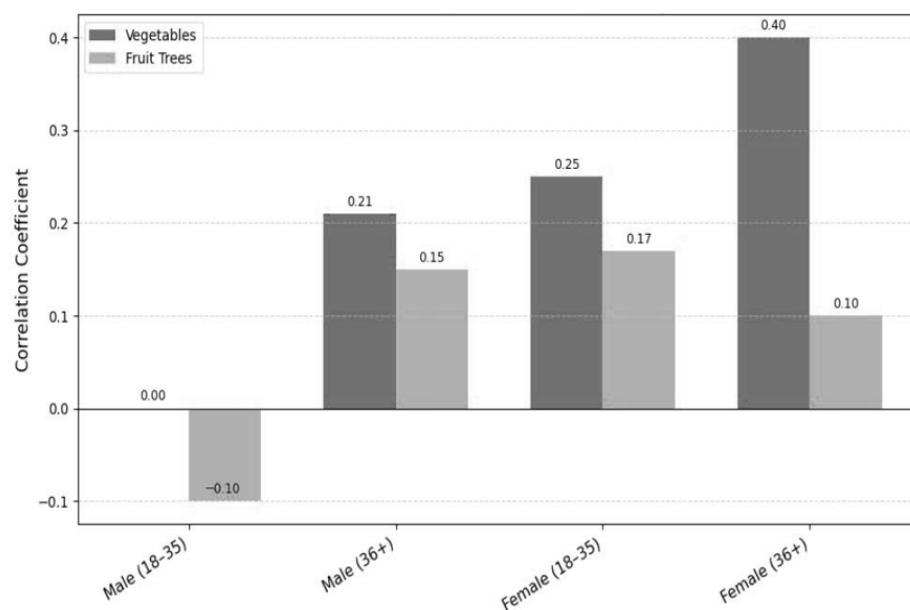


Figure 4. Correlation of Vegetable and Fruit tree usage by gender and age groups.

To further examine whether the relationship between age and ethnobotanical knowledge of wild edible plants differed by gender, a Generalized Linear Model was fitted using age as a continuous predictor with gender included as an interaction term. This approach avoids assumptions of linear ordering across demographic categories while allowing direct assessment of gender-specific age effects. The Generalized Linear Model revealed group-specific differences in wild edible plant knowledge rather than a linear progression across age categories (Figure 5). Accordingly, the model revealed a weak positive association between age and the number of wild vegetable species cited, with no strong evidence that this relationship differed significantly between men and women. Significantly, adult female participants exhibited the highest estimated marginal mean number of cited wild vegetable species, whereas youth groups of both genders showed lower predicted means (Table 1). For wild fruit species, estimated marginal means varied less markedly across demographic groups, indicating weaker differentiation. These results suggest that variation in indigenous plant knowledge is structured by demographic group membership rather than by a continuous age gradient.

Additionally, the results for mean citations show a clear pattern of demographically differentiated ethnobotanical knowledge. Adult participants exhibited higher overall citation means than youth, suggesting cumulative knowledge acquisition through experience and prolonged exposure to wild food resources. Female adults demonstrated particularly strong knowledge of wild vegetables, consistent with gendered household roles in food preparation, daily foraging, and nutritional provisioning. In contrast, male adults exhibited greater knowledge of wild fruit species, likely reflecting broader landscape use, seasonal

mobility, and engagement with fruit-bearing trees beyond homestead areas. Among youth, the lower citation means across both categories suggest partial erosion or incomplete transmission of traditional knowledge, although gendered patterns remain evident. Presenting these mean comparisons and significance tests alongside the figure strengthens the interpretability of the results and highlights the importance of demographic factors in shaping wild edible plant knowledge.

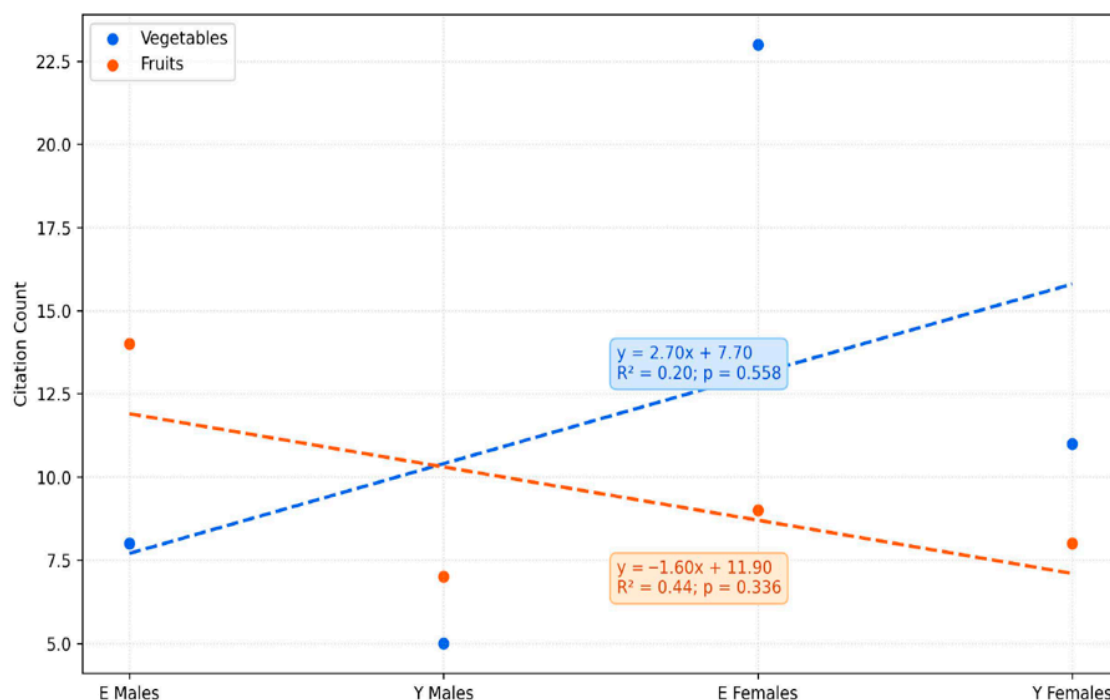


Figure 5. Generalised Linear Model trends of wild edible plant citations.

Table 1. Mean number of cited wild edible plant species by demographic group.

Demographic Group	Wild Vegetables (Mean Citations)	Wild Fruits (Mean Citations)	Dominant knowledge Category
Male youth	5.0	7.0	Wild fruits
Female youth	11.0	8.0	Wild vegetables
Male adult	8.0	14.0	Wild fruits
Female adult	23.0	9.0	Wild vegetables

Note: Values represent mean numbers of distinct wild edible plant species spontaneously cited per group.

While overall differences in citation counts highlight variation in the quantity of wild edible plant knowledge across demographic groups, analysis at the species level indicates that knowledge is partly concentrated around a limited number of widely recognised species. Among wild vegetables, *Corchorus tridens* L. emerged as the most frequently cited species across all demographic groups, reflecting its widespread availability, frequent consumption, and cultural importance within the study area. In contrast, other vegetable species were cited less consistently, suggesting uneven retention or transmission of knowledge beyond a core set of commonly used plants. Similarly, *Sclerocarya birrea* (A.Rich.) Hochst. subsp. *caffra* (Sond.) Kokwaro was the most frequently cited wild fruit species, particularly among adult participants, indicating strong shared knowledge of this culturally and nutritionally significant species. However, citations of other wild fruit species varied markedly among groups, with male adults citing a wider range than youth and female participants. This pattern suggests that while knowledge of certain keystone wild food species remains robust, broader knowledge of less common species may be more fragmented and demographically differentiated. Shedding light on these findings, it is clearly illustrated

that indigenous knowledge of wild edible plants is not uniformly distributed across species. Instead, it appears to be anchored around a small number of culturally salient species, with more specialised or less frequently used species showing weaker and more uneven knowledge transmission, particularly among younger generations.

3.3. Age Variation in Knowledge of Wild Edible Plants

The results indicate that elderly respondents are more knowledgeable than youth members. This ultimately gives the impression that knowledge of wild edible plants still resides with the elderly people of the Vhembe District Municipality. A similar scenario was experienced by Kwinana-Mandindi and Afolayan [65] during their survey of participants in the Amathole District Municipality. Similar results were observed by and [66–68]. Additionally, Shalini et al., [69] observed during data collection that knowledge about plants was more prevalent among older individuals (>35 years). Furthermore, some participants commented that young members of the communities are not participating in the collection and processing of these wild vegetables, and thus, knowledge about some of the species may be lost. These findings are supported by reports from other studies [70,71], which also reported the same finding. The fact that younger generations impart less information about wild edible plants raises concern about the transmission of knowledge.

3.4. Contribution of Participants' Educational Level on Knowledge of Wild Edible Plants

Figure 6 illustrates the educational status of the survey participants. A total of 56% of the survey sample ($n = 160$) holds secondary education. Amongst the secondary education holders, the majority (90%) of respondents are between 18 and 40 years old. The study revealed that participants in the age group generally lacked interest in learning from older generations [60]. Some responses from this cohort indicated that “we don’t eat leaves.” They also pronounced the fact that they grew up eating wild vegetables; and therefore, it is no longer time for them to eat wild vegetables. According to them, eating plant-based foods is associated with poverty simply because they were the only food available when no other food was available. The fact that they have an education also contributes to a loss of interest in learning about and continuing to use wild plants.

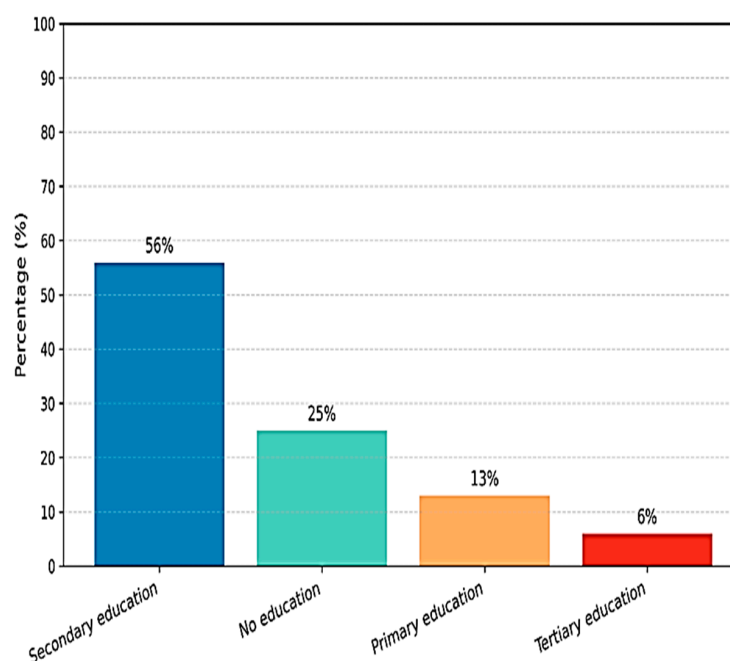


Figure 6. Educational status of the respondents.

Another fact is that the relocation of indigenous people from rural to urban communities is due to their level of education. Therefore, urbanisation, as well as urban lifestyles, has a significant impact on the way rural African populations live. This, therefore, results in changes to indigenous species knowledge and use. Nevertheless, in communities living far from cities, knowledge of wild edible plants appears to be passed down from one generation to the next.

4. Discussion

4.1. Demographic Patterns in Wild Edible Plant Knowledge

The demographic findings indicated that most participants were youth aged 18–35, followed by adults aged 36–60, and older adults aged 61 and above. The findings demonstrate clear demographic differentiation in knowledge of wild edible plants across age and gender groups. Nevertheless, the overall trend remained consistent with the wider ethnobotanical literature: knowledge of wild edible plants increased with age, with older adults generally citing a higher number of species than youth. Similar age-related gradients in ethnobotanical knowledge have been documented across Africa and other regions, where cumulative learning, repeated exposure, and long-term engagement with natural environments contribute to deeper plant knowledge among older individuals [27]. On the other hand, repeated exposure to natural environments, sustained participation in foraging, and long-term reliance on wild resources enhance experiential learning and knowledge retention. However, the observation that some older participants cited fewer species than certain youths indicates that age alone does not uniformly predict knowledge levels. This suggests that ethnobotanical knowledge is shaped not only by chronological age but also by individual livelihood histories, degrees of environmental engagement, and continuity of cultural practice.

4.2. Youth Knowledge Decline and Lifestyle Transitions

Although the study was anticipated to capture indigenous knowledge primarily from elders, a striking observation emerged where some of the oldest participants listed fewer wild edible vegetables and fruits than some of the youths. Nonetheless, the broader pattern showed that older participants generally listed more wild edible plant species than younger respondents, a trend similarly reported in other ethnobotanical studies [57]. The relatively lower number of species cited by youth can be attributed largely to lifestyle transformations driven by modernisation, urbanisation [57], and changing food systems. Younger generations increasingly rely on store-bought foods and formal markets, reducing their dependence on wild edible plants and limiting opportunities for experiential learning in natural landscapes. These findings align with global evidence showing that globalisation and dietary transitions weaken everyday interactions with wild foods and erode traditional ecological knowledge among youth [72,73]. Reduced interaction with wild environments constrains the practical contexts through which plant knowledge is acquired, remembered, and renewed.

4.3. Intergenerational Knowledge Transmission and Its Disruption

Another major impediment is the decline in intergenerational knowledge transmission. An ethnobotanical study conducted by Mothupi and Shackleton [27] has documented that knowledge of edible plants is primarily acquired through oral tradition, family participation, and daily interaction with elders. Therefore, alarmingly, when younger people spend less time with elders or participate less in subsistence activities, the flow of knowledge becomes interrupted. Previous studies in southern Africa and elsewhere demonstrate that ethnobotanical knowledge learned through daily interaction with older family members is far more durable than knowledge acquired through indirect or formal means [74,75].

Thus, reduced intergenerational contact not only limits knowledge acquisition but may also accelerate irreversible knowledge loss. Similarly, research conducted in Niger showed that ethnobotanical knowledge increases with age, and youths tend to have limited knowledge of edible plants because they engage less with traditional subsistence activities that historically transferred this knowledge [76].

Cultural value shifts further exacerbate this trend. In many rural contexts, wild vegetables and fruits are increasingly perceived by youth as symbols of poverty or indicators of “backwardness,” leading to disinterest in learning or consuming them. This stigmatization of traditional foods has been widely reported and is strongly associated with the adoption of modern identities and aspirations [77,78]. Formal schooling can compound this effect by restructuring daily schedules and prioritising formal knowledge systems over experiential ecological learning. While education brings undeniable social benefits, it may accidentally marginalise indigenous knowledge by physically and culturally distancing young people from traditional practices [73].

Environmental and spatial factors also play a decisive role in shaping knowledge transmission. As access to communal lands diminishes through urban expansion, land-use change, and tenure restrictions, opportunities for youth to interact with wild plant habitats decline. Research from Ethiopia and other African contexts shows that communities located farther from urban centres and closer to intact natural environments consistently retain more extensive ethnobotanical knowledge than those in peri-urban settings [79,80]. This finding reinforces the notion that ethnobotanical knowledge is not only socially transmitted but also ecologically reinforced through frequent interactions with the landscape. Similarly, Abera and Belay [80] echo this notion by alluding that communities living in remote areas possess greater knowledge of edible plants than those living closer to modernized centers [79]. This suggests that proximity to natural environments and frequency of plant-related activities strongly influence the retention of plant knowledge.

4.4. Gendered Distribution of Ethnobotanical Knowledge

Gender-based differences in wild edible plant knowledge align with socially differentiated roles within households and communities. Female participants, particularly adult women, demonstrated greater familiarity with wild vegetables, which are closely linked to household food preparation and daily nutrition. In contrast, male adults exhibited broader knowledge of wild fruits, likely reflecting greater spatial mobility, livestock herding, and interaction with fruit-bearing trees beyond homestead spaces. These patterns support the concept of complementary gendered knowledge systems rather than knowledge inequality, reinforcing the importance of recognising gender-specific roles when designing conservation and knowledge-revitalisation initiatives.

4.5. Novelty of Gendered Distribution of Ethnobotanical Knowledge

An unexpected but important finding of this study was that some female youth demonstrated relatively high levels of knowledge of wild edible plants, in some cases comparable to or exceeding those of older participants. This challenges the commonly held assumption that indigenous plant knowledge is concentrated primarily among elderly community members. While the present study did not explicitly investigate the mechanisms underlying knowledge transmission, several plausible explanations may account for this pattern. One possibility is strengthened intergenerational learning within households, particularly in contexts where grandmothers or older female relatives play a central role in caregiving and food preparation, thereby facilitating knowledge transfer to younger women. Female youth may also be more actively involved in domestic food-related activities, providing greater exposure to indigenous vegetables and fruits. In addition, recent educational initiatives,

school-based nutrition programs, or local efforts aimed at reviving indigenous food systems may be increasing awareness and interest among younger generations.

Rather than indicating a uniform resurgence of traditional knowledge, this finding likely reflects context-specific pathways of knowledge retention that merit closer investigation. Importantly, these observations suggest that female youth could be key allies in efforts to revitalise indigenous food knowledge and practices. Future research should therefore explicitly examine the social, educational, and familial factors that enable knowledge acquisition among young women, as such insights could inform the design of more effective, youth-inclusive knowledge-transfer and food-security interventions. Therefore, the findings of this study suggest that conservation and revitalisation strategies should move beyond conventional, unidirectional models of knowledge transfer from elders to youth. Notably, the relatively high levels of indigenous plant knowledge observed among some female youth indicate that younger community members can also serve as important knowledge holders. This highlights the potential value of identifying and empowering such knowledgeable youth as peer-to-peer educators who can facilitate knowledge exchange within their age groups and social networks.

Furthermore, the observed association between higher education levels and expressions of disinterest in wild foods (e.g., perceptions such as “we do not eat leaves”) underscores the need for carefully designed educational interventions. Rather than presenting indigenous foods solely as cultural heritage, school-based curricula could integrate nutritional science and health education to emphasise the demonstrated dietary and medicinal value of wild edible plants. By addressing stigma and reframing indigenous foods as nutritionally valuable and relevant to contemporary lifestyles, such approaches may enhance acceptance among younger and more formally educated populations.

4.6. Concentration of Knowledge on Keystone Species

Importantly, species-level analysis reveals that knowledge transmission may not be evenly distributed across all wild edible plants. Instead, knowledge appears concentrated around a small number of culturally salient and commonly used species. In the present study, *Corchorus tridens* L. emerged as the most cited wild vegetable, while *Sclerocarya birrea* (A.Rich.) Hochst. subsp. *caffra* (Sond.) Kokwaro dominated citations among wild fruits. The prominence of these species suggests that they function as “keystone cultural species,” whose continued use and visibility help anchor ethnobotanical knowledge even as broader plant knowledge declines. Similar patterns have been observed elsewhere, where a limited subset of highly valued species remains well known while knowledge of less common species deteriorates rapidly [30,77].

4.7. Study Limitations

Several limitations should be acknowledged. First, the study relied on citation frequency as a proxy for knowledge, which captures recall but not depth of understanding, practical competence, or frequency of use. Second, the cross-sectional design limits the ability to assess temporal changes in knowledge transmission. Third, although purposive sampling strengthened contextual relevance, findings are not statistically generalisable beyond the study area. Future research integrating longitudinal designs, participatory observation, and practice-based assessments would provide a richer understanding of knowledge dynamics.

5. Conclusions

The study revealed a complex interplay between age, gender, and ethnobotanical knowledge of wild edible plants in the Vhembe District Municipality. While expectations

leaned toward elderly respondents as the primary custodians of traditional plant knowledge, some youth participants demonstrated unexpectedly high levels of awareness. This also suggests that ethnobotanical knowledge is not exclusively age-bound and may still be actively transmitted in certain contexts. Female participants, particularly elderly women, showed greater familiarity with wild edible vegetables, consistent with their traditional roles in food preparation and collection. Conversely, male participants, especially elderly men, were more knowledgeable about wild fruits, likely due to their time spent in the wild as herders. However, the study also highlighted a concerning trend of younger generations, particularly those with secondary education and urban exposure, who are losing interest in using wild edible plants. Comments such as “we don’t eat leaves” reflect a cultural shift influenced by modernisation and changing dietary norms. This aligns with findings from other researchers who noted that urbanisation contributes to the erosion of Indigenous plant knowledge. Despite isolated cases of knowledgeable youth, the overall pattern confirms that older community members still predominantly hold traditional ecological knowledge. Some caution must be exercised to deliberately preserve and transmit this knowledge; otherwise, there is a real risk of cultural and ecological loss. Conservation and revitalisation of Indigenous knowledge through documentation, education, and policy integration are increasingly recognized as essential strategies for strengthening food system resilience and achieving sustainable food and nutrition security in South Africa.

Culturally salient species such as *Corchorus tridens* L. and *Sclerocarya birrea* (A.Rich.) Hochst. subsp. *caffra* (Sond.) Kokwaro could serve as entry points for revitalising broader plant knowledge. Gender-responsive strategies that recognise women’s and men’s complementary knowledge domains are essential. Integrating indigenous knowledge into local education programmes and conservation planning may further enhance knowledge transmission while respecting cultural context.

6. Recommendations and Implications

Recommendations from this study suggest that preserving and promoting Indigenous plant knowledge requires implementing several strategies. Community-based knowledge transfer programs can foster intergenerational learning by encouraging elders to share traditional practices with youth through storytelling, practical demonstrations, and seasonal foraging activities. Integrating Indigenous plant knowledge into school curricula, particularly in life sciences and agricultural studies, will provide learners with early exposure and foster an appreciation for this knowledge. Additionally, documentation and digital preservation through community-led databases or archives can safeguard plant names, uses, preparation methods, and cultural significance for future generations. Women, as key custodians of wild vegetable knowledge, should be empowered through targeted agricultural support, training, and recognition initiatives. Youth engagement campaigns that reframe wild edible plants as nutritious and sustainable food sources can help counter the stigma that sees them as “poverty food.” Finally, strong policy and funding support from local governments and NGOs is essential to finance ethnobotanical research and community conservation projects, ensuring the protection of Indigenous plant knowledge and biodiversity.

Author Contributions: Conceptualization, M.G.M.; methodology, M.G.M.; formal analysis, M.G.M.; investigation, M.G.M. and M.P.T.; data curation, M.G.M.; writing and original draft preparation, M.G.M.; writing, review, and editing, M.G.M. and M.P.T.; supervision, M.P.T. All authors have read and agreed to the published version of the manuscript.

Funding: This research received no external funding.

Institutional Review Board Statement: Ethical review and approval were waived for this study. According to Section 3.5 (“Working with traditional knowledge”) of South Africa’s Bioprospecting, Access and Benefit-Sharing Regulatory Framework, “No permits are required but you will need to obtain permission from the traditional knowledge holder and get their prior informed consent. You are required to notify the Minister of your research.” For this study, only permission from the chiefs and consideration of the consent agreement were required. All participants signed the consent form, which guaranteed the protection of their privacy.

Informed Consent Statement: Informed consent was obtained from all participants involved in the study prior to data collection.

Data Availability Statement: The data presented in this study are available on request from the corresponding author. The data are not publicly available due to ethical and confidentiality considerations.

Conflicts of Interest: The authors declare no conflict of interest.

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