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Journal of Ethnobiology and Ethnomedicine (2025) 21:28
https://doi.org/10.1186/s13002-025-00778-0

Journal of Ethnobiology and Ethnomedicine

RESEARCH

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Medicinal plants trade in Harare's urban markets: diversity, conservation status, and economic significance

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Abstract

Background Urban markets serve as crucial centres for trading traditional medicinal plants, yet there is limited research on the diversity, geographic origins, and socio-economic contributions of these plants. Therefore, this study aimed at understanding the species composition and diversity, conservation status, and economic importance of medicinal plants in urban markets of Harare, Zimbabwe, to provide insights into their sustainability and cultural significance.

Methods This study surveyed medicinal plant vendors in three major urban markets in Harare, Mbare, Highfield, and the Central Business District (CBD) in 2019 over a period of three months. Data were collected through semi-structured questionnaires to inventory medicinal plant species, document vendors' districts of origin, and assess harvesting practices. Species diversity was analysed using Shannon–Wiener and Simpson diversity indices, while Non-metric Multidimensional Scaling (NMDS) was used to compare species composition across markets. The informant consensus factor (ICF) was calculated to determine the level of agreement among vendors on the medicinal use of plant species.

Results A total of 64 medicinal plant species were identified, with Fabaceae being the most represented family. Sixty-one species were in the least concern IUCN Red List category. Key species with high use reports included *Entada goetzei* (62), *Cassia abbreviata* (58), *Pterocarpus angolensis* (40), and *Albizia anthelmintica* (31). Roots were the most sold plant part, followed by bark and leaves. Mbare exhibited the highest species richness (54), followed by Highfield (34), while the CBD recorded the lowest richness (23). Non-metric Multidimensional Scaling (NMDS) analysis revealed distinct differences in species composition among the three markets ($R=0.492$), with Highfield displaying a unique suit of medicinal plant species. Vendors primarily originated and sourced their medicinal plants from eastern Zimbabwe, particularly Chipinge, highlighting a strong link between plant sourcing and geographic origin. The ICF was highest for gastrointestinal disorders (0.807), women's health (0.778), sexually transmitted infections (0.746), and labour-related ailments (0.842). Medicinal plant trade contributed significantly to vendors' livelihoods, with monthly incomes ranging from US$150 to $300.

Conclusion This study underscores the high diversity of medicinal plants and their socio-economic importance in Harare's urban markets. This shows that traditional medicine is still considered important in primary health care in the city of Harare. However, the reliance on distant districts ($\sim\geq 100$ km) for plant sourcing raises concerns about the possibility of unknowingly overharvesting.

Keywords Diversity, Harare, Medicinal plants, Public markets, Use report, Informant consensus factor

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Background

Traditional medicine, recognized globally as a complementary approach to modern healthcare, holds significant importance in both rural and urban settings [1–5]. Urban populations frequently seek natural remedies, motivated by factors including their relative affordability and cultural tradition, resulting in a high demand for traditional medicines [6, 7]. Remarkably, global data from 2012 indicate widespread usage of Traditional and Complementary Medicine (T&CM) in various industrialized nations, with substantial percentages of the population incorporating these practices into their healthcare routines [8]. This trend is especially pronounced in countries like Canada, Chile, Colombia, and certain African nations, where T&CM usage rates soar as high as 80% [6, 8].

In South Africa, for example, a significant proportion of the urban population (72%) was observed to still rely on traditional medicine [9], with approximately 27 million consumers nationwide [10]. However, this growing demand raises concerns about the sustainability of medicinal plant species due to overharvesting [11], exacerbated by the need to source plants from distant locations as urbanization progresses [11, 12]. The provenance of medicinal herbs sold by different vendors must be understood, as this knowledge is essential to not only ensure the efficacy and safety of these plants but also to promote the sustainable harvesting and management of medicinal plant resources.

In Zimbabwe, traditional medicine has played a pivotal role in healthcare delivery, serving a substantial portion of the population for decades [13]. However, there exists a significant gap in understanding the trade and utilization of medicinal plants, particularly in urban centres like Harare, where urbanization, commercialization, and cultural shifts influence the dynamics of medicinal plant use. Due to the significant population growth in Harare, the healthcare infrastructure has struggled to keep pace, leading to shortages of essential drugs and medical equipment, further highlighting the importance of alternative healthcare options such as traditional medicine [14]. Traditional medicine in Zimbabwe is deeply rooted in cultural heritage, with traditional healers holding esteemed positions and preserving indigenous healing practices [15].

In urban settings like Harare, where access to conventional healthcare is limited, traditional medicine offers accessible, affordable, and culturally resonant solutions. The reliance on traditional medicine in urban areas reflects broader socio-economic factors such as poverty, unemployment, and healthcare disparities, underlining the need for holistic healthcare strategies that integrate traditional and modern medical practices effectively [16]. While studies have documented the use of medicinal plants in rural Zimbabwean communities [17–22], there is limited information on their trade and utilization in urban areas. Urban markets like those in Harare serve as significant hubs for the documentation and trade of medicinal plant species, providing valuable insights into plant sources, use reports, contribution to livelihoods, and general diversity [3, 11, 23–25]. It is against this backdrop that this study aims to document the diversity of ethnomedicinal plant species sold in Harare markets, identify their places of origin, assess their conservation status using the IUCN Red List, and examine the role of ethnomedicinal plant trade to income generation.

Methods

Study area

The study was conducted in Harare, the capital city of Zimbabwe, located 17°51′50 S and 31°1′47 E in the north-eastern upland areas of the country (Fig. 1). Harare falls on the Highveld plateau at an elevation of 1450 m asl. The city receives an average annual precipitation of 850 mm, while the mean annual temperature is approximately 22 ^{0}C [26, 27]. With a population of 1,849,600 people as of 2023 (UNICEF, 2023), Harare stands as Zimbabwe's pivotal hub for finance, commerce, communication, and trade. Since gaining independence in 1980, the city's population has surged more than threefold [28]. However, this rapid growth has not been matched by a corresponding expansion in health infrastructure. Harare continues to rely on the three major referral hospitals inherited from the colonial era, which suffer from chronic underfunding and persistent shortages of essential medicines [29]. Consequently, the pressure on the city's healthcare system remains immense, prompting many citizens to turn to traditional medicinal practices as a viable alternative. While private clinics have emerged, their services often come at a high cost, rendering them inaccessible to a significant portion of the population, particularly those from impoverished backgrounds. The selection of the three markets—Mbare, Highfield, and Harare Central Business District (CBD)—was based on their strategic locations in densely populated areas and their significance as commercial hubs within Harare. Mbare is a central destination for large volumes of traders from diverse rural and urban areas and is located approximately 5 km from the CBD (Fig. 1). At the market, traders sell their produce from both designated stalls and street pavements. Highfield market is nearly 10.2 km from the CBD and has a big marketplace similar to Mbare where people trade in commodities such as furniture, clothes, vegetables and traditional medicine at designated stalls. The CBD has a large population and is the center of most commercial activities, including street vendors selling

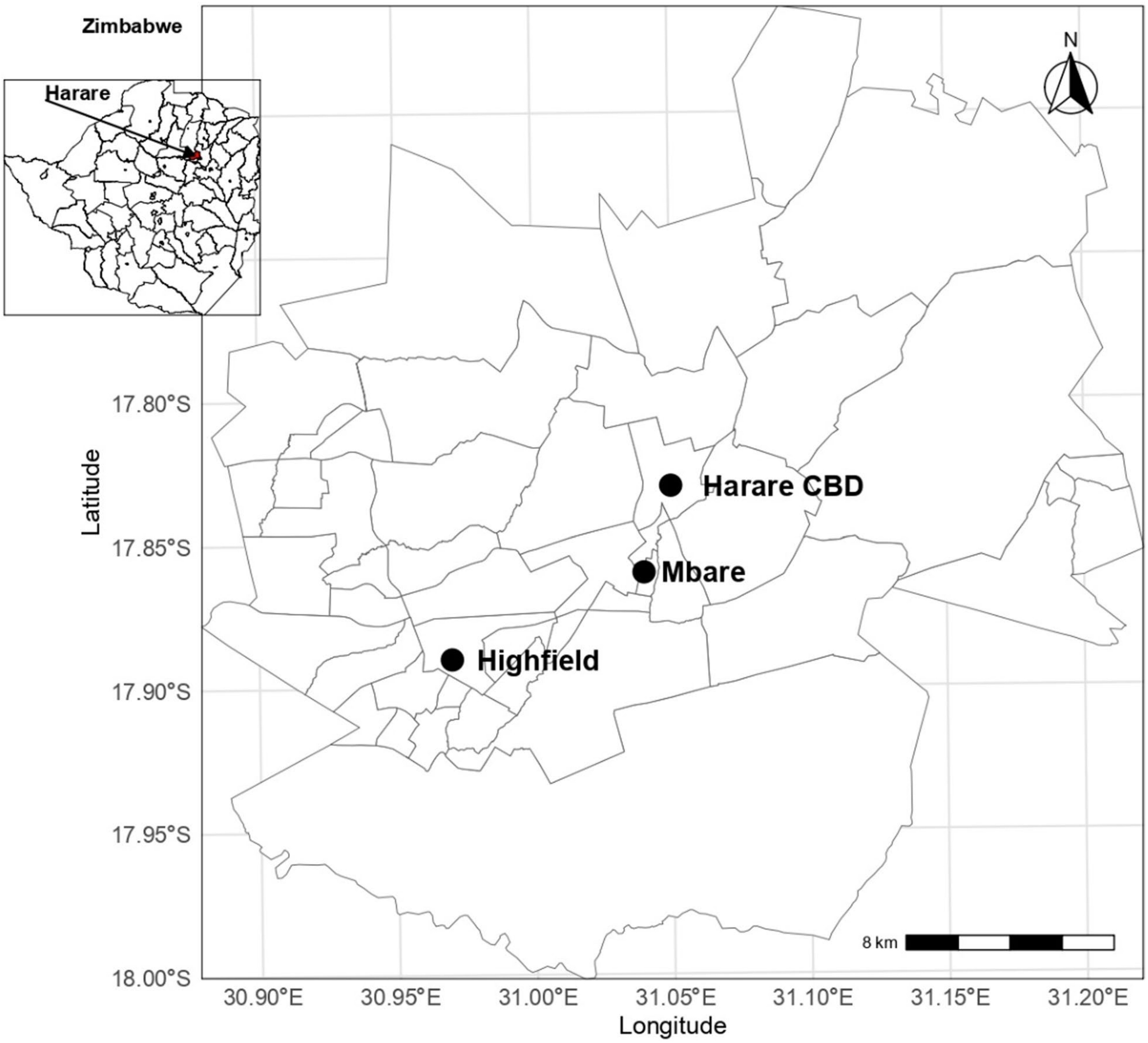

Fig. 1 Map showing the location of the city of Harare in Zimbabwe (**a**) and the location of sampled markets in Harare as black dots (**b**)

various products such as medicinal plants on street pavements. Therefore, these three markets were selected for their high level of activity in buying and selling.

Data collection

Vendors were targeted based on their experience, with a focus on those who had been selling herbs at these markets for at least one year, excluding transient or "fly-by-night" medicinal vendors. We created a comprehensive list of all vendors selling medicinal herbs in each market, regardless of the size or stock level of their stalls. Each vendor was assigned a unique identifier, and a random number generator was used to select participants from this list. This approach ensured that every vendor meeting the inclusion criteria (i.e. selling herbs for at least one year) had an equal chance of being selected, irrespective of their stall size or stock diversity, resulting in a total of 40 respondents (Mbare = 16, Highfield = 11, CBD = 13). Medicinal plant vendors directly involved in marketing medicinal plants were interviewed after being briefed on the study's objectives and providing oral consent. Semi-structured questionnaires were used during the surveys, and an inventory of the common names of plants sold by each trader was compiled. Each trader was treated as an individual sample. Due to the diverse nature of medicinal plant products (e.g. barks, roots, leaves, powders), the presence and absence of species were recorded, allowing for multiple plant parts of the same species being sold by a single trader. Additional information gathered encompassed participant demographics, district of origin, district where they harvest. Respondents were asked to provide the vernacular names of the medicinal plant species they sold, whether processed or unprocessed. Medicinal plant species were identified using a field guide tailored to Zimbabwean flora, primarily documented in vernacular terms [30]. To minimize errors in identification, it was ensured that all reported medicinal plant species are well known and have unique names in the predominant vernacular languages of Harare (*ChiShona* and *IsiNdebele*). Additionally, potential issues such as two vernacular names representing single taxon, for example muunga or munzwa, were addressed based on prior study [25]. A set of voucher specimens for all the recorded species were purchased and identified at the National Herbarium and Botanic Garden in Harare, Zimbabwe (SRGH). The external appearance and characteristics of the plant parts sold under the same name across different shops were consistent throughout the survey and corresponded to the voucher specimens in the reference collection at the National Herbarium and Botanic Garden in Harare, Zimbabwe.

To assess the conservation status of the medicinal plants sampled in this study, we used the International Union for Conservation of Nature (IUCN) Red List of Threatened Species [31]. Each species was searched on the IUCN Red List database to determine its conservation category. The plants were classified into one of the following categories based on the IUCN criteria: Least Concern (LC), Near Threatened (NT), Vulnerable (VU), Endangered (EN), Critically Endangered (CR), Extinct in the Wild (EW), or Extinct (EX). We added our own class for species that did not appear on the IUCN Red List and categorized them as Not Evaluated (NE). This classification helped provide insights into the conservation status of the medicinal plant species documented in the study. We also did not consider the conservation status of exotic species since their status was driven from their native countries.

Data analysis

Diversity of medicinal plant species available in markets

In order to determine how species richness, Shannon diversity and Simpson diversity increase with sampling effort and completeness, sample-size and coverage-based curves along with confidence envelopes were generated in the *iNEXT* package in R statistical software version 4.2.3 [32]. Sample-based curves evaluated the number of individuals in a sample by plotting diversity estimates in relation to the number of sampling units. Coverage-based curves were plotted against rarefied sample completeness to illustrate diversity estimates in relation to sample coverage. All extrapolation curves were plotted using a doubling in sample size, and 3000 bootstrap replicates were used to estimate 95% confidence intervals. Ninety-five per cent confidence intervals were used to determine whether there were statistically significant differences between sites [33, 34]. Non-overlapping 95% confidence intervals between sites indicate statistically significant differences at the 5% level [35].

Similarity in medicinal plant species composition sold in markets

To test for significant differences in plant assemblage composition traded by medicinal vendors between the three sampled markets, analysis of similarity (ANOSIM) was applied (Clarke and Warwick, 2001). The output was interpreted based on the R statistic since p-values are sometimes unreliable depending on sample size [36]. In this study, the R-statistic measures the dissimilarity between assemblages from the three sampled sites (Mbare, Highfields, and CBD), with values close to 1 indicating high dissimilarity. R-statistic values ≥ 0.3 were considered important [37]. We employed Non-Metric Multi-Dimensional Scaling (nMDS) based on Jaccard distance of species composition between the sites in the Plymouth Routines in Multivariate Ecological Research (PRIMER) software to visually represent the three sites (Mbare, Highfield, and CBD). Similar samples group closely together on the plot, while dissimilar groups are more distant from each other.

Use report

Our ethnobotanical data were first subjected to a simple calculation of the use report (UR), a metric that provides insight into the significance of a species based on the number of uses reported by informants [38]. The UR is calculated for each species by summing the total number of uses reported across all informants within each use-category associated with that species [39, 40]. Although the use categories are based on the information we obtained during the survey, our broad categorization was also guided by International Classification of Primary Care (ICPC) set standards [41, 42]. This can be expressed by the following equation:

$$URs = \sum_{u=1}^{uNC} \sum_{i=1}^{iN} UR_{ui}$$

where

- *URs* is the Use Report for species *s*.
- UR_{ui} represents the use report for each informant *i* within each use-category *u* for species *s*.
- *uNC* is the total number of use categories for the species.
- *iN* is the total number of informants who reported uses for the species.

Informant consensus factor

To assess the level of agreement among the surveyed medicinal vendors regarding the use of plant species for specific therapeutic purposes, we applied the informant consensus factor (ICF). The ICF provides insight into the cultural importance and reliability of plant use knowledge within a community, reflecting the consensus on the use of plant species for treating particular ailments (Trotter and Logan, 1986).

The ICF is calculated for each category of ailments (e.g. gastrointestinal, dermatological, respiratory) using the following formula:

$$\mathrm{ICF} = \frac{N_{ur} - N_t}{N_{ur} - 1}$$

where

- N_{ur} is the total number of use reports for particular ailment category. A use report is recorded every time an informant mentions a specific plant species for treating a particular ailment.
- N_t is the number of different plant species used to treat that ailment category.

The ICF value ranges from 0 to 1. A value close to 1 indicates a high level of consensus among informants, meaning that a few species are widely recognized for treating specific ailments. A value closer to 0 suggests low consensus, implying that many different species are used for treating the ailment, or there is a lack of agreement among informants.

Results

Socio-demographic characteristics of vendors

Of the sampled vendors, 55% were female. When asked about their sources of traditional medicinal knowledge, 47% of the vendors stated that they were taught while 45% claimed that it was spiritual, while only 8% claimed that it was passed on within the family (Table 1). The highly participative age group of vendors was 21–40 years of age with a few individuals above 60 years of age. The markets were dominated by two ethnic groups, Samanyika (40%) and Zezuru (25%) (Table 1).

Sampling completeness and medicinal plant diversity in the markets

The medicinal plant species richness for Mbare, Highfield, and CBD were 54, 34, and 23, respectively. The average number of plant species per vendor were 8, 7, and 5 for Mbare, Highfield, and CBD, respectively. Mbare had the highest rarefied species richness (q = 0) compared with CBD and Highfield for an equivalent number of medicinal vendors sampled (Fig. 2a). Shannon–Wiener and Simpson diversity indices (q = 1 and q = 2, respectively) varied significantly across markets, with the least values being recorded for CBD (Fig. 2a). Although sample coverage did not reach an asymptote for the three markets, the number of sampling units (vendors) was sufficient for the study (Fig. 2b). Highfield and CBD had higher sample coverage after sampling just a few vendors, while Mbare picked up after sampling more vendors (Fig. 2b). Species richness, Shannon, and Simpson diversity indices increased with increase in sample coverage (Fig. 2c). The increase in richness, Shannon, and Simpson diversity indices varied significantly between markets with increase in sample coverage (Fig. 2c).

Similarity between sites

Species traded by vendors in the three markets were highly dissimilar as reflected by the global *R* value of 0.492. Medicinal plant species assemblage composition traded in Mbare and CBD were highly similar ($R = 0.081$), while those traded in both Mbare and Highfield ($R = 0.708$) and Highfield and CBD (R = 0.766) were highly dissimilar (Table 2). Non-metric multidimensional scaling shows that Mbare vendors were highly spread out with high overlap with CBD vendors (Fig. 3). Highfield and CBD, and Highfield and Mbare form distinct groups, which indicate that medicinal plant species composition for these markets are to a large extent different.

Vendor origin and medicinal plant harvesting districts

Vendors came from 21 districts nationwide (Fig. 4a), with harvesting activities spanning the same 21 districts (Fig. 4b). Chipinge district had the highest number of vendors, closely followed by Masvingo district (Fig. 4a). Interestingly, the majority vendors seemed to come from the eastern region of the country, potentially influenced by the geographic distribution of the sampled markets. The districts witnessing the highest levels of harvesting were also those from which most vendors originated, as evidenced by a significant correlation between the number of vendors originating from a district and the volume of harvesting occurring in that district (Fig. 5). This trend suggests that vendors often return to their rural origins for harvesting purposes.

Table 1 Socio-demographic characteristics of vendors that were sampled in the three markets of Harare, Zimbabwe

Characteristics	CBD	Mbare	Highfield	Frequency	Percentage
Location (GPS)	17°49′48.11"S; 31°03′07.07"E	17°51′32.35"S; 31°02′16.90"E	17°53′34.84"S; 30°59′28.07"E	–	–
Altitude	1492m	1466m	1440m	–	–
Sex					
Male	4	9	5	18	45
Female	9	7	6	22	55
Age group					
21–40yrs	10	6	6	22	55
41–60yrs	3	8	3	14	35
>60yrs	–	2	2	4	10
Marital status					
Married	11	12	9	32	80
Not married	2	3	1	6	15
Widowed/Widower	–	1	1	2	5
Religion					
Traditional	13	16	11	40	100
Ethnicity					
Samanyika	4	7	5	16	40
Karanga	1	3	1	5	12
Buja	1	1	1	3	8
Zezuru	4	3	3	10	25
Ndebele	3	–	–	3	8
Korekore	–	2	1	3	7
Occupation					
Vendor	13	16	11	40	100
Source of traditional knowledge					
Taught	8	3	8	19	47
Ancestral	3	12	3	18	45
Family	2	1	–	3	8
Education					
Primary	5	7	1	13	32
Secondary	8	6	6	20	50
Tertiary	–	1	2	3	8
No education	–	2	2	4	10

Contribution of medicinal plants to livelihood.

There was a significant (Kruskal–Wallis test: $\chi^2 = 9.60$, df = 2, $p < 0.01$) variation in income from the sale of medicinal plants across the three different markets in Harare (Fig. 6). The vendors in the CBD earned significantly more, with an average income of approximately 300 USD per month, compared to vendors in Mbare and Highfield, who earned around 150 USD and 200 USD per month, respectively (Fig. 6). The income difference is statistically significant, as indicated by the distinct labels "a" for the CBD and "b" for Mbare and Highfield (Fig. 6). This highlights that vendors in the CBD have a significantly higher income from selling medicinal plants compared to those in the other two markets.

Medicinal plant knowledge and importance

We recorded a total of 530 use reports across the three markets, with Mbare accounting for 49% of these reports, while Highfield and the CBD contributed 30% and 21%, respectively. The highest number of use reports was recorded for gastrointestinal disorders (GA) (Table 3). Among the use categories documented across all three markets, the CBD and Mbare had 95% of the categories, while Highfield had 80%. Notably, 25% of the use categories recorded across all markets achieved a 100%

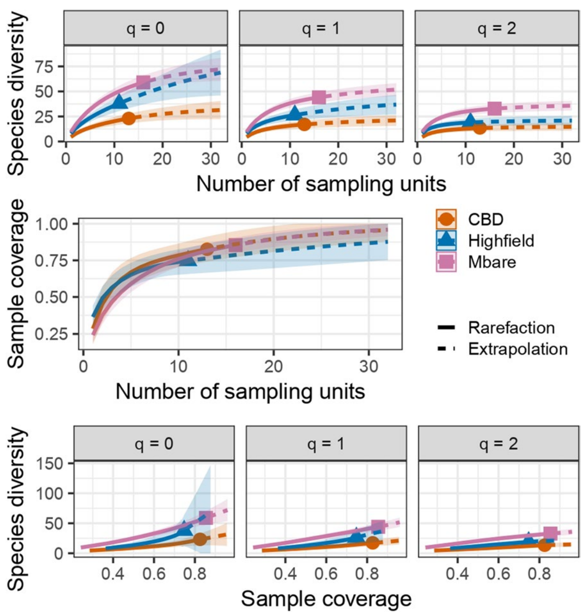

Fig. 2 Comparison of incidence-based interpolation and extrapolation for **a** species richness (q = 0), Shannon–Wiener diversity (q = 1) and Simpson diversity (q = 2), **b** individual-based interpolation and extrapolation for sample coverage, and (c) sample coverage-based interpolation and extrapolation for species richness (q = 0), Shannon–Wiener index (q = 1) and Simpson index (q = 2) compared across the three study sites, Mbare, CBD and Highfield. All extrapolation curves were plotted to double the sample size, and 300 bootstrap replicates were used to estimate 95% confidence intervals (shaded area)

Table 2 One-way Analysis of Similarity (ANOSIM) performed for the availability of medicinal plant species at the three markets, Mbare, Highfield and CBD in Harare

	R statistic	p-value
Global R	0.492	0.001
Mbare vs CBD	0.081	0.064
Mbare vs Highfields	0.708	0.001
CBD vs Highfields	0.766	0.001

informant consensus factor (ICF). Within the CBD, 47% of use categories had a 100% ICF, compared to 21% in Mbare and 13% in Highfield, where only two use categories reached this level of consensus. Mbare and CBD had generally high IFC values.

High numbers of taxa were documented for aphrodisiacs (AP, n = 14), gastrointestinal disorders (GA, n = 28), fevers and aches (FI, n = 19), and sexually transmitted infections (STIs, n = 16) across the three markets (Table 3). All sites combined exhibited high IFC values for all the diseases (Table 3). The informant consensus factor (ICF) values varied, with lower values observed in the CBD for AP (0.33) and respiratory conditions (RE, 0.43). In contrast, Mbare generally exhibited high ICF values across most disease categories (> 0.6), with the exception of fever and aches (FI), which had a notably low ICF of 0.33. Fever and aches also showed the lowest consensus across all sites, with an ICF of 0.56. Similarly, in the Highfield market, lower ICF values were recorded for love potions (LP, 0.5), fever and aches (FI, 0.56), and women's health (GY, 0.44) (Table 3). CBD and Mbare had similarly high ICF values for AB, DE, GU, IB, HD, LA and LU (Table 3). Disease categories such as GA, AB, GY, and STIs, which had high use reports across all three sites, also exhibited high informant consensus values (Table 3).

A total of 65 medicinal plant species were identified in the three markets comprising 38 trees, 10 shrubs, 15 forbs and two other growth forms (Table 4). Five species could not be identified successfully, and scientific names could not be established and as such are not listed in the table of uses. The identified plant species were from 35 families. Fabaceae were the most represented family, accounting for 54% of all species recorded (Table 4). Species that ranked higher on the number of disease use categories were *Cassia abbreviata* (n = 5), *Senna singueana* (n = 4), *Pterocarpus angolensis* (n = 5), *Erythrina abyssinica* (n = 4), *and Docoma anomala* (n = 4) (Table 4). The top five species with the highest total use reports were *Entada goetzei* (62), *Cassia abbreviata* (58), *Pterocarpus angolensis* (40), *Dicoma anomala* (35) *and Albizia anthelmintica* (31) (Table 4). The most used plant parts were roots, accounting for over 50% of plant parts sold, followed by bark (28%), and then leaves (12%) (Table 4). The remaining plant parts were leaves and seeds (Table 4). It was common for one medicinal plant species to be sold in several forms, for example roots, bark, and leaves. Sixty-nine per cent of the recorded species were classified as **Least Concern** on the IUCN Red List, while 28% had not been evaluated, and 3% were categorized as **Vulnerable**.

Discussion

A total of 64 medicinal plant species from 35 families were recorded across the three urban markets. The number of species recorded is higher than some studies in rural communities of Zimbabwe, for instance [19], where 61 medicinal plant species from 28 families were recorded. In Tanzania, 162 species and 135 genera were recorded across five towns (Arusha, Morogoro, Mbeya, Mwanza, and Dodoma) [124]. However, the findings were not split per town to enable a fair comparison with our study. In Kenya, two towns (Thika and Nairobi) produced 89 plant species belonging to 42 families [125], while in Lagos Nigeria, 185 species belonging to 61 families were

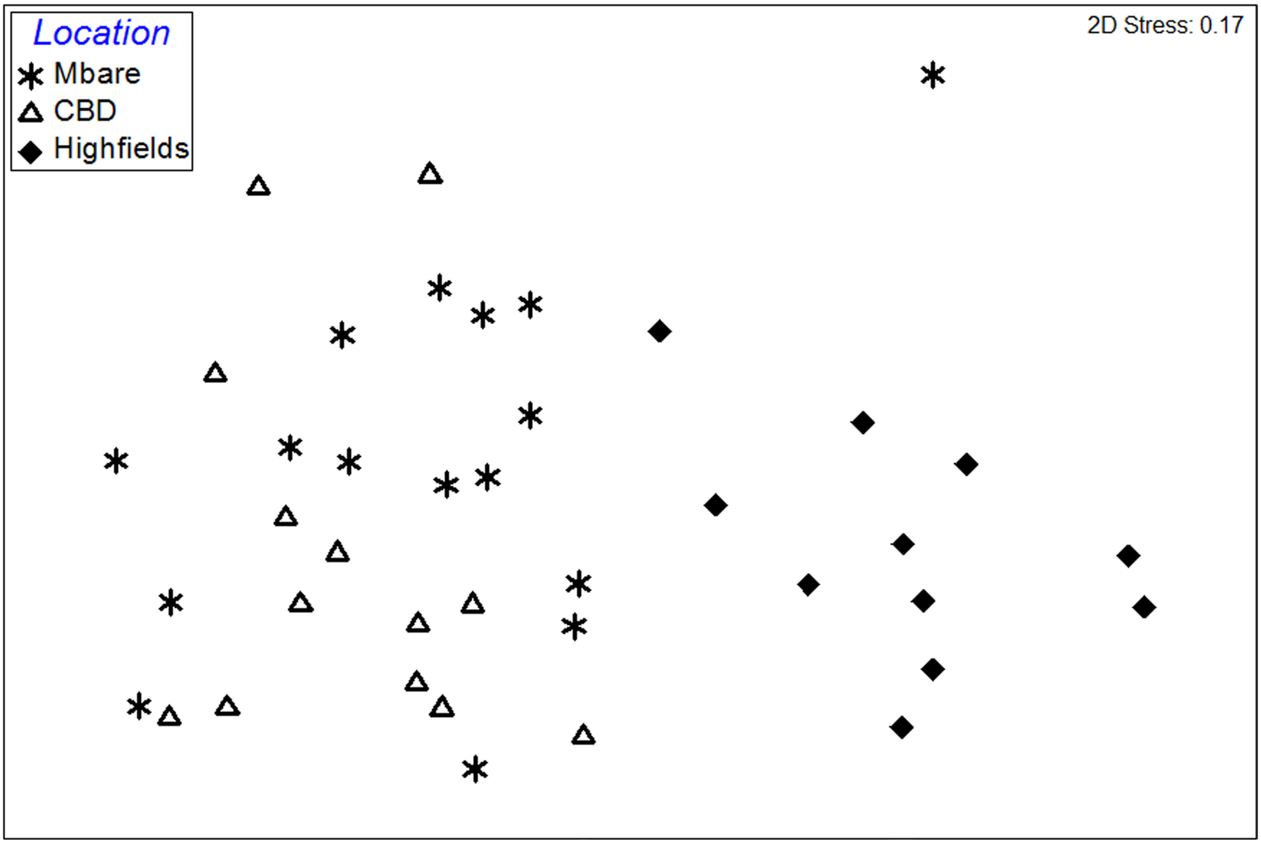

Fig. 3 Non-metric multi-dimensional (nMDS) scaling ordination of ethnobotanical species sampled for three medicinal markets, Mbare, Highfield and CBD

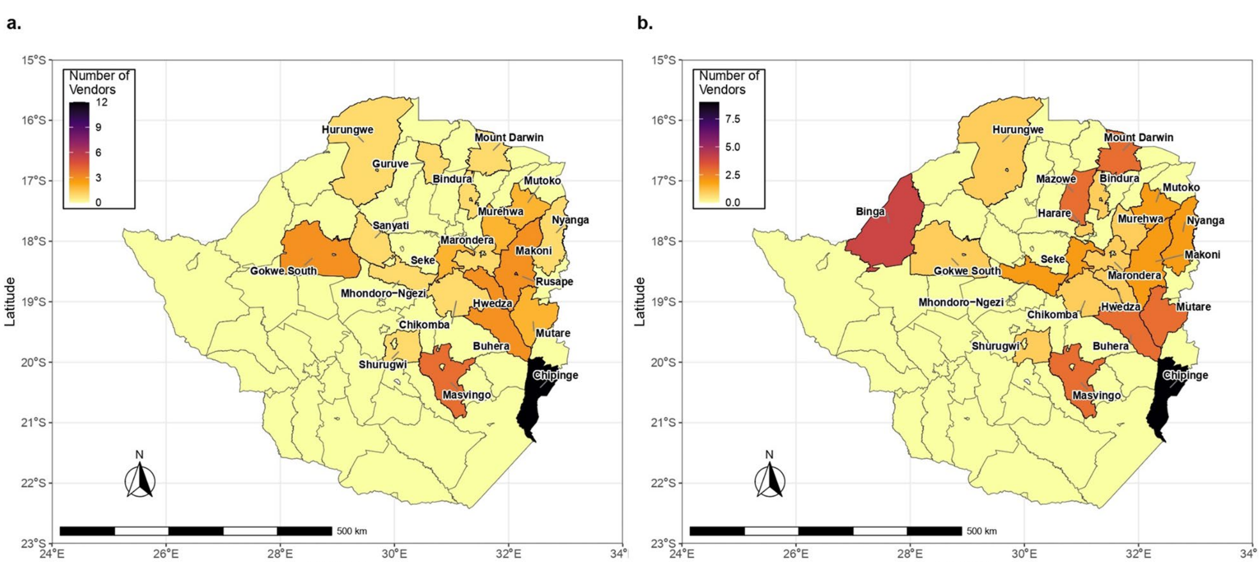

Fig. 4 **a** Number of vendors by district of origin sampled from the three markets, CBD, Mbare and Highfield in Zimbabwe and **b** Number of vendors harvesting medicinal plants per district across Zimbabwe, as sampled from the three markets, Mbare, CBD and Highfield

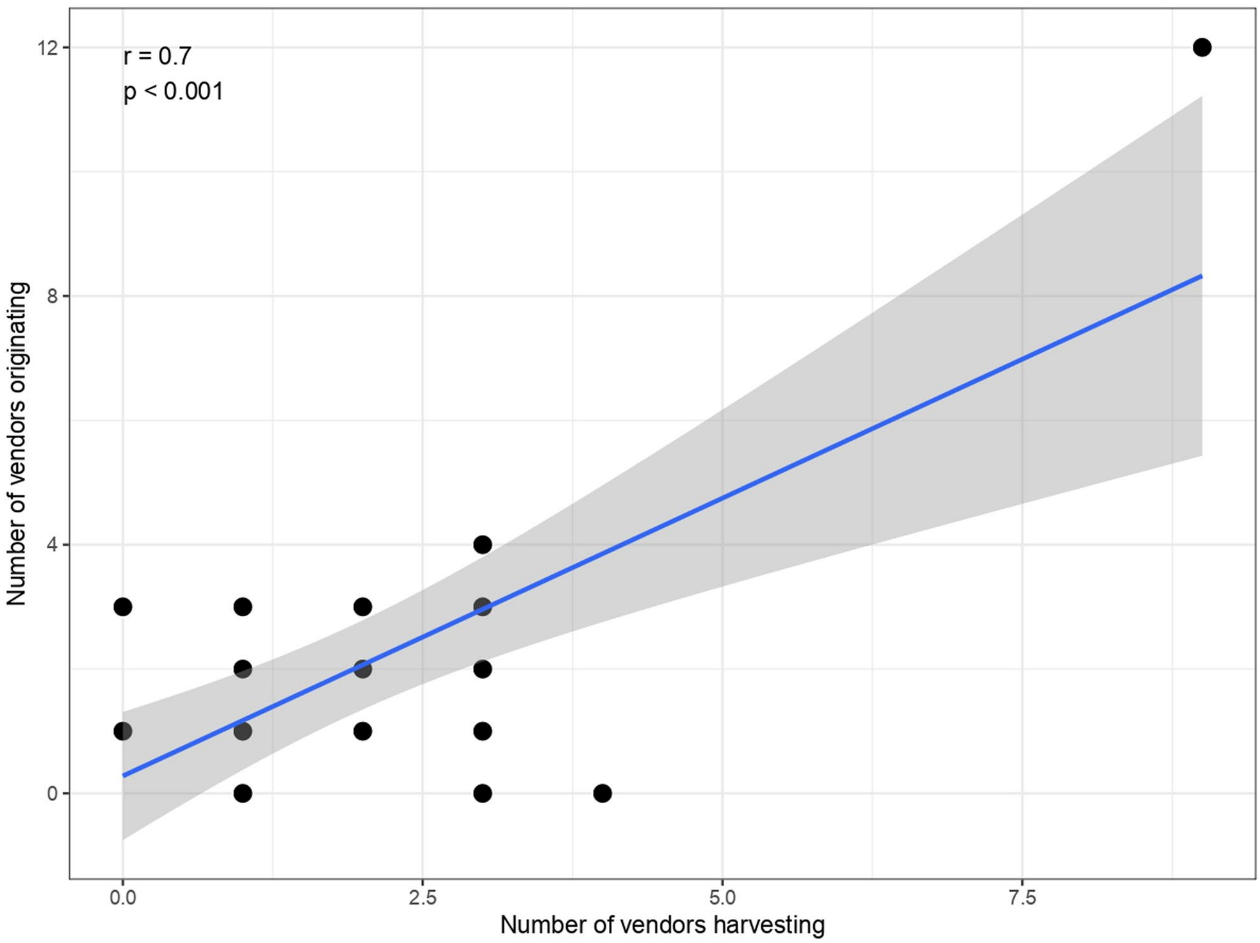

Fig. 5 The relationship between the number of vendors harvesting from a given district and the number of vendors originating from the same district

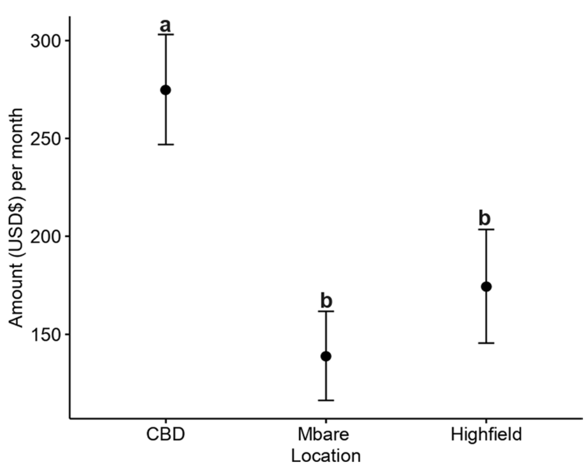

Fig. 6 Mean ± standard error of money generated by vendors in the three study sites. Dots represent the means, and whiskers denote the standard errors. Sites with different letters indicate significant differences in income obtained by vendors per month

recorded [126]. These findings indicate the popularity of medicinal plants in urban areas, which support the high use of traditional medicine which has been highlighted globally [8]. The higher diversity of species recorded in Harare compared with some studies that have focused on rural communities [19] could be attributed to a diversity of traders in the metropolitan setting, unlike rural areas where there could be possible homogenization of plants due to reliance on the same local communal woodlands and herbal knowledge. Indeed, this large medicinal species richness is supported by the wide spatial distribution of vendor source of medicinal plants in the country (Fig. 5). Furthermore, these vendors originated from different districts of the country, enhancing the diversity of species used in traditional medicine. However, this may not always be the case when rural communities are compared with urban areas [71]. Although we applied a robust methodology capable of accounting for unequal sample sizes through interpolation and extrapolation [127] to compare the richness and diversity of plant

Table 3 Quantitative analysis of medicinal plant use across 20 use categories in three urban markets based on vendor reports in Harare, Zimbabwe

Use category	UR_{All}	UR_{CBD}	UR_{Mbare}	$UR_{Highfield}$	NT_{All}	NT_{CBD}	NT_{Mbare}	$NT_{Highfield}$	ICF_{All}	ICF_{CBD}	ICF_{Mbare}	$ICF_{Highfield}$
AB	30	9	12	9	1	1	1	1	1	1	1	1
AIDS	4	1	1	2	2	1	1	2	0.667	NA	NA	0
AP	45	4	27	14	14	3	10	5	0.705	0.333	0.654	0.692
CA	2	2	–	–	1	1	–	–	1	1	–	–
DE	15	3	9	3	3	1	2	3	0.857	1	0.875	0
DU	13	4	6	3	3	1	3	1	0.833	1	0.6	1
ES	20	7	9	4	6	4	3	2	0.737	0.5	0.75	0.667
FI	42	7	16	19	19	4	11	9	0.561	0.5	0.333	0.556
GA	141	31	72	38	28	8	26	12	0.807	0.767	0.648	0.703
GU	8	2	3	–	2	1	1	–	0.857	1	1	–
GY	37	10	17	10	9	3	6	6	0.778	0.778	0.688	0.444
HD	5	2	3	–	1	1	1	–	1	1	1	–
IB	11	5	5	1	1	1	1	1	1	1	1	NA
LA	20	2	10	8	4	1	2	2	0.842	1	0.889	0.857
LP	5	–	2	3	2	–	2	2	0.75	–	0	0.5
LU	28	2	13	13	4	1	2	3	0.889	1	0.917	0.833
MA	11	1	5	5	2	1	2	2	0.9	NA	0.75	0.75
NB	2	1	1	–	1	1	1	–	1	NA	NA	–
RE	31	8	15	8	7	5	5	3	0.8	0.429	0.714	0.714
STIs	60	10	33	17	16	4	13	6	0.746	0.667	0.625	0.688

Total number of use reports is 530; UR_{All}, use reports across all markets; UR_{CBD}, use reports for town market; UR_{Mbare}, use reports for Mbare market; $UR_{Highfield}$, use reports for Highfield; NT_{All}, number of taxa across all markets; NT_{CBD}, number of taxa for Town; NT_{Mbare}, number of taxa for Mbare; $NT_{Highfield}$, number of taxa for Highfield; ICF_{All}, informant consensus factor for all the markets; ICF_{CBD}, informant consensus factor for Town; ICF_{Mbare}, informant consensus for Mbare; $ICF_{Highfield}$, informant consensus factor for Highfield; use categories defined as AB, adds blood; AIDS, acquired immune deficiency syndrome; AP, aphrodisiac; CA, cancer; DE, disease of the skin; DU, different uses; ES, evil spirits; FI, fever; GA, gastrointestinal disorder; GU, genitourinary problems; GY, women's health; HD, headaches; IB, immune booster; LA, women in labour; LP, love portion; LU, luck; MA, malaria; NB, nose bleeding; RE, respiratory complains; STIs, sexual transmitted infections

species traded by vendors across Harare's three markets, the varying number of vendors sampled at each market may still have introduced potential biases into the calculated diversity indices.

Fabaceae was the most represented family, a finding which is also similar to other studies [19, 44, 128]. Similar observations have been made elsewhere, whereby some plant families have many more medicinal plant species than others [24]. The most common species traded were *C. abbreviata*, *E. goetzei and M. oleifera* akin to other surveys [11, 19, 44], whereas the most cited ailments for the recorded medicinal plants were gastrointestinal disorders and respiratory problems. This could be an indication of proven effectiveness of these plant species in curing a wide range of diseases. Also, it could be that these species are commonly used to cure gastrointestinal and respiratory diseases, problems most people seek medicinal plants for [19, 128, 129]. High use reports recorded for *P. angolensis*, *C. abbreviata* and *E. goetzei* are an indication of the varied uses per species, even for those cited less [130, 131]. Interestingly, *C. abbreviata* was also a commonly traded medicinal plant in Tanzania, where it was found in large quantities in urban markets [124].

Gastrointestinal disorders (GA), adds blood (AB), women's health (GY), and sexually transmitted diseases (STIs) are disease categories that exhibited both high use reports (UR) and high informant consensus factor (ICF) values. Similarly, in a separate study by [132], GA and GY were also found to have elevated UR and ICF values. The prevalence of stomach problems can be attributed to the lack of clean drinking water and malfunctioning sewage systems. Furthermore, the collapse of the health delivery system in Harare, as noted by [29], may have driven women to increasingly turn to traditional medicine as an alternative to conventional healthcare. The high ICF values recorded when all three sites were analysed together suggest either the genuine therapeutic potential of the species for treating specific diseases or a homogenization of knowledge among the vendors across the three markets. Although the URs were not high, the ICF values for women in labour (LA) were high across the three markets. A relatively recent study at Zimbabwe's largest referral hospital reported a maternal mortality rate (MMR) of 651 per 100,000 and a child mortality rate of 900 per 100,000 live births [133]. These alarming statistics may be

Table 4 List of medicinal plants, their use categories, use reports (tURs), conservation status and other studies citing similar uses. The conservation status of exotic species was not considered. The sign (–) indicates no information was provided

Family	Growth form	Botanical name	Common name	Plant part	Medicinal uses	Conservation status (IUCN Red List)	Voucher No//	tCD	tURs	Other studies citing similar uses
Anacardiaceae	Tree	*Lannea discolor* (Sond.) Engl	Mushamba (Shona), Tree grape (English)	Root	GA (1), FI (1)	Least concern	HR1	2	2	[43]
Anacardiaceae	Tree	*Ozoroa insignis* Delile	Isafice (Ndebele), Mugaragunguwo (Shona), Tar berry (English)	Root, bark	AP (4) LU (9), FI (6)	Least concern	HR2	3	19	[19, 44, 45]
Apocynaceae	Forb	*Gomphocarpus glaucophyllus* Schltr	Blue milkweed (English), Gwendere (Shona)	Root, bark	AP (5), GY (4), DE (1)	Least concern	HR4	3	10	[46]
Apocynaceae	Tree	*Tabernaemontana elegans* Stapf	Muchanga (Shona), Toad-tree (English)	Root	STIs (1), RE (1)	Least concern	HR11	2	2	[47]
Apocynaceae	Shrub	*Holarrhena pubescens* Wall. ex G. Don	Jasmine-tree (English), Mugashu (Shona)	Bark, seed	GA (3), LA (4)	Least concern	HR16	2	7	[48, 49]
Araliaceae	Tree	*Cussonia arborea* Hochst. ex A. Rich	Mufenje (Shona), Octopus cabbage tree (English), Umelemele (Ndebele)	Root	GY (1)	Least concern	HR5	1	1	[50]
Aristolochiaceae	Forb	*Aristolochia heppii* Merxm	Chividze (Shona), Prostate dutchmans-pipe (English)	Root	MA (3), DU (2), FI (1)	Least concern	HR7	3	6	[51]
Asparagaceae	Shrub	*Asparagus africanus* Lam	Bush asparagus (English)	Root	LA (1)	Least concern	HR6	1	1	[19, 44]
Asphodelaceae	Forb	*Aloe cryptopoda* Baker	Dr Kirk's aloe (English), Gavakava (Shona)	Root, leaves	GU (9)	Least concern	HR 8	1	9	[19]
Asteraceae	Forb	*Dicoma anomala* Sond	Chifumuro	Root	GA (1), GY (12), STIs (1), ES (12)	Least concern	HR9	4	35	[19, 44]
Asteraceae	Shrub	*Tagetes minuta* L	Mbanda (Shona), Mexican marigold (English)	Root, bark	GY (4), FI (1)	Not evaluated	HR11	2	5	[52]
Asteraceae	Forb	*Linzia glabra* Steetz	Cornflower vernonia (English)	Root, bark	LP (2), STIs (1)	Not evaluated	HR13	2	3	[21]
Bignoniaceae	Tree	*Kigelia africana* (Lam.) Benth	Mubveve (Shona), Sausage tree (English), Umvebe (Ndebele)	Root, fruit	STIs (3), FI (1)	Least concern	HR14	2	4	[53–55]
Bignoniaceae	Tree	*Stereospermum kunthianum* Cham	Mutandangozi (Shona), Pink jacaranda (English)	Root	RE (4)	Least concern	HR15	1	4	[56, 57]
Cannabaceae	Tree	*Sparrea gomphophylla* (Baker) X.G. Fu & T.S.Yi	Mugunduzi (Shona) Rough-leaved white-stinkwood (English)	Bark, leaves	GA (2), LP (2)	Least concern	HR10	2	4	-
Celastraceae	Tree	*Gymnosporia senegalensis* (Lam.) Loes	Chizhuzhu (Shona), Confetti tree (English), Isihlangu (Ndebele)	Root, leaves	GA (2), FI (2)	Least concern	HR17	2	4	[58]
Chrysobalanaceae	Tree	*Parinari curatellifolia* Planch. ex Benth	Hissing tree (English), Muchakata (Shona), Umkhuna (Ndebele)	Root	NB (1), FI (1)	Least concern	HR18	2	2	[59]

Table 4 (continued)

Family	Growth form	Botanical name	Common name	Plant part	Medicinal uses	Conservation status (IUCN Red List)	Voucher No//	tCD	tURs	Other studies citing similar uses
Clusiaceae	Tree	*Garcinia buchananii* Baker	Granite garcinia (English), Mutunduru (Shona)	Root	AP (1), FI (1)	Not evaluated	HR19	2	2	[15]
Combretaceae	Tree	*Terminalia sericea* Burch. ex DC	Mususu (Shona), Silver cluster-leaf (English), Umangwe (Ndebele)	Root, bark	GA (2)	Least concern	HR32	1	2	[60, 61]
Cucurbitaceae	Forb	*Cucumis metuliferus* Jacques	African horned cucumber (English), Mugaka (Shona), Umhlagahlaga (Ndebele)	Root	FI (1)	Not evaluated	HR33	1	1	[62]
Ebenaceae	Shrub	*Euclea divinorum* Hiern	Magic guarri (English), Mushangura (Shona), Umtshekesane (Ndebele)	Root, bark	GA (7), DU (1)	Least concern	HR43	2	8	[15, 19, 44, 63]
Euphorbiaceae	Forb	*Ricinus communis* L	Castor-oil plant (English)	Leaves, seed	GA (2), FI (1)	Not evaluated	HR44	2	3	[64]
Fabaceae	Tree	*Albizia adianthifolia* (Schumach.) W. Wight	Rough-barked flat-top (English)	Root	LU (7), AP (7), LA (7)	Least concern	HR20	3	21	[65]
Fabaceae	Tree	*Albizia anthelmintica* (A. Rich.) Brongn	Munanzwa (Shona) Worm-cure albizia (English	Root	(LU)11, AP (1), GY (2), LA (8)	Least concern	HR21	4	31	[66]
Fabaceae	Tree	*Albizia antunesiana* Harms	Muriranyenze (Shona) Purple-leaved albizia (English) Umnonjwana (Ndebele)	Root	MA (8), RE (8)	Least concern	HR22	2	16	[15, 19, 44, 67]
Fabaceae	Tree	*Bobgunnia madagascariensis* (Desv.) J.H. Kirkbr. & Wiersema	Mucherekese (Shona) Snake bean (English)	Root, bark	CA (2)	Least concern	HR23	1	2	[21]
Fabaceae	Tree	*Burkea africana* Hook	False ash (English) Mukarati (Shona) Umnondo (Ndebele)	Root	RE (1)	Least concern	HR24	1	1	[22, 68]
Fabaceae	Tree	*Cassia abbreviata* Oliv	Brachystegia tamarindoides Benth. subsp. microphylla (Harms)	Root, bark, leaves	GA (26), AP (3), GY (1), STIs (27), ES (1)	Least concern	HR25	5	58	[15, 19, 22, 44]
Fabaceae	Tree	*Cassia fistula* L	Bridelia micrantha (Hochst.) Baill	Root	GA (6), AP (1), STIs (6)	–	HR26	3	13	[69]
Fabaceae	Tree	*Colophospermum mopane* (J. Kirk ex Benth.) J. Léonard	Iphane (Ndebele), Musharu (Shona), Turpentine tree (English)	Root, leaves	STIs (2)	Least concern	HR27	1	2	[22, 70]
Fabaceae	Tree	*Dichrostachys cinerea* (L.) Wight & Arn	Mupangara (Shona), Sickle bush (English), Ugagu (Ndebele)	Root, bark	AP (3), STIs (3)	Least concern	HR28	2	6	[15, 22, 71, 72]
Fabaceae	Forb	*Dolichos kilimandscharicus* Taub	Veld lupin (English)	Root	AIDS (1)	Not evaluated	HR29	1	1	[73]

Table 4 (continued)

Family	Growth form	Botanical name	Common name	Plant part	Medicinal uses	Conservation status (IUCN Red List)	Voucher No//	tCD	tURs	Other studies citing similar uses
Fabaceae	Shrub	*Entada goetzei* (Harms) S.A.O'Donnell & G.P. Lewis	Intolwane (Ndebele), Mugudzuru (Shona), Narrow-pod elephant root (English)	Root	GA (31), LA (1), AB (3)	Not evaluated	HR30	3	62	[74, 75]
Fabaceae	Shrub	*Entada abyssinica* Steud. ex A. Rich	Muguruzwuzwu (Shona), Skew-leaved Elephant Root (English)	Root	GA (3)	Least concern	HR31	1	3	[76–78]
Fabaceae	Forb	*Eriosema cordatum* E.Mey	Tsombori (English)	Root	AP (1), FI (2)	Not evaluated	HR34	2	3	[79–81]
Fabaceae	Tree	*Erythrina abyssinica* Lam	Mutiti (Shona), Red-hot-poker tree (English), Umgqogqogqo (Ndebele)	Root, bark	GA (3), AP (2), STIs (3), FI (3)	Least concern	HR35	4	11	[82, 83]
Fabaceae	Forb	*Indigofera setiflora* Baker	Mutsvairo (Shona), Ruvava-shuro (Shona)	Leaves	GA (1)	Not evaluated	HR36	1	1	[22, 71, 84]
Fabaceae	Tree	*Julbernardia globiflora* (Benth.) Troupin	Mutondo (Shona), Umtshonkwe (Ndebele)	Root, bark	GA (1)	Least concern	HR37	1	1	[22]
Fabaceae	Tree	*Piliostigma thonningii* (Schumach.) Milne-Redh	Ihabahaba (Ndebele), Monkey bread (English), Musekesa (Shona),	Leaves	FI (1)	Least concern	HR38	1	1	[85]
Fabaceae	Tree	*Pterocarpus angolensis* DC	Bloodwood (English), Mubvamaropa (Shona), Umvagazi (Ndebele)	Root, bark	GA (11), AP (6), GY (11), ES (1), IB (11)	Least concern	HR39	5	40	[15, 19, 44, 86]
Fabaceae	Shrub	*Senna singueana* (Delile) Lock	Isihaqa esincinyane (Ndebele), Mushayan-yoka (Shona), Sticky pod (English)	Root, bark	GA (5), RE (5), DE (5), FI (1)	Least concern	HR40	4	16	[87–90]
Hypoxidaceae	Forb	*Hypoxis hemerocallidea* Fisch., C.A. Mey. & Avé-Lall	Star flower, Nhindiri (Shona)	Root	GA (1)	Not evaluated	HR41	1	1	[91, 92]
Hypoxidaceae	Forb	*Hypoxis obtusa* Burch. ex Ker Gawl	Yellow star (English), Hodzori (Shona)	Root	GU (1), GA (2)	Not evaluated	HR42	2	3	[15, 44, 84]
Lamiaceae	Tree	*Vitex payos* (Lour.) Merr	Chocolate berry (English), Mutsubvu (Shona), Umtshwankela (Ndebele)	Root, bark	GA (1), GY (1)	Least concern	HR45	2	2	[93]
Loganiaceae	Tree	*Strychnos cocculoides* Baker	Corky monkey-orange (English), Muzhumwi (Shona)	Root, bark	GA (4), STIs (1)	Least concern	HR46	2	5	[15, 19, 44]

Table 4 (continued)

Family	Growth form	Botanical name	Common name	Plant part	Medicinal uses	Conservation status (IUCN Red List)	Voucher No//	tCD	tURs	Other studies citing similar uses
Loganiaceae	Tree	*Strychnos spinosa* Lam	Mutamba-mun'ono (Shona), Spiny monkey-orange (English), Umngono (Ndebele)	Root, bark	GA (2), STIs (2)	Least concern	HR47	2	4	[13, 19, 44, 84]
Malvaceae	Forb	*Hibiscus cannabinus* L	Sosoori (Shona), Small-flowered kenaf (English), Ugangampunza (Ndebele)	Leaves	STIs (1)	Not evaluated	HR51	1	1	[94]
Malvaceae	Forb	*Hibiscus mutabilis* L	Sosoori (Shona), Prickly hibiscus (English), Ugangampunza (Ndebele)	Leaves	FI (2)	Not evaluated	HR52	1	2	[95]
Meliaceae	Tree	*Ekebergia capensis* Sparrm	Dogplum (English), Mudan-hatsindi (Shona)	Root, bark	RE (1), FI (11), ES (1)	Least concern	HR53	3	22	[96–98]
Meliaceae	Tree	*Khaya anthotheca* (Welw.) C.DC	Mururu (Shona), Red mahogany (English)	Root	STIs (2)	Vulnerable	HR54	1	2	[99, 100]
Moraceae	Tree	*Ficus thonningii* Blume	Common wild fig (English), Intenjane (Ndebele), Mut-samvi (Shona)	Root, bark	GY (1)	Least concern	HR48	1	1	[101]
Moringaceae	Shrub	*Moringa oleifera* Lam	Horse-radish tree (English), Moringa (English)	Root, bark, leaves	DU (1)	-	HR49	1	10	[19, 44, 102, 103]
Myrothamnaceae	Shrub	*Myrothamnus flabellifo-lius* Welw	mufandichimuka (Shona), Resurrection bush (English)	Root, bark	GA (1), RE (5), FI (3), GU (5)	Not evaluated	HR50	4	14	[15, 44, 84, 86]
Myrtaceae	Tree	*Eucalyptus camaldulensis* Dehnh	River red gum (English)	Bark, leaves	RE (2)	–	HR55	1	2	[104]
Ochnaceae	Tree	*Ochna pulchra* Hook	Muparamhosva (Shona), Peeling-bark ochna (English), Umnyelenyele (Ndebele)	Root, seed	RE (1), GA (1)	Least concern	HR56	2	2	[13, 44, 84, 105]
Orchidaceae	Epiphyte	*Ansellia africana* Lindl	Leopard orchid (English)	Bark	GA (2)	Vulnerable	HR57	1	2	[106, 107]
Pittosporaceae	Tree	*Pittosporum viridiflo-rum* Sims	Cheesewood (English), Iyoyi (Ndebele), Muchemedzam-buya (Shona)	Root	GA (4), STIs (2)	Least concern	HR58	2	6	[108, 109]
Polygalaceae	Tree	*Securidaca longepeduncu-lata* Fresen	Mufufu (Shona), Umfufu (Ndebele), Violet tree (English)	Root	GA (3)	Least concern	HR59	1	3	[110, 111]
Sapindaceae	Tree	*Lecaniodiscus fraxinifo-lius* Baker	Musando (Shona), River-litchi (English)	Root	FI (1)	Not evaluated	HR60	1	1	–
Sapindaceae	Tree	*Zanha africana* (Radlk.) Exell	Muchenya (Shona), Velvet-fruit zanha (English)	Root	HD (5)	Not evaluated	HR61	1	5	[112]

Table 4 (continued)

Family	Growth form	Botanical name	Common name	Plant part	Medicinal uses	Conservation status (IUCN Red List)	Voucher No//	tCD	tURs	Other studies citing similar uses
Sapotaceae	Tree	*Mimusops zeyheri* Sond	Muchechete (Shona),Red milkwood (English), Umbumbulu (Ndebele)	Root, bark	STIs (1), ES (1)	Least concern	HR62	2	2	[113–115]
Sinopteridaceae	Fern	*Hemionitis calomelanos* (Sw.) Christenh	Mumvuriwedombo (Shona)	Root	GA (1), AP (1), FI (1)	Not evaluated	HR63	3	3	[15, 116–118]
Urticaceae	Shrub	*Pouzolzia mixta* Solms	Nymphaea nouchali Burm. f	Root	GA (3), STIs (2)	Least concern	HR64	2	5	[72, 119–121]
Zingiberaceae	Forb	*Aframomum angustifolium* (Sonn.) K.Schum	Matongururu (Shona)	Root, bark	GA (3), AIDS (3), STIs (3)	Least concern	HR65	3	9	[122, 123]

tCD: Total categories of diseases; tUr: Total reported use; Use categories defined as AB, adds blood; AIDS, acquired immune deficiency syndrome; AP, aphrodisiac; CA, cancer; DE, disease of the skin; DU, different uses; ES, evil spirits; FI, fever; GA, gastrointestinal disorder; GU, genitourinary problems; GY, women's health; HD, headaches; IB, immune booster; LA, women in labour; LP, love portion; LU, luck; MA, malaria; NB, nose bleeding; RE, respiratory complains; STIs, sexual transmitted infections driving more women to turn to traditional medicine as an alternative.

Most traders in Harare were selling roots and bark of medicinal plants, which would be a cause for concern as harvesting roots or bark can result in the death of the plants. Studies have shown that people use various plant parts such as leaves, fruits, bark, flowers, roots, and seeds as medicine [19, 44]. Several factors can influence plant part choice, for instance, perceived effectiveness of plant part in treatment, ease of access and storage or seasonal variation in availability [19, 44]. Other studies have also found that roots and leaves were the most common form in which the medicinal plants were used [44, 134, 135], whereas elsewhere informants mentioned bark and leaves as most of the plant parts used for treatments [136–138]. Identification of the most versatile plant parts, plant species and plant families is vital for monitoring overuse and overharvesting. In particular, care should be taken in monitoring harvesting practices of medicines from trees, as they emerged as the most important growth form for medicine, above shrubs and herbs. Conservation priorities for commonly harvested species should be established, considering that vendors were sourcing their medicinal plants from distances ranging from 200 to 500 km away from the markets. Our study highlighted that vendors were harvesting mostly from their places of origin, an observation which we associate with familiarity of woodlands where medicinal plants of interest can be found. Of the 61 indigenous plant species documented in Harare's three sampled markets, 69% are categorized as *Least Concern* under the IUCN Red List, indicating their populations are currently stable and not at significant risk of extinction. However, two plant species (3%) require urgent conservation attention due to their threatened statuses: *Khaya anthotheca* (Vulnerable), and *Ansellia africana* (Vulnerable). The presence of *Khaya anthotheca* and *Ansellia africana* among traded species is particularly concerning. *Khaya anthotheca*, commonly known as African mahogany, is under threat primarily due to habitat loss and overharvesting for timber and medicinal purposes [139, 140]. Its inclusion in trade highlights the need for sustainable harvesting practices and strict regulation to prevent further population decline. Similarly, *Ansellia africana*, an orchid species, faces threats from habitat destruction and overcollection for ornamental and medicinal use [141]. The trade of these two species underscores the importance of raising awareness among vendors and consumers about their conservation status and promoting alternative species for trade.

The dynamics of medicinal plant species trade in Harare are intriguing, with distinct patterns observed between different markets. Our analysis suggests that traders in the Central Business District (CBD) likely source some of their medicinal products from Mbare, a larger and more diverse market. Conversely, the dissimilarity between CBD and Highfield markets indicates that despite both being sizable markets, CBD traders may not procure from Highfield. These findings highlight the complex interplay of factors influencing trade dynamics, including market size, accessibility, and possibly even cultural preferences among urban dwellers. Secondly, there could be limited sharing of information between traders from Highfields and both CBD and Mbare, as people may be reluctant to share medicinal plant knowledge in general. The sale of traditional medicine in Harare markets significantly contributes to livelihoods through income generation. The potential of traditional medicine should not be underestimated, as vendors from the CBD could earn over US$3,000 per annum. Although [142] reported lower earnings from the sale of medicinal plants, this discrepancy highlights the importance of medicinal plants in different contexts. The key difference between our study and that of [142] lies in the environmental context: our study is urban, while theirs is rural. Although the range is broad, from US$242 to $1210 [132], our monthly values for the markets in Harare fall within range. This indicates the potential of the medicinal plant trade to be one of the biggest economies globally. Support for this assertion is shown in the global figures that are estimated to be over 100 billion worldwide [8].

Limitations of the Study

This study encountered several challenges. One of the main limitations was the difficulty in determining the conservation status of medicinal plants from the districts where vendors sourced their materials. In many cases, vendors were not directly involved in harvesting or restocking but instead received consignments from buses transporting goods from source districts. This lack of direct knowledge made it challenging to trace the sustainability and availability of specific species. Additionally, some vendors operating in the central business district (CBD) were initially suspicious, fearing that we might be undercover municipal police, as they were selling in undesignated areas. This created some hesitation in sharing information freely.

Another limitation was the reliance on self-reported data from vendors, which may be subject to recall bias or misrepresentation, especially regarding sourcing practices and plant availability. Future studies could consider triangulating vendor reports with direct field assessments in source regions. Furthermore, this study did not quantify the exact volumes of medicinal plant species traded annually. Understanding these trade volumes would provide insights into demand pressures and potential overharvesting risks. Future research could aim to quantify the quantities traded per species per year and conduct phytochemical analyses of commonly used plants, particularly those used to treat prevalent illnesses such as stomach ailments. Despite these challenges, we were able to collect valuable data that provide insight into the dynamics of the medicinal plant trade in Harare, Zimbabwe.

Conclusion

The medicinal plant markets in Harare demonstrate a noteworthy diversity of plant species, reflecting the rich indigenous knowledge of the vendors. Among the most traded species, *C. abbreviata*, *Pterocarpus angolensis*, and *E. goetzei* stand out, showing high Use Reports (UR) and Informant Consensus Factor (ICF) values. The economic challenges faced by Zimbabwe may be contributing to the high UR for disease categories such as gastrointestinal disorders, blood-related conditions, women's health, and sexually transmitted infections, highlighting the growing reliance on traditional medicine as an alternative to conventional healthcare. The Fabaceae family emerges as the most prevalent, with roots being the most commonly used plant parts, raising concerns about sustainable harvesting practices. The trade dynamics reveal that vendors in the Central Business District (CBD) likely source medicinal plants from Mbare, while Highfield market appears more isolated in its trade practices. This underscores the complexity of urban medicinal plant trade, shaped by factors such as market size, accessibility, and possibly cultural preferences.

Given the wide spatial distribution of plant sourcing and the important contribution of traditional medicine to vendor livelihoods, conservation efforts must prioritize the sustainability of commonly traded species, especially those harvested for roots. Future studies should focus on assessing the population status of these species in the wild, considering the pressures of urbanization, deforestation, and growing demand for alternative medicine. The findings from this study underscore the importance of traditional medicine in urban settings like Harare, emphasizing the need for sustainable practices to ensure the continued availability of these vital resources.

Abbreviations

CBD	Central business district
RFC	Frequency of citation
UV	Use value
RI	Relative importance index
PRIMER	Plymouth Routines in Multivariate Ecological Research
nMDS	Non-metric multidimensional scaling
ANOSIM	Analysis of similarity

Author contributions

J.M. and M.M. collected the data. J.M. analysed the data. J.M. and M.M. both contributed equally to the writing of the paper.

Funding

There is no funding to report on for this study.

Availability of data and materials

No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate

The study was granted a human ethics approval by the Ministry of Local Government of Zimbabwe through the City of Harare Municipality. The municipality assessed the proposal and tools for the study and certified that the study was performed in accordance with the ethical standards as laid down in the 1964 Declaration of Helsinki and its later amendments. Prior informed consent to being interviewed and for the work to be published was granted by all the interviewees. Participants provided verbal consent before taking part in interviews. Additionally, they consented to the use of their individual data for publication.

Consent to Publication

Not applicable.

Competing interests

The authors declare no competing interests.

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Received: 11 February 2025 Accepted: 2 April 2025
Published online: 24 April 2025

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