

The Trade in Wild Medicinal Plants, Narok County, Kenya

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Abstract Sale of wild plants can provide income security for rural communities during times when their livelihoods are disrupted by land use change, globalization of economies and climate change. This study was carried out to describe the trade in wild medicinal plants in Narok, a rural region of Kenya. Data were gathered between July 2013 and June 2014. Semi-structured questionnaires were administered to traders in wild medicinal plants. These were supplemented by key informant interviews and field observation. Results showed that trade in wild medicinal plants in Narok was a recent phenomenon, it started in the early 1980's and the number of traders had gradually increased over the last 30 years. The average age of traders was 48 years and most (65%) of them had no formal schooling. This trade was dominated by men at 85% and it was unregulated in open air markets. Most traders (66%) were engaged in it on full time basis. Fifty five percent (55%) of all traders interviewed were mobile and moved from one market to another while the rest operated from a fixed location. At least 106 wild plant species were on sale in the markets, with the family Leguminosae having the highest number of species 16% traded followed by Compositae at 5.7%. Most traders had 11-30 plant species up for sale. The clientele for wild medicinal plant products were households, hoteliers and livestock herders. Medicinal plant products on sale were sourced from the wild. The increasing popularity and marketing of these wild medicinal plants was seen to be a threat to the remaining wild stocks. This project recommends that conservation measures that include both *in situ* and *ex situ* measures be undertaken to meet this demand. In addition the traders should be organized into groups to help self-regulate the trade.

Keywords: wild medicinal plants, trade, dry land, Maasai, Narok

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1. Introduction

Non-timber forest products (NTFPs) are products of biological origin, other than timber, derived from natural forests or woodlands. They are sources of food, forage, fodder, construction materials, medicines, dyes and tannins, among others, or can be collected for cultural purposes. Wild medicinal plant(s) (WMPs) are a subset of NTFPs that may be used for preventive, curative and nutritive purposes [1].

The marketing of NTFPs is an evolving means of livelihood by rural communities worldwide. Sale of NTFPs in drylands is an option in diversifying livelihoods in response to drought and as a way of adapting to climate change [2]. NTFPs including WMPs harvested from natural forests and woodlands are used by local communities for

subsistence and income as their low input costs make them a viable resource for poor rural household's [3]. A review to qualify the contribution of NTFPs to livelihoods [4] categorized them into supplementary, integrated, specialized (wild collection) and specialized (cultivated) economic strategies. However, there is no consensus on the publicized role of NTFPs as safety nets due to limited quantitative studies [5]. Wild medicinal plants (WMPs) are sold in local, regional and international markets. There has been an increase in sale of NTFPs, more so sale of wild medicinal plants worldwide [6]. Popularity of natural products worldwide has accelerated demand for organic products. This has resulted in the rise of certification schemes to ensure sustainability and that ethical considerations are put in place when procuring natural products [7].

The sale of wild medicinal plants is common in many regions in Kenya [8,9,10]. A significant volume of these plants are harvested from the wild [1,7,9,11,12]. Trade in

wild harvested plant products as currently structured is unregulated, sometimes illegal [8,13]. Wild medicinal plants fetch low prices that are not commensurate with the actual cost of the production [14]. Marginal income to local producers from sale of medicinal plants has been reported even in formalized markets [7]. There is an added concern that commercialization of these wild medicinal plants products without adequate measures to ensure sustainability will result in depletion of resources at local level [15]. In addition international trade in medicinal plant products consumed at home could deny local rural households access to subsistence products they have relied on over time for their subsistence needs [4,16]. In Kenya herbalists of the Maasai ethnicity are reported to visit many towns in the country to sell herbal products [9,12].

No previous study had been done in Narok on trade in wild medicinal plants. The overall aim of this study was to characterize trade in wild medicinal plants in Narok County. Specific objectives were; (i) to describe this trade (the people who are involved, how they are involved, what WMPs products are in the market, sources of the plants)

(ii) to make an inventory of the wild medicinal plant species traded in these markets (plant species, life forms, plant parts, and iii) to evaluate the sustainability of this trade and to draw attention to species whose conservation status appears to be concern.

2. Materials and Methods

2.1 Study Area

Narok County covers an area of 17,933.1 Km² and lies between latitudes 0° 50' and 1° 50' south of the equator and between 35° 28 'and 36° and 23' east. It borders Tanzania to the south, and the Kenyan counties of Kisii, Migori, Nyamira and Bomet to the west, Nakuru to the north and Kajiado to the east. Overall rainfall and temperatures vary with altitude and range from 400-1800mm and 12°C to 18°C respectively. Narok County consist of four sub-counties, namely Narok North, Narok South, Narok East and Narok West.

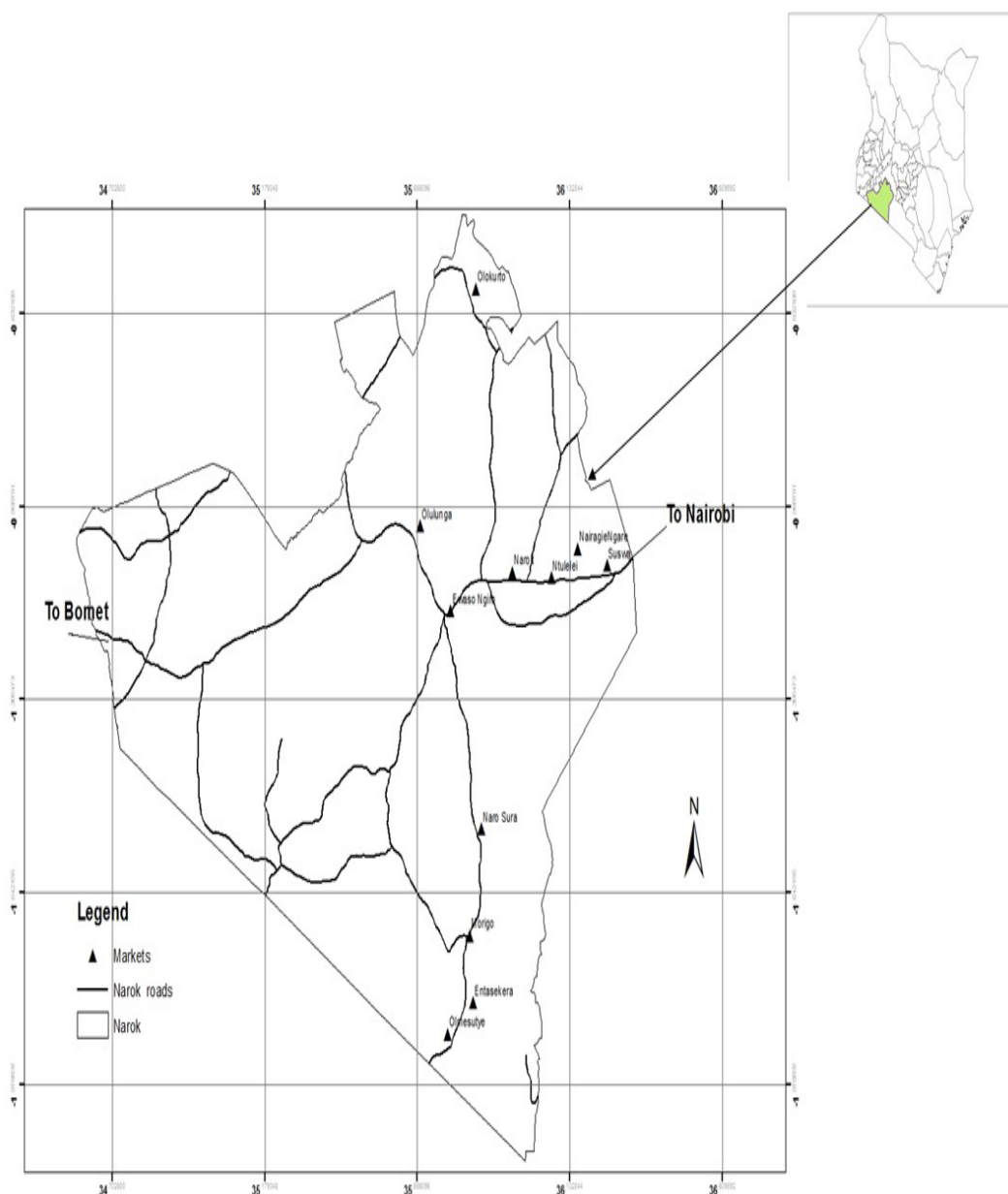


Figure 1. Map of Kenya insert showing Narok County And markets surveyed

Narok County is predominantly occupied by the Maasai ethnic community. The Maasai are Plain Nilotes and/or Eastern Nilotes, in their territories they were divided into social territorial sections known as *Iloshon* [17,18]. The Maasai were traditionally nomadic pastoralists but are now in transition to mixed livestock and cultivation in some areas. The main economic activity in Narok County is agriculture in the humid zone in the northern part, tourism and agro-pastoralism in the southern region. Livestock farming accounts for 10% of the county's GDP while crop farming consists of wheat, maize, beans and horticultural crops [19]. This market survey was carried out in Narok North and Narok South sub counties. In this area 23% of the landscape is made up of forests and woody shrub land, while the rest is largely savanna grassland. The market centers chosen for this survey were along major roads traversing Narok North and Narok South sub-counties. They included; markets in Loita, Narosura, Suswa, Ntulele, Narok town, Ololunga, Ewaso Ngiro (Figure 1).

2.2. Methods

To characterize trade in wild medicinal food plants a market survey was carried out in Narok South and Narok North sub counties. A cross sectional study design was adopted for this study and random sampling approach was used to select respondents. A semi-structured questionnaire was administered to traders as recommended by [20,21]. Data gathered included biodata of the traders, entry into the trade, and inventory of wild plant species traded, parts sold, sources of products, seasonality, trade networks, processing.

The target population comprised of traders (vendors) of WMFPs in Narok who were sometimes harvesters and/or traditional health practitioners (THPs). During market days about 70 traders were found selling products in Loita, Narosura, Ewaso ngiro, Narok, Ntulele and Suswa markets. A sample size of 40 traders was used for this study. Respondents were chosen among the traders selling products in each market and their willingness to participate. During data collection plants were identified using local names with the help of a taxonomist and scientific names confirmed using existing literature [22,23]. Data collected was entered into an excel datasheet and analyzed using

descriptive statistics. Thematic and content analysis were used to describe qualitative data [24]. Results are presented in form as narratives and percentages and figures.

3. Results

3.1. Characteristics of the WMPs Traders and Markets

The age of traders ranged between 23-74 years and the average age was 48 years. The trade was dominated by men at 85% while women constituted only 15%. Sixty five percent (65%) of the traders interviewed had no formal schooling. The traders (87.5%) used indigenous knowledge acquired through apprenticeship and during moranhood (for men after initiation and before becoming junior elders which takes about five to ten years) while only 12.5% had trained on modern techniques. Trade in WMPs was carried out informally, only 5% of the traders were registered as traders with social services department and had permits to collect WMP products from government forests. Wild medicinal plant (WMP) products were sold along major roads in market centres. Products were displayed spread on mats on the ground by the roadside along the streets. Traditional health practitioners (THPs) sold WMPs products from their premises used for consultation. Sixty three percent (63%) of the traders indicated that WMPs sales were high during weekly markets days, which were also livestock market days, the rest (37%) did not report differences in sales. The highest number of WMPs traders recorded in one market was 25 vendors in Suswa market. Results showed that 55% of the traders were mobile i.e. without a fixed sale point/structure while 45% had a fixed location i.e. either a shop or a fixed stall/point within the market. Some part-time traders were also harvesters, who supplied herbal products to retailers on market days. As they delivered their orders they always had excess which they retailed on the same day.

Sixty percent (60%) of the traders engaged in WMPs trade as a fulltime job while 40% engaged in it on part-time basis. The traders had sold WMPs for between one year and over 30 years. Over half of traders (57%) had started trading in WMPs in the last 10 years and 5% were in this business for over 30 years (Figure 2).

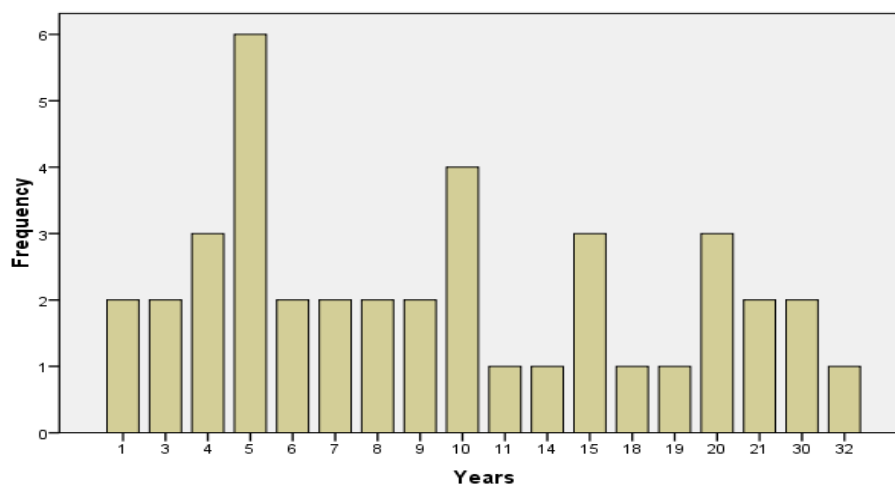


Figure 2. Number of Years the Sellers of WMPs have been Trading (n = 40)

Out of forty traders interviewed 75% operated solely, while 22.5% operated their business as a family enterprise and 2.5% reported working in partnership. As a family enterprise, the women managed the business while men sourced new supplies or went to sell products in other markets. Only five percent were members of the National Traditional Health Practitioners Association (NATHEPA).

3.2. Entry into the Trade

Reasons for joining WMFPs trade were varied; some traders inherited the business from parents or relatives (57.5%), others were Traditional Health Practitioners (THPs) who were also trading (32.5%) and only 10% had entered the trade as a source of income (10%) (Box 1). Those who had inherited this practice as THPs had embraced sale of WMPs products besides the practice.

3.3. Diversity of Plant Species Sold in Markets

During this study, 106 plant species were found in the markets (Appendix I). They were distributed across 46 families; of which 26 families had only one species, nine families had two species and three families three species each, the rest families had four species and above (Table 1). The family Leguminosae had the most species recorded at 16% followed by Compositae 5.7%, Eurphorbiaceae and Solanaceae had 4.7% each. The genus *Acacia* had highest number of species with eleven species (Appendix I). The

WMP products were mostly obtained from shrub and tree life forms (Figure 3).

Different parts from the same plant species were sold in markets for example *Acacia gerrardii* roots and stem bark; *Kigelia africana* (fruit and roots); *Balanites aegyptiaca* (fruit and bark) and *Aloe secundiflora* (roots and leaves). Roots, root bark and tubers accounted for 45% of the parts sold, stem and stem bark accounted for 39%, leaves and shoots 8.78% while whole plants and exudates accounted for 0.67% of products in the markets (Figure 4). The highest number of species on sale by one trader was 65 and the least were four species. Most traders (65%) had 10 - 30 species on display for sale (Figure 5).

- i) "Drought and famine in 2009 wiped out my livestock; I was left with nothing to sustain myself and resorted to selling WMPs in the markets (RESP 16, Olchoro market).
- ii) "I was jobless after warriorhood and started trading in medicinal plants to earn a living" (RESP 30).
- iii) "This trade needs no capital to start, only indigenous knowledge and experience which I already had from warriorhood" (RESP. 6, Olitipis market)
- iv) "I grew up learning from wilderness as a herd boy and interacted with herbalists who introduced me to the trade" (RESP.20, Ololunga market).
- i) "I was inducted into the WMPs trade by my father who was a herbalist" (RESP 28).
- ii) "I was a harvester who used to supply *Mrysiine africana* (seketet) to the traders in the market and on realising the opportunity, I engaged fully in trading in WMPs (RESP.22)

Box 1. Excerpts of Responses to the Question "how/why Did you Start/get into WMPs trade?"

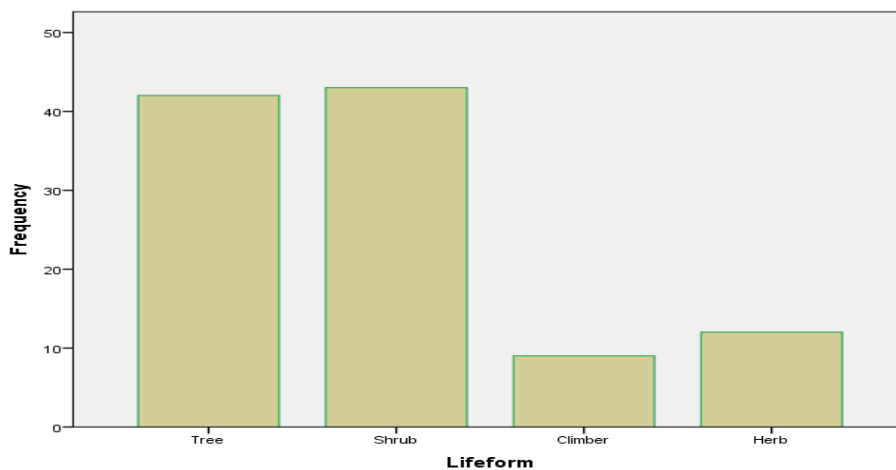


Figure 3. Life Forms of Wild Medicinal Plants Documented in Markets

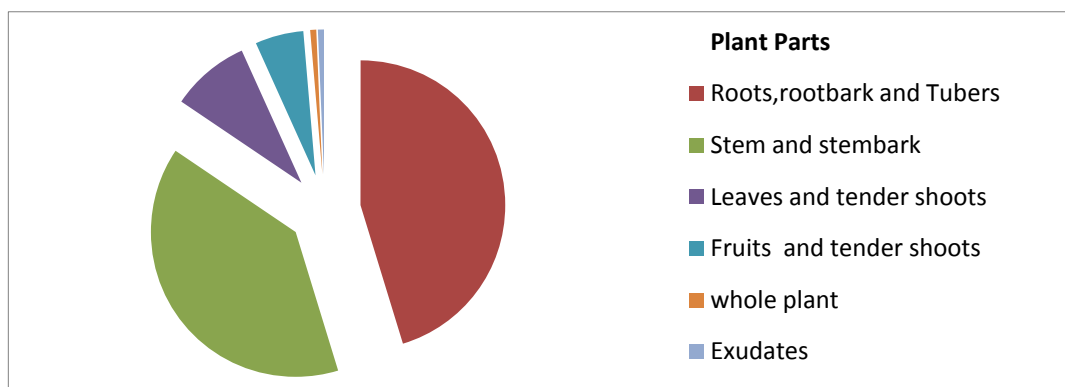


Figure 4. Wild Medicinal Plants Parts in the Markets

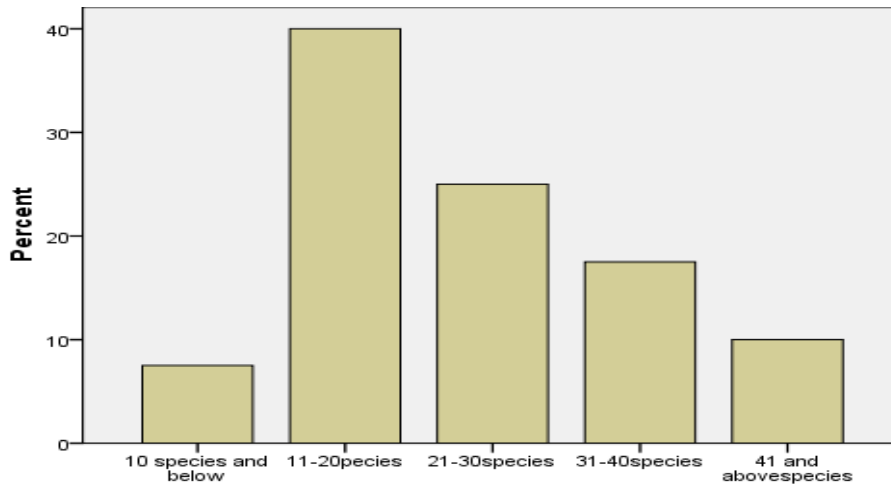


Figure 5. Number of Species of Wild Medicinal Plant per Trader in the Market

3.4. Challenges Facing Traders

Challenges encountered by the traders included, harassment by County officers for trading without permits, long distances travelled to harvest products and exposure to extreme weather conditions (sunshine, heat, rain, cold, wind and dust). The traders also reported lack of capital (to expand business, process and package products), client complaints when not cured. Challenges directly related to WMP trade were competition, low profit margins, bargaining by customers and product scarcity for some species such as *Myrsine africana* and *Osyris lanceolata*, language barrier for non-Maasai customers and transport to harvesting sites during the rainy season. Despite these challenges traders were optimistic with 70% indicating that WMPs trade had a future and were willing to continue.

3.5. Clientele of WMPs

Customers of WMPs in markets were the household users, livestock herders and hoteliers (butcheries and hotels as an accompaniment to bone/meat soup). Among those who bought WMPs for home consumption, three categories of users were identified; first were those who used WMPs as a cultural practice (37.5%) at home, the second category resorted to WMPs when conventional medicine was not working or not available (35%) and the third category used WMPs because it was the available

form of healthcare accessible to them (27.5%).

The buyers were conversant with WMPs products regularly used at home however for curative purposes they consulted THPs on administration and dosage. Preference and use of WMPs by sellers and buyers was based on believe in their efficacy and accessibility with statements such as “medicinal plants are free from chemical additions “(RESP 6, Suswa market); and ii) “medicinal/soup species cures and are effective” (RESP.7, Oletipis market). Over two third of traders (67%) reported that they advised customers on how to use WMPs even if not requested while 30% said they advise on request. According to the traders 65% of customers knew the WMPs products they needed to buy while the other 35% consulted the traders.

3.6. Wild Harvesting of WMPs

All WMP products on sale in Narok markets were collected from the wild. According to 72.5% of the traders, wild stocks of WMPs were declining while 27.5% reported that wild stocks were still available. Seventy two percent of traders reported a decline in wild stocks of WMPs resulting mainly from land use change and overuse /multiple use of species (Figure 6). Only 17.5% were aware that seedlings of some WMPs were available in nurseries. None of the traders had planted any plants themselves, but a few expressed willingness to plant *anthoxylum. usambarense* and *Myrsine africana* species.

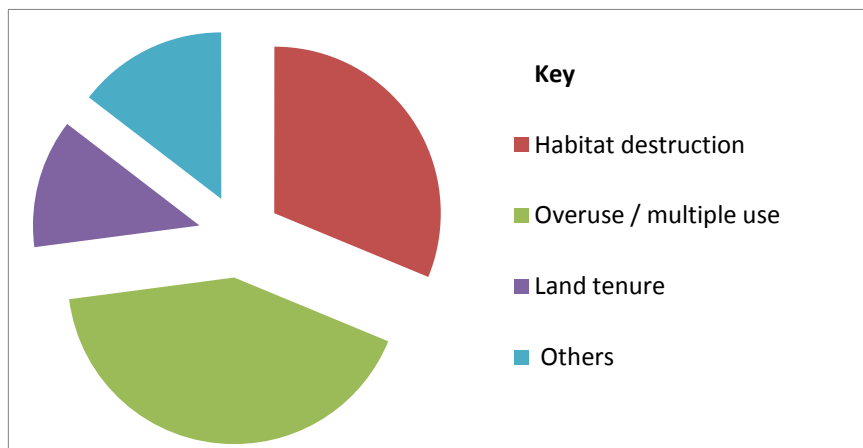


Figure 6. Causes of Declining Wild Stocks of WMPs in Narok

3.7. Nodes along the Market Chain, Pricing and Processing of Wild Medicinal Plants (WMPs)

Traders preferred to harvest and process WMPs themselves to ascertain identity of species and quality of the treatment as a means of eliminating possibilities of adulteration of products for profit. However scarce species such as *Rapanea melanophloes* and *M. africana* were obtained from harvesters. All of WMP products sold in Narok were sourced from within the county except *Azadirachta indica* which was sourced from the Kenyan coastal region. According to traders factors influencing pricing of WMPs products included the species availability/scarcity, buying price from harvester, ailment/disease, and season; with prices going up during the rainy season

Additionally any value addition through semi-processing by drying, grinding and packaging attracted a higher price. Pricing/cost of WMPs was challenge to quantify as there were no standardized measurement used by traders. The average price of ground WMP products was KES 400 per kilogram. Unprocessed plant parts including wet stems or roots were sold as a bundle and their price range was between 100 -150 Kenya shillings (KES) (1-1.5USD) per kilogram. Owing to informal nature of the trade and competition, traders used unstandardized containers and packets.

Customer's bargains and request for discounts were reported. The products were stored and packaged in plastic bags. Powdered products were stored in plastics or metallic containers, often recycled. Stationary traders sold semi processed products which were sometimes combinations of species as used traditionally, *M. africana*/*R. melanophloes* seeds were however sold singly.

4. Discussion

4.1 Characteristics of Wild Medicinal Plants (WMPs) Traders and Markets

Traditionally, trade in WMPs was relegated to the elderly, mostly because the youth with formal education have other options for employment. During this study average age for respondents was 48 years, showing there was recruitment of younger people into the profession. This trend of increasing participation by younger people in WMP trade is in line with other findings [9]. It is possible that their involvement may be as a result of unemployment or loss of other forms of livelihood [13]. The presence of younger people in the trade nevertheless has ensured that the associated indigenous knowledge is passed on and thus ensuring its continuity into the future [24]. On the other hand it gives hope in eventually formalizing this trade as the people involved have potential learn and engage business skills.

Men dominated trade in WMFP in this study comprising 85% and only 15% of the vendors were women. One explanation of this disparity is that men undertook frequent travels away from homesteads unlike women who had the duty of household chores. This finding agrees with observations by other scholar's [9,14]. All traders interviewed were Maasai, the dominant community in Narok County. Dominant communities in the neighborhood of markets lead in NTFPs trade [13,14]. In addition vendors

identify ethno species with vernacular names in local languages or those of predominant group's [14]. Dominance of the Maasai community in medicinal plants trade could be attributed to a strong and relatively intact culture and tacit knowledge. In addition availability of herbal products from significant natural forests patches besides being the dominant community in this County.

Categorization of traders in Narok was based on mode of operation; permanently selling from one point in one market or mobile; fulltime job or part time job. Some of the traders who operated part-time were harvesters who came to deliver supplies and they sold excess products. Full time traders had a stationary point in the markets from where they sold their products all days of the week. For full time traders selling WMPs was a major livelihood activity while for others it was supplementary engagement.

During this study over 65% of the traders had no formal education. Knowledge and skills of WMPs and trading was acquired through apprenticeship with practitioners or handed down as family business. This was an ongoing process that equipped traders with required knowledge and skills. Formal education though not a requirement would enhance trade through expanding the clientele and integration into conventional trading systems [13]. Apprenticeship and induction of relatives into traditionally based livelihoods such as marketing of herbal products and traditional health practice are a common phenomenon and has been reported elsewhere [25,26].

Wild medicinal plants (WMPs) were a new product range that is yet to be recognized and incorporated. This observation on the informal nature of WMPs trade corresponds with other studies [25,27]. The informal nature hinders investment due to market uncertainty and unsustainability of wild resource base. Traders and harvesters as such work on it as a subsistence or supplementary strategy [4]. Peak market days for WMPs were also livestock market days, this is characteristic of rural agro pastoral dryland areas in Kenya. During market days public transport and a large clientele are available. This shows that WMPs trade is still evolving and marketing is dependent on other products mainly livestock. Ad hoc selling of products in Narok markets by traders differs from that observed in Kibuye market, Kisumu [12] where traders of WMPs operated from one section inside the market and were registered with the regional traditional health practitioners association.

Commercialization of WMPs in Narok is thought to have started in the 1980s. Though a recent form of livelihood there is an increase of vendors over time. A unique finding is that most traders had entered the trade during or after the cycles of drought years starting around 1980-1982, with peaks in 1999, 2002 and 2007. These periods coincide with years preceded by drought occurrence could be a pointer to decline or loss of livestock-based livelihood. The evolution of WMPs trade is partly explained by changing means of earning income and diversification of livelihoods by the Maasai community. Changes in pastoral lands such as increase in population, land demarcation and privatization have negatively affected pastoral livelihood resulting in diversification in addition to weather variability. This view is in agreement with those of [9,28] who see this as an adaptation to climate change by the local community

diversifying their activities and trading in WMPs is one emerging alternative.

However increase in WMPs traders over the last thirty years could also be explained by external factors. Internationally, “the Chiang Mai declaration” in 1978 was the first formal recognition of the essential role of medicinal plants in primary healthcare [29]. In Kenya, it coincides with policy developments in the area namely establishment of the Centre for Traditional Medicine at Kenya Medical Research Institute (KEMRI) in 1985. Recognition of traditional healer’s [9] by the Department of Culture in the 1990s; and the declaration of 2001-2010 the Decade for African Traditional Medicine by the Organization for African Unity (now African Union). Since then, 31st August was declared the day of African Traditional Medicine, celebrated in Kenya and supported by World Health Organization (WHO) through Ministry of Health and Department of Culture.

4.2. Taxonomic Diversity, Life Forms and Plant Parts Used

The number of species of WMPs recorded Narok markets were comparable with those found in other studies [8,27]. This could be indicative of the species diversity in the regions from where they are sourced. The families Leguminosae/ Fabaceae and Asteraceae had the highest number of species followed by Eurphorbiaceae and Solanaceae. The number of species on display by traders in the markets ranged from four to sixty-five. The range could be as a result of the category of vendors. As traders tend to formalize their business they tend to specialize on a few plant species products and increase the volumes and act as suppliers [8].

The majority of species used were trees or shrubs while climbers and herbs were not commonly traded. There is a likelihood that trees and shrubs are reported often because they are available throughout the year, less bulky and easier to transport, process and preserve. The preference of bark and roots is of conservation concern for the targeted species this can affect the conservation status of a species if the species involved have a small population and/or a restricted distribution [26,27]. This concern is shared by reference [8].

4.3. Processing and Pricing of WMP Products

Harvesting WMPs products for markets was mainly undertaken throughout the year and mainly during the dry season. This was because of this season facilitated sun drying of WMPs products and one could easily access to harvesting sites and markets unlike during the rainy season. In addition, traders involved in this trade part time basis have extra time from farm work and needed to supplement their income during the dry season by engaging in WMPs trade as reported elsewhere [9,26].

Wild medicinal plant (WMPs) products were sold as whole plant parts in bundles (wet or dried) and semi processed products which were packaged in sacks, nylon bags, tins or plastic containers. Noting that WMPs products were consumed for health, nutritional, preventive, curative, cultural or aromatic value; packaging and/or storage this packaging could expose them to contamination [29].

It was challenging to determine the prices of WMPs products during this. Because of the informal nature of this trade, non-uniform quantities of WMPs products were sold and sometimes the products were dispensed as mixtures. Assessment of aspects of wild medicinal plant markets with certainty is a challenge as reported in other studies [6,9]. For all species the selling price of products depended on value addition which attracted higher price Pricing also depended on species with *Myrsine africana* and *Rapanea melanophloes* seeds attracting a highest price Kenya shillings 400 to 700 (est. \$ 4 - 7). This falls within the price range reported elsewhere [31].

At the international level challenge in determining the price of wild medicinal plant raw materials is compounded because products maybe disguised to avoid detection at exit points thus distort pricing. Such a case was by reference [31] and [14] reported that WMP products where they were exported as wood chips or timber. These WMPs products even legal markets products fetch a marginal price for the local harvesters and traders in comparison to their real value in external markets because of middlemen and networks [7].

Part-time engagement, lack of proper record keeping challenges quantification of monetary benefits and thus contribution of trade in WMPs this study and similarly reported elsewhere [8,13]. Despite the informal nature of WMPs trade its contribution is important at the local level indicated by the fact that traders engage in the practice and appreciate its contribution to livelihoods. Similar sentiments have been reported by other studies [9, 26] thus confirming its significance.

4.4. The Future of Wild Medicinal Plants (WMPs) Trade

Most WMPs products in the markets were collected from the wild within Narok County except *Azandrachta indica*. Pastoral land use and communal ownership of land in the past allowed continued free access to WMPs products in the landscape. This is likely to change in the near future due to increased privatization and conversion of wild habitats into agricultural land use. However wild sourcing of NTFPs is common in developing countries [14,27]. Similarly short market chain nodes for WMPs were reported Uganda [9,13]. From this study *Osyris lanceolata* in international trade and *M. africana* popular in local and regional trade scarcity may be because of trade. Two species *O. lanceolata* and *M. africana* were threatened by trade and had earlier been listed as of conservation concern during rapid conservation assessment [31].

5. Conclusion and Recommendations

The trade in medicinal plants is an upcoming means of livelihood in Narok County. At present it operates informally, but is has the potential to grow. Its sustainability is dependent on the indigenous wild plant resources and wild stocks are declining. Its future will rely on both sustainable harvesting in-situ and ex-situ production. With climate change, reducing land sizes threatening the traditional livelihood of livestock rearing it is likely that WMPs trade will develop as an economic activity under the subsistence

or supplementary strategy in Narok. If sustainable harvesting and value addition along the market chain are advocated for, trade in WMPs can revitalize local health and traditions while diversifying livelihoods. It is recommended that WMPs traders association be formed in Narok County to help self-regulate the trade, formalize it, help in value addition and look into the future sustainability.

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Statement of Competing Interests

The authors have no competing interests.

List of Abbreviations

NTFPS: Non timber forest products
WMPs: wild medicinal plants.

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Appendix 1. Medicinal Food Plants found on sale in Narok Markets

Local name(s)	Family	Genus	Species	Life Form	Plant part(s) used
Esonkoyo	Acanthaceae	<i>Ruelia</i>	<i>patula</i>	C	Whole plant leaves, stems
Osuguroilombokush	Aloaceae	<i>Aloe</i>	<i>kulalensis</i>	S	root, leaves
Osuguroi	Aloaceae	<i>Aloe</i>	<i>secundiflora</i>	S	roots, leaves
Osuguroi	Aloaceae	<i>Aloe</i>	<i>volkensii</i>	S	roots, eaves
Olokunonoi	Anacardiaceae	<i>Ozoroa</i>	<i>Insignis</i>	T	Bark
Oltankotua	Anacardiaceae	<i>Pistacia</i>	<i>aethiopica</i>	T	Bark
Olmisigiyoio	Anacardiaceae	<i>Rhus</i>	<i>vulgaris</i>	S	bark
Olmang'uai /olmangwai	Anacardiaceae	<i>Sclerocarya</i>	<i>Birrea</i>	T	Roots, stem barks & fruit
Olmorijoi	Apocynaceae	<i>Acokanthera</i>	<i>schimperi</i>	T	Bark/stem &Fruit
Olamuriaki	Apocynaceae	<i>Carissa</i>	<i>spinarum</i>	S	Root
Engoswa /olngosua	Balanitaceae	<i>Balanites</i>	<i>aegyptiaca</i>	T	fruit , bark
Olekikuuni	Berberidaceae	<i>Berberis</i>	<i>Holstii</i>	S	root , stembark
Oldarpoi	Bignoniaceae	<i>Kigelia</i>	<i>africana</i>	T	fruit, roots
Oseki	Boraginaceae	<i>Cordia</i>	<i>monoica</i>	S	roots, stem
Olmororoi	Burseraceae	<i>Commiphora</i>	<i>africana</i>	S	Stem and root bark
Osokonoi/entoroniki	Canellaceae	<i>Warburgia</i>	<i>ugandensis</i>	T	stem , barks, roots
Olokordodai	Capparaceae	<i>Capparis</i>	<i>fascicularis</i>	S	Bark
Osoket	Celastraceae	<i>Elaeodendron</i>	<i>buchananii</i>	S	Fruit
Olodonganayioi	Celastraceae	<i>Mystroxyylon</i>	<i>aethiopicum</i>	T	Barks
Olamurunyai	Celastraceae	<i>Maytenus</i>	<i>senegalensis</i>	S	Roots
Olmororoi	Combretaceae	<i>Combretum</i>	<i>molle</i>	T	Barks
Naing'ong'undeyo	Asteraceae	<i>Gutenbergia</i>	<i>cordifolia</i>	H	stem, leaves
Olabaaiiepartolu	Compositae	<i>Psiadia</i>	<i>punctulata</i>	S	roots, stems, leaves/sap
Oleturot	Compositae	<i>Sphaeranthus</i>	<i>confertifolius</i>	H	stem, root, leaves
Olbangi	Compositae	<i>Tagetes</i>	<i>minuta</i>	H	leaves
Oleleshua /osentu	Compositae	<i>Tarconanthus</i>	<i>camphoratus</i>	S	Tender branches and leaves
Enchaniembae	Compositae	<i>Vernonia</i>	<i>brachycalyx</i>	S	Roots
Olng'arlayioi	Cucurbitaceae	<i>Coccinia</i>	<i>grandis</i>	C	Roots
Esumeita	Cucurbitaceae	<i>Momordica</i>	<i>friesiorum</i>	C	Bark roots
Olekidong'o	Dracaenaceae	<i>Dracaena</i>	<i>ellenbeckiana</i>	S	Tuber
Oloibor benek	Euphorbiaceae	<i>Croton</i>	<i>dichogamus</i>	S	Roots
Olmergueit	Euphorbiaceae	<i>Croton</i>	<i>megalocarpus</i>	T	barks, stems
Enchani olpurkel	Euphorbiaceae	<i>Croton</i>	<i>menyharthii</i>	S	Root
Ooltangarian	Euphorbiaceae	<i>Euphorbia</i>	<i>ugandensis</i>	S	root, stembark
Olkobobit	Euphorbiaceae	<i>Synadenium</i>	<i>grantii</i>	T	stem, leaves
Olmorogi/ Olmorog	Flacourtiaceae	<i>Dovyalis</i>	<i>abyssinica</i>	S	roots/stem
Oladarridar/oladardar	Flacourtiaceae	<i>Scolopia</i>	<i>theifolia</i>	S	stem/roots
Oledat	Flacourtiaceae	<i>Trimeria</i>	<i>grandifolia</i>	S	Roots
Oltiasimpol	Icacinaceae	<i>Apodytes</i>	<i>dimidiata</i>	T	Stem
Oltarara/oltaraarani	Leguminosae	<i>Acacia</i>	<i>abyssinica</i>	T	stems bark
Oluuai/oluai/Eluagai	Leguminosae	<i>Acacia</i>	<i>Drepanolobium</i>	S	Roots
Olng'ong'uenyi	Leguminosae	<i>Acacia</i>	<i>gerrardii</i>	S	roots, bark stem
Olerai nanyokie	Leguminosae	<i>Acacia</i>	<i>kirkii</i>	T	Bark
Oitiorok	Leguminosae	<i>Acacia</i>	<i>mellifera</i>	T	Barks
Olkiloriti	Leguminosae	<i>Acacia</i>	<i>nilotica</i>	T	Barks
Oitioibor	Leguminosae	<i>Acacia</i>	<i>senegal</i>	T	Barks
Olerai	Leguminosae	<i>Acacia</i>	<i>seyal</i>	T	Bark
Oltepesi	Leguminosae	<i>Acacia</i>	<i>tortilis</i>	T	roots bark resin
Elerai	Leguminosae	<i>Acacia</i>	<i>xanthophloea</i>	T	Barks
Oldepe	Leguminosae	<i>Acacia</i>	<i>nubica</i>	T	Bark and Roots
Olmugutan	Leguminosae	<i>Albizia</i>	<i>anthelmintica</i>	T	Roots, Bark
Olasiti /olmoso	Leguminosae	<i>Albizia</i>	<i>gummifera</i>	T	bark
Olbukoi	Leguminosae	<i>Piliostigma</i>	<i>thonningii</i>	T	Roots
Osenetoi	Leguminosae	<i>Senna</i>	<i>didymobotrya</i>	S	barks, roots, stem
Olchaki	Leguminosae	<i>Vigna</i>	<i>membranacea</i>	H	Roots
Olkiloilo	Leguminosae	<i>Zornia</i>	<i>pratensis</i>	H	Root
Oltipilikua/oltipilikwa	Loganiaceae	<i>Strychnos</i>	<i>henningsii</i>	T	roots stem bark
Muarobaine	Meliaceae	<i>Azadirachta</i>	<i>indica</i>	T	roots, leaves
Olmokorionko	Meliaceae	<i>Ekebergia</i>	<i>capensis</i>	T	roots, bark

Local name(s)	Family	Genus	Species	Life Form	Plant part(s) used
Osukunua	Moraceae	<i>Ficus</i>	<i>cordata</i>	T	Barks
Olngaboli	Moraceae	<i>Ficus</i>	<i>sycomorus</i>	T	barks, stems
Oseketeki	Myrsinaceae	<i>Myrsine</i>	<i>africana</i>	S	Seeds
Seketeki/olenkaburra	Myrsinaceae	<i>Rapanea</i>	<i>melanophloeos</i>	S	Seeds
Enkamai	Oleaceae	<i>Ximena</i>	<i>americana</i>	T	bark stem/roots
Oloirien	Oleaceae	<i>Olea</i>	<i>europaeasppafricana</i>	T	stems, barks
Oliala	Oleaceae	<i>Schrebera</i>	<i>Alata</i>	S	roots/leaves
Olkirenyi	Oliniaceae	<i>Olinia</i>	<i>rochetiana</i>	S	roots, leaves, stem
Enkaisijoi	Oxalidaceae	<i>Oxalis</i>	<i>latifolia</i>	H	leaves, roots
	Palmae	<i>Phoenix</i>	<i>reclinata</i>	T	Root
Olkarlei/olkalei	Papilionaceae	<i>Dolichos</i>	<i>oliveri</i>		Root
Olngeriantus	Plumbaginaceae	<i>Plumbago</i>	<i>zeylanica</i>	H	leaves, roots
Olorite	Proteaceae	<i>Fauera</i>	<i>saligna</i>	T	Bark
Olkonyil	Rhamnaceae	<i>Rhamnus</i>	<i>prinoides</i>	S	stem, bark roots
Olkokola	Rhamnaceae	<i>Rhamnus</i>	<i>staddo</i>	S	barks, stems, roots
Olkujuk	Rosaceae	<i>Prunus</i>	<i>africana</i>	T	roots, stem bark
Entakurukuriet	Rubiaceae	<i>Gardenia</i>	<i>volkensii</i>	T	Fruits
Olonini	Rubiaceae	<i>Rubia</i>	<i>cordifolia</i>	C	Roots
Enchanienkashe	Rubiaceae	<i>Tarenna</i>	<i>graveolens</i>	S	roots, stem
	Rubiaceae	<i>Vangueria</i>	<i>apiculata</i>	S	Roots
Oleparmunyo	Rutaceae	<i>Toddalia</i>	<i>asiatica</i>	C	roots bark
	Rutaceae	<i>Vepris</i>	<i>nobilis</i>	S	Stem
Osojo/Enkinyei/olchaniorok	Rutaceae	<i>Vepris</i>	<i>simplicifolia</i>	T	Root
Oloisuki /Enkoisuki	Rutaceae	<i>Zanthoxylum</i>	<i>usambarensis</i>	T	bark
Oremit	Salvadoraceae	<i>Salvadora</i>	<i>persica</i>	S	roots, stem
Ololesiai	Santalaceae	<i>Osyris</i>	<i>lanceolata</i>	S	barks, roots
Oltimigomi/Entimigomi	Sapindaceae	<i>Pappea</i>	<i>capensis</i>	T	bark
Olenyawaitie	Scrophulariaceae	<i>Craterostigma</i>	<i>pumilum</i>	H	stem, barks
	Solanaceae	<i>Physalis</i>	<i>peruviana</i>		
Osikawoi/osikawai	Solanaceae	<i>Solanum</i>	<i>aculeastrum</i>	S	fruits, roots, stems, barks
Entulelei	Solanaceae	<i>Solanum</i>	<i>indicum</i>	S	Roots
Olesayiet	Solanaceae	<i>Withania</i>	<i>somnifera</i>	S	Root
Osupukiai Orok	Sterculiaceae	<i>Dombeya</i>	<i>burgessiae</i>	T	roots-human
Olmotoo	Sterculiaceae	<i>Dombeya</i>	<i>rotundifolia</i>	T	roots barks
Ositeti	Tiliaceae	<i>Grewia</i>	<i>bicolor</i>	S	roots
olkuyiaine/Enkuyiaine	Apiaceae	<i>Heteromorpha</i>	<i>trifoliata</i>	H	Stems
Olmakutukut	Verbenaceae	<i>Clerodendrum</i>	<i>myricoides</i>	S	stem roots
Olmakirikiriaine	Verbenaceae	<i>Lantana</i>	<i>trifolia</i>	S	Roots
Osinoni	Verbenaceae	<i>Lippia</i>	<i>javanica</i>	S	Leaves
Osinoniorok	Verbenaceae	<i>Lippia</i>	<i>kituiensis</i>	H	Leaves
Osukurtuti	Vitaceae	<i>Cissus</i>	<i>Quadrangularis</i>	C	Stem
Olorrondo	Vitaceae	<i>Cyphostemma</i>	<i>cyphopetalum</i>	C	leaves/barks
Olkilenyai	Vitaceae	<i>Rhoicissus</i>	<i>revoilii</i>	C	Roots
Olkilenyai	Vitaceae	<i>Rhoicissus</i>	<i>tridentata</i>	C	tuber, stem, sap

Key: Lifeforms: T – Tree S- Shrub C- Climber and H-Herb.