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The practice of herbal medicine in management of oral health in Nairobi County, Kenya

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Abstract
The use of herbal materials for oral health is on the increase due to the high cost of conventional medicine. However, there is scanty data about key players in the trade of the herbs and conditions under which they are handled and this study addressed the above concerns using a questionnaire. Results show that majority of the participants were male (72%) and middle aged while 40% were illiterate. Majority of the participants declined to state how and where they acquired knowledge of herbal medicine. Herbs are stored, packaged, prescribed and sold under unhygienic conditions hence increasing possibility of adulteration and deterioration. The study concluded that the quality of herbal materials used for oral health was poor and therefore safety and efficacy of the herbs may not be guaranteed. We therefore recommend that efforts should be directed at improving herbal trade through good agricultural, harvesting and processing practices that will make the products safe.

Keywords: Oral health, herbal medicine, quality, safety, efficacy, deterioration

1. Introduction
Majority of the developing countries worldwide continue to rely heavily on the use of traditional medicines as their primary source of healthcare. In some countries like Ghana, the government encourages the use of indigenous forms of medicine rather than allopathic drugs. In Nigeria, a large percentage of the population depends on herbal medicines because the commercially available orthodox medicines are expensive and out of reach [1]. Furthermore, herbal medicine is seen to offer gentler ways of managing chronic diseases. In Kenya, the high poverty level and increased disease burden usually associated with HIV/AIDS has resulted to people seeking traditional medicine [2]. Oral health care facilities have not been adequate for majority of African populations including Kenya [3, 4]. There is great demand for herbal medicinal products for oral health care attracting a multiplicity of vendors in Nairobi County. However, there is inadequate documentation on the practitioners involved and the conditions under which herbal materials are prepared and prescribed in Nairobi [5, 6, 7]. The study investigated the demographic characteristics of traders as well as how they acquire, process, package and store herbal materials used for oral health in Nairobi.

2. Materials and methods
The study was carried out in Nairobi County, the capital city of Kenya. The city is Kenya's principal economic and cultural centre. Sampling was carried out in Gikomba, Juja road, Kawangware, Kangemi, Kibra, Kenyatta University, Thika road, Eastleigh, Kahawa estate and Central district area. The study area was divided into various strata according to the localities and product sold as described by Martin, (1995). Stratified random sampling was carried out to pick traders and markets. The sample size of the participants was determined by use of sample size calculator Raosoft Inc 2004®. Randomly generated computer numbers were used to select the traders, clinics and herbalists. In total, 186 respondents were identified but only thirty one percent (60) consented to participate. After obtaining informed consent, a semi-structured questionnaire and informal discussions were used to gather information on practitioners and plants used. The data obtained from the interview guides was supplemented by direct observations at the sale or treatment point [8].

3. Results and Discussion
3.1 Types of herbal products
Various herbal preparations were identified in the markets which include pastes (Table 1), suspensions (Table 2), powders (Table 3) and chewing sticks (Table 4). Some of the suspensions were clearly labeled and ingredients indicated.

The extracts of *Aloe vera* plant, clove (*Sizygium guinesse*), peppermint (*Mentha piperita)*, tea tree (*Camellia sinesis*) and chamomile (*Matricaria chamomilla*) were added to the tooth paste. The major ingredient noted in herbal suspensions was *Warbugia ugandensis*. Other ingredients included were *Mentha piperita* (peppermint), *Rosemarinus officinalis* (rosemary) and *Withania somnifera*. Plants were used singly or in combination for management of oral health (Table 1). However, most of the products had inadequate labeling indicating that the products do not meet the World Health Organization's standards [9]. Earlier studies indicated that majority of herbal formulations lacked the required standards [10]. The inadequate labeling in Kenya is probably due to lack of regulating mechanisms.

Table 1: Herbal pastes used for oral health in Nairobi, Kenya

Herbs as reported by herbalist	Label			Processing	Packaging
	Ingredients declared	KEBS mark of quality	Indication		
Aloe vera gel	Yes	Absent	Antibacterial	Extraction of gel	Plastic tubes
Warbugia ugandensis bark	No	Present	Antibacterial	Drying and grinding	Plastic bags
Camellia sinesis leaf *Salvia officinalis* leaf *Matricaria chamomilla* flower bud	No	Present	Antibacterial	Maceration	Plastic tubes
Sizygium guinesse oil, wintergreen oil, *Cinnamomum verum*	No	Present	Antibacterial	Extraction and mixing	Plastic tubes
*Warbugia ugandensis*bark, *Mentha piperita* leavesandginger rhizome (*Zingeber officinale*), *Persea american* (seeds)	Yes	Absent	Pain killer	Grinding and mixing	Plastic bags

KEBS – Kenya Bureau of Standards

Table 2: Herbal suspensions used for oral health in Nairobi, Kenya

Herbs as reported by herbalist	Label			Processing	Packaging
	Ingredients declared	KEBS mark of quality	Indication		
*Warbugia ugandensis*bark extracts	Yes	Present	Bad mouth breath, antibacterial	Grinding of the bark and suspending in water	Properly sealed dark plastic container
Warbugia ugandensis, bark powder	Yes	Absent	Antibacterial, heals gum disease	Drying, grinding and extracting in water	Properly sealed dark plastic container
*Warbugia ugandensis, Mentha piperita*and *Sizygium guinesse (*clove*)*	Yes	Absent	Antibacterial, bad mouth breath	The extracts of herbal powders are dissolved in clove oil	Properly sealed dark plastic container
Aloe vera gel,*Warbugia ugandensis, Withania somnifera*	No	Absent	Antibacterial	The extracts of herbal powders are dissolved in clove oil	Properly sealed dark plastic container
Warbugia ugandensis bark and*Rosemarinus officinalis* leaves extracts	No	Absent	Antibacterial	Grinding, extracting in water	Properly sealed dark plastic container
Aloe vera gel *Withania. sominfera* and *Echenecea* species (leaves)	No	Absent	Antibacterial, antifungal, bad mouth breath	Gel is obtained and mixed with extracts of the *Withania sominfera, Echenecea* species leaves	Brown dark bottle
Warbugia ugandensis bark *Cinnamomum annuum* fruits extracts	No	Absent	Antibacterial, antifungal	Extraction in water	Brown dark bottle

KEBS – Kenya Bureau of Standards

Table 3: Powders used for oral health in Nairobi, Kenya

Herbs as reported by herbalist	Label			Packaging
	Ingredients declared by herbalist	KEBS mark of quality	Use	
*Senna didymobotrya*leaves, roots	Yes	Absent	Mouth ulcers	Polythene bags
Zanthoxyleum chalybeum powder	No	Absent	Tooth ache	Polythene bags
*Warbugia ugandensis*barkpowder	No	Absent	Tooth ache	Polythene bags
Terminalia brownii rootpowder	No	Absent	Tooth ache, tonsillitis	Polythene bags
Warbugia ugandensis bark, *Terminalia brownii, Zanthoxyleum chalybeum*	Yes	Absent	Gum bleeding, tonsillitis, teeth problem	Polythene bags
Warbugia ugandensis bark, *Zanthoxyleum chalybeum, Azindirachta indica Terminalia. Brownie*	Yes	Absent	Gum bleeding, tonsillitis, teeth problem	Polythene bags
Warbugia ugandensis bark, *Medicago sativa* leaves, *Rumex usambarensis*, leaves *Azadirachta indica*	Yes	Absent	Tonsillitis	Polythene bags Capsules
Cinnamomum annuum fruits. *Warbugia ugandensis*, iodine, black charcoal	No	Absent	Antibacterial	Polythene bags
Juniperus procera stem *Euclea divinorum* roots, *Carissa edulis* roots	Yes	Absent	Mouth ulcers	Polythene bags

KEBS – Kenya Bureau of Standards

Table 4: Chewing sticks used for oral health in Nairobi County

Herb	Uses	Packaging
Clematis hirsuta roots	Tooth ache	None
Euclea divinorum Hien roots	Gum bleeding	None
Salvadora persica roots and stems	Tooth cleaning	None

3.2 Processing of herbal materials

The primary processing procedures that were mainly used were those described by the World Health Organization (2016). Out of 60 respondents, 7 purchased ground herbal materials which they repacked for sale. Of the remaining 53 participants, 64.15% ground or milled herbs into powders, 22.6% simply chopped or cut the herbs into small pieces while 13% extracted herbs before selling them (Fig. 1).

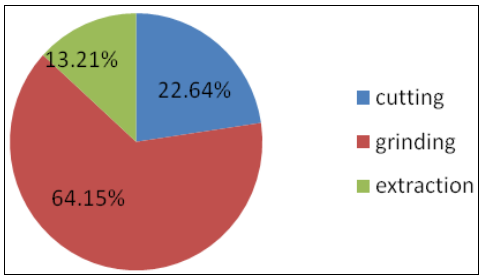

Fig 1: Methods used for processing herbal materials

3.3 Business premises

Results indicate that only ten percent of the respondents had their business premises set up in a clean environment (Fig. 2). The latter were mainly herbal clinics. Most of the businesses (58.3%) were located near crowded areas while 36.7% were next to running sewers and 15% were found near a garbage dumping site. In Gikomba, several traders were found along Pumwani road near Nairobi River Bridge, a crowded and polluted area. In Kangemi, respondents were mainly found in the market area along Waiyaki Way near a garbage dumping site. Hawking of the chewing sticks in Eastleigh was concentrated in the 6th street, a crowded and dusty place. In Kibra, respondents were in Silanga area, next to the Nairobi dam; an area where waste, including excreta, was disposed. According to Oyetayo, 2008 and Stevic *et al*., 2012, in Africa and other parts of the world, herbal materials are prepared under unhygienic conditions, lacking in sanitation facilities. The finding of the current study collaborates with these facts since only 10% of the premises were located in hygienic conditions.

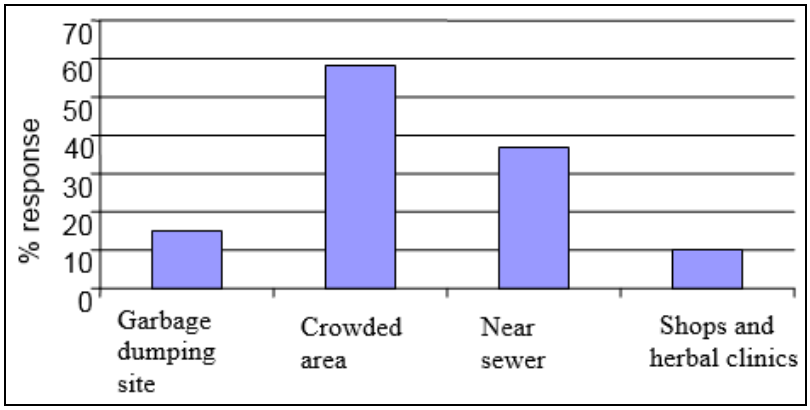

Fig 2: Location of herbal product business premises

3.4 Supply, transport and source of raw herbal materials

All the respondents obtained the raw herbal materials from middle men who in turn sourced them from the wild. According to the study carried out by Kuipers (1997) for Food and Agricultural Organization (FAO), there are two sources of medicinal materials: those collected from the wild and those that are cultivated. The dependence on wild sources of herbal materials as revealed in this study is doomed by recent high rates of tropical deforestation and habitat destruction. Sustainable harvesting is therefore not only essential for conservation of plant species but also for livelihoods of many people [11]. In Nairobi, studies showed that the herbal materials are used in form of bark, leaves, fruits, flowers, stems or roots [6]. The harvesting of roots and barks may kill the plant and threaten the survival of the species [12]. Herbal materials were mainly transported to Nairobi from rural areas by the middlemen using public means. Within Nairobi County, majority of the respondents used public means for the transportation of their materials. However, respondents from the herbal clinics declined to give the mode of transport for their herbal materials. The mode of transport and storage of herbal material is likely to compromise quality through contamination. The storage of the products in polythene bags that are heat labile is likely to alter the active chemical components of the herbal powders in the market.

3.5 Demographic characteristics of herbal medicine traders/ practitioners

Majority of the respondents were male (72%) while females were 28%. Studies in different parts of the world show that women have better knowledge of plants than men [13]. However, current findings indicate that majority of the practitioners were men. This contradicts the findings in South Africa where 74% of plant harvesters, street vendors and traditional healers were women and only 26% were men [14]. In this study, the dominance of men in the trade could be due to the difficulties involved in the sourcing and transportation of herbal materials. The highest number of respondents was in age groups of 18-29 years (26.7%), 30-39 years (26.7%) and 40-49 years (25%) (Fig. 3). The age group of 70-79 years had the lowest number of participants at 5 % followed by age group of 50-59 years at 6.7%. The age group of 60-69 years had 10 % of the participants. The knowledge of medicinal plants has always been associated with senior members of the

communities. Indeed ethno botanical researchers have frequently lamented the little or no interest among young members of communities to assimilate and pass on the medicinal plant knowledge to future generations [13, 15]. On the contrary, the current study shows that most of the respondents were in age group of 21-50 years. The involvement of the youthful group in herbal trade could be due to lack of employment but not necessarily due to their expertise in herbal knowledge. The study recommends proper training probably through apprenticeship to ensure advancing of the right information from generation to generation. Voeks (2007) indicates that the most pressing threat to the knowledge and existence of medicinal plants in tropical regions appears to be cultural changes. However, the findings of this work alleviate such fears, as the youth are more involved in herbal trade.

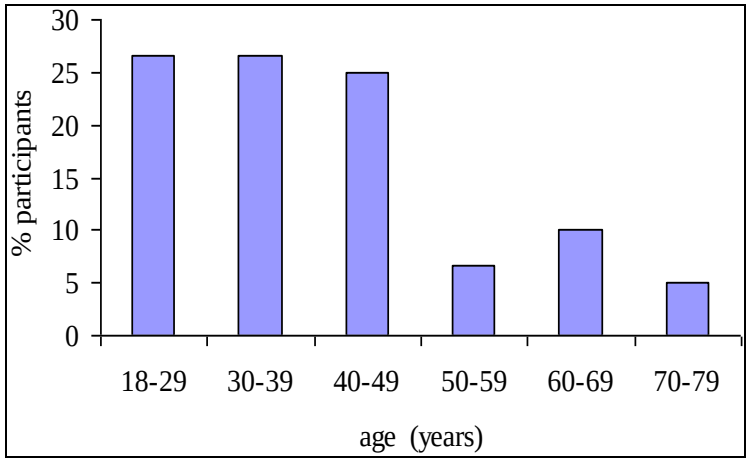

Fig 3: Age distribution of herbal traders/practitioners

3.5.1 Education level

Forty percent of the participants were illiterate while only 10% had tertiary education (Fig. 4). Most of the participants (93.4%) declined to state where and how they acquired training as traditional medical practitioners. The high level of illiteracy recorded here agrees with earlier findings in South Africa and Ethiopia [16]. Most of the elite group may have some form of formal employment or they may be in other enterprises that are more paying [17]. Lack of formal training may be a contributing factor to poor handling of medicinal plants. The use and trade of medicinal plant material is no longer confined to traditional healers but has entered both the informal and increasingly formal commercial sector [18].

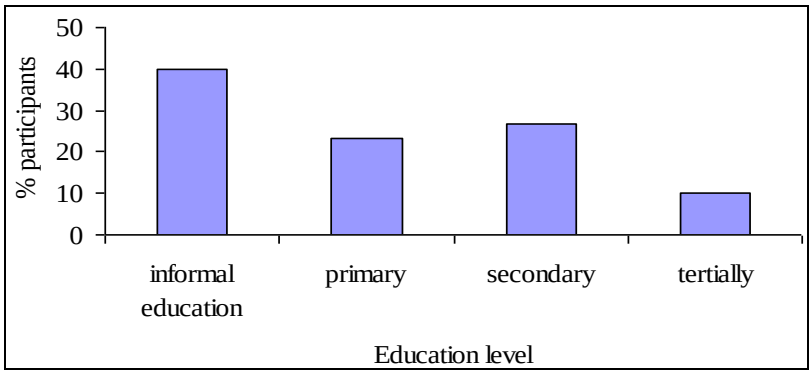

Fig 4: Education level of herbal medicine traders/practitioners

The use and trade of medicinal plant material is no longer confined to traditional healers but has entered both the informal and increasingly formal commercial sector [15]. This has led to the emergence of several quack traditional healers who are out to fleece and make quick money from desperate patients. There are possibilities that the majority of the key players are in this category. It is not surprising that most of the traders refused to disclose the source of their herbal knowledge.

4. Conclusions

Handling of herbal medicine in Nairobi is facing major challenges that require urgent solutions to streamline the practice and maximize on its benefits. The conditions under which the trade is being practiced pose challenges in safety, quality and efficacy of traditional remedies for oral health care. To improve the quality of herbal practice, the herbalists should be equipped with good agricultural, harvesting and processing skills. This will lead to the development of safe, high quality and efficacious herbal medicine that are comparable to those in China and India where traditional medicine is well advanced.

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