

# Consumer behavior and consumption practices towards less documented wild leafy vegetables among rural households in Dodoma Region, Tanzania

Hadijah Ally Mbwana

Sokoine University of Agriculture, Department of Food Technology, Nutrition and Consumer Sciences, P.O. Box 3006, Morogoro-Tanzania

\*Corresponding author: Email: [hadija27@yahoo.com](mailto:hadija27@yahoo.com)

**Abstract**— Inadequate dietary diversity is a key challenge in many countries in sub-Saharan Africa.

Diversifying diets with African indigenous vegetables is a sustainable way to supply a variety of nutrients to household members due to their richness in vitamins and minerals. Understanding the preferences and consumption practices of different varieties of wild vegetables is important information for agricultural promoters and is scarcely explored in Tanzania. This study aimed to gain an understanding of consumer behavior and consumption practices of wild vegetables in semi-arid areas in Tanzania in order to inform food policy and agricultural promoters. The study was conducted in two villages; Ilolo and Idifu from the semi-arid Dodoma region in Tanzania. Focus group discussions were conducted with forty women from both villages because women are more involved in cultivation, gathering and preparation of vegetables. Information collected in the focus group discussions included; perceptions, preferences, beliefs and taboos associated with consumption of wild vegetables. Participants reported that wild vegetables are seasonally available with most time of the year being scarce. The majority of the women reported consuming the wild vegetables due to good taste, abundance of nutrients, availability/affordability (they are mostly free), and because the other sources of relish are usually scarce. The most common wild vegetables that were consumed in the past 24 hours preceding the focus group discussions in the two villages included *Ipomoea pandurata* which is locally known as *chiwandagulu* and *Corchorus trilocularis* commonly known as *ilende*. For most vegetables, leaves and stems were common parts consumed. The women in both villages ranked *Corchorus trilocularis* as the most preferred wild vegetable. Women also reported some medicinal values attached to some of the wild vegetables such as *Bidens Pilosa* leaves which are claimed to increase blood. Generally, wild vegetables have the capability to escalate their significance to household income generation if farmers are given the chance to market them. Also domestication and promotion of these vegetables may help to enhance food and nutrition security.

**Keywords**— Wild, vegetables, rural, women, consumption.

## I. INTRODUCTION

Inadequate dietary diversity is a key challenge in many countries in sub-Saharan Africa, Tanzania inclusive and is one of the causes of malnutrition in rural farming communities (TDHS, 2016; Thompson and Meerman, 2013). This situation perseveres because most households depend on carbohydrate-rich staples while merely small amounts of animal products, fruit, and vegetables are consumed, and therefore diets lack a variety of nutrients needed for good nutrition and health. Diversifying diets with African

indigenous vegetables is a sustainable way to supply a variety of nutrients to the household members while battling micronutrient deficiencies and related health problems, mainly for the poor rural households (Keding, 2007). African wild vegetables are wild vegetables which are not cultivated and whose leaves and/or young shoots and flowers are consumed (Abukutsa-Onyango, 2007). African wild vegetables are important due to their influence to food security, nutritional status and household income in many areas in developing countries. They are a source of minerals,

fibre and vitamins which are crucial components of a balanced diet (Ojiewo et al., 2013). Wild vegetables may not inevitably be native to an area, but due to their long time use and preference by societies, they have been integrated into wild customs and culture (Keding, 2007). At present, the demand for wild vegetables is very squat and this may be contributed by lack of awareness of consumers regarding the importance of these vegetables to health. Their production and consumption is also very low due factors such as cultural aspects, perceptions and lack of awareness (Afari-Sefa et al., 2016). Studies on wild vegetables in Tanzania and other sub-Saharan countries mainly focused on the production, availability and marketing of traditional (common) vegetables without examining consumer behavior and consumption practices. African wild leafy vegetables which have not been domesticated, but rather gathered from the fields where they naturally occur are almost not explored. Also, it is challenging that information about Sub-Saharan Africa's yearly consumption or production of indigenous vegetables remains mysterious while statistics for cash crops is widely known (Smith & Eyzaguirre, 2007). Understanding of the preferences and consumption practices of different varieties of wild vegetables is important information for agricultural promoters and is scarcely explored in Tanzania. Promoting the inclusion of African wild vegetables in food policy is important first for their richness in nutrition and their probable influences to the household incomes to improve rural livelihoods.

This paper therefore aims to gain an understanding of consumer behavior and consumption practices of wild vegetables in semi-arid areas in Tanzania. While not the best region for vegetable cultivation, Mvumi ward in Dodoma region delivers an opportunity to learn how communities in semi-arid areas have been able to meet their dietary needs during the different seasons of the year. The results of this study will add to the existing knowledge of wild vegetables in the less studied semi-arid areas and thus aid in their promotion.

## II. MATERIALS AND METHODS

### Study area

The study was conducted in two villages from the semi-arid Dodoma region in Tanzania. Chamwino district was selected and Ilolo and Mzula villages represented the semi-arid climate. Food production in Chamwino is predominantly rain fed. Dodoma region receives one rainfall season per year with an average of 350-500mm per annum and is characterized by a prevalence of high food insecure areas.

The food system in Dodoma is mainly cereal based with pearl millet as the preferred staple. Groundnuts are normally mixed in most of the relishes used together with the main dish. Edible wild products particularly vegetables and fruits are important in the local food menus (Mutabazi, 2013). The Chamwino district imports food crops from other regions during the deficit months. Foods imported include maize, beans and pigeon peas. During the deficit months imported food is sold at a price more than three times its price during the months of plenty. This is because there are no structured local markets in the case study villages but small grain and pulses traders.

### Study design and sampling procedure

This study was a sub-study in a larger study of the Trans-SEC project. The main aim of the Trans-SEC study was to improve the food security for the most vulnerable rural populations in Tanzania by applying food securing up-grading strategies along local and regional food value chains. The focus of this sub-study was to explore ways of promoting the utilization of wild vegetables to rural communities that could possibly lead to increased wild knowledge and dietary diversity. Initial meetings were held with the village executive officers and ward representatives for their assistance to obtain representative sample of participants from all sub-villages with a mix of wealth levels. The study population comprised women or caregivers in the sampled households. This study chose to include only women from the selected areas because there has been a comprehensive agreement that women are the knowledge-holders of vegetable cultivation and gathering (Nekesa & Meso, 1997). It was also reported that although agricultural activities are performed mutually among the family members, there is a convincing insight that women usually hold the responsibility for vegetable cultivation. The principal perception is that men are mostly responsible for livestock, main staples and cash crops, whereas women are in charge of the vegetables and other household chores (Obuobie et al., 2006).

The respondent was the mother/ woman or any other person responsible for food preparation and serving in the household. Purposive sampling was used for this study following a pre-defined set of criteria. The participating women were required to sign the form or apply a thumb print (in ink), marking their consent to participating in the study. Permission to conduct the study was granted by the District Commissioners' Offices and Ethical clearance was obtained from the Tanzania National Institute for Medical Research

(NIMR/HQ/R.8a/Vol.IX/2226). The study used a qualitative interpretive description approach (Thorne, 2008) to explore and describe women's knowledge and perceptions and their use of wild green leafy vegetables.

### Study instruments

To gain a better understanding of consumption behavior and practices of rural farming communities, focus group discussion was selected as a probable method which allows access and understanding of activities and knowledge of the community that cannot be easily gained from direct observation or individual interviews. A semi structured focus group guide was developed and contained four parts including; variety of wild vegetables in the areas and their preference to farmers, availability and consumption of the wild vegetables and how important they are in the local diets. A structured questionnaire was used for socio-demographic characteristics.

### Data collection

A total of four focus group discussions (two in each village) were conducted and each comprised 10 women from the study sample and lasted for about 60 minutes. The focus group discussions were held at the village offices on weekend days. The village office location was selected in order to make participants feel that they were in a location to which they were already used; as villagers usually hold village meetings in the village offices. Household socio-demographic characteristics data for the 40 women who participated in this study was collected by using a structured questionnaire before the focus group discussions.

All participating women were provided with some refreshments before and after the focus group discussions. Participants were seated in a circle in order to enable them to see each other during the discussions thus a sense of togetherness. All focus group discussions were conducted in the local language (Swahili), audio-recorded and transcribed verbatim. Each focus group was done by an interviewer and a moderator who was in charge of operating the recorder, making observations and taking notes. The focus group discussions were conducted in semi-structured layout to make sure that the topics covered were accurate through the different groups and they also assured a certain degree of flexibility within the groups as described by Neumark-Sztainer et al., (1999).

For the purpose of this study, African wild leafy vegetables are any vegetables which have not been domesticated, but are gathered from the fields where they naturally occur. Other

vegetables that are either native to the region, or were introduced to it a long time ago to evolve through natural processes or farmer selection, including both wild vegetables and ones traditionally cultivated by the inhabitants of a region (Van der Hoeven et al., 2013) are not included. Information collected in the focus group discussions included; perceptions, preferences, beliefs and taboos associated with consumption of wild vegetables. Here, women were asked to mention common wild vegetables consumed and their sources (the interest was in those gathered in the fields). They were asked to mention eight to ten most important wild vegetables and these were categorized based on factors such as their availability, frequency of consumption and preference. In all these aspects, participants were asked to give very detailed information. Regarding consumption, participants were asked to state vegetable parts they consumed for example leaves, flowers and tubers and the frequency of consumption of such vegetables for instance twice per week depending on its availability. Participants were also asked to mention what types of vegetables were consumed in their households in the past 24 hours preceding the focus group discussion. On another level they were asked about preparation and processing methods and if there were any medicinal aspects attached to the vegetables together with cultural taboos on specific vegetables. Questions on best time of the year in which vegetables were readily available were also discussed.

### Data analysis

Participant's socio-demographic characteristics data were analysed by descriptive statistics using SPSS (IBM SPSS 21 for Windows). Qualitative data from the focus group discussions were analysed by considering the themes, contents and concepts acquired from the topics and questions discussed as supporting information about the study. A quality check was carried out on the transcribed data of the focus groups by a research assistant who was fluent in both English and Swahili, to make sure that the information was translated in a correct way without losing the intended meaning. The hand written notes taken during the focus group discussions were used to complement the transcribed information.

## III. RESULTS AND DISCUSSION

A total of forty (40) women (median age 42.4 years, range 19.2 - 68.0 years) took part in four focus group discussions. Table 1 indicates the characteristics of these women. About 75% of the households were male headed whereas 22% were

female headed. As indicated in Table1, most participants had low education level and from a lower socio-economic status.

*Table 1: Characteristics of focus groups participants (n=40)*

Characteristics	n	%
<b>Marital status</b>		
Married-monogamous	24	60
Married-polygamous	6	15
Widowed	2	5
Divorced	2	5
Single	5	12.5
Cohabitation	1	2.5
<b>Level of literacy of caregiver/mother</b>		
Not able to read or write	11	27.5
Can read and write to some extent	6	15
Can read and write	23	57.5
<b>Occupation of respondent</b>		
Farmer	37	92.5
Self employed	1	2.5
Other	2	5
<b>Total number of people living in the household</b>		
3 to 5	22	55
6 to 8	13	32.5
9 to 12	5	12.5
<b>Education level of respondent</b>		
No education	11	27.5
Primary education	25	62.5
Secondary education	4	10
<b>Total monthly household income</b>		
Less than 100,000 TZS	20	50
100,000-300,000 TZS	17	42.5
More than 300,000 TZS	3	7.5

Due to the fact that the names of all wild vegetables were given by their local names, the wild vegetables were identified with the help from the Department of Crop Science and Horticulture of the Sokoine University of Agriculture. In this study, the majority of wild vegetables were acquired from collecting in the field. However, there were also marked differences among different focus group members across different households regarding the role of wild vegetables in food consumption patterns.

Participants reported that wild vegetables are seasonally available with most time of the year being scarce. The wild vegetables are usually not domesticated but rather gathered from the fields during rainy seasons when they are plenty. Most participants reported that local preservation of wild vegetables is done by open sun drying and it is usually the responsibility of the women/ caregivers of the household. They expressed the desire to preserve more vegetables during the season of plenty to be consumed during dry seasons. The

majority of the women reported consuming the wild vegetables due to good taste, abundance of nutrients, availability/affordability (they are mostly free), and because the other sources of relish are usually scarce. These reasons for the preference of wild vegetables were also mentioned in other studies (CRS, 2017; Van der Hoeven et al., 2013)

Reasons mentioned in this study to affect wild vegetable consumption were cost of the vegetable if it were to be bought and seasonal availability of the vegetables. Other studies also reported cost and seasonality as major factors impeding consumption of nutritious foods (Ruel et al., 2004). On the other hand, another study indicated that regardless of seasonal availability, and other foods being

cheaper and readily available, still many households do not consume recommended amounts of these vegetables (Hart, 2005). This could be due to limited knowledge on the importance of such vegetables. Together with factors such as price and seasonality, women reported that consumption of wild vegetables has reduced as people in their communities have other alternatives to meet their needs for vegetables and nutrition. Items such as exotic vegetables, anchovies and dried fish from external markets give variety to daily diets and are regarded as superior food items. Participants added that consumption of wild vegetables is perceived by some of the younger generation as being backward and of less value.

Table 2. Common wild vegetables consumed in the past 24 hours

Local name	Scientific name
Ilende	<i>Corchorustrilocularis</i>
Mbwembwe/ Kishonanguo	<i>BidensPilosa</i>
Bwete	<i>Urerahypselerodendron</i>
Chiwandagulu	<i>Ipomoea pandurata</i>
Mchungu	<i>SonchusLuxurians</i>
Fwene/mchichapori	<i>Amaranthusgraecizans</i>
Mlendaufuta	<i>Sesamumangustifolium</i>
Matanga	<i>Cucumisanguria</i>
Chipali	<i>Ipomoea obscura</i>
Mhilile	<i>Cleome hirta</i>

Table 2 indicates the most common wild vegetables that were consumed in the past 24 hours preceding the focus group discussions in the two villages. These included *Ipomoea pandurate* which is commonly known as *chiwandagulu* and *Corchorus trilocularis* commonly known as *ilende*. For most vegetables, leaves and stems were common parts consumed (Table 3). Regarding the preparation of vegetables, for almost all the vegetable types mentioned leaves are utilized for consumption, some few such as *Corchorus trilocularis* and *Sesamum angustifolium* utilize the stems and for *Cucumis anguria*, even the flower is utilized. Despite from these vegetables being used for human consumption, some of them are also used as animal feeds; for example the leaves and stems of African night shade. In the

majority of households, wild vegetable leaves and stems are being prepared to supplement the main meal, but the quantity of vegetables consumed is rather very small and does not matter to them, only what is available is to be consumed and it is used only to add flavor and make the main meal appetizing.

The women in both Ilolo and Idifu villages ranked *Corchorus trilocularis* as the most preferred wild vegetable and *Ipomoea pandurate* was rated next most popular vegetable in both villages (Table 4). Participants of the focus group discussions also reported some of the vegetables such as *Sonchus luxurians* to be more resistant compared to other vegetables during drought.

Table 3: Plant parts of wild vegetables used for consumption

Wild vegetable	Plant part		
	Leaves	Stem	Flower
<i>Corchorustrilocularis</i>	x	x	
<i>BidensPilosa</i>	x		
<i>Urerahypselodendron</i>	x	x	
<i>Ipomoea pandurata</i>	x	x	
<i>SonchusLuxurians</i>	x		
<i>Amaranthusgraecizans</i>	x	x	
<i>Sesamumangustifolium</i>	x	x	
<i>Cucumisanguria</i>	x		x
<i>Ipomoea obscura</i>	x	x	
<i>Cleome hirta</i>	x	x	

Table 4: Ranking of the most important wild vegetables in the two villages

Wild vegetable		Iloilo	Idifu
Local name	Scientific name		
Mlendamwage	<i>Corchorustrilocularis</i>	1	1
Kishonanguo	<i>BidensPilosa</i>	6	10
Bwete	<i>Urerahypselodendron</i>	7	6
Chiwandagulu	<i>Ipomoea pandurata</i>	2	2
Mchungu	<i>Sonchusluxurians</i>	3	3
Fwene	<i>Amaranthusgraecizans</i>	8	9
Mlendaufuta	<i>Sesamumangustifolium</i>	4	5
Matanga	<i>Cucumisanguria</i>	9	7
Chipali	<i>Ipomoea obscura</i>	10	4
Mhilile	<i>Cleome hirta</i>	5	8

The common methods of preparation of the wild vegetables reported are boiling, steaming and frying in oil, even though most participants reported not to use oil on a regular basis due to its un-availability. Ingredients reported to be used by women are mostly locally available. Most women reported to use groundnuts due to their abundance in the area. Exotic ingredients such as onions were also reported to be added occasionally. A number of vegetable recipes were minimal in the two villages, only limited to three or four. Sun drying of vegetables was practiced in both villages due to their scarcity during the dry season. The common method used for drying is by using direct sun light for two to three days. The prolonged dry season constrains the growth of wild vegetables in the two villages and sufficient water sources for irrigation are too scarce. Therefore rural farmers in the study areas practice direct sun and shaded drying of wild vegetables during months of plenty and store them to use during times of scarcity. Women reported that dried

vegetables can be stored up to six months as for most households it is the only dependable source of relish to accompany staple foods during the dry months. Sun drying of vegetables is reported to be a normal exercise; nevertheless, it has some glitches. Open drying methods are, however, prone to dust and dirt contamination, attacks by birds, rodents and insects, and re-wetting of the drying material by rain. At the same time nutrient loss especially of vitamins is high through sun-drying probably if vegetables are not exposed to pre-processing such as blanching (FAO, 2001; Mulokozi & Svanberg, 2003; Keding, 2007).

Women also reported some medicinal values attached to some of the wild vegetables that they consume. They said that some vegetables are consumed also due to their preventive and curative properties. For example the women explained that African night shade is eaten due to its capability to improve eye sight, but also raw leaves of this vegetable can prevent bleeding and easy healing of raw



wounds. Women also reported that *Bidens Pilosa* leaves help to increase blood. Regarding taboos surrounding wild vegetable consumption, women mentioned that there are some types of vegetables that are usually not allowed to be eaten by specific groups of people in the community especially pregnant and lactating women.

#### IV. CONCLUSION

The respondents in the focus groups described their consumption practices and preferences of wild vegetables and showed their concerns and need for improvement. Wild vegetables are considered to be versatile, steadfast and robust to the dry climate. Taking these reasons into consideration and the fact that even if rural farming households start to consume more of exotic vegetables, the wild vegetables will continue to be part and parcel of the consumption practices of the people in Idifu and Iloilo villages. From the discussions in focus groups it was indicated that most households in the rural areas collect wild vegetables for household consumption and that wild vegetables are an important source of household nutrition in Mvumi diets. Wild vegetables have the capability to escalate their significance to household income generation if farmers are given the chance to market them. Also domestication and promotion of these vegetables may help to enhance food and nutrition security. Issues of adequate quantities to be consumed in order to meet recommended daily requirements need to be addressed.

**Conflict of interest:** The author declares no conflict of interest.

#### ACKNOWLEDGEMENTS

The work in this paper was funded by the Innovating Strategies to Safeguard Food Security using Technology and Knowledge Transfer: A People-Centred Approach Project ('Trans-SEC'). The Trans-SEC project was financially supported by the German Federal Ministry of Education and Research (BMBF) and co-financed by the Federal Ministry for Economic Cooperation and Development (BMZ).

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