

Indigenous Knowledge on Utilization Aspects of Selected Edible Wild Fruits from Zambia

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Abstract

In recent years, the potential role of edible wild fruits has been recognized in the reduction of poverty and improving human health and nutrition. Edible wild fruits are an important source of household food security for the poor in both rural and urban communities. Edible wild fruits tend to be overlooked by policy-makers despite their significant contribution to food security, nutrition and health. The aim of this study was to establish indigenous knowledge on utilization aspects of selected edible wild fruits Masuku (*Uapaca kirkiana*), Impundu (*Parinari curatellifolia*), Intungulu (*Afromomum africanum*) and Imfungo (*Anisophyllea Boehimii*). A survey was used to establish indigenous knowledge based on utilization, nutritional and food safety aspects of the selected fruits. Detailed questionnaires and focused group discussions were used to collect data on these aspects. Data from the survey were analysed using Statistical Package for the Social Sciences (SPSS version 22). The findings from this study revealed that Masuku, Impundu, Intungulu and Imfungo are mainly consumed unprocessed. The reasons for consuming these fruits include satisfying hunger, snacking, sweetness, and sour taste. Processing of products such as jams, juices and fermented beverages was reported in isolated cases. The wild fruits under investigation were reported to have medicinal uses that included blocking diarrhoea, boosting the immune system, increasing blood levels and boosting appetite of the sick. Food safety concerns were reported for Intungulu and Masuku when consumed in excess. The Intungulu fruit was reported to cause stomach pain due to its high acidic nature while its seeds cause intestinal obstruction when consumed in excess. Excessive consumption of Masuku fruit was reported to cause stomach bloating and sores on the upper pallet of the mouth. Indigenous knowledge revealed valuable data on utilization, nutritional, medicinal and food safety aspects of the fruits.

Keywords: wild fruits, utilisation, indigenous knowledge, nutrition

1. Introduction

Indigenous wild fruits play a very significant role in the household food security of the majority poor in developing countries. According to Akinnifesi (2008), these fruits play a vital role in nutrition and food security and the local people generate an income out of them. Bvenura et al., (2017) suggests that hunger and malnutrition incidences could be reduced if the wild fruits are incorporated in the diets of families in Sub-Saharan Africa. Wild fruit trees are a cheap and an easy source of food during drought periods, and are still in abundance in many rural areas of developing countries (Tuyizere et al., 2021).

When wild fruits are available, they reduce food insecurity by about one third during times when food is scarce (Moombe et al., 2009). According to Mithöfer et al, (2011) the chances of falling below the poverty threshold increases to 70% in periods where there is hunger. Wild fruits would likely reduce the levels of being vulnerable to food insecurity during these periods. The role of wild fruits in food security could be seen from the way these fruits are utilized. Wild fruits and nuts are sometimes pounded and mixed with cereal flour to make soft porridge (*Nshima*) which is a staple food in most of the Southern Africa region countries (Moombe et al., 2009).

In southern Africa, wild fruits are an important source of income especially for the less privileged people (Mithöfer et al, 2011). Wild edible fruit trees in Zimbabwe represent 20% of the plants used by rural households (Moombe

et al., 2009). Wild fruit collection has a higher profit return compared to crop production enterprises according to Moombe et al., (2009). The contribution of wild fruits to the socio-economic development is substantial in that the fruits generate income for most of the rural communities (Akinnifesi, 2008). So many people are employed to harvest wild fruits when the fruits are in season and the fruits are sold to generate income (Leakey, 1999). Wild fruits are usually in seasons when income from agriculture is generally low, and therefore the selling of the fruits is critical for household income during this period (Akinnifesi, 2008).

Wild fruits have great potential to boost rural incomes and employment opportunities greatly. In Sub-Saharan Africa, a few wild fruit products have great market potential. According to (Akinnifesi, 2008), there are five wild fruits that have high trade potential in Southern Africa and they generate high income as they are widely traded in the region. These fruits include Masuku (*Uapaca kirkiana*), Impundu (*Parinari curatellifolia*), Mahulu-hulu (*Strychnos cocculoides*), Matobo (*Azanza garckeana*) and Tumbulwa (*Flacourtia indica*). The five fruits mentioned above are traded fresh and are an important source of income that is used for purchasing food, paying rentals, transport, school fees and other basic household goods (Moombe et al., 2009).

Considerable quantities of wild indigenous edible fruits are generally consumed in season when they are in abundance. However, a few of these fruits are preserved while the majority go to waste. Indigenous knowledge on the utilization of wild fruits if well harnessed can help boost the food system resilience of the forest edible resources. For many people and ethnic groups, the use of wild edible fruits is a source of cultural identity, reflecting a deep and important body of knowledge about the environment, survival, harvesting, preservation and other forms of management (Cheikhyoussief and Maroyi, 2017). According to Ngulube (2002), the growing realization that indigenous knowledge has a role to play in national development as well as the knowledge management environment has led to the growth of interest in preserving and managing it.

In the current investigation, Masuku (*Uapaca kirkiana*), Intungulu (*Afromomum africanum*), Impundu (*Parinari curatellifolia*) and Imfungo (*Anisophyllea boehimii*) wild fruits were studied. Some nutritional aspects on these fruits have been studied previously. According to a study by Saka et al., (2007), analysis for nutritional value of Masuku fruit revealed the following nutrient compositions: Water 72g/100g, crude protein 1.8g/100g, fat 1.1g/100g, fiber 8.4 g/100g, ash 2.2 g/100g, potassium 13.68 mg/100g, magnesium 1.106 mg/100g, phosphorous 0.555 mg/100g, iron 0.431mg/100g, sodium (g/g) 0.365mg/100g and calcium 0.033 mg/100g.

The nutritional value of Impundu (*Parinari curatellifolia*) as reported by Chatepa et al., (2018) is as follows: Dry matter ranged from 88.66 ± 0.15 to $99.31 \pm 0.04\%$ for pulp and peels, and fruit respectively, protein ranged from 3.90 ± 0.03 to $15.61 \pm 0.05\%$ for pulp and kernel respectively, crude fat ranged from 2.02 ± 0.47 to $46.05 \pm 0.19\%$ for pulp and kernels respectively, ash content was reported as $2.46 \pm 0.09\%$, crude fibre ranged from 1.58 ± 0.04 to $21.39 \pm 0.28\%$ for kernels / nuts and whole fruit respectively, carbohydrate content ranged from 34.34 ± 0.21 to $84.95 \pm 0.14\%$.

A study by Mutelo (2021) on nutrient composition of Intungulu revealed the following: ash (6.33 ± 0.57 g/100g DW), moisture ($12.25 \pm 0.21\%$ DW), crude protein (13.55 ± 0.21 g/100g DW), crude fat (1.83 ± 0.007 g/100g DW) and carbohydrate (56.50 ± 2.12 g/100g DW). In the same study, the following nutrient composition was reported for Imfungo: ash (2.51 ± 0.09 g/100g DW), moisture (12.55 ± 0.07 % DW), crude protein (16.30 ± 0.280 g/100g DW), crude fat (5.41 ± 0.62 g/100g DW) and carbohydrate (50.50 ± 2.12 g/100g DW).

The current study was carried out to establish indigenous knowledge based on utilization, nutritional, consumption pattern, medicinal and food safety aspects of these fruits.

2. Materials and Methods

2.1 Research Design

The cross-sectional design was utilised to establish indigenous knowledge on utilization aspects, nutritional knowledge, consumption patterns, consumer preference, food safety aspects, indigenous knowledge and attitude towards the selected edible wild fruits (Masuku, Impundu, Intungulu and Imfungo). The four fruits that were studied are shown in Figure 1:

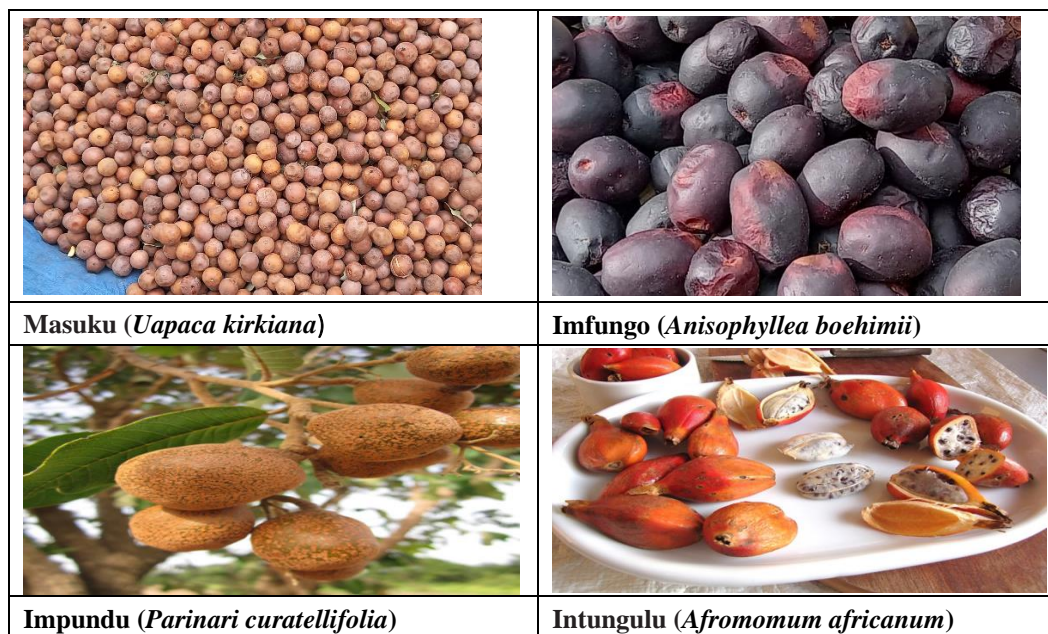


Figure 1. Wild fruits investigated

Note: Photos for Impundu and Intungulu were adopted from African Plants – A Photo Guide (2022) and Wikimedia Commons (2022) respectively. The two fruits are not in season currently (Status December 2022)

2.2 Target Population

Elderly men and women, adult men, female and male teenagers whose age ranged between 16 - 85 years were the target population in order to have a representation of all age groups in the survey and reduce bias.

2.3 Study Site

The study was conducted in Mantapala area of Nchelenge district, Luapula Province of Zambia (shown in Figure 2). Mantapala has 7 villages that includes Nsemiwe, Sekesa, Sikazwe, Inkana, Champo, Chibamaba and Nshoka. The study site was an operational area for the Food Security in rural Zambia (FOSEZA) project for which domestication of wild fruits as a way of ensuring food security was one of its goals. Nchelenge is one of the districts of Zambia with households that have lower resilience to food and nutrition security compared to others. According to First 1000 Most Critical Days Program (2019) baseline results for hunger and access to food report indicates that Nchelenge district household reports 21.2% of low resilience to lean season and environmental shocks.

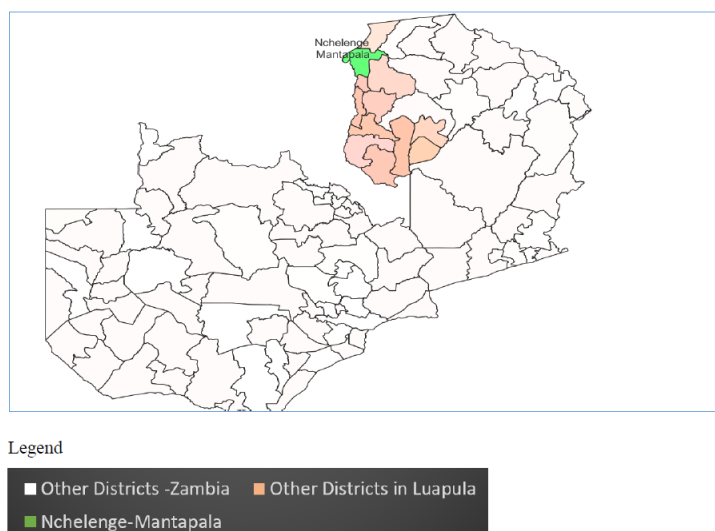


Figure 2. Map of Zambia showing the study site

2.4 Sampling Procedure

Multi-stage sampling technique was used to select participants in this study. The selection was done in four stages as follows:

Stage 1. Nchelenge district was purposively selected as it was the operational area for the FOSEZA project.

Stage 2. Mulwe ward was purposively selected as it was the operational area for the FOSEZA project.

Stage 3. Four (4) villages out of seven (7) villages in the selected ward were randomly selected by listing down the 7 villages on a piece of paper and the names of the villages were separated from each other by cutting them into small pieces and folding them. The pieces of paper with names of the villages that were folded were placed in plastic bag and shaken. The researcher picked four papers out of the seven villages.

Stage 4. From the four villages, using the random sampling technique, households were selected from the updated village register provided by the headman. Using the table of random numbers, the households were randomly selected to arrive at the sample.

2.5 Sample Size Calculation

The following formulae was used to determine the minimum sample size:

$$N = (Z)^2 \pi (1 - \pi) / ME^2$$

Where N = required sample size

Z = z value of desired level of confidence

π = population proportion of interest (households reporting low resilience to lean seasons and environment shocks) MCDP (2019)

ME = Acceptable margin of error

Z = 1.96 = 95% confidence interval (CI)

π = 0.212

ME = 0.05

$N = (1.96)^2 \times 0.212 (1 - 0.212) / 0.05^2$

Minimum sample Size = 257

The minimum sample size was adjusted at 5% for attrition and non-response biases to get 270.

2.6 Survey Instrument and Pretesting

A semi-structured questionnaire (Appendix 1) focussing on social demographics of respondents, utilization, nutritional knowledge, food safety aspects and indigenous knowledge of selected wild fruits (Masuku, Impundu, Intungulu and Imfungo) was developed in the XLS format and deployed on the Open Data Kit (ODK) software for collecting, managing and using data.

Data was also collected by means of a Focused Group Discussion (FGD) using the same questionnaire but mainly focussing on utilization, food safety aspect and indigenous knowledge of these fruits. The FGD was conducted at Mantapala village where the participants were divided into three groups, comprising 12 individuals in each group. The FDGs were interactive and flexible in order to allow the respondents adequate time to provide relevant details on a topical subject under discussion.

The questionnaire was pretested among non-participating households with similar characteristics in a nearby village where the project was being carried out. Pretesting was done on 20 households.

2.7 Data Analysis

Statistical analysis was performed using SPSS version 22. Descriptive statistics were generated as mean, frequencies, \pm standard deviation (SD) and percentages to summarize dependent variables. Values at $p < 0.05$ were considered statistically significant. The data was analysed as follows:

- The demographic and socio economic, consumer preference, the frequency of consumption, months when each fruit is in season, the methods of utilization, respondent's attitude towards wild fruits, nutritional knowledge of the wild fruits, the proximate component analysis, mineral content and vitamin content of the selected edible wild fruits were analysed using descriptive and frequency statistics.
- Multiple response was employed to analyse the reason of consumption.

- Thematic analysis method was used to analyse qualitative data from two FGDs by summarising the responses from the following themes: months when each fruits are in season, method of utilization, indigenous knowledge on medicinal uses and food safety concerns on the consumption of the four selected wild fruits. Then the data was compared among the two groups and a conclusion was made from each theme.

3. Results and Discussion

3.1 Consumer Preference towards the Consumption of Masuku, Imfungo, Intungulu and Mpundu

Ranking of the selected edible wild fruits (Masuku, Imfungo, Intungulu and Mpundu) by consumers in Mantapala area of Nchelenge district of Luapula province of Zambia revealed varying perceptions. Table 1 presents the consumers ranking of edible wild fruits under investigation. Out of the four selected wild fruits consumed, Masuku was the most preferred fruit or the most commonly consumed wild fruit. The respondents ranked Masuku first with an overall percentage score/rank of 35%, followed by Imfungo (29.7%), Intungulu (22.5%) and Impundu (12%) respectively.

Table 1. Ranking of consumption preference of selected wild fruits

Name of wild fruit	Rank	
	Score % (N)	Score
Masuku	35% (107)	1
Imfungo	29.7% (91)	2
Intungulu	22.5% (69)	3
Impundu	12.7% (39)	4

3.2 Frequency of Consumption of Selected Wild Fruits

Table 2 summarises the frequency of consumption of Impundu, Imfungo, Intugulu and Masuku when each of these fruits are in season. Masuku was reported to be consumed daily by 49.7% of the respondents, followed by Imfungo (37.9%), Intungulu (35.3%) and Impundu (25.5%) respectively. In terms of preference, Masuku was the most preferred and popular wild fruit among the fruits investigated, followed by Imfungo. A similar study covering 451 households in Malawi, Tanzania, Zimbabwe and Zambia showed Masuku to be the most preferred wild fruit amongst other fruits investigated (Akinnifesi *et al.*, 2008). This study confirmed the anecdotal observation about the dominance of Masuku in terms of preference among the edible wild fruits in Zambia. The main reasons for consuming these fruits were sweetness, satisfying hunger and as snack. A study done elsewhere showed that Masuku, which was among the fruits in the current investigation was consumed for its sweetness, satisfying hunger and as a snack (Kalaba *et al.*, 2009).

Table 2. Frequency of consumption of selected wild fruits

Name of Fruit	Frequency of consumption % (N)				
	Daily	2 days/week	4 days/week	6 days/week	Never
Impundu	25.5 (78)	40.2 (123)	12.4 (38)	4.2 (13)	17.6 (54)
Imfungo	37.9 (116)	33.1 (103)	19.6 (60)	5.2 (16)	3.6 (11)
Intungulu	35.3 (108)	36.6 (112)	17.3 (53)	6.9 (21)	3.9 (12)
Masuku	49.7 (152)	25.8 (79)	15.7 (48)	5.6 (17)	3.3 (10)

3.3 Period when Fruits are in Season

Figure 3 shows the months when the selected wild fruits are in season. Most of the respondents in the survey reported that Impundu is in season around June (20.8%), July (19.2%) and 10.6% were not sure. For Imfungo, respondents reported that the fruit is in season in October (15.8%), November (24.3%), December (17.7%) while 10.3% did not know when the fruit is in season. Intungulu was reported to be in season around June (37.9%), July (27.4%) while 2.6% of the respondents were not sure. The majority of the respondents reported that Masuku is in season around October (12.8%), November (25.2%), December (24.6%) while 6.9% of the respondents did not know when these fruits are in season.

However, data from the FGD collectively revealed that Impundu is in season around June, Imfungo in October and November, Intungulu in May and June, and Masuku in October respectively. The data is reliable because the majority of the respondents that participated in the FGD were elderly men and women.

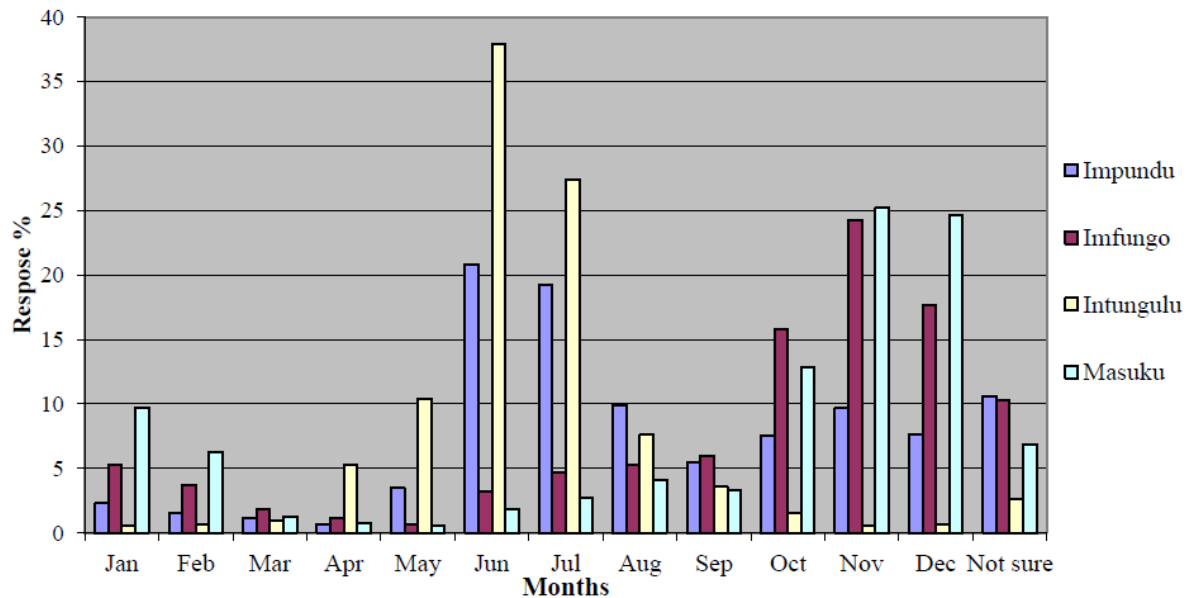


Figure 3. Months when each fruits are in season

3.4 Reasons for the Consumption of Each Wild Fruit

Figure 4 presents the reasons why respondents like consuming the wild fruits. The most common reasons given by the respondents for the consumption of the selected wild fruits under investigation was the fruits sweet taste. The reasons given for the consumption of Impundu include sweetness (52.9%), snack (22.3%), satisfying hunger (21.8%), and sour taste (3.0%). For Imfungo, the main reasons for consumption were sweetness (52.5%), snack (20.1%), sour taste (17.2%) and satisfying hunger (10.2%). For Intungulu, the reasons for consumption in descending order is sour (55.5%), sweetness (21.2%), snack (17.3%) and satisfying hunger (6.1%). The reasons for the consumption of Masuku were sweetness (63.6%), satisfying hunger (17.9%), snack (17.2%) and sour taste (1.2%).

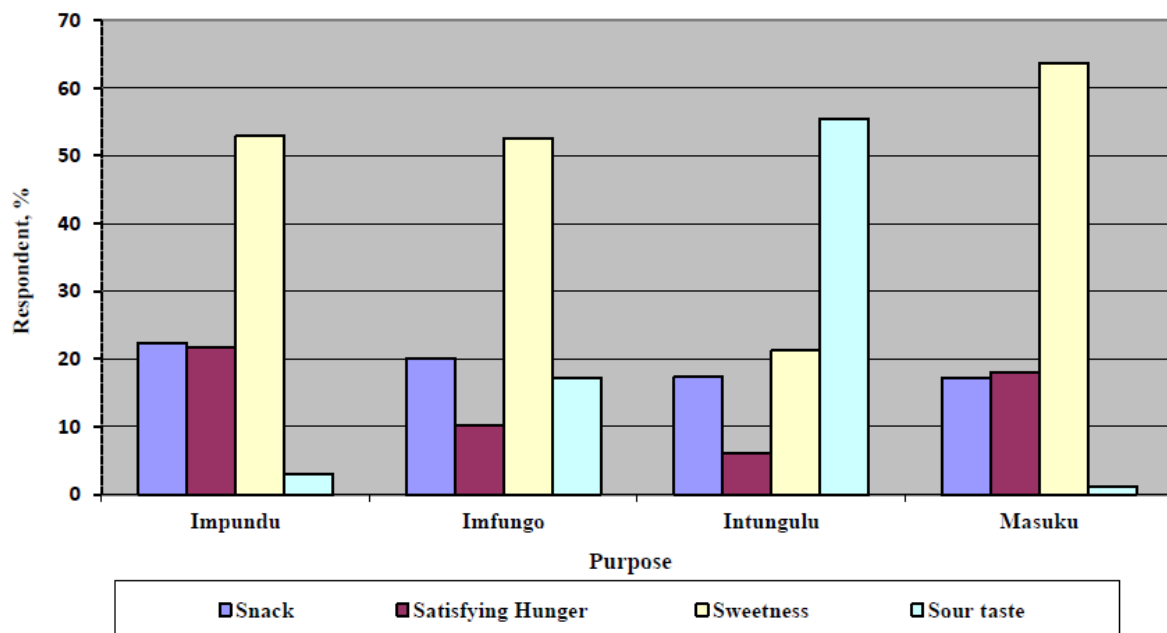


Figure 4. Reasons for consumption of wild fruits

3.5 Methods of Fruit Utilization

Based on the results obtained from the survey, the selected wild fruits (Masuku, Imfungo, Intungulu and Mpundu) are consumed raw, dried, fermented/pickled or as processed juice/jam (Figure 5). Most of the respondents consumed these fruits raw, followed by consuming them in form of juice/jam, then fermented/pickled and lastly dried. Impundu is mostly consumed raw (69.2%), juice/jam (14.3%), fermented/pickled (10.7%) and dried (5.8%) respectively. Imfungo is consumed raw (87.8%), juice/jam (6.1%), fermented/pickled (4.6%) and dried (1.4%). For Intungulu, it is mostly consumed raw (93.3%), juice/jam (3.7%), fermented/pickled (2.1%) and dried (0.9%). The consumption of Masuku followed this order; raw (95.9%), fermented/pickled (1.9%), juice/jam (1.3%) and dried (0.9%) respectively.

Findings from the FGD on how these fruits are utilized and consumed revealed that Impundu is processed and used as follows: the fruit is put in a mortar and mashed, the mashed fruit is removed from the mortar and sun dried for half a day for the mashed fruit to be sweetened. Thereafter, water is added to the mashed fruit to make a paste or drink. Impundu was also reported to be used in the processing of wine. After crushing or pounding of the fruit, it the crushed fruit is boiled and sieved and left in a container for 2-3 days for fermentation to take place, the longer it is fermented the stronger the wine. The fruit is also crushed, dried and pounded to powder which is used to cook a soft porridge by combining it with cassava meal, maize meal or millet meal.

Data from the FGD revealed that Imfungo is processed when the fruit is ripe. The fruit is washed, pressed by hands and the extract is added to water to make a drink. The solid waste is thrown away. The drink made from Imfungo is also added to porridge to improve palatability. Imfungo is also eaten in order to rehydrate the body because it contains a lot of water.

FGD respondents reported that Intugulu is eaten unprocessed. The fruit is not processed into any juice, jam, fermenting or dried.

Masuku is washed peeled and eaten while the seeds are discarded. This fruit is only consumed when it is ripe.

Previously, similar studies were conducted in Zambia, Tanzania, Zimbabwe, Malawi and Kenya on how the wild fruits are utilized besides eating them unprocessed when ripe. A study by Mwanza and Kweisga (1995) reported that Masuku is processed into a type of wine called *Mulunguzi* in Zambia. Packham (1993) reported the brewing of wine/fermented beverage from Masuku. In another study conducted in Tanzania, Tiisekwa *et al* (2004) reported that Masuku is processed into jam and juice. The fruits produce juice and jam of high quality acceptable to consumers. Leakey (1999) reported that Masuku is also processed into into a spirit (wine) locally called *Kachasu* and jams. Similarly, Karaan *et al* (2006) highlighted the processing of a different wild fruit (*Stychnos*) into juice in Tanzania and *Parinari* nuts into oil in Zimbabwe.

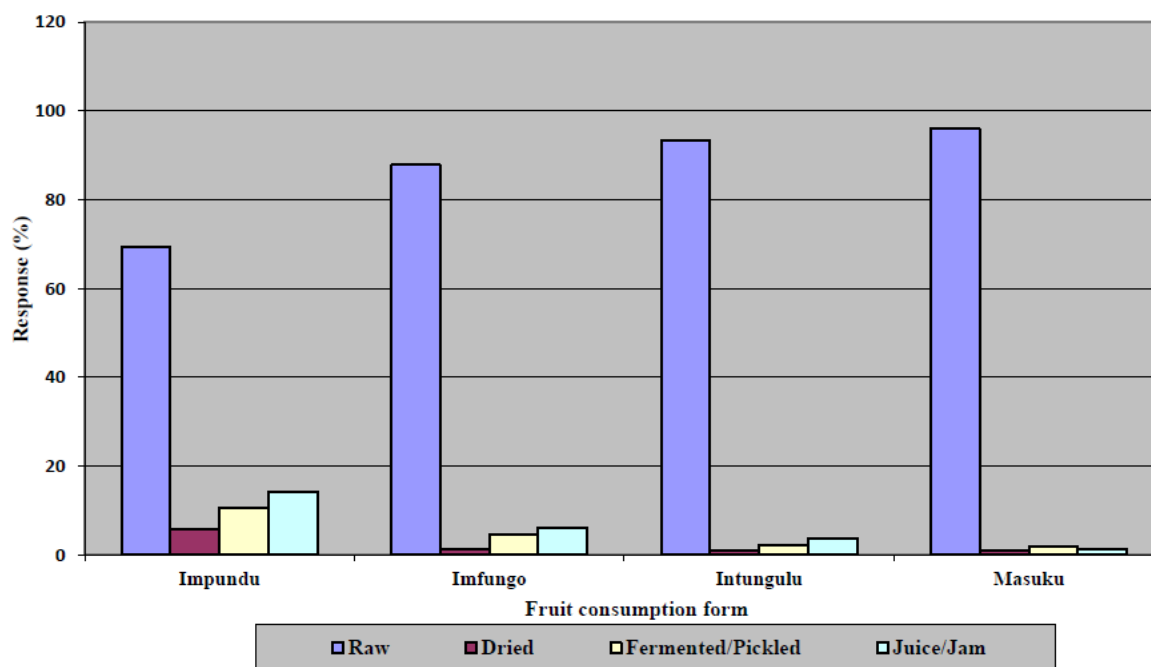


Figure 5. How wild fruits are consumed

3.6 Respondents Attitude towards Wild Fruits

Table 3 summarises the attitude of respondents towards wild fruits. The majority of the respondents disagreed that wild fruits are poor people's food (58.8%). Most of the respondents disagreed (62.7%) that wild fruits are not nutritious. About 73.5% of respondents disagreed that wild fruits are not safe. Some of the respondents disagreed (67%) that wild fruits are only important when there is poor harvest, implying that these fruits are important even when the harvest is good. The majority of the respondents agreed (68.6%) that wild fruits boost household incomes. This observation is in agreement with the study by Moombe et al., (2009) who reported an increase in households income for rural communities when fruits were in season. Further, wild fruits improve household food security because they are among the cheapest source of food for the poor and those that are malnourished (Akinnifesi *et al.*, 2008; Seal et al., 2014).

Table 3. Attitude towards wild fruits

Variable	Respondents opinion, % (n=306)			Total
	Agree	Not sure	Disagree	
Wild fruits are poor people's food	38.2 (117)	2.9 (9)	58.8 (180)	100
Wild fruits are not nutritious	29.1 (89)	8.2 (25)	62.7 (192)	100
Wild fruits are not safe	23.5 (72)	2.9 (9)	73.5 (225)	100
Wild fruits are only important when there is poor harvest	28.4 (87)	4.6 (14)	67 (205)	100
Wild fruits in season boost household income	68.6 (210)	2.9 (8.7)	28.4 (87)	100
Wild fruits are not tasty	18.3 (56)	0.7 (2)	81 (248)	100
Wild fruits are better than Domestic fruits	25.8 (79)	2 (6)	72 (221)	100

3.7 Indigenous Knowledge on Medicinal Uses of Selected Wild Fruits

With the current health prevailing challenges, wild fruits could likely be a source of medicine. In rural areas, there are claims that wild fruits boost the immune system, blood levels, increase appetite, reduce diarrhoea and protect the body against disease. Responses from the semi-structured questionnaire and FGD showed that wild fruits are perceived to have medicinal properties. FGD revealed that Imfungo is used to boost the immune system and blood levels in the body of the sick. Impundu is given to diarrhoea patients in paste preparation to stop the running stomach. The respondents also believe that Masuku is rich in vitamins and boosts the immune system. Intungulu is known to increase or boost appetite for persons who have lost appetite due to an illness. As previously reported (Mander et al., (2006); Karaan et al., (2006), traditional medicines are used for primary health care and 80% of the world population rely on them. According to Lucy and Le Breton, (2008), healing properties of wild fruit tree species is tied to cultural beliefs and these fruit trees are used to self-medicate a range of minor ailments.

3.8 Food Safety Concerns on the Consumption of Selected Wild Fruits

Information on the food safety concerns of the fruits under investigation was collected from the FGD in which the respondents composed of elderly men and women. Intungulu was reported to cause stomach pain if eaten in excess as the fruit is generally acidic in nature. Its seeds were reported to cause intestinal obstruction when eaten in excess. Masuku was reported to cause stomach blotting when eaten in excess while its seeds cause sores on the upper palate of the mouth during mastication. No food safety concerns were reported for Imfungo and Impundu.

3.9 Respondents Nutritional Knowledge of Selected Wild Fruits

Figure 6 presents the findings on nutritional knowledge of the selected wild fruits. About 56.2% of the respondents agreed that wild fruits protect the human body against diseases, 68.6% of the respondents agreed that wild fruits are a source of vitamins and minerals, 54.6% agreed that wild fruits are a good source of energy while 50.7% agreed that wild fruits have medicinal value. However, this knowledge is based on speculations. Most of the participants speculated that the four wild fruits under investigation are nutritionally rich. Validated research on nutritional composition of these fruits combined with sensitization on the health benefits of the fruits would increase the consumption, improve health and food security of rural communities.

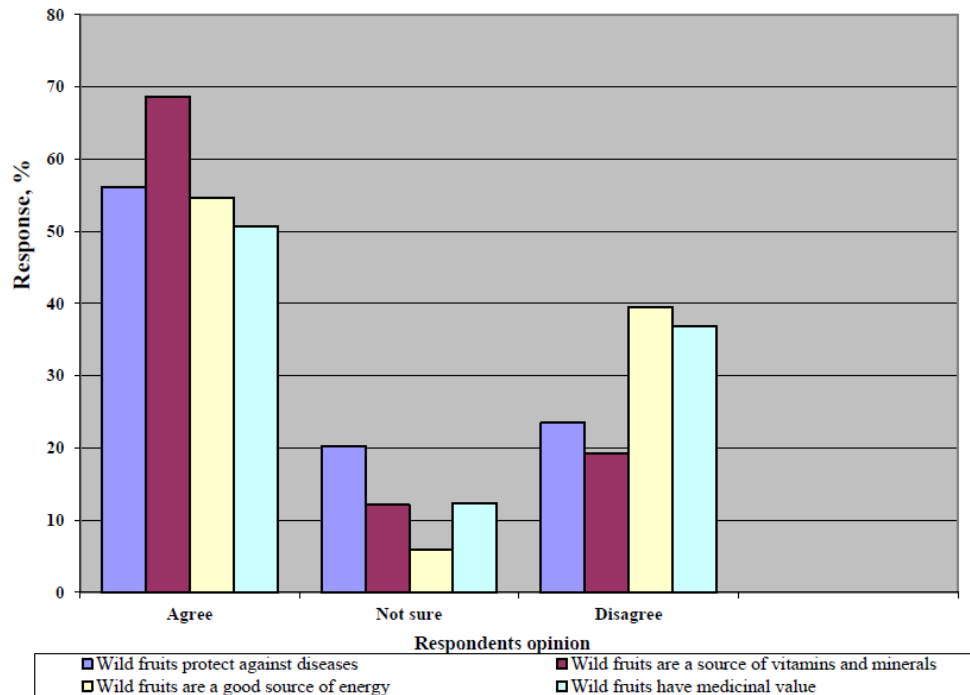


Figure 6. Nutritional Knowledge of respondents on Masuku, Imfungo, Intungulu and Mpundu

4. Conclusion

The selected edible wild fruits (Impundu, Imfungo, Intungulu and Masuku) in Nchelenge district of Zambia are consumed mainly as snacks and partly as processed products (juices/jams, fermented/pickled and dried). Indigenous knowledge revealed varying medicinal uses: Impundu paste stops diarrhoea; Intungulu helps to increase appetite of the sick, aid digestion of food and boosts immunity; Imfungo extract boosts immunity and blood levels and Masuku is generally used to boost immunity of the sick. Intungulu and Masuku have food safety issues: Intungulu seeds may cause intestinal obstruction when eaten in excess while excess eating of its pulp may raise acid levels in the stomach; excessive consumption of Masuku may cause stomach blotting and sores on the upper palate of the mouth. Indigenous knowledge has revealed that the four fruits are important for food security and health of the rural communities of Nchelenge district. It is recommended that future studies should be conducted to determine the optimum intake that would not cause food safety problem for Masuku and Intungulu.

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Appendix

Appendix 1. QUESTIONNAIRE ON THE UTILIZATION ASPECTS FOR SELECTED EDIBLE WILD FRUITS

Household Identification:

Household ID.....

District.....

Village.....

Agricultural camp.....

SECTION 1. DEMOGRAPHIC AND SOCIAL ECONOMIC INFORMATION

HOUSEHOLD HEAD			
1	Age		[]
2	Sex	1. Male 2. Female	[]
3	What is your marital status?	1. Single 2. Married 3. Separated 4. Divorced 5. Widowed	[]
4	What is the highest educational grade/level you have attained (specify)		
5	What is your occupation?	1. Not employed 2. Civil servant 3. Privately employed (NGOs, private companies) 4. Self-employed (business) 5. Farmer 6. Employed and farming 7. Pensioner 8. Other.....	[]

SECTION 2. FRUIT UTILIZATION AND CONSUMPTION

1. In a scale of 1 to 4, would you rank the wild fruits (Impundu, Imfungo, Intungulu and Masuku) in order of preference?

Wild fruit type	Ranking
Impundu	
Imfungo	
Intungulu	
Masuku	

2. Frequency of consumption when fruits are in season

Wild fruit type	Frequency			
	Daily	2 days/week	4days/week	6days/week
Impundu				
Imfungo				
Intungulu				
Masuku				

3. Months when each of these fruits are in season

Wild fruit type	Months when there in season
Impundu	
Imfungo	
Intungulu	
Masuku	

4. Why do you consume each of the fruits?

Wild fruit type	Reason for Consumption			
	Snack	Satisfy hunger	Sweetness	Sour taste
Impundu				
Imfungo				
Intungulu				
Masuku				

5. How do you consume each of the fruits?

Wild fruit type	Consumption pattern			
	Raw	Dried	Fermented/pickled	Juice/jam
Impundu				
Imfungo				
Intungulu				
Masuku				

6. Attitude towards wild fruits (Impundu, Imfungo, Intungulu and Masuku)

Variable	Agree	Not sure	Disagree
Wild fruits are poor people’s food			
Wild fruits are not nutritious			
Wild fruits are not safe			
Wild fruits are only important when there is poor harvest			
Wild fruits in season boost household income			
Wild fruits are not tasty			
Wild fruits are better than Domesticated fruits			

7. Nutritional knowledge of wild fruits (Impundu, Imfungo, Intungulu and Masuku)

Variable	Agree	Not sure	Disagree
Wild fruits protects against diseases			
Wild fruits are sources of vitamins and minerals			
Wild fruits are good source of energy			
Wild fruits have medicinal value			

SECTION 3. FOCUS GROUP DISCUSSION QUESTIONNAIRE (UTILIZATION OF WILD FRUITS)

Fruit type	Seasons they are found	Processing	Uses	Who consumes the fruit	Importance for food security	Physical/food safety hazards
Mfungu						
Intungulu						
Masuku						
Mpundu (Lumembe)						

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