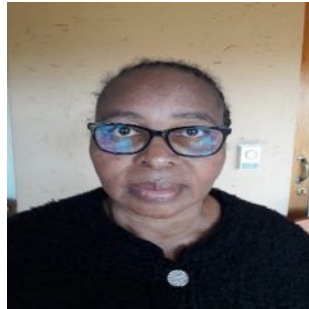


CONTRIBUTION OF INDIGENOUS FOOD PRESERVATION AND PROCESSING PRACTICES TO FOOD SECURITY OF RURAL HOUSEHOLDS IN SEKHUKHUNE DISTRICT OF LIMPOPO PROVINCE, SOUTH AFRICA

Masekoameng MR^{1*} and MC Molotja²



Mosima Rachel Masekoameng

*Corresponding author email: masekmr@unisa.ac.za

¹Department of Agriculture and Animal Health, University of South Africa, Florida campus, South Africa

²Department of Student Affairs and Regional Services, University of South Africa, South Africa



ABSTRACT

Rural people have the indigenous knowledge of processing and preserving food to ensure household food security during times of food scarcity. Although indigenous knowledge plays an important role in ensuring household food security for many rural households, it is often overlooked as a solution to address food and nutrition insecurity. The main objective of the study was to identify and document indigenous food preservation and processing techniques used by rural women to ensure household food security. Qualitative data were collected from small-scale farming households in seven villages through focus group discussions, individual interviews, and observations. The researchers adhered to ethical considerations (approvals, permissions with the relevant authorities, consent from participants, their privacy, anonymity, and confidentiality) throughout the research process. Data were analysed using thematic content analysis. The results indicate that sun-drying and fermentation were the most commonly used methods for food preservation, while the most prevalent methods used for processing vegetables (*merogo*) involved cooking, mashing, pelleting and sun-drying. Crops, such as mung beans, bambara groundnuts and sorghum are threshed and winnowed to remove all impurities. The seeds, which are to be used in the next planting season, are treated with aloe ash to prevent pest infestation. Indigenous fruits are gathered from the wild and eaten as snacks. Indigenous dried vegetables (*merogo*) and fermented *marula* beer were sold to generate income that is used to buy other basic food items. The paper concludes by highlighting the existing indigenous knowledge that rural households demonstrate in terms of food processing and preservation. Given the existing knowledge and the commonly used methods for preserving and processing food, it is crucial to create awareness regarding ways of retaining nutrients during food preservation and processing to ensure availability and proper utilisation of indigenous foods for household food security purposes. The study recommends that these methods, including ways of retaining nutrients, be documented and made easily accessible for rural households to use now and in the future for ensuring household food and nutrition security. Therefore, there is a need for agricultural and food security policies to embrace, adopt, promote and adapt indigenous knowledge and technologies to address food security.

Key words: indigenous knowledge, food preservation, food processing, food security, indigenous food preservation



INTRODUCTION

Indigenous knowledge is an important resource for many poor, rural societies and it remains with them even when other resources decrease. An indigenous knowledge system focuses on the ways of knowing, seeing, and thinking that are passed down orally from generation to generation [1]. Indigenous knowledge is defined as knowledge aimed at social and natural well-being, which is continually influenced by local creativity, experimentation and contact with external systems [2]. It is what people know and do, and what they have known and done for generations and this knowledge is passed from generation to generation. Rural people rely on indigenous knowledge system to ensure food security [3, 4]. Aworh agrees that African traditional foods and African traditional food processing techniques dates back thousands of years and they are part of the rich cultural heritage of the people [5]. For example, rural people have for many years been able to identify different types of edible wild fruits, vegetables, and roots; they know when and how to plant, harvest, process and preserve different types of food to ensure food security. The use of indigenous knowledge to preserve and store food, thereby ensuring household food security, has been widely documented [3, 4, 6, 7, 8, 9, 10]. Indigenous knowledge plays an important role in the livelihood of the rural poor because they depend on it to ensure household food security.

Many people around the world are affected by hunger and find it difficult to afford healthy food. This threatens the efforts to end hunger and ensure food security, and the attainment of Sustainable Development Goal 2 (SDG2) by 2030. Between 702 and 828 million people in the world faced hunger in 2021, with the majority being in Africa [11]. Nearly 240 million people in sub-Saharan Africa lack adequate food for a healthy and active life, however, one way to tackle this challenge is through the promotion and utilisation of indigenous knowledge of food processing, preservation, and storage [8]. Food security is best ensured when household members can produce, process and preserve food for themselves throughout the year [12]. Similarly, Aluga and Kabwe [13] agree that women's indigenous food processing and preservation practices is one way to ensure household food security. Many developing countries of Africa are experiencing high post-harvest food losses, largely due to limited food preservation capacity, which is a major factor constraining food and nutrition security [8]. Post-harvest and processing account for more than 40% of food losses in sub-Saharan Africa, similarly to the food losses that occur at retail and consumer levels in the industrialised countries [8]. Therefore, using local practices to process and preserve food would ensure household food security without jeopardising future food consumption [6, 9, 10]. Indigenous ways of food preservation and storage in Malawi have declined or been



abandoned because indigenous knowledge is regarded as “primitive” and treated as inferior to modern food preservation and storage measures, technologies or chemicals, despite their contribution to food security [6]. Despite the important role that indigenous knowledge plays in the achievement of food security, its documentation and dissemination remain a big challenge confronting libraries, scholars, and other information professionals, particularly in Africa where cultural practices are prevalent [8].

It is against this background that this paper on the contribution of indigenous food preservation and processing practices to the food security of rural households in Sekhukhune District of Limpopo Province, South Africa was written. The objectives of this paper were to:

- identify the indigenous methods of food processing and preservation of the crops, vegetables, and fruits;
- describe the indigenous methods of food processing and preservation of the crops, vegetables, and fruits;
- document the potential contribution of indigenous food preservation and processing to food security;
- identify the gaps and contribution of this study to policy and scientific knowledge.

MATERIALS AND METHODS

Study design

This article is based on a longitudinal study which explored the food habits of the BaPedi people, residing in the Sekhukhune District in Limpopo Province, South Africa. Phase one of the research (2001–2003) explored the food habits of the BaPedi. Phase two (2005–2007) focused on food-gathering, production, processing, preservation, utilisation, and consumption activities of the sampled seven rural villages. Phase three (2012–2015) explored the patterns of household food availability, accessibility, and utilisation of selected rural households in the same district. This qualitative study explored the indigenous food preservation and processing techniques used by rural people in the Sekhukhune District, Limpopo, South Africa. Various data collection methods, such as focus group discussions, semi-structured interviews, and observations were used to get detailed information from the participants regarding the indigenous food preservation and processing methods they used. The discussions took place in a relaxed environment during which participants expressed their opinions on issues pertaining to food preservation and processing within their villages and in their respective households. A checklist containing open-ended questions for food preservation,



processing, preparation, and utilisation was used to guide the interviews and to probe further. Participants were given flip charts and asked to draw seasonal calendars showing rainfall patterns, available natural resources and to indicate activities pertaining to food production (from planting to harvesting), village resources and social maps.

Study area

The study was carried out in Sekhukhune District (Figure 1), Limpopo Province, South Africa, which has been declared food insecure and is one of the poorest districts in the country [14]. The area has an unemployment rate of 61.1% [15]; however, the Human Sciences Research Council (HSRC) [16] posits that agriculture is considered the main contributor to employment and livelihoods in Sekhukhune District.

The district's rainy season starts in late October. The average annual rainfall is approximately 560mm [16], which is low due to climate change. The area is therefore suitable for drought resistant crops. Most crop production takes place in backyard gardens and on communal land. Households involved in agricultural activities are mostly engaged in the production of food as alluded to by Statistics South Africa [12] that reported the highest percentage of households (38.3%) in Limpopo Province being involved in agricultural production activities to secure an additional source of food. A study conducted in Mamone community in Sekhukhune District reveals that community members have noted that changes in temperature and rainfall over the past 24 years have negatively affected the community's indigenous livelihood resources [17]. Furthermore, the changing weather conditions, characterised by high temperatures, have resulted in low rainfall, and affected the timing of rainfall from occurring between September and December to occurring between late November and January [17]. The following crops were produced in Sekhukhune District: sorghum, millet, maize, pumpkin, Bambara groundnuts, mung beans, cowpeas, gourds, citron, watermelon, and sweet reed [18]. Sekhukhune District consists of forests and woodlands where indigenous fruits and vegetables are gathered.



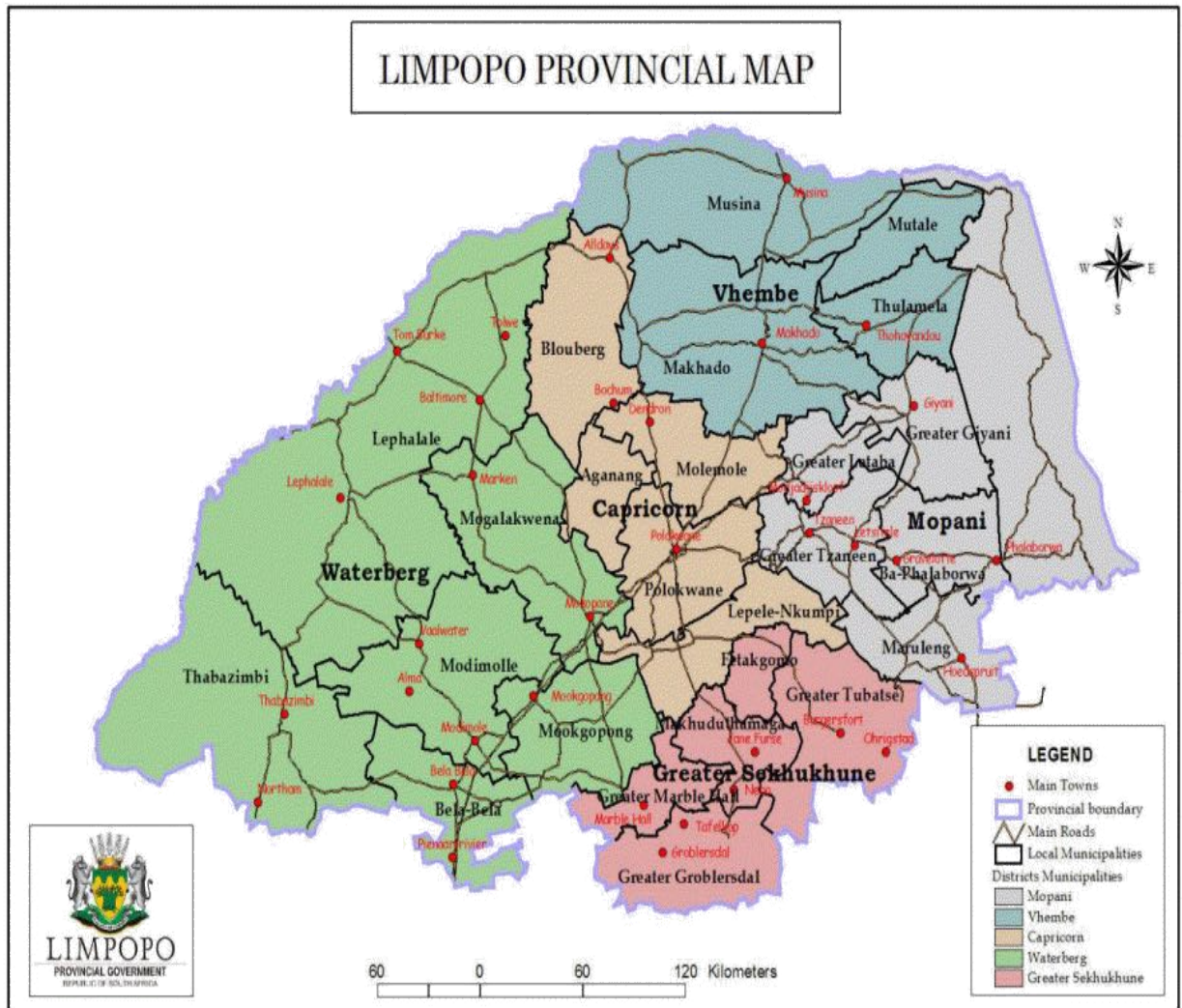


Figure 1: Map of Limpopo Province [19]

Population and sampling

The target population of this study comprised rural households from seven villages (Elandskraal, Mabitsi, Mmakgatle, Mogaladi, Mohlalotoane, Tsimanyane, and Vaalbank) of Sekhukhune District in Limpopo Province, South Africa. Purposive sampling was used to select small-scale farming households from the seven rural villages that participated in the study. Purposive sampling involves a conscious selection of typical subjects with characteristics, knowledge and understanding about the phenomenon being studied [20]. The participants were selected on the basis that they would be able to provide comprehensive and relevant information regarding indigenous foods and Indigenous Knowledge Systems (IKS) as well as their contribution to household food security. This was done in consultation with key informants such as agricultural extension officers, community leaders and

indigenous knowledge holders/practitioners in the area. The study consisted of 14 focus groups (two focus groups from each village) and each focus group consisted of 10–12 individuals.

Data collection and analysis

Data were collected through focus group discussions, semi-structured interviews, and observations during the three phases of the research project (2001–2003; 2005–2007; 2012–2015). With the understanding that food processing and preservation issues of the rural households can only be defined by the people concerned, the research team spent one week in each village collecting data, and later returned to the villages to observe certain food production, processing and preservation activities as per the seasonal calendars given to them by the participants. Apart from staying in each village for a week, the researchers visited several households to conduct observations and interviews. The interviews were recorded using a tape recorder, with the permission of the participants. Photographs and video recordings were taken, and the information was verified in consultation with key local informants.

Data were analysed using thematic content analysis. This approach of data analysis involves repeated reading of field notes, listening to, transcribing and translating of recorded data from focus group discussions [21]. Data obtained were organised, sorted, and coded into meaningful units. An inductive approach was followed and codes or labels assigned to the pieces of data were generated by working from the text during the data analysis process. Different codes were then clustered into meaningful groups called themes. The data organised under different themes were then interpreted.

Ethical considerations

The study was approved by University of Venda's research ethics committee. Permission was also obtained from the Department of Agriculture, Forestry and Fishery as well as from the local chiefs and/or other local leaders in the villages concerned. Consent was sought from the participants and their privacy, anonymity, and confidentiality were upheld during the three phases of the study [20]. All participants took part in the study willingly and were informed that they could withdraw from participating at any time. To improve validity and reliability, the study involved a researcher and two research assistants who were trained before data collection. Different observers or interviewers were used to minimise bias. Notes were taken; discussions were recorded for further listening and transcribing at a later stage.



RESULTS AND DISCUSSION

Demographic and socio-economic characteristics of participants

All participants in this study are women who are involved with the indigenous processing and preservation of food. Most of the participants are older (40 years and above) since the older generation that is still involved with these practices is most likely to be the custodian of indigenous knowledge. Most participants are married and depend on the remittances sent by their husbands who mainly work in the cities, far from home. Some participants also indicated that they rely on social grants provided by the government, more especially those who live with elderly family members (60 years and older) in their households. Most household sizes range from one to 10 members as indicated in Table 1. The women who participated in this study have different educational levels ranging from primary (34%) to secondary education (24%) below matric level but a noticeable number of participants do not have any form of formal education (22%). Few participants obtained matric (Grade 12) or post matric qualifications (national diplomas). With a lack of employment opportunities in the rural areas, most men migrate to the cities in different parts of the country to work for their families, leaving women as heads of households. The participants indicated that most households in these villages are involved in subsistence farming, with women mainly involved in food production activities. They produce food (crops and vegetables) from their backyard gardens and communal land allocated to each household by the traditional leaders. As reported in another study, age, educational status, food gardening, indigenous knowledge and remittances were found to be factors determining household food security status [22].

The participants indicated that food was available from the natural environment and the households were also involved in food production activities to ensure household food security. Dry land farming methods were used to produce indigenous foods. Indigenous fruits were gathered in the wild, whereas indigenous vegetables were mainly gathered from communal areas around settlements, residential plots, arable or abandoned lands and deserted animal kraals. The results showed that the participants used their indigenous knowledge to process and preserve surplus food for future use to ensure household food security as similarly reported in other studies [3, 10, 18]. Some of the processed and preserved food items were sold and the money was used to buy other household food items to add to the food basket.



Preservation and processing of indigenous crops

Maize and sorghum are the two most commonly planted cereal crops in the study area. These crops are processed into mealie meal, which is used to cook porridge, a staple starch for the rural people. A surplus of these crops is processed, preserved, and taken to the cooperatives for proper storage. The stored maize and sorghum would be reclaimed later when the need arises. Table 2 presents the different indigenous processing and preservation methods and tools used for these crops.

The participants reported that their indigenous knowledge guided them on how to process, preserve, prepare and utilise food crops. Some food processing took place on threshing platforms (*seboya*), which were lined with cow-dung that was allowed to dry before food processing could take place. The researchers observed women using wooden threshing sticks (*sefolo*) to thresh sorghum. Thereafter, they would use winnowing baskets to remove any impurities from the sorghum. After processing, households used empty maize meal bags, metal or plastic tanks and basins for post-harvest storage. Some of the qualitative comments from the focus groups included:

“We grew up helping our parents to plough and plant sorghum, mung beans, cowpeas, and pumpkins”.

“We never suffered of hunger when we grew up; therefore, we also plant the same food because we know that they will feed us and our families”.

“We used different methods to process field crops such as using a threshing stick to process sorghum and beans and using a winnowing basket to remove impurities”.

“Aloe ash is used to preserve seeds for the coming planting season”.

Participants were observed using grinding stones to process cereals such as sorghum, millet and maize. The process involved grinding (*šila*) maize by crushing the grain and subsequently grinding it into a fine meal between the surface of a nether stone (*lwala*) and that of an upper one (*tšhilo*). Whilst the nether stone remains stationary, the upper one, held down firmly with both hands, is rubbed in a reciprocating, rocking motion over the surface of the *lwala*. These indigenous food processing methods were also reported in another study [10] in four rural communities in Limpopo Province, South Africa. Sun-drying, hanging on the house roof and using aloe ash (to prevent infestation by pests) were the most popular

preservation methods described by the women in this study, which corroborates with methods reported in other studies [2, 8, 10].



Threshing sticks to process sorghum



Winnowing basket used to process sorghum

Processing and preservation methods of indigenous leafy vegetables, legumes and fruits

Indigenous leafy vegetables (*merogo*) form an important part of the BaPedi people's diet and are served with porridge. Some indigenous leafy vegetables grow naturally in the wild, around communal areas and in the production fields (for example, pigweed, cleome, black jack and wild cucumber) whereas others are planted in the backyards and on communal lands (for example, cowpeas leaves, pumpkin leaves, watermelon leaves, and citron leaves). The availability of indigenous wild vegetables depends on sustainable climatic conditions, such as rainfall, hence their seasonal availability. There is a long history of gathering food from the wild in Africa as well as the rest of the world as wild fruits and vegetables are an available source of food and income especially during periods of drought [3]. Unlike exotic species, wild fruits and vegetables are well adapted to harsh local climatic conditions such as in the study area [3]. To ensure household food security, the women dry indigenous leafy vegetables (*merogo*) to make them available long after the harvesting period. Legumes are also consumed as relish or snacks that are a good source of protein in the BaPedi diets while fruits are consumed fresh as snacks. Table 3 presents different types of indigenous leafy vegetables, legumes and fruits that are commonly eaten by the participants. Indigenous leafy vegetables (*merogo*) are gathered or picked, washed, cooked, kneaded, macerated by hand and shaped into small pellets and placed on a corrugated iron roofing sheet, then dried in the sun. Dried indigenous leafy vegetable pellets (*mokhuša*) are stored in buckets or bags until they are cooked and served as relish that is eaten with porridge [10]. Another way of drying

indigenous leafy vegetables, such as pumpkin leaves, is to harvest them, break them into smaller pieces, then wash and dry them in the shade. Therefore, they provide food for households long after the harvesting period, ensuring food security [7, 8, 10].



Shade-drying of pumpkin leaves (*morogo*)



Processing of indigenous leafy vegetables (*mokhuša*)

Sun-drying is one of the oldest food preservation methods that is still widely used in many parts of the world [5, 8]. Drying is important in food security because it extends the shelf life of certain foods and makes them available during off-season times [8]. The dry vegetables are stored in buckets and, if production is high, the surplus is sold. The second method of processing leafy vegetables, more especially pumpkin leaves and flowers, is to wash and dry them in the shade to avoid losing colour and nutrients. When dry, the leafy vegetables are stored in airtight buckets and used when a need arises. The whole process involves indigenous knowledge. Below are some extracts from the participants:

“We gather wild leafy vegetables such as lerotho and theepe [that] form part of meals and are used as relish eaten with porridge.”

“We use indigenous methods to process and preserve indigenous leafy vegetables (merogo).”

“We let indigenous leafy vegetables dry in the sun. Pumpkin leaves are dried in the sun as well as in the shade.”

“Vegetables such as pumpkin leaves and its flowers are shade dried.”

“Vegetables such as mung beans leaves are cooked, mashed, shaped into small pellets and sundried.”

Many societies depend on food processing and preservation to ensure a sustainable food supply throughout the year [3]. The preservation of seasonal wild vegetables ensures food availability during off-season periods, and this brings food stability to rural households that will then become food secure all year round [7, 8]. During the time of research, the researcher observed street vendors in Groblersdal town, selling indigenous vegetables (fresh and processed). The vendors indicated that, by selling indigenous vegetables, they generate income which is used to buy other essential basic foods. Bvenura and Sivakumar [3] believe that food and nutrition security concerns are addressed when people use their wild food resources and those who sell wild fruits and vegetables generate income that could be used to meet other household needs.

Processing and preservation of indigenous wild fruits

Table 3 includes four different types of indigenous fruits (*legapu*, *lerotse*, *leraka*, and *ntsho*) that the participants planted, processed and preserved for future consumption. For example, the seeds of sweet reeds are not subjected to threshing, but their heads are cut and stored on the roof of a firehouse so that the smoke from the fire house can prevent infestation by weevils. In addition to the indigenous fruits that they planted, they also consumed indigenous wild fruits that they gathered from the wild (Table 4). Indigenous wild fruits play an important role as they are regarded as snacks. The fresh *marula* fruit is eaten as a snack. The *marula* kernel (*koko*) is sun dried, cracked and the inside embryos (*mooko*) are consumed as a snack. Some households use *mooko* as a condiment when preparing indigenous vegetables. Mabilo fruit can be mashed and fresh milk is added to it to make indigenous yoghurt. *Matšhidi* (*Ximenia caffra* Sond) fruits are consumed and the kernels are used as a dye for women's traditional leather aprons (*ntepa*). The other fruits are eaten fresh and are regarded as snacks.

Some of the extracts from the participants are as follows:

"We gather wild fruits and vegetables from the veld. We eat wild fruits as snacks."

"Indigenous fruits are seasonal, and we gather them as per their availability in different seasons."

"We collect marula from the veld, eat the marula fruit and even make marula beer which is sold locally. The kernels of marula are used as a snack (nuts)."



Although the *marula* fruit is eaten as a snack, it is also processed and fermented to make *marula* beer, which is sold locally as a beverage.

Sun-drying and fermentation are the oldest traditional methods of food preservation and have become part of people's culture [8]. The indigenous methods of processing and preserving food constitute an important body of knowledge acquired by observation and experience [5] that becomes a rich cultural heritage of the people. Wild fruits and vegetables are nutritionally rich and high in phytochemicals, especially antioxidants, and therefore can play a significant and positive role in contributing to food and nutrition security [3, 7]. If wild fruits and vegetables are processed and stored correctly, they have the potential to be major sources of income for some poor households, thereby ensuring household food security during off-season times [3]. During observations made in villages where indigenous fruits, dried leafy vegetables (*merogo*) and *marula* beer were sold along the main roads, rural household members indicated that income from the sale of these items is used to buy other kinds of food. Processed fruits and vegetables can also be used as tourist attractions through marketing the indigenous richness of local communities [3].

Fermentation is one of the oldest indigenous methods of food preservation and processing, and has become part of people's culture. The respondents indicated that fermentation is used for food such as *marula* beer; sorghum beer (*bjala bja mabele thoro*) or a non-alcoholic drink known as *mageu*; soft porridge known as *motogo*, using yeast to ferment flour and the fermentation of milk. According to the respondents, sorghum, for example, is soaked, germinated, dried on a platform (*lapa*) and ground with grinding stones to make flour that is known as *mohlaba*. To make sorghum beer, the flour is soaked in warm water using a large clay pot which is put in a warm place such as in the hut (*mokutwana*) where a fire is made. When the consistency is fermented, it is cooked and is then known as *lešeleba* which is allowed to cool by putting it in large enamel dishes and then water and sorghum or maize flour is added to it. This process is known as *go omela*. The whole process can take five days before the fermented beer is fully matured when it is subjected to a process known as *gohlotla*, a process of separating impurities from beer, known as *mašifa*. All fermented beers are sold to generate income. For BaPedi people, sorghum beer is used for all social events such as weddings.

CONCLUSION, AND RECOMMENDATIONS FOR DEVELOPMENT

The study discovered that women are the custodians of indigenous knowledge to ensure household food security, more so in terms of indigenous food processing



and preservation practices, as the focus of this study. Sun-drying and fermentation are the most commonly used indigenous food preservation methods being practiced by the women in the rural areas, while indigenous tools and equipment are used for the processing of food (for example, grinding stones used for grinding maize, threshing sticks and winnowing baskets used for the processing of sorghum and cowpeas). To ensure a stable food supply, there is a need for an improvement in food availability and access. The indigenous methods of processing and preserving food are vital to ensure food availability for rural households whose main meal consists mainly of a starch (such as porridge), indigenous vegetables (*merogo*) and legumes. The participants in this study shared vital information on their indigenous food processing and preservation techniques (sun-drying and fermentation) to ensure household food security. Rural women, particularly, are a group within a community that holds indigenous knowledge of food production, processing, preservation, and storage which can assist in reducing food insecurity and hunger. During seasonal gaps, rural people are entirely dependent on the preserved food as the only food source until the onset of harvest later in the year. Therefore, indigenous food processing and preservation techniques should form the basis of measures to improve food security status of rural people. This calls for innovations in the manner in which post-harvest staples, including vegetable and fruit surpluses, can be processed, preserved and sold cheaply and safely for human consumption. Indigenous knowledge of the local people could be used to achieve this. Therefore, there is a need for agricultural and food security policies to embrace, adopt, promote, adapt and use indigenous knowledge and technologies to address food security.



Table 1: Demographic and socio-economic characteristics of participants

Variables	Categories	Frequencies (n = 134)	Percentage (n = 100%)
Age	20–29	10	7%
	30–39	12	9%
	40–49	28	21%
	50–59	51	38%
	60 and above	33	25%
Marital Status	Married	74	55%
	Single	44	33%
	Divorced	5	4%
	Widowed	11	8%
Education	No schooling	29	22%
	Primary school (Grade 1–7)	46	34%
	Secondary school (Grade 8–11)	32	24%
	Grade 12	15	11%
	Diploma	12	9%
Household size	1–5	59	44%
	6–10	60	45%
	> 10	15	11%

Table 2: Indigenous processing and preservation of crops

Botanical names	Common name	Local name	Part harvested	Preserved	Processed
<i>Zea mays</i> , L	Maize	<i>Lefela</i>	Maize cob	Sun-dried	Stamped or crushed to make maize meal to cook porridge
<i>Andropogon.sorghum</i>	Sorghum	<i>Mabele thoro</i>	Grain (seeds)	Sun-dried (the seeds are mixed with aloe ash to prevent infestation by weevils)	Ground to make mealie meal used to cook porridge

Table 3: Processing and preservation of indigenous vegetables, legumes and fruits

Botanical names	Common name	Local name	Part harvested	Preserved	Processed
Grow naturally					
Amaranthus thunbergia Moq	Pigweed	<i>Theepe</i>	Leaves	Sun-drying	Leaves are cooked, mashed, shaped into small pellets and sundried
Gynandropsis pentaphylla D.C.	Cleome	<i>Leroto</i>	Leaves		
Cleome monophylla L.	Cleome	<i>Sekalerothane</i>	Leaves		
Bidens bipinnata L.	Black jack	<i>Monyane</i>	Leaves		
Cucumis africanus L f	Wild cucumber	<i>Monyaku</i>	Leaves		
Planted in back yards and communal land					
Vign sinensis	Cowpeas	<i>Monawa</i>	Leaves	Sun-drying	Leaves are cooked, mashed, shaped into small pellets and sundried
		<i>Dinawa</i>	Legumes (beans)	The beans used for planting are mixed with aloe ash to prevent infestation by weevils	Beans are cooked, mashed and eaten with porridge or cooked and eaten as snacks
Cucurpit pepe	Pumpkin	<i>Mofodi</i>	Leaves	Sun-drying & shade drying	Leaves are cooked, mashed, shaped into small pellets and sundried
		<i>Lefodi</i>	Vegetables	N/A	Wash, cook and eat as a vegetable
Citrollas Schrad vars.	Watermelon	<i>Mogapu</i>	Leaves	Sun-drying	Leaves are washed, cooked, mashed, shaped into small pellets and sundried

		<i>Legapu</i>	Fruit	N/A	Eaten as a fruit
Citrullas vulgaris/ Kaffir-melon	Melon	<i>Morotse / Motšhatšha</i>	Leaves	Sun-drying	Leaves are washed, cooked, mashed, shaped into small pellets and sundried
		<i>Lerotse</i>	Fruit	N/A	Peeled, cooked and mixed with mealie meal to make a sweet porridge called kgodu
Voandzeia subterranea	Bambara nuts	<i>Tloo marapo</i>	Nuts	Sun-drying	Washed, cooked fresh legumes and eaten as snacks and sun-dry legumes for later consumption
Langeria vulgaris set	Squash	Leraka	Fruit	N/A	Consumed while fresh
Sorghum vulgore Pers	Sweet reed	Ntsho	Stalk	Stalk consumed fresh	Consumed while fresh as snack

Table 4: Processing and preservation of indigenous wild fruits

Botanical names	Common name	Local name	Part harvested	Preserved	Processed
Vangeuria infausta		<i>Mabilo</i> (African medlar)	Fruit	Sun-drying	The fruit is consumed while fresh or dried
Ximenia caffra Sond	Sour plum	<i>Matšhidi</i>	Fruit	N/A	The fruit is consumed while fresh
			Kernel	Sun-drying	The kernel is dried and its inner oil is used to dye women's traditional leather aprons (ntepa)
Sclerocarya caffra Sond.	<i>Marula</i>	<i>Marula</i>	Fruit	Fermentation	<i>Marula</i> fruit is consumed while fresh. The fruits can be fermented to make <i>Marula</i> beer.
			Kernel		The kernel is cracked and used as a snack (nuts)

REFERENCES

1. **Taremwa NK, Gashumba D, Butera A and T Ranganathan** Climate Change Adaptation in Rwanda through Indigenous Knowledge Practice. *Journal of Social Sciences*. 2016; **46(2)**: 165-175.
2. **Ndwandwe S and M Mudhara** Contribution of indigenous knowledge practices to household food security: A case study of rural households in KwaZulu-Natal. *Indilinga African Journal of Indigenous Knowledge Systems*. 2014; **13(2)**: 271-282.
3. **Bvenura C and D Sivakumar** The role of wild fruits and vegetables in delivering a balanced and healthy diet. *Food Research International*. 2017; **99**: 15-30.
4. **Masekoameng M and MC Molotja** The impacts of climate change on household food security: The case of Mogaladi village in Sekhukhune district, South Africa. *Indilinga – African Journal of Indigenous Knowledge Systems*. 2016; **15(2)**: 49-70.
5. **Aworh OC** African traditional foods and sustainable food security. *Food Control*. 2023; **145**: 1-9.
6. **Kamwendo G and J Kamwendo** Indigenous knowledge systems and food security: Some examples from Malawi. *Journal of Human Ecology*. 2014; **48(1)**: 97-101.
7. **Bvenura C and AJ Afolayan** The role of wild vegetables in household food security in South Africa: A review. *Food Research International*. 2015; **76**: 1001-1011.
8. **Asogwa IS, Okoye J I and K Oni** Promotion of Indigenous Food Preservation and Processing Knowledge and the Challenge of Food Security in Africa. *Journal of Food Security*. 2017; **5(3)**: 75-87.
9. **Tirivangasi MH** Regional disaster risk management strategies for food security: Probing Southern Africa development community channels for influencing national policy. Jàmbá: *Journal of Disaster Risk Studies*. 2018; **10(1)**: 1-7.



10. **Tirivangasi MH and SA Rankoana** Sustainable food security through indigenous food processing and preservation in four rural communities of Limpopo Province, South Africa. *African Journal of Development Studies*. 2021; **11(4)**: 243-257.
11. **FAO**. The state of food security and nutrition in the world: Repurposing food and agricultural policies to make healthy diets more affordable. FAO, Rome. 2022.
12. **Statistics South Africa**. General household survey 2016. StatsSA, Pretoria, South Africa. 2017.
13. **Aluga M and G Kabwe** Indigenous food processing, preservation and packaging technologies in Zambia. Paper Presentation. The Indigenous Knowledge Systems Symposium at Kisii University, in Zambia, July 2016.
14. **Mpandeli S, Nesamvuni E and P Maponya** Adapting to the impacts of droughts by smallholder farmers in Sekhukhune District in Limpopo Province, South Africa. *Journal of Agricultural Science*. 2015; **7(2)**: 115-124.
15. **Maponya P and S Moja** Asset Portfolio and food accessibility in Sekhukhune District, Limpopo Province, South Africa. *Journal of Agricultural Science*. 2012; **4(11)**: 144-153.
16. **Human Sciences Research Council (HSRC)**. Food security in South Africa: Key policy issues for the medium term. Human Sciences Research Council, Pretoria. 2012.
17. **Rankoana SA** Human perception of climate change. *Weather*. 2018; **73(11)**: 367-370.
18. **Masekoameng MR and MC Molotja** The role of indigenous food and indigenous knowledge systems for rural households' food security in Sekhukhune District, Limpopo Province, South Africa. *Journal of Consumer Sciences*. 2019; **14**: 34-48.
19. **Statistics South Africa**. Poverty trends in South Africa: An examination of absolute poverty between 2006 and 2011. Statistics South Africa, Pretoria. 2014.
20. **Creswell JW and JD Creswell** Research design, qualitative, quantitative and mixed methods approaches. Sage Publications, California. 2018.



21. **Yin RK** Qualitative research from start to finish. Guilford Press, New York. 2011.
22. **Chari MM, Zhou L, Ngarava S and T Ningi** Determinants of Food Access in Raymond Mhlaba Local Municipality, South Africa. In: Leal FW, Kovaleva M and E Popkova (Eds). Sustainable Agriculture and Food Security. *World Sustainability Series*. Springer, 2022: 495-509.