

## THE ROLE OF INDIGENOUS FOODS AND INDIGENOUS KNOWLEDGE SYSTEMS FOR RURAL HOUSEHOLDS' FOOD SECURITY IN SEKHUKHUNE DISTRICT, LIMPOPO PROVINCE, SOUTH AFRICA

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### ABSTRACT

Despite the fact that South Africa is considered a food secure country, many rural households are facing food insecurity. This is regardless of the potential contribution of indigenous foods and knowledge to food security. However, there are few studies in South Africa that empirically estimate the linkages between household food security and indigenous knowledge systems (IKS). Rural households were purposively selected from seven villages of Sekhukhune District and used to document how these rural households use IKS to help ensure food security. Focus group discussions and semi-structured individual interviews were conducted to collect data from participants. Additionally, Participatory Rural Appraisal (PRA) and Rapid Rural Appraisal (RRA) tools such as seasonal calendars and direct observations were used to collect data. The results were analysed using thematic content analysis. Participants indicated that they have indigenous knowledge that they use to help ensure household food security. They were able to identify edible indigenous food from their natural environment; they could also cultivate indigenous food that contributed to food availability at household level; they could use various indigenous methods to process and preserve food; and used various indigenous coping strategies in times of food shortages. Therefore, indigenous foods and IKS play a significant role in contributing towards household food security in these rural communities. The use of indigenous foods and IKS should be promoted to deal with food insecurity in rural communities. Since indigenous knowledge might eventually disappear, it is highly recommended that IKS is documented and integrated with modern knowledge so that the two complement each other in contributing to household food and nutrition security.

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### ARTICLE INFO

Received September 2018

Revised May 2019

Accepted November 2019

### KEYWORDS

food security, indigenous foods, wild fruits and  
vegetables, indigenous knowledge systems

## INTRODUCTION

The 2006 World Food Summit defined food security as “a situation that exists when all people, at all times, have physical, social and economic access to sufficient, safe and nutritious food that meets their dietary needs and food preferences for an active and healthy life” (FAO 2009: 8). According to FAO (2009), four aspects are considered when defining food security, namely, food availability, access, utilisation and stability. Therefore, a household is considered food secure when all four aspects of food security are achieved. Sustainable Development Goal 2 (SDG 2) aims to end hunger and malnutrition in the world by the year 2030. Target 2.1 of SDG 2 states that “by 2030, end hunger and ensure access by all people, in particular the poor and people in vulnerable situations, including infants, to safe, nutritious and sufficient food all year round” (FAO et al. 2018: 2). The attainment of Target 2.1 requires significant progress in the reduction of hunger. Despite a prolonged decline in global hunger, the most recent estimates show that global hunger had increased in 2016 (FAO et al. 2018). This setback threatens the realisation of Target 2.1 of SDG 2. Of great concern is that undernourishment and severe food insecurity appear to be increasing in almost all sub-regions of Africa (FAO et al. 2018). At the national level, South Africa may be considered a food-secure country, but Hochfeld et al. (2016) report that the majority of South African residents continue to live in poverty.

Poverty and food insecurity in South Africa are the result of several centuries of colonial and apartheid policies, designed to create general conditions, which were unfavourable to the overall well-being of black people, especially in the former homelands, such as Sekhukhuleni (Machete et al. 1997; Quin 1959). Although hunger still exists in South Africa, the country has made progress in reducing extreme income poverty, largely as a result of a progressive, pro-poor tax system which supports the provision of social assistance, health, education and free basic services (Republic of South Africa 2015). Reductions in poverty have led to reduced food insecurity. Statistics South Africa reported a

decline in the number of households that were vulnerable to hunger, from 23.8% to 11.8%, for the period 2002 to 2016, respectively (Statistics South Africa, 2017). The percentage of households and individuals who had limited access to food also decreased (Statistics South Africa, 2017). Therefore, hunger has declined and food access has improved in SA but the fight against hunger continues for those that are still affected.

The results of a Household Food Insecurity Access Scale (HFAS), aimed at determining households' access to food, showed that the percentage of South African households with inadequate or severely inadequate access to food decreased from 23.9% in 2010 to 22.3% in 2016 (Statistics SA 2017). However, the HFAS that measured the food insecurity of rural households in Sekhukhune District revealed that the majority (80%) of the households could not access food and this influenced their food security status (Masekoameng 2015). Earlier studies of the food habits of BaPedi residing in Sekhukhune region had revealed that they relied on indigenous food and crops to contribute to food and nutrition security (Quin 1959; 1964). In order to be able to identify edible wild fruits and vegetables, they require indigenous knowledge that is mainly known to adult members of the community and is transferred orally from generation to generation. Although rural communities rely on indigenous foods, Bvenura and Afolayan (2015) reported that communities frowned upon wild vegetables and their inclusion in their diets despite their important role in ensuring food and nutrition security in rural areas. Traditionally, the diet of Bapedi was monotonous and consisted mainly of porridge and wild vegetables as staple foods which were eaten for breakfast, lunch and supper (Quin, 1959). This, together with the changes that took place in terms of the introduction of and exposure to other types of foods could be associated with the negative attitude among some communities in terms of the inclusion of wild vegetables in their diet. This could be an obstacle to reducing food insecurity, especially in poor rural communities. Based on the above, this study aimed to document the indigenous foods consumed by the rural households of

Sekhukhune District and the role of indigenous knowledge systems (IKS) in contributing to food security.

## **INDIGENOUS KNOWLEDGE AND INDIGENOUS KNOWLEDGE SYSTEMS**

There is no single definition of indigenous knowledge (IK) but words such as native, traditional and local have sometimes been used to describe it. Gaoshebe (2014) mentions that IK includes the unique traditional and local knowledge existing within, and developed around, the specific conditions of women and men who are indigenous to a particular geographical area. According to Persens (2005: 136), "IK is seen to contrast with the knowledge generated within the international system of universities, research institutions and private firms." At the local level, communities in developing countries use IK as a basis for decision making, especially regarding food security, human and animal health, education and natural resource management (Persens 2005; Smit & Masoga 2012). Ndwandwe and Mudhara (2014) define IK as knowledge aimed at social and natural well-being, which is continually influenced by local creativity, experimentation and contact with external systems. Indigenous knowledge is thus not static, but evolves with time.

Closely related to IK is indigenous knowledge system (IKS), which, according to Du Toit (2005), is related to local communities' interactions with their environment, their knowledge, stories, beliefs, rites and rituals developed over long periods of time and passed on through socialisation from one generation to the next. Similarly, Taremwa et al. (2016) mentioned that IKS is an emerging area of study that focuses on ways of knowing, seeing and thinking that are passed down orally from generation to generation. Indigenous knowledge is culture-specific in the sense that different cultural groups possess different systems, which are unique to their way of life and the context of the environment they live in. Since IKS is dynamic, new wisdoms are continuously added to the existing body of knowledge. As the

environment changes, so beliefs, convictions, lifestyles, means of ensuring food security and knowledge systems change. The transition from one environment to another is, however, gradual and adaptation strategies are required to maintain any impact (Du Toit 2005). Although IKS is highly valued by rural people, it is not esteemed in the modern world, and this imbalance makes rural people more vulnerable to food insecurity (Kamwendo & Kamwendo 2014).

Rural people have for many years relied on IKS to ensure food security (Bvenura & Sivakumar 2017; Enete & Amusa 2010). For example, they can identify different types of edible wild fruits, vegetables and roots, they know when to plant which types of food, how to plant them, when and how to harvest and process the food and how to preserve the food to ensure food security. Rural people are also able to use agricultural practices, such as intercropping. According to Ogle and Grivetti (1985) and Rankoana (2017), agriculture, based on IK, ensures the production of a variety of foods by using mixed cropping even prior to the introduction of conventional agriculture. According to Ndwandwe and Mudhara (2014: 272), the discourse on the use of IK agriculture emerged as an alternative to colonial policies, which emphasised economic maximisation in developing strategies, where the latter led to scientific tools being promoted while indigenous knowledge practices were seen as backward and of low productivity. Modern agriculture implies the use of improved seeds, advanced farm machinery (tractors, harvesters, threshers) and chemical inputs, in an optimal combination with water. Indigenous farmers produce indigenous crops through knowledge of environmental conditions and seasonal changes without access to external inputs, capital and modern scientific knowledge (Maroyi 2012).

In comparison, Matsa and Mukoni (2013) identify agriculture based on IK as being reliant on low external input systems, i.e., minimal association with modern farm inputs, access to marketing infrastructure, modern agro-processing facilities and sources of credit. In Matsa and Mukoni's (2013) view, IK agriculture

is seen as structurally unfit for commercial food production systems. Matsa and Mukoni (2013) mention that, despite modern technological systems being introduced by Western cultures and knowledge systems to ensure food security in Africa, most people – especially in remote rural areas – are still dependent on local communities' knowledge and technology systems (including cultural values) for food security. Those communities strive to pass on this knowledge through socialisation, to the younger generation, to ensure sustainability, increased food security and self-sufficiency.

Modernisation has brought about change in the use of IKS to ensure food security and adapt to a changing environment because most subsistence farmers cannot access the latest knowledge or afford to use modern technology due to their low income (Gaoshebe 2014). According to Kalumikiza (2018), science and IK share a common goal in relation to food security and that is to feed the population. Therefore, the two are complementary and must be treated as such with IK informing scientific research and application, and science scrutinising and validating IKS (Kalumikiza 2018). Indigenous knowledge systems (IKS) have been used in the past to help ensure household food security, especially in rural communities.

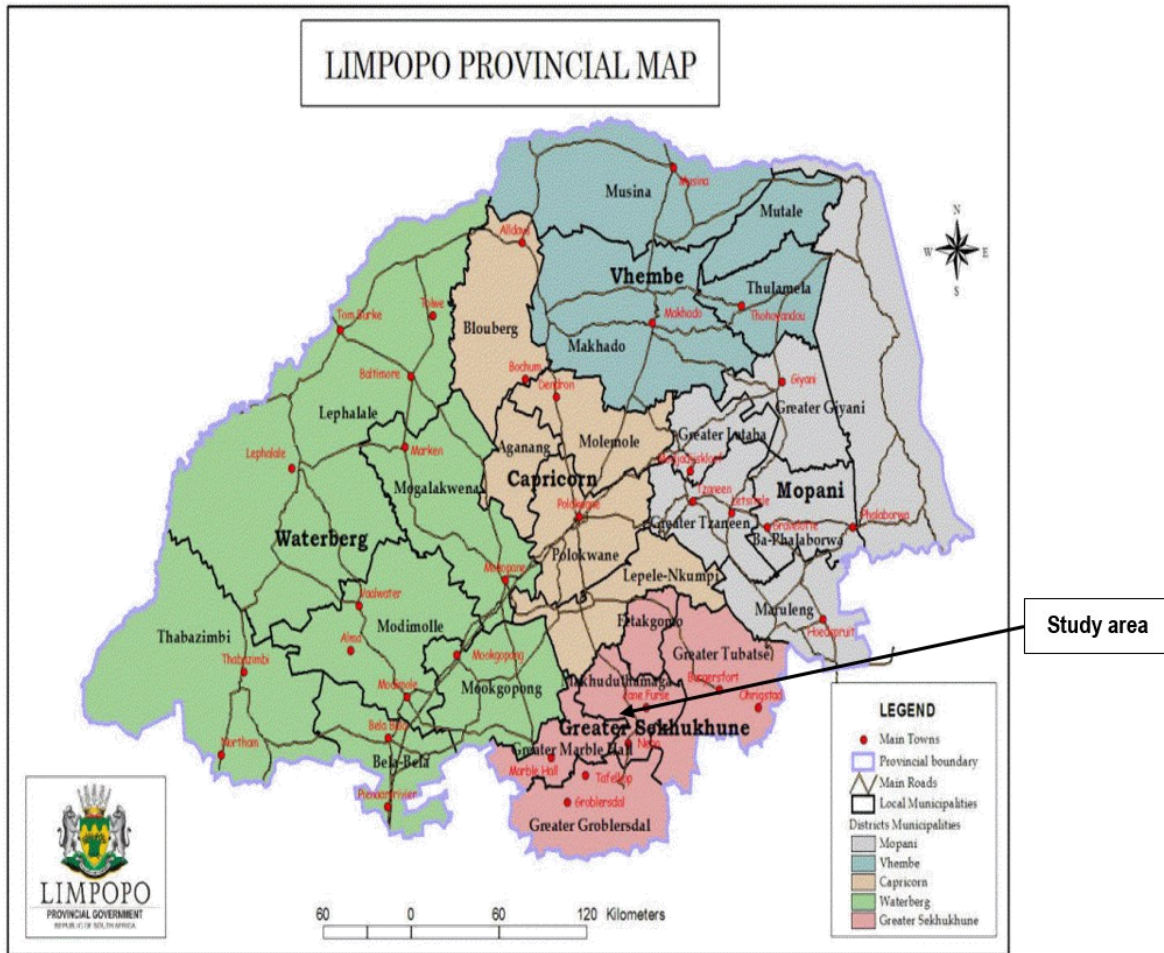
According to Kamwendo and Kamwendo (2014), only a limited number of research studies have explored the extent to which IKS can contribute to the achievement of food security. The use of indigenous foods, especially wild vegetables, which were initially primary sources of food in many societies, has been marginalised in favour of exotic vegetables (Bvenura & Afolayan 2015). Food security issues have become the concern of local, national, as well as international governments. The objective of this paper is to document the indigenous food consumed by the rural households of Sekhukhune District and the role of indigenous knowledge systems (IKS) in achieving food security.

## THE STUDY AREA

The study was conducted in Sekhukhune District (refer to Figure 1) in Limpopo Province, South Africa, which is one of the regions that has a majority of poor households (Statistics South Africa, 2014). Sekhukhune District has a summer rainfall and receives 90% of its total annual rainfall during the period October to March each year (Human Science Research Council 2012). The rainfall pattern is suitable for the survival of indigenous crops, such as sorghum and millet (Khumbane, 2004). Although this is the case, the changes that are brought about by climate change cannot be ignored as they somehow affect rainfall patterns. Rankoana (2018) reported that a study conducted in Mamone Community in Sekhukhune District revealed that community members have noted that changes in temperature and rainfall over the past 24 years has negative consequences on the community's indigenous livelihood resources. Furthermore, they mentioned that long-term change in temperatures are responsible for excessively hot and dry summers. The changing weather conditions resulted in decreases in rainfall as well as a change in the timing of rainfall, which in recent years has occurred in late November and January (Rankoana, 2018).

According to Khumbane (2004) and Quin (1959), the communities practise mixed cropping which they use to produce crops for household consumption with the aim of ensuring household food security. Sekhukhune District consists of forests and woodlands where indigenous fruits and vegetables are available for the communities to collect at no cost. In the livelihood survey conducted as part of the Food Insecurity and Vulnerability Information and Mapping Systems (FIVIMS) pilot in 2006, it was revealed that, although over 40% of the households in Sekhukhune indicated that they grew their own crops, this was largely for supplementary purposes and by means of a vegetable garden or maize plot (Drimie et al. 2009).

In South Africa, agriculture plays an important role in the process of economic development



**FIGURE 1: MAP OF LIMPOPO PROVINCE (STATISTICS SOUTH AFRICA, 2014)**

and can contribute significantly to household food security (Statistics South Africa 2017). Most crop production takes place in backyard gardens and households involved in agricultural activities are mostly engaged in the production of food. Limpopo Province has the highest percentage of households (38.3%) that are involved in agricultural production activities in an attempt to secure an additional source of food (Statistics South Africa, 2017). Most households in Limpopo Province (67.8%) cultivate grains and food crops; 55% grow fruit and vegetables and 25.2% of the households produce livestock (Statistics South Africa 2017).

people, residing in the Sekhukhune District. The research, which spanned the periods 2001–2003 (phase 1) and 2005–2007 (phase 2), focused on the food-gathering and production activities of the aforementioned rural villages. A further study into the patterns of household food availability, accessibility and utilisation by selected rural households in the same District was conducted from 2012 to 2015, which included a focus on IKS and food security issues. Although all three studies used both quantitative and qualitative methods, this article reports on qualitative aspects of the research.

**Study population and sampling procedure**

The target population of the latest study comprised rural households from seven villages (Elandsdraal, Mabitsi, Mmakgatle, Mogaladi, Mohlalotoane, Tsimanyane, Vaalbank) of Sekhukhune District in Limpopo Province, South Africa. Purposive sampling was used to select

**METHODS**

**Research design**

This article is based on a longitudinal study which explored the food habits of the BaPedi

rural households from the seven rural villages that participated in the study. The participants were selected on the basis that they would be able to provide comprehensive and relevant information regarding indigenous foods and IKS as well as their contribution to household food security. The selection of the participants was done in consultation with key informants, such as agricultural extension officers, community leaders and indigenous knowledge holders/practitioners in the area. The University of Venda granted ethical clearance (SHS/11/PH/006) to conduct the study prior to its commencement. 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. All participants took part in the study willingly and were informed that they could withdraw from participating at any time.

#### Data collection methods

Participatory rural appraisal (PRA) and rapid rural appraisal (RRA) methods were used to collect data for this study. Participatory rural appraisal is an approach and method for learning about rural life and conditions from rural people's perspective (Cavestro 2003). Rapid rural appraisal involves learning rapidly and directly from villagers, and obtaining information for the purposes of analysing it (Cavestro 2003). These methods were used as they are regarded as complementary methods when undertaking agricultural research in collaboration with farmers and local residents. This is due to the failure of conventional agricultural development models in conventional research methodologies (Chambers et al. 1989; Hart & Mouton 2005; Scoones & Thompson 1994). With the understanding that IKS and food security issues can only be defined by the people concerned, the research team spent one week in each village collecting data through focus group discussions and individual interviews. The study consisted of 14 focus groups (two focus groups from each village) and each focus group consisted of between 10–12 individuals. According to McMillan and Schumacher (2010), qualitative samples can range from one to 40, or more. Furthermore, Yin (2011) mentions that

qualitative research is not concerned with large sample sizes, but the researcher has to probe until reaching saturation when no new information emerges.

The team later returned to the villages to observe certain food production and processing 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 for observations and conducting individual interviews. The interviews were conducted in Sepedi, which is the language of the participants, and they were recorded using a tape recorder, with the permission of the participants. The interviews were later transcribed verbatim and translated into English before being analysed. The following RRA and PRA tools were used to generate and record information:

- **Focus group discussion:** The researchers introduced the topic, guided the discussions which were recorded using a tape recorder. The focus group discussions were conducted with two groups of 10–12 farming household members from each of the seven villages. There was a checklist with open-ended questions designed to collect data on IKS and food security. Examples of questions asked were: Tell us more about the manner in which you get food in your household/community? What kinds of food do you eat? What happens when the food runs out?
- **Semi-structured interviews:** Informal, relaxed interviews were held using a more defined topic guide with a list of questions that assisted the researchers to probe for more information. Participants were asked questions about indigenous foods consumed to ensure food security and their indigenous knowledge pertaining to food within their village and in their respective households. Some of the questions asked were: Which indigenous food do you eat? Where do you get these foods? How do you differentiate between edible and inedible indigenous foods?
- **Seasonal calendars:** The participants were asked to draw a seasonal calendar showing the availability of wild indigenous fruits, vegetables and cultivated indigenous foods.

- **Direct Observations:** The researchers conducted direct observations by capturing processes such as indigenous food gathering, production, harvesting, processing, drying and storing. Photographs and video recordings were taken, and the information was verified in consultation with key local informants. The researchers stayed in each of the villages for a period of one week to observe activities related to IKS and food security.

To ensure credibility and trustworthiness, the study involved a researcher and two research assistants who were trained before data collection. The use of different observers or interviewers was to minimise bias. Notes were taken, discussions were recorded for further listening and transcribing at a later stage. A checklist was used to guide the discussions and to probe further.

### Data analysis

Data were analysed using thematic content analysis that involves repeated reading of field notes, listening to, transcribing and translating of recorded data from focus group discussions and individual interviews. The translated data were typed, organised, sorted and coded into meaningful units. An inductive approach was followed, and the codes or labels assigned to the pieces of data were generated by working from the text during the data analysis process. Recurring issues that commonly emerged from the interviews and focus groups were identified and grouped together into meaningful groups called themes. The data organised under different themes were then interpreted.

### RESULTS

Although food security can be measured scientifically by scales, such as the Household Food Insecurity and Access Scale (HFIAS), the purpose of this paper is to report on the qualitative aspects of the indigenous foods consumed by the rural farming households and how they used IKS to contribute to household food security. The results are based on in-depth knowledge that was collected through

observations, focus group discussions and individual interviews with rural farming households. The participants indicated that the natural environment around their villages provided them with certain edible indigenous fruits and vegetables (refer to Table 1). 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. Some extracts from the interviews and focus group discussions are given below.

*“We gather wild vegetables such as ‘lerotho’ and ‘theepe’ which are used as a relish.”*

*“In our village, we still eat indigenous vegetables and crops to alleviate hunger.”*

*“We gather wild fruits and vegetables from the veld. We eat wild fruits as snacks whereas vegetables form part of meals and are used as relish eaten with porridge.”*

*“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).”*

The seasonal calendars revealed that the participants knew when to plough, plant, weed and harvest their crops through the IK passed from one generation to the next. The participants indicated that they used dry land farming methods and mixed cropping to produce different indigenous foods as indicated in Table 1. The participants also mentioned indigenous animals that they owned and their products (refer to Table 1) that were also used as a source of food. The following extracts from the interviews and focus group discussions with participants support the above:

**TABLE 1: INDIGENOUS FOOD AVAILABLE IN SEKHUKHUNE DISTRICT**

Wild indigenous food	Cultivated indigenous food	Indigenous animals
<b>Fruits:</b> Marula Sour plum Wild plum Prickly pear Wild medlar Dithetlwa Mabupudu Magaba Dikgoto Dikonaona	<b>Fruits:</b> Watermelon Sweet reed	<b>Animals:</b> Free-range chickens Pigs Sheep Goats Cattle
<b>Vegetables:</b> Cleome Cat's whiskers African spider flower Long legs Wild cucumber Black jack Pigweed Amaranthus	<b>Vegetables:</b> Pumpkin Gourds Citron	<b>Animal products:</b> Eggs Milk Meat (chicken, pork, mutton, beef)
	<b>Vegetable leaves (Merogo):</b> Pumpkin leaves Cowpea leaves Watermelon leaves Citron leaves ( <i>Motšhatšha</i> )	<b>Wild animals:</b> Mmutla (hare/ rabbit) Phala (Impala) Phuti (Springbok) Tholo (Kudu) Ditšie (locusts)
	<b>Legumes:</b> Cowpeas Mung beans Small white beans Bambara groundnuts	Supplement
	<b>Staple food crops:</b> Sorghum Millet Maize	

*"We grew up helping our parents to plough and plant sorghum, mung beans, cow peas, gourds 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."*

*"Boys hunt animals such as rabbits, springbok, tholo, so that we can have meat to eat with porridge. We would even dry the meat so that it can last longer and those who have refrigerators can keep the meat for longer."*

Food availability depends on the land allocated for production, amongst other factors. Participants in this study owned land for food production, with some households owning larger pieces of land (two hectares) than others. Some participants used backyard spaces as well as fields allocated to cultivate food crops as

indicated in Table 1. Most food production takes place in the backyards, however, the participants mentioned that the food produced this way was insufficient, especially for large families. Food produced from backyard spaces supplemented other food items available in the households. Some of these foods are indigenous. Some extracts from the participants are given below.

*"When we have some rain, we plough the land and plant sorghum, maize, millet, mung beans, cow peas, gourds, sweet reed, bambara ground nuts, watermelons, small white beans and pumpkins."*

*"I have produced mung beans, citron, cow peas, millet, sorghum, pumpkins, bambara groundnuts, maize, sweet reed and watermelons in my two hectare land as well in my backyard space so that we can have enough food to eat in the household."*



*"If we plant sorghum, maize or millet, we were guaranteed of mealie meal which is an important ingredient for porridge as our staple food. Vegetables, vegetable leaves (merogo) and legumes are eaten with porridge or mixed together with other ingredients to make a traditional dish. Indigenous fruits, such as watermelon and sweet reed, are snacks eaten between meals."*

*"Some of us only have backyard spaces to produce food such as sorghum, maize, mung beans, cow peas, pumpkins, bambara groundnuts, citron, small white beans, sweet reed, watermelons. Unlike those with two-hectare fields and backyard spaces, the food produced from a small piece of land will not be enough to sustain us for longer periods. It would have been better if we also had two hectare fields like in other villages because they even sell surplus food produced from their fields."*

Focus group discussions revealed that, prior to cultivation, the land was prepared using animal traction, hand hoes or both and, in some instances, tractors. The farming households used kraal manure to improve soil fertility. When production (especially of maize) was higher than the consumption rate, households took the excess maize to the cooperative for proper storage and to avoid food losses. The stored maize would be reclaimed later when a need arose. The disadvantage of cooperative storage was that households had to pay storage and collection fees charged per bag of maize and this increased the costs of accessing food.

Food access entailed gathering from the natural environment in the wild and around communal residential areas, and production in the fields. The participants indicated that they used various indigenous food accessing strategies learnt from their parents, such as exchanging (bartering), borrowing and payment in gifts and in kind. For example, they exchanged some of the food they produced, for instance, sorghum, for maize meal, and borrowed maize meal from neighbours, friends or relatives and returned the same quantity when they had their own. In this

study, the food items that were subject to gifting included maize meal, beans and vegetables, but seldom prestige food such as meat. Households that produced and gathered surplus indigenous vegetables, such as merogo, sold them (fresh or dried) so that they could earn money to access other kinds of food. Some participants mentioned that they would sell fruits that they gathered from the wild because not everybody goes far into the field to gather indigenous fruits. Observations were made in some villages that people were selling indigenous fruits and marula beer which was brewed by the local villagers through their indigenous knowledge. The focus group discussions revealed that the money from the sale of indigenous foods and marula beer would be used to buy household food items, among other things.

Participants reported that their indigenous knowledge guided them on how to process, preserve, prepare and utilise food. Some food processing took place on threshing platforms (seboya), which were made by the rural women through the indigenous knowledge and skills that were passed on from one generation to the next. The researchers observed women using wooden threshing sticks (sefolo) to thresh beans, millet and sorghum. Thereafter, they would use winnowing baskets to remove any impurities from the beans, millet and sorghum. The processed foods were stored in empty maize meal bags, metal or plastic tanks and basins. Indigenous leafy vegetables (merogo) were harvested, 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) were stored in buckets or bags. Another way of drying indigenous leafy vegetables, such as pumpkin leaves, was to harvest them, break them into smaller pieces, then wash and shade dry them. Dried indigenous leafy vegetables (merogo) were used as a relish that was served and eaten with porridge. Therefore, they provided food for households long after the harvesting period ensuring food security. To make dried indigenous leafy vegetables (merogo) more nutritious and tasty, they were mixed with ground peanuts or nuts of the marula fruit during

cooking. The brewing of sorghum or marula beer was another typical example of the participants' existing knowledge of food processing, preparation and serving. Although this is not an important aspect of food security, it contributes to food security because the sorghum and/or marula beer brewed would be sold and the money used to buy household food items.

This indigenous knowledge was acquired through socialisation by household members, peer groups and social networks within their communities. Although most of the food produced was consumed, households would put away some seeds for the next planting season. The seeds were treated with aloe ash, paraffin, salt and herbs from their backyards or the wild to prevent pest infestations.

During times of food shortages, households used various coping strategies to ensure food security. For example, they would use food that was stored from previous harvests, food received from relatives who had more or they would send their children to stay with relatives who could afford to feed them. Some of the participants' quotes are given below.

*"I am not working and my sister gives me food, such as maize meal, vegetables and sometimes meat. I repay her by working in her fields and helping out with household chores."*

*"I help my neighbour to plough, plant and look after the crops and vegetables planted in her bigger field so that during the harvesting period, I can get food for my family."*

## DISCUSSION

This study investigated the indigenous foods consumed by the rural households in Sekhukhune District and how they used IKS to contribute towards household food security. The motivation for this study was to obtain information that could be documented and used to promote IKS and their contribution to household food security, especially in poverty-

stricken areas. As Kamwendo and Kamwendo (2014) report, there is a limited number of research studies that looked into the extent to which IKS can contribute to the achievement of food security.

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. The participants relied on the IKS and practices that they learned from their parents to identify edible indigenous foods. Observations by the researchers confirmed the availability of wild fruits and vegetables gathered, consumed and sometimes sold by the participants. Similar findings regarding the gathering and consumption of indigenous fruits and vegetables were also reported by Masekoamneg (2007). According to Bvenura and Sivakumar (2017), the history of gathering fruits and vegetables for food from the wild in Africa as well as the rest of the world cannot be overemphasised as wild fruits and vegetables are an available source of food and income especially during periods of drought. Unlike exotic species, wild fruits and vegetables are well adapted to the harsh local climatic conditions (Bvenura & Sivakumar 2017). Visits to the participants' back yards confirmed the food production activities of the households. Similar results were reported by Khumbane (2004) and Quin (1959, 1964), but the types of food gathered in the wild and those produced have declined as compared to those reported earlier by Quin, who conducted studies of food and feeding habits of the BaPedi in the same area. This could be due to poor rainfall that limits the success of subsistence farming activities in Sekhukhune District (Ziervogel et al. 2006).

Rankoana (2017) found that indigenous knowledge continues to play an important role in rural communities, such as villages in Limpopo Province, where people used indigenous knowledge and indigenous farming practices to cultivate indigenous foods in their backyard gardens and fields. This study found that, although indigenous methods (animal traction) to prepare the land for cultivation were used, some households had shifted to using modern methods, such as tractors. The shift to modern

methods is evidence that IKS is not static, but changes with time. Rural people acknowledge modern methods for preparing land for cultivation and this might increase the production of food. For the future generations, this shift implies that they can have more time for other activities that might help to maintain food security levels such as improved processing, preservation as well as selling of food items for income generation when production levels are higher.

Although food may be available in the country, province or community, poor households may still face food insecurity because they may not have the resources to access the food. This study found that households gathered indigenous food from the environment. Similar results were reported by Ndhleve et al. (2012) who concluded that, in times of food stress, households resorted to the environment as a means of accessing food. Da Costa et al. (2013) also mentioned that farmers and farm households in Timor-Leste used their indigenous knowledge and harvested wild food to cope with repeated periods of food insecurity caused by climate change. Other ways of accessing food used by participants in this study included exchanging, borrowing and payments in gifts that are indicative of the strong social networks existing among rural households. Bvenura and Sivakumar (2017) also reported on the fact that relatives provided food for each other, for example, relatives based in rural or peri-urban areas could provide relatives in urban areas with indigenous fruits and vegetables.

According to Da Costa et al. (2013), social networks imply a number of levels of support ranging from lending, borrowing, bartering and outright gifting. All these indigenous networks are created by household members with the aim of securing food in the wake of food scarcity due to crop failure as a result of climate change and/or a lack of finance to purchase food. The gifting of food between neighbours and members of extended families may be characterised as “delaying reciprocity”, whereby the gift is returned at a later stage when the household that received the gift has a surplus and its

members are aware that another household has a shortage (Da Costa et al. 2013).

Some households in this study sold indigenous leafy vegetables to get money that would be used to buy other kinds of food. Bvenura and Sivakumar (2017) are of the opinion that the more people interact with their wild food resources, the more food and nutrition security concerns are addressed and that this could also generate an income for those who sell the fruits and vegetables. The participants in this study also had animals that they used to ensure food security, but livestock was used only on special occasions, such as weddings and funerals. According to Lemke (2001), livestock is an asset that can be sold in times of shortage, and represents personal insurance in instances of food insecurity. However, in these villages, the management of animals, such as goats, sheep and cattle, was governed by the cultural norm that only men can make decisions regarding when to slaughter or sell such animals.

The results of this study regarding IKS and food utilisation are similar to those reported in several other studies (Drimie et al. 2009; Okigbo 1987; Pieters et al. 2013; Quin 1959) that mentioned that food utilisation included household factors, such as food processing and preservation, to ensure food security during off-season periods. Food processing, including preservation, has played a pivotal role in many societies to ensure a supply of food throughout the year (Bvenura & Sivakumar 2017). Bvenura and Afolayan (2015) explain that if seasonal wild vegetables are made available during off-season periods, this will increase access and bring food stability to households that will then become food secure all year round. The indigenous methods of processing and preserving food become vital to ensure food availability for rural households whose main meal consists mainly of a starch (i.e. porridge), indigenous vegetables (merogo) and legumes. The cultural practice of eating indigenous leafy vegetables and legumes adds vital nutritional elements to the traditional African diet since good vegetables are a source of vitamins A and C with protein derived from the legumes, such as bambara, ground nuts and cowpeas (Khumbane 2004; Quin 1959, 1964).

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 (Bvenura & Sivakumar 2017). If wild fruits and vegetables are processed and stored well, they have the potential to be major sources of income for some poor households (Bvenura & Sivakumar 2017) thereby ensuring household food security during off-season times. 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. Bvenura and Sivakumar (2017) mention that processed fruits and vegetables can also be used as tourist attractions through marketing the indigenous richness of local communities and particular countries. If the knowledge of indigenous foods, as important sources of food, and the IKS pertaining to food processing and preservation are not documented for the next generations, they are at risk of being lost.

The indigenous method of applying aloe ash to seeds to prevent infestation by pests corresponds with the results of a study conducted by Ndwandwe and Mudhara (2014) who concluded that indigenous knowledge practices in pest management were applied for seed storage, planting and post-harvest processing. The use of aloe ash was viewed as the most cost effective way of preserving seeds for the next planting season (Masekoameng 2007). This practice was also reported by Rankoana (2017) in a study conducted in Dikgale village, Limpopo Province. Participants mentioned the use of various coping strategies, such as reducing the number of meals or portion sizes in a day to ensure food stability and these methods correspond with the findings of Ndhleve et al. (2012) and Ziervogel et al. (2006).

## CONCLUSIONS AND RECOMMENDATIONS

This study shows that indigenous foods are still consumed and that IKS is still a valuable asset to the rural households of Sekhukhune District

who use it to help ensure household food security. The participants' indigenous knowledge enables them to identify edible indigenous fruits and vegetables from the natural environment. They also use their indigenous knowledge to cultivate, harvest, process, preserve and prepare indigenous foods. This knowledge is passed on from one generation to the next. Indigenous foods are sold in the communities and the money earned is used to contribute to household food security. Therefore, it is concluded that the use of indigenous knowledge is a viable livelihood strategy for poor rural households. The study found that IKS plays a pivotal role in the achievement of household food security. In many developing countries, where gardens contribute to food security, this is overlooked by policy makers and extension officers in favour of exotic vegetables which are mainly produced for commercial purposes. The availability of land and other resources, such as water, that can contribute to food production activities at a household level are important aspects that require serious attention in rural areas.

Given the existing knowledge that the rural households demonstrated in terms of food processing and preservation, it is crucial to emphasise the nutritional value of indigenous vegetables and to find ways of retaining nutrients during preservation to prevent nutrient losses and ensure household food security. The consumption of indigenous foods, especially wild vegetables, is declining, therefore, their importance in terms of ensuring food and nutrition security should be documented and promoted to tackle food and nutrition insecurity in South Africa.

Indigenous knowledge system is mainly known and practised by elderly members of the communities and there is a risk that it might eventually disappear, as younger generations may not see its relevance. Therefore, the importance of indigenous foods and IKS in ensuring food security (i.e. through food production, food gathering, processing, preservation and storage) should be documented for future custodians to access. The researchers recommend that IKS should be

documented and integrated into modern bodies of knowledge, so that the two systems can complement each other in ensuring household food and nutrition security. Therefore, African governments are urged to promote indigenous foods and their importance in ensuring household food and nutrition security as well as being a direct and indirect source of income, particularly for rural households. The researchers here propose new policy directions which link IKS and food security, and the recognition, appreciation and documentation of IKS, to identify areas which need improvement. Future research should focus on the promotion of indigenous foods among young people so that they can know about their importance in addressing food and nutrition security.

#### ACKNOWLEDGEMENTS

The authors thank all the people of Sekhukhune District for their participation and contributions made in this study. The following institutions funded the different phases of the research and we thank them for the financial support: The National Research Foundation (NRF), Cannon Collins and the Land Bank. Some of the work in this manuscript is related to the work published in a Matser's dissertation and Doctoral thesis for Dr. Masekoameng.

#### REFERENCES

- Bvenura, C. & Afolayan, A.J., 2015, The role of wild vegetables in household food security in South Africa: A review, *Food Research International*, 76, 1001-1011, viewed 05 April 2019, from <https://www.sciencedirect.com>.
- Bvenura, C. & Sivakumar, D., 2017, The role of wild fruits and vegetables in delivering a balanced and healthy diet, *Food Research International*, 99, 15-30, viewed 05 April 2019, from <https://www.sciencedirect.com>.
- Cavestro, I., 2003, Participatory rural appraisal concepts: Methodologies and techniques, *Master om Cooperazione Allo Sviluppo Nelle Aree Rurali, Univesita Degli Studi. D-1*.
- Chambers, R., Pacey, A. & Thrupp, L.A. (eds.), 1989, *Farmer first: farmer innovation and agricultural research*, Intermediate Technology Publications, London.
- Da Costa, M.D.J., Lopes, M., Ximenes, A., Ferreira, A.D.R., Spyckerelle, L., Williams, R., Nesbitt, H. & Erskine, W., 2013, Household food insecurity in Timor-Leste, *Food Security*, 5(1), 83-94, viewed 14 March 2014, from <https://doi.org/10.1007/s12571-012-0228-6>.
- Du Toit, C.P., 2005, The environmental integrity of african indigenous knowledge systems: Probing the roots of African rationality, *Indilinga African Journal of Indigenous Knowledge Systems* 4(1), 55-73.
- Drimie, S., Germishuys, T., Rademeyer, L. & Schwabe, C., 2009. Agricultural Production in Greater Sekhukhune: the future for food security in a poverty node of South Africa? *Agrekon*, 48 (3), 245-275, viewd 01 October 2017, from <http://ageconsearch.umn.edu/record/55045/files/2.%20Drimie%20et%20al.pdf>.
- Enete, A.A. & Amusa, T.A., 2010, Challenges of agricultural adaptation to climate change in Nigeria: A synthesis from the literature, *Journal of field actions*, 4, 25-38 viewed 14 March 2014, from <https://journals.openedition.org/factsreports/678>.
- Food and Agricultural Organization of the United Nations (FAO), 2009, The state of food insecurity in the world. Economic crises - impacts and lessons learned, FAO, Rome, viewed 10 June 2014, from <https://www.fao.org/docrep/012/i0876e/i0876e00.htm>.
- FAO, IFAD, UNICEF, WFP & WHO, 2018, The state of food security and nutrition in the world 2018. Building climate resilience for food security and nutrition, FAO, Rome, viewed 05 April 2019, from <https://www.fao.org>.
- Gaoshebe, T., 2014, African indigenous food security strategies and climate change adaptation in South Africa, *Journal of Human Ecology*, 48(1), 83-96, viewed 14 March 2015, from <https://www.tandfonline.com/doi/abs/10.1080/09709274.2014.11906777>.
- Hart, T. & Mouton, J., 2005, Indigenous knowledge and its relevance for agriculture: A case study in Uganda, *Indilinga African Journal of Indigenous Knowledge Systems*, 4(1), 249-263, viewed 14 March 2015, from [https://www.researchgate.net/publication/279923688\\_indigenous\\_knowledge\\_](https://www.researchgate.net/publication/279923688_indigenous_knowledge_)

- and\_its\_relevance\_for\_agriculture\_a\_case\_study\_in\_UGANDA.
- Hochfeld, T., Graham, L., Patel, L., Moodley, J. & Ross, E., 2016, Does school breakfast make a difference? An evaluation of an in-school breakfast programme in South Africa, *International Journal of Educational Development*, 51: 1-9.
- Human Sciences Research Council, 2012, Food security in South Africa: Key policy issues for the medium term, Pretoria: Human Sciences Research Council.
- Kalumikiza, Z, 2018, Science or indigenous knowledge: What will it take to secure the African food basket?, in Academy of Science of South Africa, Policy direction, eradication of hunger and achievement of food security, Birchwood Hotel and OR Tambo Conference Centre, Boksburg, South Africa, April 11-13, 2018, pp. 58-60.
- Kamwendo, G. & Kamwendo, J., 2014, Indigenous knowledge systems and food security: Some examples from Malawi, *Journal of Human Ecology* 48(1), 97-101, viewed 14 March 2015, from [www.krepublishers.com/.../JHE-48-1-097-14-2674-Kamwendo-G-Tx\[10\].pdf](http://www.krepublishers.com/.../JHE-48-1-097-14-2674-Kamwendo-G-Tx[10].pdf).
- Khumbane, T., 2004, Food security: Traditional knowledge and permaculture, *South African Rural Development Quarterly* 2(4), 44-49, viewed 20 July 2015, from [https://journals.co.za/content/sardq/2/4/AJA1812299X\\_12](https://journals.co.za/content/sardq/2/4/AJA1812299X_12).
- Lemke, S., 2001, Food and nutrition security in black South African households: Creative ways of coping and survival, Technische Universität München, Weihenstephan, Germany.
- Machete, C.L., Reardon, T. & Mead, D.C., 1997, Promoting farm/non-farm linkages for employment of the poor in South Africa: A research agenda focussed on small-scale farms and agro-industry, *Development Southern Africa* 14 (3), 377-394 viewed 20 September 2016, from <https://www.tandfonline.com/doi/abs/10.1080/03768359708439972>.
- Maroyi, A, 2012, Enhancing food security through cultivation of traditional food crops in Nhema communal area, Midlands Province, Zimbabwe, *African Journal of Agricultural Research*, 7, 5412-5420.
- Masekoameng, M.R. (2007). Indigenous knowledge systems in food gathering and production in selected rural communities in Sekhukhune District of the Limpopo Province, Master's dissertation, University of Limpopo, Polokwane, South Africa.
- Masekoameng, M.R. (2015). Patterns of household level availability, accessibility and utilisation of food in some rural areas of Sekhukhune District in South Africa, PhD thesis, University of Venda, Thohoyandou, South Africa.
- Matsa, W. & Mukoni, M., 2013. Traditional science of seed and crop yield preservation: exploring the contributions of women to indigenous knowledge systems in Zimbabwe, *International Journal of Humanities and Social Science* 3(4), 234-245, viewed 10 March 2014, from [https://www.researchgate.net/publication/277015505\\_Traditional\\_Science\\_of\\_Seed\\_and\\_Crop\\_Yield\\_Preservation\\_Exploring\\_the\\_Contributions\\_of\\_Women\\_to\\_Indigenous\\_Knowledge\\_Systems\\_in\\_Zimbabwe](https://www.researchgate.net/publication/277015505_Traditional_Science_of_Seed_and_Crop_Yield_Preservation_Exploring_the_Contributions_of_Women_to_Indigenous_Knowledge_Systems_in_Zimbabwe).
- McMillan, J. & Schumacher, S., 2010, *Research in education: Evidence-based inquiry*, Pearson Education, USA.
- Ndhleve S., Musemwa L. & Zhou, L., 2012, Household food security in a coastal rural community of South Africa: Status, causes and coping strategies, *Journal of Agricultural Biotechnology and Sustainable Development* 4 (5), 68-74, viewed 20 May 2017, from <https://academicjournals.org/journal/JABSD/article-full-text-pdf/99AD02F1887>.
- Ndwandwe, S. & Mudhara, M., 2014, 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* 13 (2), 271-282 viewed 20 May 2017, from <https://www.ingentaconnect.com/content/sabinet/linga/2014/00000013/00000002/art00007?crawler=true>.
- Ogle, B.M. & Grivetti, L.E., 1985, Legacy of the chameleon: Edible wild plants in the kingdom of Swaziland, Southern Africa. A cultural ecological, nutritional study. Part I: Introduction, objectives, methods, Swazi culture, Landscape and Diet, *Ecology of Food and Nutrition* 16(3): 193-208, viewed 14 March 2014, from <https://www.tandfonline.com/doi/>

- pdf/10.1080/03670244.1985.9990861?needAccess=true.
- Okigbo, B.N., 1987, Nutritional perspective on food security and family survival: The role of the home economist. Economic food security and family survival in Africa, Proceedings of the First All-Africa Home Economics Conference, Accra, Ghana, 20-24 April.
- Persens, J., 2005, Indigenous knowledge systems: Striking a balance, *Indilinga African Journal of Indigenous Knowledge Systems* 4(1), 136-143, viewed 14 March 2014, from <https://journals.co.za/content/linga/4/1/EJC61481>.
- Pieters, H., Guariso, A. & Vandeplass, A., 2013, Conceptual Framework for the Analysis of the Determinants of Food and Nutrition Security, Belgium: LICOS Centre for Institutions and Economic Performance & Department of Economics, KU Leuven, viewed 14 March 2015, from <https://ideas.repec.org/p/fsc/fspubl/13.html>.
- Quin, P.J., 1959, Foods and feeding habits of the Pedi, Witwatersrand University Press, Johannesburg.
- Quin, P.J., 1964, Foods and feeding habits of the Pedi, *South African Medical Journal* 26(38), 969 – 971.
- Rankoana, S.A., 2017, 'The use of indigenous knowledge in subsistence farming: Implications for sustainable agricultural production in Dikgale community in Limpopo Province, South Africa', in H. Jordaan & M.M. Bergman (eds.), *Toward a sustainable agriculture: Farming practices and water use: Series on Frontiers in Sustainability: Volume 1. Selected papers from 5th World Sustainability*, Basel, Switzerland, September 7–9, 2015, pp. 63-72.
- Rankoana, S.A., 2018, Human perception of climate change, *Weather*, 73(11), 367-370, viewed on 25 August 2019, from <https://rmetsonline.wiley.com/doi/10.1002/wea.3204#>.
- Republic of South Africa, 2015, Millennium development goals: Country report 2015, Statistics South Africa, Pretoria, viewed 08 November 2017, from [http://www.statssa.gov.za/MDG/MDG\\_Country%20Report\\_Final30Sep2015.pdf](http://www.statssa.gov.za/MDG/MDG_Country%20Report_Final30Sep2015.pdf).
- Scoones, I. & Thompson, J. (eds.), 1994, *Beyond farmer first: rural peoples' knowledge, agricultural research and extension practice*, Intermediate Technology Publications, London.
- Smit, J.A., & Masoga, M.A. (eds.), 2012, *African indigenous knowledge systems and sustainable development: Challenges and prospects*, People's Publishers, Durban, South Africa.
- Statistics South Africa, 2014, *Poverty trends in South Africa: An examination of absolute poverty between 2006 and 2011*, Statistics South Africa, Pretoria, viewed on 23 October 2014, from [https://www.gov.za/sites/default/files/Poverty\\_Trends\\_03April2014.pdf](https://www.gov.za/sites/default/files/Poverty_Trends_03April2014.pdf).
- Statistics South Africa (StatsSA), 2017a, *General household survey, 2016*, StatsSA, Pretoria, South Africa, viewed 31 July 2017, from <http://www.statssa.gov.za/publications/P0318/P03182016.pdf>.
- Taremwa, N.K., Gashumba, D., Butera, A. & Ranganathan, T., 2016, Climate change adaptation in Rwanda through indigenous knowledge practice, *Journal of Social Sciences*, 46(2), 165-175, viewed on 19 October 2017, from <https://www.tandfonline.com/doi/pdf/10.1080/09718923.2016.11893524?needAccess=true>.
- Yin, R.K., 2011, *Qualitative research from start to finish*, Guilford Press, New York, London, viewed 11 September 2014, from <http://0-lib.mylibrary.com.oasis.unisa.ac.za/PrintPages.aspx>.
- Ziervogel, G., Taylor, A., Thomalla, F., Takama, T. & Quinn, C., 2006, *Adapting to climate, water and health stresses: insights from Sekhukhune*, South Africa, SEI Research Report, viewed on 18 March 2014, from <https://www.sei.org/publications/adaptation-south-africa/>.
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