Southern Africa Development Community Indigenous Food Development Programme – Scoping Study on Indigenous Foods

Regional Synthesis Report

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ABBREVIATIONS AND ACRONYMS

ACAT	Agricultural Consultancy and Training
ABS	Access and Benefit-Sharing
AEFJN	Africa Europe Faith & Justice Network
APAP	Agricultural Policy Action Plan (South Africa)
APMIS	Agricultural Production and Market Information System
ARC	Agricultural Research Council
ASDP	Agricultural Sector Development Programme (Tanzania)
AUDA-NEPAD	African Union Development Agency-New Partnership for Africa's Development
BAITS	Botswana Animal Identification and Traceability System
BAMB	Botswana Agricultural Marketing Board
BUAN	Botswana University of Agriculture and Natural Resources
CEDA	Citizen Entrepreneurial Development Agency
CIMMYT	International Maize and Wheat Improvement Center
CoHD	Cost of Healthy Diet
COSPE	Cooperation for the Development of Emerging Countries
DAFF	Department of Agriculture, Forestry and Fisheries
DARSS	Department of Agricultural Research and Specialist Services
DRC	Democratic Republic of Congo
EDB	Economic Development Board
FAO	Food and Agriculture Organization of the United Nations
FAREI	Food and Agricultural Research and Extension Institute (Mauritius)
FANRPAN	Food, Agriculture and Natural Resources Policy Analysis Network
FBDG	Food Based Dietary Guidelines
FENAGRI	National Federation of Agriculture of Mozambique
FOFIFA	Centre National de Recherche appliquée au Développement Rural, Madagascar
GEF	Global Environment Facility
GoB	Government of Botswana
HGSF	Home-Grown School Feeding
HIV/AIDS	Human Immunodeficiency Virus/Acquired Immune Deficiency
ICRISAT	International Crops Research Institute for the Semi-Arid Tropics
IFAD	International Fund for Agricultural Development
IPCC	Intergovernmental Panel on Climate Change
IPR	Intellectual Property Rights

LEA	Local Enterprise Authority
LIMID	Livestock Management and Infrastructure Development
MAFSN	Ministry of Agriculture, Food Security and Nutrition
NAMBoard	National Agricultural Marketing Board
NARDI	National Agricultural Research and Development Institute
NASFAM	National Smallholder Farmers' Association of Malawi
NDB	National Development Bank
NFTRC	National Food Technology Research Centre
NGO	Non-Governmental Organization
NTFP	Non-Timber Forestry Product
OFDA	Office of U.S. Foreign Disaster Assistance
OPV	Open Pollinated Variety
PIC	Prior Informed Consent
PPP	Purchasing Power Parity
R&D	Research and Development
R2R	Ridge-to-Reef
RISDP	Regional Indicative Strategic Development Plan
RSDA	Rural Self-Help Development Association
SADC	Southern African Development Community
SAGL	South African Grain Laboratories
SDGs	Sustainable Development Goals
SMMEs	Small, Medium and Micro Enterprises
SOFI	State of Food Security and Nutrition in the World
TAVI	Taiwan Africa Vegetable Initiative
UNICEF	United Nations Children's Fund
UN	United Nations
UNDP	United Nations Development Programme
USAID	United States Agency for International Development
WEPs	Wild Edible Plants
WFP	World Food Programme
WHO	World Health Organization
WVC	World Vegetable Centre

EXECUTIVE SUMMARY

The Southern African Development Community (SADC) is rich in indigenous foods, which are diverse in nutrients and resilient to climate variability. These foods, including pulses, cereals, tubers, and fruits, require fewer agrochemicals and offer substantial health and economic benefits. Indigenous foods can combat malnutrition and support livelihoods. Despite these advantages, their value chains are underdeveloped, with limited data on production systems, inadequate market infrastructure, and low consumer demand. Private sector investment is crucial but is hindered by the lack of conducive policies and legislation and information on potential demand. The COVID-19 pandemic and the Russia-Ukraine conflict have underscored the need for Africa to reduce its reliance on food imports, leading to initiatives aimed at boosting local food production and diversifying imports.

To address these challenges, the SADC Secretariat, with support from the World Food Programme (WFP), is developing the SADC Indigenous Food Value Chains Development Programme. The programme will enhance the availability and utilization of indigenous foods, support investments, and reduce dependency on imports. It is aligned with SADC's Vision 2050 and the Regional Indicative Strategic Development Plan (RISDP 2020–2030), which promote regional value chains and agro-processing. The programme seeks to tackle agricultural and food system challenges, including climate change and food insecurity, by scoping priority indigenous crops and animal species. The UN World Food Programme, the Food and Agriculture Organization (FAO), the International Fund for Agricultural Development (IFAD), the African Union Development Agency-New Partnership for Africa's Development (AUDA-NEPAD) and other development actors are supportive of this SADC initiative.

This regional synthesis report summarizes scoping studies on the status of indigenous foods that were conducted in 15 SADC Member States and coordinated by the Food, Agriculture and Natural Resources Policy Analysis Network (FANRPAN). The studies covered different aspects of indigenous foods produced in each Member State, including the challenges, priority commodities, production and production practices, post-harvest management, utilization and consumption, enabling environment, private sector engagement and finance and the role of research and development.

A literature review and stakeholder consultations were employed to generate evidence on the status of indigenous foods in each country. In each Member State, the study was led by a suitably qualified expert as country lead to conduct the literature review of past research on indigenous foods. The countries were categorised into "light touch" study countries (eight), comprising a desk study and a virtual feedback and validation meeting, or "detailed" study countries (seven), where the desk study was complemented by a virtual feedback meeting, stakeholder consultations through key informant interviews, and a virtual or in-person validation meeting.

In this report, indigenous foods are categorised as food crops, animal species, insects and non-timber forest products such as honey and mushrooms, among others. The study found that with a few exceptions, for example sorghum, indigenous foods are underdeveloped, resulting in low participation of these foods in formal markets and food systems. Production is mostly in the hands of smallholder farmers who use traditional practices and supply is largely seasonal and unreliable. Farmers tend to sell raw produce, either locally within the communities, roadside markets or to middlemen who then either sell to urban markets or supply processors and retail outlets such as supermarkets. Due to poor access to post-harvest infrastructure such as packhouses, storage facilities, cold chain, product quality and shelf-life are compromised, while there is high wastage of perishable products.

While there are general policies on agriculture, there are not many policy measures specifically targeted at supporting indigenous food value chains as most resources are focusing on the more established commodities such as maize, wheat and rice, among others. Private sector involvement is minimal, with SMMEs playing a greater role in providing inputs, processing and market linkages. This is largely

because of low levels of awareness of potential business opportunities in the indigenous foods value chains as well as the perceived high risk and transaction costs associated with smallholder production systems. In addition, there are not enough policy incentives to improve the business case for indigenous foods.

Indigenous foods in Africa are highly vulnerable to misappropriation and exploitation due to a lack of formal recognition and protection mechanisms. This vulnerability not only threatens the cultural heritage and traditional knowledge of African communities, but undermines their economic opportunities and food sovereignty. To address these challenges, it is imperative to develop and implement robust policies that recognize and protect the intellectual property rights (IPR) of Africa's communities over indigenous foods, including development of appropriate access and benefit sharing (ABS) policies and regulations.

Notwithstanding these challenges, there is great potential to develop indigenous foods, especially given their nutritional, health and environmental benefits. A multi-pronged strategy focusing on addressing challenges in primary production and regular supply of products, post-harvest management and processing, and creating and assessing potential demand through product development, food safety, consumer awareness, market linkage business models and adequate incentives for the private sector, will unlock the potential of indigenous foods as a significant component of regional food systems.

While there are many types of indigenous foods in the SADC region, seven foods, namely sorghum, cassava, amaranth, cowpea, breadfruit, local fish and local chickens, were selected as priorities to be included in the regional indigenous foods value chain development strategy and programme. These foods were selected based on Member State priorities.

The following recommendations are organised as a call to action by different actors, covering short-term (1–3 years), medium-term (3–7 years), and long-term (7+ years) actions:

Policy makers

Short-term

i) Develop policies and strategies to integrate indigenous foods into national food systems.
ii) Extend government agricultural input support programmes to include indigenous foods such as sorghum and cowpeas, among other key commodities.
iii) Work with agripreneurs to develop indigenous food seed systems based on released improved varieties, for example, sorghum, cowpea, finger millet, Bambara ground nut, and ensure participation of women and youth in seed multiplication.
iv) Integrate indigenous foods in public institution feeding programmes, for example, schools, hospitals, prisons and humanitarian food aid, based on the Ministries of Health nutrition guidelines, thereby creating a market for local produce, fostering growth among farmers and home gardeners.
v) Work with the private sector and civil society to develop policies and strategies to support access to local, regional and continental markets for small-scale indigenous food producers through market linkage models, for example, marketing hubs, contract farming or cooperatives to facilitate product bulking, storage, processing, packaging and branding through established formal market offtakers, wholesalers and retailers.
vi) Develop and implement a policy to protect the intellectual property rights (IPR) over indigenous foods and implement the Access and Benefit-Sharing (ABS) agreement that requires any entity seeking to use indigenous foods or associated knowledge to obtain prior informed consent (PIC) from the relevant communities and agree on fair compensation and benefit-sharing arrangements.
vii) Work with development partners and the private sector to develop innovative financing mechanisms, for example public-private partnerships, blended financing, and risk sharing

mechanisms such as credit guarantees, among others, to support development of indigenous food value chains.

viii) Develop fiscal and financial policy incentives to promote participation of the private sector in indigenous food value chains, for example through tax breaks for investing in indigenous food value chains, and risk sharing mechanisms, for example, provision of credit guarantees.

Medium-term

i) Incorporate indigenous foods in national food-based dietary guidelines.
ii) Promote sustainable climate-smart and ecological production techniques, for example, the use of organic fertilisers.
iii) Work with relevant private sector actors to develop and implement food safety and quality standards for indigenous foods covering production, processing, packaging, distribution and traceability systems.
iv) Work with relevant private sector actors to train all value chain actors on food safety and quality standards.

Long-term

i) Put in place policy measures to improve rural infrastructure such as transportation networks, electricity, and water supply to facilitate the distribution, processing, and marketing of indigenous food products.

Agriculture and health extension services

Short-term

i) Provide training-of-trainers programmes for agricultural extension service staff on the value of indigenous foods and production and utilisation techniques.
ii) Develop agronomic packages and guidelines for each major indigenous food type.
iii) Promote use of digital technologies to disseminate technical and market information on indigenous foods, incorporating youth participation to create employment and business opportunities.
iv) Develop recipes and share knowledge on the utilisation and preparation of indigenous foods in household diets.
v) Provide training to local communities on sustainable harvesting, processing, and marketing of indigenous foods from the wild.

Medium-term

i) Promote consumption of indigenous foods, especially by vulnerable populations at risk of malnutrition, by implementing targeted campaigns and use of champions and influencers to raise the awareness of the population on the nutritional and therapeutic value.
ii) Partner with development partners, private sector and civil society to develop the capacity of indigenous food value chain actors with the necessary skills and knowledge through provision of technical training and mentorship programmes in production, processing, distribution and marketing.

Research institutions

Short-term

i) Assess current and potential demand for different indigenous foods under different scenarios.
ii) Conduct analysis of indigenous foods for nutrient and medicinal active ingredient content to facilitate their incorporation into national food-based dietary guidelines.
iii) Conduct research on post-harvest loss management, including storage, preservation and value addition to extend shelf life of products and food safety.

iv) Conduct research on different labour-saving technologies for different indigenous foods value chains.

Medium-term

v) Partner with regional and international research institutions to develop innovative products from indigenous foods, taking into account consumer preference, convenience and nutritive value.
vi) Conduct research and work with the private sector to develop a wide range of products from indigenous foods, for example to make flours, snacks, beverages, cosmetics, and herbal remedies to increase market appeal and profitability.

Long-term

vii) Document traditional knowledge systems on indigenous foods and use in design of research programmes.

Tourism agencies

i) Promote use of indigenous foods as part of cultural heritage and indigenous food tourism, working with influencers and celebrity chefs.

Development partners

Short-long-term

Work with governments, private sector and civil society to support initiatives across all indigenous food value chains.

1. INTRODUCTION

1.1. Background

The Southern African Development Community (SADC) is experiencing high levels of malnutrition in all its forms, that is undernutrition, micro-nutrient deficiencies and overweight/obesity. The prevalence of undernourishment has been increasing steadily since 2017, from 6.9% to 9.6% in 2023, while the prevalence of moderate or severe food insecurity in 2023 was 24.9%, representing 17.3 million people (FAO, IFAD, UNICEF, WFP and WHO, 2024). On key nutrition indicators, Southern Africa has seen no change in prevalence of low birthweights between 2012 and 2022 at 16.4%, while stunting in under five children decreased marginally from 23.4% to 22.8%, overweight in children under five decreased from 12.3% to 11.4%, wasting in children under five stood at 3.5% in 2022, anaemia in women of reproductive age (15-49 years) increased from 28.5% to 30.3% and obesity in the adult population (>18 years) increased from 27.3% to 29.7% (FAO, IFAD, UNICEF, WFP and WHO, 2024). From the foregoing, the SADC region is not on course to achieve the Sustainable Development Goal (SDG) 2 and the global nutrition targets. The question is, what role can indigenous foods play to contribute to addressing the challenge of malnutrition in the region?

SADC is home to a variety of indigenous foods, including pulses, cereals, tubers, fruits, vegetables, animal species and non-timber forestry products. Indigenous foods offer opportunities for dietary diversity and are potent sources of macro- and micronutrients (Mibei et al., 2016; Ontita et al., 2016; Ali et al., 2021). These foods are more adaptable to their environments and are, therefore, more resilient to climate variabilities such as droughts, pests and diseases compared to industrial crops such as maize, rice and wheat (Sousa and Raizada, 2020). There is evidence that sustained consumption of diets based on indigenous foods may help address malnutrition, while supporting the livelihoods of food producers (Bharucha and Pretty, 2010; Ebert, 2014).

The social, economic and environmental benefits of indigenous foods are potentially significant but their contribution to local and national food systems is poor and demand remains low (Francesca et al., 2020), except for some varieties of sorghum which are more developed due to their use in industrial processes such as brewing in some countries. Data on production levels of indigenous foods are limited, while production systems are dominated by traditional practices, mainly by smallholder farmers. In addition, suitable market infrastructure and systems are lacking and information on consumer preferences, access and demand is limited (Akinola et al., 2020). Little data exist that link indigenous foods to diverse diets and improved nutrition or compare cost-efficient methods of utilizing species for dietary outcomes. There are very few case studies on how to integrate indigenous foods into food systems. Most relevant information is inaccessible or scattered across reports that do not reach policy makers and practitioners.

The recent disruption to food and input markets caused by the COVID-19 pandemic, and lately the Russia-Ukraine conflict, have provided lessons to African countries that have hitherto largely relied on food imports. As a result, several African governments, including those in the SADC, have started implementing programmes to diversify sources of imports of crucial foods and boost local production. Many of these governments are promoting private investments in local, sub-regional and regional agricultural markets through innovative financing arrangements and blended business models. This is expected to improve the availability and quality of indigenous food commodities that could reduce vulnerability to shocks, while enhancing agricultural development and food and nutrition security.

At the meeting of October 2022 with the World Food Programme (WFP), the SADC Secretariat reaffirmed its commitment to develop indigenous food value chains as an important strategy to improve food systems, while boosting regional production and trade. SADC's heightened attention to indigenous foods is in line with its Regional Indicative Strategic Development Plan (RISDP, 2020 – 2030), which seeks to promote regional value chains and increase value-addition in select priority sectors, including agro-processing. SADC recognizes the need to involve the private sector to invest in the development of indigenous food value chains. However, the involvement of the private sector in indigenous food value chains will remain elusive until there is an understanding of the demand, market potential, a clear business case and a conducive policy and regulatory environment.

The challenges facing indigenous foods are many. They include poor access to inputs, including seed, by smallholder farmers, lack of data on current and potential production, low consumer awareness of nutritional and medicinal value, unpredictable demand, poor market access, poor integration into formal food systems and food-based dietary guidelines, lack of policy incentives to support investment into value chains by private sector, weak financing mechanisms and lack of supportive infrastructure from primary production to post-harvest components of the value chains.

The SADC Indigenous Food Value Chains Development Programme is aimed at promoting the availability, accessibility and utilization of indigenous foods, knowledge and technologies, while guiding investments for increased food and nutrition security, reduced import dependency and enhanced intra-regional trade. Engagement of the private sector stakeholders will be one of the imperatives of the programme. WFP, the Food and Agriculture Organization (FAO), the International Fund for Agricultural Development (IFAD), the African Union Development Agency-New Partnership for Africa's Development (AUDA-NEPAD) and other development actors are supportive of this SADC initiative.

This report is a summary of scoping studies on the status of indigenous foods conducted in 15 SADC Member States. The study was coordinated by the Food, Agriculture and Policy Analysis Network (FANRPAN) and was funded by the World Food Programme (WFP).

1.2. Terminology on Indigenous Foods

Various terms have been used to describe what is known in this study as indigenous foods. The term *indigenous foods* refers to foods that have existed in any community since time immemorial, have become part of the culture and traditions of a given community and are tied to indigenous knowledge systems (Chivenge et al., 2015; Mabhaudhi et al., 2017). Indigenous foods may comprise foods that occur naturally in a certain bio-region, or may be those that were introduced hundreds of years ago and became part of the bio-region (Akinola et al., 2020). The following terms have, therefore, been used synonymously: traditional foods, local crops, adapted crops, orphan crops, underutilised crops, neglected, and wild foods, among others.

Indigenous foods serve as a symbol of heritage, trademark and culture, offering an important opportunity to diversify the food base (Akinola et al, 2020). Studies have shown that a high proportion of indigenous crops in Africa were introduced to the continent hundreds of years ago (Akinola et al., 2020). Indigenous foods are categorised as food crops, animal species, insects and non-timber forest products such as honey and mushrooms, among others.

2. METHODOLOGICAL APPROACH TO THE SCOPING STUDY

The study comprised a literature review and stakeholder consultations to generate evidence on the status of indigenous foods in each country. In each Member State, the study was led by a suitably qualified expert as a country lead to conduct the literature review of past research on indigenous foods. The countries were categorised into "light touch" study countries (eight), comprising a desk study and a virtual feedback and validation meeting, or "detailed" study countries (seven), where the desk study was complemented by a virtual feedback meeting, stakeholder consultations through key informant interviews, and a virtual or in-person validation meeting.

Literature review

The scoping study in each Member State focused on the analysis of types of commonly produced and consumed foods. The study consisted of a scoping review of current published and grey literature. The following databases were used for the peer-reviewed articles: Google Scholar, Scopus, Google, Web of Science, Yahoo and PUBMED, Biomed Central; BioOne; BIOSIS; CINAHL; EBSCOHost; JSTOR; ProQuest; SAGE Reference Online; ScienceDirect; SpringerLink; Taylor & Francis; and Wiley Online. For grey literature, an online search of institutional websites/repositories, including Harvest Plus, BioInnovation, among others, was conducted.

A comprehensive inquiry of keywords was set around a topic, in this case the stage of the value chain. The following were the stages reviewed (a) inputs and production of indigenous foods, (b) postharvest management and distribution, (c) utilization and consumption, (d) an enabling policy and regulatory environment, and (e) the status of private sector engagement and opportunities for their accelerated participation in the value chains. Search terms and synonyms were then constructed around the topics. The inclusion criterion was literature published for each country from 2010 up to present, with a focus on the last five years. The exclusion criteria included: articles outside the period of the study (2010–2024); articles not related to the inclusion themes/topics; and publications where the country was not the main point of focus. Database rules were adhered to as much as possible with use of Boolean operators 'AND', 'NOT', 'OR' and wild cards to increase the number of retrieved publications. Information from other countries and the global literature was used where necessary to explain general concepts.

Key informant interviews

In seven of the Member States, the literature review was complemented by expert consultations through key informant interviews, targeting key stakeholders along each commodity value chain. Regional experts provided key informant interview guidelines for use by country leads.

Case studies

The country leads identified examples of successful investments and applied the case study approach to determine success factors related to different parts of the commodity value chains, that is, production, post-harvest processing, marketing, utilisation and demand issues, and identified lessons that would be useful for other value chains.

3. KEY FINDINGS

3.1. Agri-food System Challenges Faced by the SADC Region

SADC Member States, in common with other African countries, are not on track to achieve the 2025 targets of the Malabo Declaration on Accelerated Agricultural Growth and Transformation for Shared Prosperity and Improved Livelihoods[1] and the 2030 Sustainable Development Goals (SDGs). The 2023

[1] https://au.int/en/documents/20240229/4th-caadp-biennial-review-report-20125-2023

SADC Regional Vulnerability and Synthesis Report put the number of people exposed to food insecurity in the lean period of 2023-24 at 37.5 million, while child stunting averaged over 25% (SADC, 2023). The cost of a healthy diet (CoHD) in Southern Africa has been steadily increasing since 2017, from 3.27 PPP (purchasing power parity) dollars to 3.97 PPP dollars in 2022 (FAO, IFAD, UNICEF, WFP and WHO, 2024). The same SOFI 2024 report quotes the proportion of the SADC population unable to afford a healthy diet at 61.6%, that is, 42.2 million people. The number of food insecure people is likely to have increased markedly due to the ongoing El Nino-induced drought affecting many countries in the region during the 2023-2024 agricultural season. Similarly, nutritional transitions in many countries highlight the prevalence of malnutrition, including micronutrient deficiencies and undernutrition, particularly affecting women and children (Nel and Steyn, 2022).

The region's climate ranges from arid in the west to semi-arid and temperate areas in central zones, to semi-arid in the east, a few sub-humid areas in the central regions and humid conditions closer to the equator in Angola, the Democratic Republic of Congo (DRC) and coastal Tanzania. The region was classified as a climate change hotspot by the IPCC Special Report on Global Warming of 1.5°C (Hoegh-Guldberg et al., 2018). According to the IPCC, the region has been experiencing a warming trend over the past few decades, with temperatures rising by over 0.5°C in the last 100 years. During this period, the region has experienced reduced rainfall and frequent droughts.

Projections based on climate modelling indicate that by 2050, the region's average annual temperature is expected to increase by 1.5-3.0°C compared to the 1961-1990 average (Davis-Reddy et al., 2017), with the greatest warming of 0.2°C to 0.5°C per decade in parts of north-western South Africa, Namibia and Zimbabwe. Annual regional precipitation is expected to reduce by 10%, with greater reductions in the northern part of the region than in the southern part. This will have a marked negative impact on water availability, agriculture and food and nutrition security (Davis-Reddy et al., 2017).

Over the last few decades, climate change-induced extreme weather events (prolonged droughts, floods, forest fires, reduced agricultural productivity, reduced water availability) have greatly impacted the region's developmental efforts. Agriculture is a key sector to the region's economy, contributing about 20.2% of the Gross Domestic Product[2]. The region's heavy reliance on rainfed smallholder agriculture makes it vulnerable to climate extremes, impacting the food security and livelihoods of about 70% of the population that depends on agriculture. High levels of carbon dioxide in the atmosphere and warming temperatures associated with climate change have been found to reduce the nutritional quality of crops (Beach et al., 2019).

Indigenous foods have the potential to play a crucial role in the SADC region, offering nutritional and economic benefits, yet remain underutilized due to lack of commercialization and market access (Akinola et al., 2020). This underutilization is often due to negative perceptions, for example, "poor man's food", and lack of commercialization, resulting in low integration of indigenous foods into food and nutrition security strategies (Akinola et al., 2020).

3.2 Types of Indigenous Foods in the SADC Region

The types and importance of indigenous foods vary by country and include cereals, tubers, pulses, leafy vegetables, fruits, livestock and non-timber forestry products. These are discussed below.

3.2.1 Crops

Within the region, sorghum and millets stand out as the most commonly cultivated indigenous cereals. These grains are grown in all member states, except Comoros, Mauritius and Seychelles, and are valued as staple foods across diverse agro-ecological regions. They provide crucial raw materials for various

[2] https://www.sadc.int/pages/sadc-facts-figures

products, for example beer, livestock feed and snacks, among others. They are important for smallholder farmers' adaptation to climate change due to their resilience to harsh conditions and lower susceptibility to pests and diseases compared to other grains.

In addition to cereals, legumes are another important group of indigenous foods cultivated across the SADC region. These include beans, cowpeas, Bambara nuts, chick peas, sesame and groundnuts, which are widely grown and consumed due to their high nutritional value, including protein content, and their ability to improve soil fertility through nitrogen fixation. These crops are essential for food security and nutrition, dietary diversity and sustainable agricultural practices, making them a critical component of the region's agricultural systems. Of these crops, cowpeas and Bambara nuts are the most commonly grown indigenous legumes in the SADC region. Cowpeas are produced and consumed in 11 Member States, excluding Seychelles, Madagascar, Lesotho, and Mauritius. Bambara nuts are cultivated in eight countries, namely Zimbabwe, Zambia, Malawi, Tanzania, Eswatini, Mozambique, DRC and Botswana. Although groundnuts are not considered an underutilized crop in some countries, they are mentioned in Zimbabwe, Tanzania, Eswatini, and Botswana as still being underutilized in certain regions. Other pulses reported to be underutilized include pigeon peas and sesame. These crops hold significant importance in the indigenous agricultural landscape and are specific to various countries within the region.

A diverse array of indigenous leafy vegetables is cultivated and consumed, each contributing significantly to the nutritional well-being of rural communities by providing essential nutrients for growth, development, and disease prevention. Eswatini's traditional leafy vegetables, gathered from fields, domestic animal dwellings, and the wild, include amaranthus, jute mallow, black jack, black nightshade, pumpkins, okra, and bitter melon. In Malawi, a wide range of indigenous vegetables such as pumpkin leaves, okra, cowpea, spider flower, Jew’s mallow, amaranths, pigweed, black nightshade, blackjack, spindle weed, and gallant soldier are consumed. Lesotho is known for prominent indigenous leafy vegetables such as Amaranthus sp (theepe), common nettle (*Urtica dioica*, Bobatsi), hare bell (*Wahlenbergia androsacea,* tenane), white goosefoot (*Chenopodium album,* Seruoe), and sow thistle (*Sonchus dregeanus,* leharasoana).

In the DRC, leafy vegetables are available all year-round, except for American black nightshade (*S. americanum)* and African jointfir *(G. africanum),* which are sold both fresh and dried. Madagascar is seeing a growing cultivation of moringa (*Moringa oleifera),* known as the "miracle tree," for its exceptional nutritional and medicinal value, promising improved food and nutrition security and income for rural communities. Seychelles features swamp cabbage or sabal palm tree (*Sabal palmetto*), moringa, amaranthus, and chayote or choko (*Sechium edule*) among its common indigenous leafy vegetables.

Namibia's indigenous vegetables feature *Amaranthus*, spider wisp (*Cleome gynandra)*, and red sorrel (*Hibiscus sabdariffa)*, while South Africa's commonly consumed leafy vegetables include *Amaranthus* sp., spider wisp (*Cleome gynandra)*, and dune spinach (*Tetragonia decumbens)*. In Tanzania, traditional vegetables include black nightshade (*Solanum nigrum*), sweet potato (*Ipomoea batatas*) leaves, cowpea (*Vigna unguiculata*), amaranth, pumpkin (*Cucurbitaceae*) leaves, spider plant *(Chlorophytum comosum*), cassava (*Manihot esculenta*) leaves, Ethiopian spinach (*Brassica carinata*), watercress (*Nasturtium officinale*), moringa, and African eggplant (*Solanum aethiopicum or Solanum macrocarpon*). In Zambia, indigenous leafy vegetables such as pumpkin and sweet potato leaves are commonly consumed, although quantifying production levels is challenging due to subsistence-level production. Zimbabwe boasts over ten commonly consumed indigenous vegetables, including spider plant (*nyevhe)*, pigweed (*Amaranthus sp*), black jack (*Bidens pilosa*), spider flower (*Cleome gynandra*), spindle pod (*Cleome monophyla*), jute (*Corchorus)*, black nightshade (*Solanum nigrum*), cowpea leaves, baobab (*Adansonia digitata*) leaves and buffalo (*Ziziphus mucronata*) thorn. These vegetables

are vital for food and nutrition security, offering protein, fibre, vitamins, and minerals, and are known for their drought tolerance and medicinal properties.

Roots and tubers
A variety of indigenous root and tuber crops are grown, including cassava (*Manihot esculenta)*, sweet potato (*Ipomea batatas*), taro (*Colocasia esculent*a), and yam (*Dioscorea spp)*, among others. Their ability to thrive in harsh conditions and marginal soils makes them valuable crops for rural communities facing climatic challenges. Cassava is grown in Comoros, Madagascar, Malawi, Mozambique, Seychelles, Tanzania, and Zambia, among others, while sweet potato is grown in Botswana, Comoros, Eswatini, Seychelles, Tanzania, Zambia, and Zimbabwe. Other tubers include taro (*Colocasia esculenta*) in Comoros and Seychelles, Livingstone potato (*Coleus esculentus*) and cocoyam (Colocasia esculenta or Xanthosoma sagittifolium) in Eswatini and in Zambia orchid (*Habenaria, Satyrium, and Disa spp*) and snout bean (*Rhynchosia)* roots are grown. In Malawi, minor root and tuber crops such as ground and air yams, cocoyam, and Livingstone potato are part of local diets and require minimal agro-inputs, allowing farmers to achieve yields even under diverse conditions. In Seychelles, the food crop system includes cassava, yam, cocoyam, and sweet potato, alongside vegetables such as capsicum (peppers) and brassica (broccoli, cauliflower, cabbage, kale). These crops are sold informally at local markets, with no identified exports.

Namibia grows tiger nuts (*Cyperus esculentus*), while in Tanzania, indigenous roots and tubers such as native potatoes (*Plectranthus esculentus and Solenostemon rotundifolius*) and cassava are crucial energy sources for small-scale farming households. Wild edible tubers are also consumed by foragers, for example the Hadza women. Additional traditional tubers include yams, taro and sweet potatoes.

3.2.2 Animal species
Domestic and wild animal species
Indigenous livestock play a vital role in the agricultural systems and rural economies of the different Member States. Local chickens are widely available across the region and are considered a delicacy, with significant populations in Botswana, Lesotho, Malawi, South Africa, Zambia and Zimbabwe. In all these countries local chickens have a cultural and economic significance.

Goats are also prominent, especially in Botswana, Lesotho, Malawi, Tanzania, Zambia and Zimbabwe. The traditional goat population has shown resilience, with increases seen in Botswana and Tanzania. Goats are valued for their meat, milk, and economic contributions, particularly in rural areas. Sheep populations, while not as abundant as goats, are still significant in countries such as Botswana, Lesotho, and Tanzania, where they contribute to food security and livelihoods.

Rodents, particularly in Malawi and Zambia, present a unique aspect of the food system. Despite being considered agricultural pests, rodents are also consumed as a cheap source of protein in rural communities. They are roasted and eaten, bones and all, especially when food is scarce. This practice highlights the resourcefulness and adaptability of these communities in utilizing available food sources. However, some of the ways in which they are caught, for example poisoning, may pose food safety and animal welfare challenges.

Bushmeat
Bushmeat remains a controversial yet significant non-timber forest product in rural Zambia and the DRC. It serves as a crucial source of protein for many communities, reflecting the diverse use of forest resources in the region (Coad et al., 2010; Schulte-Herbrüggen et al., 2013), but there is a risk of zoonoses with a potential to infect human beings (Friant et al., 2020; Jagadesh, et al., 2023). In Malawi, wild pigs are among the underexploited wild animal species, offering a potential source of bushmeat that can contribute to food security and local diets. In DRC, bushmeat contributes 3.1% to the total food consumed in households compared to fish and wild edible plants (WEPs) that account for 6.2% and

9.6%, respectively. In terms of weight, this corresponds to 0.04 kg/day for bushmeat, 0.06 kg/day for fish, and 0.11 kg/day for WEPs. On average, households consume bushmeat on 5.8 ± 5.1 days per month (De Merode et al., 2004). Gender and age partly influence skills in cooking, smoking, and selling wild meat, curing disease, and gathering wild produce. Shephard et al. (2023) found that there was a much more marked skill among men, with diminishing levels of wild meat skill reported for those around 35–40 years, and even earlier for knowledge of traditional medicine and wildmeat taboos. Men traditionally undertake the capture elements of hunting, while women deal with wildmeat processing, marketing and cooking (Shephard et al., 2023).

Aquaculture and fisheries

Fish is considered an important indigenous food, even though there is limited information from countries. It plays a crucial role in the diets and livelihoods of people in countries such as Botswana, Comoros, DRC, Madagascar, Mauritius, Namibia, Seychelles, Tanzania, Zambia, and Zimbabwe. Madagascar stands out with its extensive coastline and diverse marine habitats. Small-scale fisheries play a crucial role in Madagascar's economy, providing a significant portion of the national fisheries production. The sector supports millions of people, particularly those living in coastal areas, and contributes significantly to food and nutrition security and livelihoods. In the DRC, the most consumed fish species include cat fish (*Clarias* sp.), carp (*Labeo* sp.), lung fish (*Protopterus* sp.), sprat (*Stolothrissa tanganyicae)*, and perch (*Distichodus* sp). Fish farming in the DRC is dominated by tilapia (*Oreochromis niloticus),* due to its superior growth performance. Similarly, in Namibia, catfish farming is a significant part of the local diet and economic activity. In the Comoros, the life cycle of octopus and reef fish provides a promising case study for exploring a successful indigenous food value chain, even though no indigenous value chain has been comprehensively analyzed through its entire cycle.

Despite its importance, the fish and aquaculture sector in Southern Africa faces several challenges, including outdated fish production techniques. For example, in the DRC, fish farming is largely subsistence-based, with minimal training. Fish farmers typically have secondary education at most, and few have received formal training in fish farming techniques. This limits the efficiency and productivity of their operations. Similarly, in Zimbabwe, traditional fishing methods such as nets, baskets, traps, and sometimes traditional poisons are commonly used. These methods may not always be sustainable or efficient, leading to overfishing and depletion of fish stocks.

Preservation and processing of fish products remain significant challenges. In the DRC, fish is almost always sold fresh due to the lack of preservation techniques and cold chain. This leads to potential post-harvest losses and reduced market value, impacting the profitability and sustainability of fish farming.

Environmental degradation and habitat loss pose severe threats to fish populations and aquaculture practices. In Namibia, overgrazing causes soil erosion, which affects the growth and harvest of aquatic resources such as Kalahari truffles, and indirectly impacts fish habitats. Climate change and pollution further exacerbate these environmental challenges. Addressing these challenges requires improved fish production techniques, better preservation and processing methods, and sustainable environmental practices. Enhanced training for fish farmers, investment in infrastructure, and effective regulations are crucial to ensure the sustainability and economic viability of the fisheries and aquaculture sectors in Southern Africa.

3.2.3 Non-timber forest products

Non-timber forest food products (NTFPs) hold great potential for food and agriculture, significantly benefiting various countries. Their sustainable utilization can lead to significant benefits, addressing local dietary and medicinal needs and economic challenges.

Mushrooms and other fungi

Mushrooms and other fungi are widely grown and utilized across Southern Africa, contributing significantly to local diets and economies. Consumed in countries such as Botswana, DRC, Malawi, Mozambique, Namibia, Tanzania, Zambia, and Zimbabwe, mushrooms serve as important sources of nutrition and income for rural communities. In Zambia, despite the lack of comprehensive data due to informal harvesting practices, wild mushrooms remain a vital source of food and income for many rural communities. Efforts to promote sustainable harvesting and cultivation practices could enhance mushroom availability and production. It is estimated that rural households in Zambia collect over 38,000 tonnes of wild foods annually, with approximately 88% sourced directly from forests, surpassing the volume of cultivated varieties and underscoring the significant reliance on forest resources (Steel et al., 2022).

In Zimbabwe, button mushrooms (*Agaricus bisporus)* are crucial non-timber forest products, providing food and income, particularly during food shortages (Kugedera et al., 2021). Tanzania boasts plentiful wild mushrooms, rich in nutrients and antioxidants, which significantly contribute to the local diet. The DRC faces challenges with mushrooms due to their seasonal scarcity in forests. To address this, initiatives to domesticate mushrooms are underway, despite obstacles such as lack of expertise and forest degradation.

In Namibia, termite hill mushrooms (*Termitomyces schimperi*) are an edible fungus found in the Oshikoto region, primarily between Oshivelo and Tsumeb, east of Etoshapan. These mushrooms grow in association with the termite species (*Macrotermes michaelseni*) and are available only during the rainy season. Farmers collect these mushrooms and sell them at informal marketplaces along roadsides. While not formalized, the market for termite hill mushrooms provides both nutritional and economic benefits to local communities. Termite-hill mushrooms are rich in protein, minerals, fibre, lipids, and vitamins, serving as an important food source. Additionally, they are used in traditional medicines to treat various ailments, including high blood pressure, obesity, diarrhoea, rheumatism, kwashiorkor, and ringworms, underscoring their importance in traditional healthcare practices (Apetorgbor et al., 2005; Kadhila-Muandingi and Chimwamurombe, 2012; Aryl and Budathoki, 2016; Živković et al., 2021). The informal nature of mushroom harvesting and trade complicates efforts to regulate and monitor activities, raising concerns about overexploitation and ecosystem degradation.

Kalahari truffle (*Kalaharituber pfeilii*) is another notable fungus found in the northern part of Southern Africa, including Namibia. It is primarily consumed by the San people or Khoisan and other indigenous peoples of the Kalahari. Truffles only grow after sufficient rainfall between January and April and are harvested sporadically, usually every four years, depending on weather conditions. The harvesting period is between April and June, disappearing when frost sets in. Kalahari truffles are highly nutritious, containing an optimal amount of fats, proteins, fibre, and vitamin B. They can be eaten raw, cooked (buried in hot ashes or sand), boiled, or fried. Beyond their culinary uses, Kalahari truffles are being explored for their potential antibacterial and antiviral properties, as well as their medicinal applications treating different ailments (Shavit and Shavit, 2014).

Addressing the challenges associated with mushrooms and other fungi requires targeted interventions tailored to the specific contexts of Southern African countries. For example, in Malawi, seasonal scarcity poses a significant challenge, impacting both local consumption and income generation from mushroom harvesting. Botswana and Namibia face hurdles in formalizing the mushroom market, leading to price volatility and poor quality control (Mogopodi et al., 2022). In Tanzania, the threat of forest degradation exacerbates the already existing challenge of seasonal availability, jeopardizing the long-term sustainability of mushroom resources. Similarly, in Zambia, the lack of widespread knowledge and expertise in mushroom cultivation inhibits efforts to expand production and commercialization.

The lack of comprehensive data and research on mushrooms hinders the development of evidence-based policies and interventions to promote sustainable utilization. Addressing these challenges requires a multi-faceted approach, including investment in research and development, capacity building, policy reforms, and community engagement. By addressing these barriers, Southern African countries can unlock the full potential of mushrooms and other fungi as valuable non-timber forest products, contributing to food security, economic development, and environmental sustainability.

Edible insects

Edible insects are a significant non-timber forest product in Botswana, Malawi, Zimbabwe, Zambia, and South Africa, offering high protein, fatty acids, minerals, and vitamins (Kwiri et al., 2020). In Malawi, various insects, including caterpillars, giant silkworm moths, and green grasshoppers, are abundant and nutritious. Zimbabwe is home to 14 edible insect species, such as mopane worms, locusts, and termites, which are rich in protein and nutrients. Zambia's Mpika district in Muchinga Province is a primary hub for edible caterpillars, with up to 200 people per hectare engaged in harvesting activities during the peak season. Some caterpillars are exported to the DRC and Tanzania, indicating their economic importance (Kachali, 2014).

In Botswana, Namibia, South Africa and Zimbabwe, mopane worms, edible caterpillars of the moth *Gonimbrasia belina,* are linked to the growth of the mopane tree, are a crucial non-timber forest product, providing seasonal employment and economic benefits. In Namibia, mopane worms are harvested both for subsistence and economic activity, with sustainable harvesting practices being promoted. Tanzania values longhorn grasshoppers (*Ruspolia differens*), a staple food around Lake Victoria, promoted as a sustainable dietary source to combat malnutrition.

Medicinal plants

Medicinal plants are highly valued across most Southern African countries. In Lesotho, African wormwood (*Artemisia afra)* and stomach bush (*Dicoma anomala)* play key roles in traditional medicine, showcasing their cultural and therapeutic importance. Tanzania and Zambia utilize a wide array of medicinal plants for healthcare. Tanzania also cultivates spices and aromatic plants for both medicinal and culinary purposes, underlining their multifaceted value. In Namibia, termite-hill mushrooms are traditionally used to treat various ailments, including high blood pressure, obesity, diarrhoea, rheumatism, kwashiorkor, and ringworms. The medicinal uses of these mushrooms highlight the importance of NTFPs in traditional healthcare practices.

Madagascar emphasizes the nutritional and medicinal value of honey, sourced mainly from stingless bees and honeybees. In the Seychelles, medicinal plants are commonly grown in home gardens, significantly outnumbering farms, with plants such as coconut, lemongrass, and cinnamon being used for both food and medicinal purposes.

Wild fruits and nuts

Wild fruits and nuts are essential sources of nutrients and antioxidants in countries such as Zimbabwe, South Africa, Lesotho, Tanzania and Malawi. In Malawi, huckleberries, tree nuts, and pine nuts are underexploited, despite their potential benefits. Tanzania's forests are abundant with wild fruits, which contribute significantly to the nutritional needs of local communities. These fruits provide natural sources of antioxidants and phytonutrients, benefiting both rural and urban diets.

Honey

Honey production is an important activity in several Southern African countries such as Botswana, Madagascar, Namibia, Zimbabwe, Zambia and Malawi. In Botswana and Zambia, for example, honey production involves both informal and formal systems, with smallholder farmers playing a crucial role. Despite challenges in documenting production accurately, honey is acknowledged as a critical economic activity, providing income and livelihoods for many rural households. The honey industry in

Zambia has grown steadily, with production increasing from 100 tonnes in 1973 to 903.79 tonnes in 2022 (Knoema, 2024). Efforts to support beekeeping, improve access to training and resources, and strengthening of market linkages are enhancing local honey production (EIF, 2024). In Malawi there are several organized groups mainly for local sales. The Mzuzu Coffee farmer group has exported honey to Europe. Honey production has high commercial potential for both domestic and export markets. In Madagascar, honey, sourced from stingless bees and honeybees, is valued for its nutritional and medicinal properties. Environmental factors, habitat degradation, pesticide use, and limited access to modern beekeeping technologies constrain honey producers.

3.3 Priority Indigenous Foods

Each country provided a list of the top five ranked indigenous foods, based on production levels, economic importance and consumption (Table 1).

Table 1. Top five indigenous foods in each country

No	**Country**	**Indigenous Foods**				
		1	**2**	**3**	**4**	**5**
Light touch study countries						
1	Botswana	Sorghum *(Sorghum bicolor)*	Morula *(Sclerocarya birrea)*	Tswana goat	Tswana chicken *(local breed*	Honey
2	Comoros	Cassava *(Manihot esculenta)*	Taro *(Colocasia esculenta)*	Pigeon pea (*Cajanus cajan*) Sweet potato *(Ipomoea batatas)*	Yam *(Dioscorea spp.)*	Sweet potato (*Ipomea batatas*)
3	Democratic Republic of Congo (DRC)	Amaranth	Sorghum *(Sorghum bicolor)*	Yam (*Dioscorea spp*)	Cowpea (*Vigna unguiculata*)	Local chickens
4	Eswatini	Sorghum *(Sorghum bicolor)*	Bambara groundnut *(Vigna subterranea)*	Amadumbe *(Colocasia esculenta)*	Wild spinach *(Bidens pilosa)*	Nguni cattle *(local breed)*
5	Lesotho	Amaranth	Goosefoot (*Chenopodium album)*	Common nettle (*Urtica dioica)*	Indigenous peaches	Village chicken
6	Madagascar	Moringa *(Moringa oleifera)*	Breadfruit *(Artocarpus altilis)*	Cassava *(Manihot esculenta)*	Zebu cattle *(local breed)*	Tilapia *(Oreochromis spp.)*
7	Mauritius	Chayote *(choko, Sechium edule)*	Breadfruit *(Artocarpus altilis)*	Arrowroot *(Maranta arundinace)*	Red snapper *(Lutjanus campechanu)*	Tilapia *(Oreochromis spp.)*
8	Seychelles	Breadfruit *(Artocarpus altilis)*	Cassava *(Manihot esculenta)*	Taro *(Colocasia esculenta)*	Local fish species *(e.g., rabbitfish, parrotfish)*	Sweet potato *(Ipomoea batatas)*
Detailed study countries						

No	Country	Indigenous Foods				
		1	2	3	4	5
9	Malawi	Amaranth *(Amaranthus spp.)*	Cowpea *(Vigna unguiculata)*	Cassava *(Manihot esculenta)*	Local chicken *(various breeds)*	Usipa fish *(Engraulicypris sardella)*
10	Mozambique	Cassava *(Manihot esculenta)*	Sorghum *(Sorghum bicolor)*	Cowpea *(Vigna unguiculata)*	Tilapia *(Oreochromis spp.)*	Local chicken *(various breeds)*
11	Namibia	Pearl millet (Pennisetum glaucum)	Sorghum *(Sorghum bicolor)*	Cowpea *(Vigna unguiculata)*	Spider plant *(Chlorophytum comosum)*	Local chicken (*Marathon chicken*)
12	South Africa	Sorghum *(Sorghum bicolor)*	Amaranth *(Amaranthus spp.)*	Cowpea *(Vigna unguiculata)*	Mopane worms *(Gonimbrasia belina)*	Nguni cattle *(local breed)*
13	Tanzania	Sorghum *(Sorghum bicolor)*	Cassava *(Manihot esculenta)*	Sweet potato *(Ipomoea batatas)*	Tilapia *(Oreochromis spp.)*	Local chicken *(various breeds)*
14	Zambia	Finger millet *(Eleusine coracana)*	Sweet potato *(Ipomoea batatas)*	Cowpea *(Vigna unguiculata)*	Cashew fruit and nut	Local chicken *(various breeds)*
15	Zimbabwe	Sorghum *(Sorghum bicolor)*	Finger millet *(Eleusine coracana)*	Cowpea *(Vigna unguiculata)*	Mopane worms *(Gonimbrasia belina)*	Nguni cattle *(local breed)*

A simple scoring system was used to select the top five indigenous foods in the region. The foods listed in the first position in each country were given a score of 5, followed by 4 for the second one, 3 for the third one, 2 for the fourth one and 1 for the fifth one. The scores for each food from across the countries were added and used to rank and select the top five foods in the region (Table 2). Since the top five foods were all crops, it was decided to expand the list to seven top-ranked foods to accommodate animal source foods.

While the scoping study reveals a diverse range of indigenous foods cultivated across the SADC region, henceforth this report will focus on the seven priority foods. This targeted approach ensures that the chosen foods will form a robust foundation for the development of a regional programme.

Table 2: Top seven ranked indigenous foods in the SADC region

Rank	Indigenous Food	Countries Scoring Food in Top 5	Reasons for Popularity
1	Sorghum (*Sorghum bicolor*)	Botswana, DRC, Eswatini, Mozambique, Malawi, Namibia, South Africa, Tanzania, Zimbabwe	Highly valued for its drought resistance and nutritional content.
2	Cassava (*Manihot esculenta*)	Comoros, Madagascar, Malawi, Mozambique, Seychelles, Tanzania, Zambia	Critical for food security due to its resilience to varying climatic conditions and its versatile use in various dishes.
3	Amaranth (*Amaranthus spp.*)	DRC, Lesotho, Malawi, South Africa	Known for its high nutritional value, including proteins, vitamins, and minerals.

			Its leaves and grains are both edible and highly nutritious.
4	Cowpea (*Vigna unguiculata*)	DRC, Malawi, Mozambique, Namibia, Zambia, Zimbabwe	Favoured for its high protein content, soil-enriching properties, and adaptability to poor soil conditions.
5	Breadfruit (*Artocarpus altilis*)	Madagascar, Mauritius, Seychelles	Valued for its versatility in cooking, high carbohydrate content, and nutritional benefits including vitamins and minerals.
6	Local fish species (e.g., tilapia, grouper, snapper, usipa)	Madagascar, Malawi, Mauritius, Mozambique, Seychelles, Tanzania, Zambia	Popular for their high protein content, rich in omega-3 fatty acids, and vital for local diets and economies.
7	Village chicken	Botswana, DRC, Lesotho, Malawi, Mozambique, Namibia, Tanzania, Zambia	Preferred for its lean meat, adaptability to local conditions, and cultural significance.

3.4. Production Levels and Practices

Overall, across various SADC Member States, production of indigenous foods exhibit diverse patterns. The production levels of some of the seven top-ranked foods are shown in Table 3 (FAO, 2024)[3] . There are no data for the production levels of amaranth, breadfruit, local fish and local chicken and for the DRC across all foods. In general, production of indigenous foods follows traditional practices, with minimal use of external inputs and limited land allocation. There are exceptions, however, in some countries, for example Namibia and Seychelles, where governments are supporting farmers to adopt improved production methods for indigenous foods, including provision of improved seed and planting material as well as technical support through extension services.

Table 3. Production indigenous foods in SADC Member States in 2022 (t) (FAO Stats 2024)

No	**Country**	**Indigenous Foods**			
		Sorghum (dry)	**Cassava (fresh)**	**Cow pea (dry)**	**Fish**
Light touch study countries					
1	Botswana	35,000			
2	Comoros		58,047		
3	Democratic Republic of Congo (DRC)	No data			
4	Eswatini	1,000			
5	Lesotho	4,013		701	
6	Madagascar	1,369		22,036	
7	Mauritius		1,276		
8	Seychelles		237		
Detailed study countries					
9	Malawi	117,000		49,942	

[3] https://www.fao.org/faostat/en/#data/QCL

No	Country	Indigenous Foods			
		Sorghum (dry)	Cassava (fresh)	Cow pea (dry)	Fish
10	Mozambique	149,566	6,466,857	82,819	
11	Namibia	5,361			
12	South Africa	103,140		4,647	
13	Tanzania	1,000,000		148,831	
14	Zambia	14,843	3,497,600	8,138	
15	Zimbabwe	87,750	271,726		

Sorghum

Tanzania leads the region in sorghum production, with over a million tonnes in 2022, followed by Mozambique, Malawi, South Africa and Zimbabwe (see Table 3). For South Africa and Zimbabwe, most of this production is from the commercial sector rather than the smallholder sector, if trends in Botswana are illustrative of the situation. While sorghum production in Botswana saw a marked increase from 2004 to 2015 from about 11,755 tonnes to 35,508 tonnes, most of this growth came from the commercial sector as smallholder production declined by 81% (Statistics Botswana, 2020, 2021). While sorghum is considered as one of the key cereal crops in DRC, there are no data on production levels. Eswatini, Lesotho, Madagascar, and Namibia produce sorghum, but the volumes are quite small. Following the severe famine of the mid-1990s, many famers in Madagascar abandoned sorghum production as seed had been consumed during the famine. Following the efforts of the Ministry of Agriculture, with support from FAO and USAID, sorghum was reintroduced by importing and multiplying 15 tons of basic seeds. Today, sorghum is once again a prominent crop in the Grand Sud (FOFIFA, Sept 2023).

Production in Malawi was marginal until the 2019/20 season when the National Smallholder Farmers Association of Malawi (NASFAM) signed a contract with Chibuku Products Limited (CPL) to supply the latter with sorghum for use in brewing traditional beer. This is a good example of the importance of markets as demand by the private sector stimulated farmers to produce more. In Mozambique, there has been a decline in the production and contribution of sorghum to total caloric intake in the recent past (FAOStat, 2024). Sorghum is the second most common crop cultivated in Namibia under rain-fed agriculture after pearl millet (Wanga *et al.*, 2018). Most of the sorghum production in South Africa is used in the brewing industry and other products such as breakfast cereals. The area used for sorghum production in South Africa for the 2019/20 season was 49,200 hectares (SAGL, 2020) and was projected to decline by 8% by 2030, due to the removal of lower potential areas from production. Sorghum is one of the few commercialised indigenous foods in Zimbabwe, mainly grown by smallholder farmers under contract to brewing companies (Musara et al., 2019a).

In South Africa, sorghum is mainly grown on low potential, shallow soils with high clay content (DAFF, 2010). It is a warm-weather crop. Sorghum seed is produced and sold by several commercial producers. It has been well supported by research since the 1980s and the Agricultural Research Council has produced over 3,800 accessions (Pereira and Hawkes, 2022). Subsistence sorghum farmers in South Africa are also involved in multiplying seeds and making them accessible through farmer-managed seed systems (Dunjana et al., 2022), where farmers save, re-plant and exchange seed from previous harvests (ACB, 2020).

Cassava

Cassava is a staple crop in traditional agricultural systems in the Comoros, accounting for 26.4% of the staple contribution (FAOStats, 2024). The production of cassava in Mauritius and Seychelles is quite low (see Table 3). Mozambique is the biggest producer of cassava in the region, with over 6.4 million tonnes, followed by Zambia (about 3.5 million tonnes) and Zimbabwe (271,726 tonnes) in 2022. Although production is dominated by bitter varieties, there is an increasing trend towards production of sweet cassava varieties as they are more tolerant to brown streak disease but may be more prone to theft (Donavan et al., 2011).

As the biggest producer of cassava, Mozambique is used as a representative case on production practices. Farmers grow over 100 different varieties of cassava, including a wide array of both bitter and sweet varieties, although the bitter varieties are preferred as they are resistant to pests due to high hydrogen cyanide content. Most cassava farmers intercrop cassava with other food crops (beans, groundnuts or maize) in the first year of production. In some long-duration cropping cycles, the cassava is pruned back at the start of the second year to increase plant longevity and permit intercropping during the second rainy season. Because cassava is a vegetatively propagated crop, many farmers retain a small reserve field of cassava to serve as a source of cuttings for planting and a reserve supply of food during crisis times. Cassava has a flexible planting and harvesting calendar. Farmers can harvest cassava year-round and over a period of up to three years for some varieties. However, because water content and root quality varies seasonally, farmers typically harvest the bulk of their crop at the end of the rainy season for bitter varieties to allow enough time for drying in the long dry season or in the middle and end of the rainy season when prices peak during the lean season for sweet varieties.

Amaranth

Amaranthus is one of the indigenous leafy vegetables commonly produced from the wild where it is considered a weed but is also grown under cultivation, usually mixed with other crops. While almost every rural homestead in Eswatini produces and consumes amaranthus, it has recently become of interest as a commercial crop, thanks to the efforts of World Vegetable Centre. In Lesotho (Khathibe, 2022), Malawi and Mozambique, amaranthus is one of the most consumed leafy vegetable but its value chain is very underdeveloped. Amaranthus is grown by a few farmers in Seychelles, and the production level is low (Val D'andorre Farmer's Association et al., 2014; Hansen and Laboudallon, 2016). In South Africa, amaranthus mainly grows in the wild in Limpopo, North West, Mpumalanga and KwaZulu-Natal Provinces, although some women harvest its seed for cultivation (Jansen van Rensburg et al., 2007). With good management, the amaranth crop can produce up to 40 tons/ha of fresh leaves (Emmanuel and Babalola, 2021). For Tanzania, out of the 45 key informant interview respondents, 12% reported that they produced amaranthus. In Zambia and Zimbabwe, amaranthus is one of the main indigenous leafy vegetables but there are no production data.

In Zimbabwe and South Africa, amaranthus is rarely cultivated, as communities believe that it grows naturally as a weed (Jansen van Rensburg et al, 2007), but when it is cultivated it is mostly produced in summer under the rainfed production system (Mavengahama, 2013). Most of the cultivated one is grown from own seed in home gardens, although hybrid varieties have been produced. Organic manure has been used in South Africa to promote growth (Shackleton et al., 2010).

Cowpea

Cowpeas are mainly produced in Tanzania, followed by Mozambique, Malawi, Madagascar, Zambia and South Africa (see Table 3). While Zimbabwe is known to be a major producer, there are no data available. In Mozambique, cowpea is one of the major pulses produced and consumed in the Tete and Sofala Provinces. In general, yields tend to be very low (250 to 350 kg/ha), mainly due to the unavailability of improved and locally adapted cultivars (Horn and Shimelis, 2013; Nkomo et al., 2021), although there are attempts to develop improved varieties in several countries. The challenge is that high yielding varieties may not meet the preference of farmers for taste and other desirable

characteristics (Horn and Shimelis, 2020; Chipeta et al, 2024). Cowpea performs relatively well under drought conditions where most crops cannot grow well (Ncube et al., 2023).

Cowpea is a warm-season crop that is typically planted in the rainy season and is normally intercropped with maize, sorghum or millets in most countries, although there may be a few cases of monoculture. Most seed is from retained stock, although some NGO and government projects are providing improved seed and supporting the establishment of seed gene banks, for example in Eswatini, Malawi, and South Africa.

Breadfruit

Breadfruit is produced in the island states of Comoros, Madagascar, Mauritius and Seychelles. In Madagascar, while production data are not available, breadfruit is estimated to provide 12-25% of total caloric requirement for the poor during the lean season of April-May (FEWS NET 2018). In Mauritius, breadfruit is ranked as the third most important indigenous food, with an annual production of 200 tonnes and a potential to grow to 8,000-10,000 tonnes (FAREI, no date). Breadfruit is ranked as the most important locally-adapted crop in Seychelles but there are no production data.

Breadfruit can be propagated using different techniques by either using seeds or vegetative propagation such as rooted shoots and root cuttings, air layering, stem cutting, in vitro propagation and in vitro culture initiation (Deivanai and Bhore, 2010). Among these techniques, grafting and layering vegetative production are most practiced in Madagascar. Breadfruit is intercropped with cash crops such as vanilla, coffee or cloves, with its extensive root system helping to prevent soil from erosion, especially on slopes and hillsides (Penot and Danthu, 2020; Mariel et al., 2021; Rousseau et al., 2023). Breadfruit trees absorb and store significant amounts of carbon dioxide in their biomass, making them valuable for mitigating climate change, making the plant a prime candidate for carbon market projects (*breadfruitonline.com*). Apart from the cuttings and the well-prepared terrain, breadfruit does not require much fertilizer. In Mauritius, breadfruit plants are mainly cultivated in the backyard with few orchards set up (1000 -2000 trees) (FAREI, n.d).

Local fish

Canned cat fish is one of the local fish products produced in Botswana but there is no information on quantities of production. In the Comoros, fishing and fish sales provide livelihood to 6% of the population, with women making up 50.3% of these. For DRC, the most consumed fish are catfish (*Clarias* sp.), carp (*Labeo* sp.), lung fish (*Protopterus* sp.), Lake Tanganyika sprat/sardine (*Stolothrissa tanganyicae/Limnothrissa miodon*, and longsnout *Distichodus sp*. (Van Vliet et al., 2019). Madagascar's extensive 5,600 km coastline has the most diverse and extensive shallow marine habitats in the Western Indian Ocean. Small-scale fisheries are a major contributor here, with an estimated catch of 83,576 tonnes of fish in 2019 (Wabnitz et al., 2023). Interestingly, the bulk of this traditional fishing activity is concentrated on the west coast of the island (Breuil and Grima, 2014). Fishing and aquaculture support 1.5 million people (The World Bank, 2020), employing 87% of the adult population directly or indirectly (Blue Ventures, 2013). Malawi produces tilapia and usipa from Lake Malawi but information on production levels is lacking. Sea and river fish are important sources of protein in Mozambique but data on production are lacking. Namibia's smallholders produce tilapia and cat fish from freshwater sources. Over 90% of Tanzania's aquaculture production is made up of Nile tilapia, with the balance comprising catfish (Peart et al, 2021), and the small, dried herrings from Lake Victoria and prawns from the Rufiji delta (Mramba and Kahindi, 2023). Freshwater fishing in Zimbabwe is common for various freshwater species.

Fish farming practices vary by country, depending on whether it is marine or fresh water fish production. In Eastern DRC, fish farmers use earthen ponds with wooden mounds and compositors (Bagula et al., 2024). They keep mainly monocultures (57%) of tilapia and other warm water species, although some use mixed cultures. Fries are either supplied from NGOs or from the farmers' own ponds

and feeding is based on manure (Bagula et al., 2024). In Madagascar, in common with other island nations, small-scale artisanal fisherfolk often consider their catch in bulk rather than separating it by species. Several catches are caught together in a single net, making separation impracticable and time consuming for small fishers. In the local market, consumers buy mixed fish rather than specific species. The fisherfolk typically use traditional methods and small boats. Women often participate in gleaning activities on reefs and near the shore, collecting octopus, sea cucumbers, clams, and other small marine life using baskets or traps. Men, on the other hand, employ various techniques such as deploying seine nets from the beach, fishing from boats, diving, or using hook and line. Women are responsible for 57% of the processing and 51% of the marketing activities in small-scale fisheries in Madagascar (Wabnitz et al., 2023). Material inputs are varied, encompassing fishing gear such as boats, nets, hooks, lines, and traps. Fuel is often a significant cost, particularly for those using boats with outboard motors (WWF, 2019), while a shortage of ice may be a challenge due to the perishable nature of the product. In Zimbabwe, there is very little aquaculture but fishing from rivers and dams using nets, baskets, traps, fishing lines, and sometimes traditional poisons (Kupika et al., 2022). The use of poisons is a risk to the ecosystem and food safety.

Local chicken

Local chickens, which go by various local names, for example, "village chicken", "road runner" or "marathon chicken", are the most common animal source food. In Botswana, local chickens account for about 13% of the 23 million national poultry population and are owned and raised by women mainly (Kitso, et al., 2018). The production of local village chickens is similar across the countries. Zambia's consumption of free range chickens is estimated at 16 million chickens per year (African Farming, 2024). Though precise figures are unavailable, millions of households rear village chickens, valued for their resilience and adaptability. Indigenous chickens have been a part of many rural households for years in South Africa, where they have helped to support food security, economically empower women, and support rural livelihoods (Desta, 2020). In Zimbabwe, indigenous chickens are more widespread than any other animal source food and, in common with South Africa and many other countries, are the cheapest main source of animal protein and can be used for producing meat and eggs (Mwale and Masika, 2009). However, production levels are unknown.

Local chickens are typically raised in free-range or semi-intensive systems, roaming freely and scavenging around homesteads and feeding on a variety of natural foods such as seeds, worms, insects and household food waste (Simainga et al., 2010; Manzvera et al., 2023; Melesse et al., 2023). While housing may be provided, it tends to be rudimentary and disease is a major challenge, especially New Castle Disease. There is a growing trend towards putting up housing for village chickens, especially by households doing semi-commercial production in peri-urban areas. This is normally accompanied by modest supplementary feeding with maize, sorghum, rice and sunflower seeds (Mtileni et al., 2012). Most of the activities related to the upkeep of the chickens at the household level, such as cleaning of fowl runs, feeding, treatment and marketing, is done by women and girls.

3.5. Post-Harvest Management

While the promotion, production and consumption of indigenous foods in the SADC region is paramount, the often-missing link and limiting factor is the post-harvest management of the products and food loss, especially for perishable products. Postharvest handling comprises interconnected activities from harvest to sorting, grading, preservation, transportation, packaging, processing, marketing, and decision by the consumer to accept or reject the food (Adewoyin et al., 2022). Proper post-harvest handling is important to minimise losses, ensuring the preservation of nutritive value and food safety. However, several challenges exist that impede effective post-harvest handling and utilization of these valuable resources.

3.5.1 Harvesting, preservation and storage

Traditional and manual harvesting techniques are used for most indigenous foods, with little or no mechanisation. Once harvesting has occurred, the produce is usually placed in sacks and carted to the homestead using animal-drawn carts or motorized transport hired from informal value chain actors. Cereals may be kept in raised cribs to facilitate drying before they are threshed and winnowed to separate the grain from chaff. This is followed by storage prior to use or marketing.

For high moisture containing foods such as leafy vegetables (e.g., amaranths) and cassava, they are either used fresh for sweet varieties (10% of the cassava crop in Mozambique) or preserved using traditional methods such as sun-drying, smoking and fermentation. Most processing takes place on an artisanal level in individual households, although a handful of semi-industrial processing businesses have emerged to process and package rale for sale in urban supermarkets. While these techniques are effective, they require specific knowledge and skills that may not always be passed down from older to younger generations. The risk of losing traditional preservation knowledge poses a threat to the sustainability of indigenous food systems. Furthermore, some of these preservation methods may lead to deterioration in the nutritive value of the food, making the food unsafe for human consumption. For example, Dlamini (2017) found that sun-drying of indigenous leafy vegetables in Eswatini leads to a loss of nutrients such as vitamin A.

Adequate storage infrastructure is essential for maintaining the quality and safety of indigenous foods after harvest. However, in rural areas, access to proper storage facilities such as cold rooms, silos, or warehouses is often limited. Traditional storage structures are usually built by smallholder farmers using locally available resources, such as tree poles, mud, plant straw, bamboo, cow dung, and bricks (Dube et al., 2023) and include sisal bags, woven baskets, bins made of cow dung and wood ash, earthen pots, and mud and wooden granaries. While these structures may provide protection against rain and sun, they do not prevent air and moisture present in the ambient air to pass through, hence they are not effective against insects, pests, and mould that are already present in the grain during harvest and are stored together with the grain (Manandhar et al., 2018). Most of the smallholder farmers using traditional storage technologies mix the grain with some natural preservatives, such as ashes, leaves, oils from different plants, or chemicals to prevent early degradation (Manandhar et al., 2018).

Some countries provide storage facilities to farmers as part of supporting the production and consumption of indigenous foods. For example, the Botswana Agricultural Marketing Board (BAMB) operates silos in different strategic areas throughout the country to provide accessible storage facilities for both farmers and processors at a fee.

3.5.2 Transportation of produce

A major challenge faced by farmers when it comes to transporting food to the market is the condition of farm access roads in all the SADC countries, which impacts transportation efficiency and quality of produce to the market. Rehabilitation of bad roads and provision of refrigerated and covered transport will reduce post-harvest losses of produce (Alulu et al., 2023).

The level of transportation development across the SADC countries varies. For example, in the Comoros, agricultural produce, including indigenous foods, is transported together with passengers in boats and aeroplanes, as there is no dedicated agricultural produce transportation within the islands. Some countries are assisting their farmers by providing transport for their goods. For example, in Botswana, NARDI provides transport for contract farmers involved in seed multiplication, while the Botswana Agricultural Marketing Board (BAMB) supports contract grain farmers with transportation services to the grain storage facilities around the country[4]. Smaller countries, for example, Mauritius

[4] NARDI, https://www.nardi.org.bw/; BAMB, https://bamb.co.bw/contract-farming-0

and Seychelles, are better off in terms of transportation of indigenous foods from farm to markets because of the short distances that need to be covered.

3.5.3. Processing of indigenous foods

In most SADC countries, indigenous foods are processed on the farm, albeit limited in extent. Most farmers just do the bare minimum processing, for example, threshing, winnowing, soaking, malting, milling, cooking, fermentation, popping and radiation (Ramashia et al., 2019), in the case of grains such as sorghum or washing for leafy vegetables, or soaking in water and drying in the case of tubers such as cassava. Cereal grains may be milled traditionally using a milling stone or commercially by a local SMME running a grinding/hammer mill. Alcoholic and non-alcoholic drinks are traditionally made by African communities using malted and fermented millets or sorghum (Hassan et al., 2020) but these processes are not standardised for consistency in the quality of products (Embashu and Nantanga, 2019; Ramashia et al., 2019).

Most processing of cassava takes places on an artisanal level in individual households, although a handful of semi-industrial processing businesses have emerged to process and package rale (fermented and dried cassava) for sale in urban supermarkets. The oldest method of processing leafy vegetables such as amaranths is sun-drying, followed by grinding the dried leaves into a powder for use in flavouring stews. This method is common across the SADC countries. Other methods of processing and preservation include canning and freezing (Joardder et al., 2019). Cowpea grain is normally dried and either used at household level or packaged for retail without processing, while leaves are used either as fresh, dried or blanched and dried vegetables. Both fresh and dried leaves are sold in local food markets or to a less extent in retail outlets such as supermarkets.

Fish is generally sold fresh with minimal processing due to lack of a cold chain, while chicken is normally sold live along roadside markets or within villages. Some countries are more advanced than others in terms of developing standardised protocols for the processing and storage of indigenous foods, particularly crops. For example, in Eswatini, the Ministry of Agriculture, Home Economics Department as well as the Department of Agricultural Research and Specialist Services (DARSS) have developed and compiled protocols and recipes for the processing and preparation of cowpeas, among other crops. Both extension workers and home economists have taught farmers how to prepare different dishes from these crops.

Marketing of indigenous foods

Indigenous food producers in the SADC region face challenges in accessing markets and establishing viable value chains. Limited market linkages, lack of market information, and inadequate transport infrastructure hinder the ability of farmers to sell their produce at fair prices, resulting in such foods occupying limited space in formal retail markets. Smallholder farmers also produce limited quantities of produce, making it difficult to do business with offtakers because of high transaction costs, unless they are organised into groups for bulking. As a result, many small-scale producers struggle to earn a sustainable income from their indigenous foods.

The use of contract farming for sorghum grain in Malawi, South Africa and Zimbabwe offers an example of what is possible when the private sector sees a business case for engagement. This has enabled large volumes of produce to move from smallholders through the brewing industry. A related marketing channel is for smallholders to supply institutional markets such as school feeding programmes and humanitarian programmes such as those run by WFP. However, to be sustainable, it is necessary to have reasonable volumes and consistent and reliable supply. This will need substantial investments in capacity building of smallholder farmers, especially women and youth.

Indigenous foods are sold in informal markets in raw or minimally processed form. Sorghum is mainly sold to the brewing industry for making commercial beer and is used by smallholder farming households

to make traditional brews, especially for ceremonial purposes. Sorghum is also milled into flour and used for making porridge, the main staple in most SADC countries. Milling is mostly done by local SMMEs using hammer mills, although there are large scale industrial milling companies that may make a variety of products besides flour, for example breakfast cereals in South Africa and Botswana.

In some countries, governments participate in the marketing and distribution of indigenous foods through their ministries of agriculture and designated agencies. In Botswana, the BAMB ensures a market for locally grown scheduled crops as its mandate includes purchasing, setting prices, and facilitating transportation, storage, processing, and sales of produce. It operates fourteen branches and twenty-three sales offices nationwide, with a storage capacity exceeding 100,000 metric tons. In Lesotho, the Ministry of Agriculture, Food Security and Nutrition (MAFSN), in collaboration with stakeholders, organises farmers' market days where farmers bring their products for sale. This is also common in other SADC countries such as Zambia and Zimbabwe. However, farmers have not fully tapped into the marketing of indigenous foods. Medicinal plants are sold raw in informal markets locally and abroad, for example to Germany, Australia and America (Seleteng-Kose et al*,* 2023). Grains are more commercially traded as they are less perishable and there is a bigger and more formal market for them, for example, for sorghum and millets.

3.5.4. Product development

Several interventions are being implemented by various governments in the SADC region to promote the development of products from indigenous foods. Product development must meet the needs of consumers for preserving the taste, nutritional value and convenience. The issue of convenience is particularly important for the younger generations and for responding to the sentiments that these are foods for the old folks and "poor man's food".

Grains are the most traded and have the most products developed. Some of the products developed have become household brands, especially in the breakfast cereal sub-sector and reputable large-scale companies participate in transforming indigenous grains, particularly sorghum, into value-added products. These companies include Bokomo (in South Africa and Botswana), Tiger Brands and Unilever (both based in South Africa), among others and some local SMEs. Cassava is mainly consumed as fermented and dried rale, while it is also used for making pre-cooked flour, a product that is popular in West Africa. There is a definite need to develop more innovative products to make indigenous foods more interesting and "cool" foods.

Given the food transition that is taking place in many SADC countries and the increasing demand for convenience foods, there is potential to develop innovative products from indigenous foods to meet the needs for nutritious but convenient foods.

3.5.5. Main value chain actors in indigenous food value chains

The main actors along the indigenous food value chains include small-scale farmers, input suppliers, middlemen/agro-dealers, processors, retailers, eateries and consumers (see Figure 1 for example of breadfruit value chain from Madagascar). Transportation of produce, particularly grains - which are bulkier, is a vital component of post-harvest handling and linking farmers to markets and consumers. Due to its similarity to maize, sorghum has good transportation services because the same trucks that ferry maize can also be used for sorghum.

Post-harvest management within the indigenous agricultural value chains involves a variety of actors who collaborate and interact to ensure efficient post-harvest management, minimise losses, maintain product quality, and deliver agricultural products to consumers promptly. In addition to the farmers, transporters, processors, wholesalers, retailers, storage facilities, packaging suppliers, quality assurance and certification, in the case of indigenous crops, government agencies are required to provide regulatory frameworks, support services, and infrastructure to enhance post-harvest management

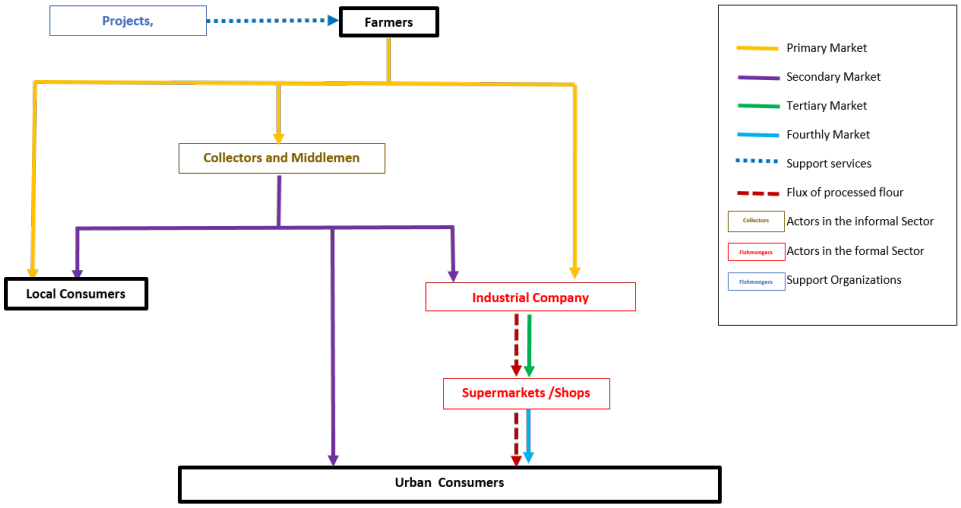

Figure 1. Breadfruit value chain in Madagascar (Source: Madagascar country report)

practices. There is also a need for financial institutions to offer funding and investment opportunities to support post-harvest infrastructure development and technology adoption Additionally, research institutions and extension services are important actors for disseminating knowledge and best practices in post-harvest management.

Postharvest technology is crucial in agricultural production and utilization systems. It plays a key role in loss reduction, value addition, food security, employment and income generation (Willis et al., 1989). A postharvest technology revolution is essential with strong linkages of storage, marketing and distribution. An inappropriate postharvest management system results in a large quantity of perishable indigenous foods getting damaged during the process of handling, transportation and marketing. Due to the absence of proper storage and marketing facilities, farmers are forced to sell their produce at throw-away prices. Sometimes farmers do not even get the two-way transportation cost, so they would rather dump their produce near the market area than bear the transportation cost required for taking the product back. It is of utmost importance to identify all aspects of critical postharvest losses and find solutions that would lead to a reduction in postharvest losses.

It is important to note that the promotion of improved postharvest handling and preservation is as important as promoting improved production so as to increase supply and consumption of indigenous foods. Both supply and demand issues must be tackled simultaneously to develop the value chains and improve livelihoods and income of farmers and other value chain actors.

3.6. Utilization and Consumption

Nutritive value

Indigenous foods are pivotal in enhancing access to affordable diets, nutrition and health when they are part of a diverse diet, given their rich content of essential nutrients. For example, Zambia and Zimbabwe prominently feature sorghum and millet in their diets. These grains are not only culturally significant but are also rich in B vitamins, magnesium, potassium, phosphorus, iron, and zinc, making them vital in areas plagued by food and nutrition insecurity (FAO, 1995). The nutrient content of selected common indigenous foods are shown in Table 4. However, it is important to note that some indigenous foods contain high levels of antinutrients, for example, phytates (Muchuweti et al., 2009), which reduce the bioavailability of nutrients. Similarly, a lot of the nutrients in indigenous foods are sensitive to heat

damage during processing, for example beta-carotene, vitamin C and some minerals (Owade et al., 2020). This would most likely reduce nutritive value under the traditional processing methods such as drying and boiling.

Table 4. Nutrient content of selected indigenous foods[5]

Rank	Indigenous Food	Protein (g/100g)	Fat (g/100g)	Carbohydrates (g/100g)	Fiber (g/100g)	Vitamin C (mg/100g)	Calcium (mg/100g)	Iron (mg/100g)	Vitamin A (µg/100g)	Zinc (mg/100g)
1	Sorghum (Sorghum bicolor)	10.6	3.3	75	6.3	-	13	4.4	-	2.1
2	Cassava (Manihot esculenta)	1.36	0.28	38.06	1.8	20	16	0.27	13	0.34
3	Amaranth (Amaranthus spp.)	4.94	0.4	8.7	1.5	64	798	11.4	481	5.8
4	Cowpea (Vigna unguiculata)	20.47	1.26	57.13	6.01	-	138.18	4.85	-	4.5
5	Breadfruit (Artocarpus altilis)	1.07	0.23	27.12	4.9	29	17	0.54	10	0.12
6	Local fish species	26	2.7	-	-	-	10	1.3	-	4.2
7	Village chicken	18.2	8.2	0.1	-	-	10.1	0.7	-	1

Medicinal uses

These foods, together with many others not discussed in detail in this report, play a critical role as alternative medicines (Table 5). Such dual uses underscore the integral role of indigenous foods in both daily diets and traditional medicine.

[5] ZAMBIA Food-Based Dietary Guidelines Technical Recommendations 2021. https://www.fao.org/infoods/infoods/tables-and-databases/south-africa-archives/en/

Table 5. Medicinal uses of some indigenous foods (Source: various country reports)

Indigenous Food	**Medicinal Benefits**
Sorghum (*Sorghum bicolor*)	● Anti-inflammatory properties: Reduces inflammation, preventing chronic diseases such as heart disease and arthritis ● Blood sugar control: Stabilizes blood sugar levels, beneficial for people with diabetes ● Suitable for celiac disease and gluten intolerance.
Cassava (*Manihot esculenta*)	● Antioxidant properties: Contains phenolic compounds that neutralize free radicals ● Anti-inflammatory benefits: Reduces inflammation due to bioactive compounds ● Digestive health: High fibre content aids in digestion and prevents constipation.
Amaranth (*Amaranthus spp*.)	● Anti-cancer properties: Contains peptides and oils that inhibit cancer cell growth ● Cardiovascular health: Lowers cholesterol levels, reducing the risk of cardiovascular diseases ● Anti-inflammatory effects: Antioxidants reduce inflammation, preventing chronic diseases.
Cowpea (*Vigna unguiculata*)	● Blood sugar regulation: Low glycaemic index and high fiber content help regulate blood sugar levels ● Antioxidant properties: Phenolic compounds protect the body from oxidative stress ● Heart health: High fibre content lowers cholesterol levels.
Breadfruit (*Artocarpus altilis*)	● Anti-inflammatory effects: Reduces inflammation, benefiting chronic inflammatory conditions ● Digestive health: High fibre content aids in digestion ● Immune support: Rich in antioxidants, including vitamin C.
Local Fish Species (e.g., tilapia, usipa)	● Heart health: Rich in omega-3 fatty acids, reducing triglycerides and lowering blood pressure ● Brain function: DHA supports brain health, improving cognitive function ● Anti-inflammatory properties: Omega-3 fatty acids reduce inflammation

Consumer preferences and consumption levels

Consumer preferences for indigenous foods vary, reflecting a blend of traditional and modern culinary practices. Despite their benefits, the current consumption levels of these foods show significant variation across the region. In Malawi, indigenous vegetables such as Amaranthus spp. are widely consumed, particularly in rural areas, due to their nutritional value and accessibility. Conversely, South Africa has seen a decline in the consumption of indigenous grains such as sorghum, as more commercial cereals become prevalent. In Zimbabwe, consumption is low, with only 9.3% consuming these foods daily and 20% never having consumed traditional foods, while consumption is higher among women and among employed people (Chopera et al., 2022). Consumption is generally higher in the high producing areas and among the older generation. There is a stigma around indigenous foods in that they are considered as "poor man's food" by some consumers (Owade et al., 2020), negatively impacting their integration into mainstream diets and markets.

Use in local food-based dietary guidelines

The role of indigenous foods in providing a balanced diet is particularly critical for low-income and vulnerable groups. In Tanzania, staples such as cassava, when used with other diverse foods, are crucial in offering affordable, nutrient-rich diets that ensure food security for economically disadvantaged families.

Several countries within the SADC have started to integrate indigenous foods into their national dietary guidelines. Zimbabwe encourages the consumption of finger millet, a nutrient-dense grain that is also part of the traditional diet and is about to publish its FBDGs where indigenous foods are a great part of the daily dietary recommendations. In Seychelles, the dietary guidelines promote the use of breadfruit and taro, aligning with global trends towards healthier lifestyles and preventing chronic non-communicable diseases. However, the limited data on the nutritional value and low supply levels of some of these indigenous foods has made it difficult to integrate them into national food-based dietary guidelines.

3.7. Policy and Regulatory Environment

3.7.1. Existence of policies, legislation, and regulations to promote indigenous foods

SADC countries have a range of policies and legislation that may be used to support and promote indigenous foods. While all SADC countries have agricultural policies, strategies, and guiding frameworks, they often lack specific policies dedicated to indigenous foods. These policies are essential for systematically preserving, enhancing, and integrating indigenous foods into the national and regional food systems. For example, in Tanzania, the Agricultural Sector Development Programme (ASDP) highlights the importance of indigenous crops and traditional knowledge in sustainable agriculture and food security. While ASDP supports the role of indigenous foods, there is no specific legislative framework solely focused on indigenous foods. In South Africa, the Agricultural Policy Action Plan (APAP) includes strategies to promote indigenous crops and traditional farming practices. The National Development Plan 2030 also emphasizes the need to support smallholder farmers, many of whom cultivate indigenous foods. However, there is no standalone policy specifically targeting indigenous foods. In Zimbabwe, the Food and Nutrition Security Policy of 2013 prioritizes the integration of indigenous foods into the national diet to enhance food security and nutrition. Similar to South Africa, Zimbabwe does not have a dedicated indigenous foods policy but incorporates indigenous foods within broader agricultural and nutrition policies. These examples are repeated in other countries and illustrate a generic but not targeted effort by SADC countries to integrate indigenous foods into their agricultural and food security frameworks. By focusing on the promotion, research, and marketing of these crops, these countries would enhance food and nutrition security, preserve cultural heritage, and support economic development.

3.7.2. Promotion of indigenous foods

Promotion of indigenous foods in the SADC region involves various strategies, combining public awareness, educational initiatives, and cultural events to foster appreciation and consumption of these foods. Botswana's Ministry of Agriculture and Food Security runs campaigns to educate the public on the nutritional benefits of indigenous foods such as sorghum and millet. The Department of Social Services in Botswana has documented various food products from around the country and has published two recipe books to further this initiative (GoB, 2008), while the Botswana Agricultural Marketing Board (BAMB) has developed two traditional food recipes based on indigenous grains. In Eswatini, the Ministry of Agriculture, through its Department of Home Economics, has developed processing and preservation protocols for selected indigenous foods and has developed a comprehensive recipe booklet. The Marula Festival in Eswatini celebrates the marula fruit, a significant indigenous food, through cultural events and educational sessions on its uses and benefits. Malawi incorporates indigenous foods such as millet, sorghum, and cassava into its school feeding programmes. This not only provides nutritional benefits to children but also supports local farmers by creating a stable market for these crops. The government collaborates with NGOs to provide technical support and resources to schools and farmers alike. Similarly, in Zambia, the Home-Grown School Feeding (HGSF) programme incorporates locally-sourced indigenous foods into school meals, benefiting both students' nutrition and local farmers. These efforts across the SADC region underscore a collective movement towards embracing indigenous foods, not only as a means to improve nutrition but also to strengthen local economies and cultural identities.

3.7.3. Policy and regulatory barriers

While supportive policies exist, several barriers hinder the effective integration and development of indigenous food value chains into food systems. These barriers range from policy implementation issues to infrastructural and market challenges. For example, in Mozambique, policies supporting indigenous foods often suffer from weak enforcement and a lack of coordination among government agencies. Rural areas in Malawi face significant infrastructural deficits, such as poor road networks and insufficient storage facilities, limiting farmers' ability to bring indigenous foods to market. Small-scale producers in Namibia often struggle to access larger markets due to high transportation costs and limited market information.

In addition, the unique knowledge and resources associated with indigenous foods face significant challenges. Africa's indigenous foods are highly vulnerable to misappropriation and exploitation due to a lack of formal recognition and protection mechanisms. This vulnerability not only threatens the cultural heritage and traditional knowledge of African communities but also undermines their economic opportunities and food sovereignty (AEFJN, 2002). Currently, the lack of specific legal frameworks for indigenous foods means that traditional knowledge and genetic resources are often exploited without proper consent or compensation. Addressing these challenges requires a concerted regional effort within the SADC. By adopting a collaborative approach, Member States can share resources, knowledge, and best practices to overcome common obstacles.

3.7.4. Incentives/disincentives for different actors to invest in value chains

Various incentives and disincentives influence actors' decisions to invest in indigenous food value chains, shaping the overall development and sustainability of these systems. Examples of incentives in SADC countries include government grants and subsidies, tax breaks, and promotion of agricultural diversity from established value chains such as maize, wheat, rice, and tobacco, among others. For example, the Namibian government offers subsidies to farmers growing indigenous crops such as pearl millet (*mahangu*), which is vital for food security in rural areas. South Africa's Land Bank provides grants and low-interest loans to farmers growing indigenous crops. In Tanzania, tax incentives are offered to companies investing in the processing of indigenous foods. Botswana provides technical assistance and training to farmers to encourage the cultivation of diverse indigenous crops.

Conversely, disincentives encompass high initial investment costs, limited access to financing, and market volatility. Establishing processing facilities for indigenous foods can require significant capital, deterring small entrepreneurs. Farmers in Malawi often face challenges in securing loans due to a lack of collateral and high interest rates. Fluctuations in demand and prices for indigenous foods can create uncertain market conditions, discouraging long-term investments.

3.7.5.Investments required to develop indigenous food value chains

Developing indigenous food value chains requires substantial investment in several areas such as infrastructure (e.g., roads, storage facilities), research and development, capacity building for farmers, and market development initiatives. The size of investment varies but often demands significant financial commitment from both public and private sectors to achieve meaningful impact. For example, establishing cold storage facilities in Madagascar to preserve perishable indigenous fruits would require significant capital investment, but it would also reduce post-harvest losses and enhance marketability. Improved road networks in rural areas of Zambia can enhance market access for indigenous food producers. Investment in storage solutions, such as silos for grains and cold storage for fruits, is crucial to reduce post-harvest losses in Malawi. In South Africa, research institutions are investing in developing drought-resistant varieties of indigenous crops such as amaranth and teff. Funding nutritional studies in Zimbabwe to document and promote the health benefits of indigenous foods can help increase consumer demand. Government budgets, for example in Botswana, can avail significant funding towards agricultural development programmes that include indigenous foods. Private investors

and agribusiness companies in the SADC region are increasingly recognizing the potential of indigenous foods and committing financial resources for their development.

3.8. Private Sector Engagement and Financial Aspects

3.8.1. Role of the private sector in each stage of the value chains

The role of the private sector in indigenous food value chains across the Member States is mixed, varies by commodity and is generally low. Smallholder farmers are responsible for primary production or collection in the case of wild non-timber forestry products. For example, in Botswana, private sector firms supply hybrid seed for improved varieties of crops such as sorghum, otherwise most seed and planting material are provided either by SMMEs or government agencies in form of open-pollinated varieties (OPVs) or farmers use retained seed. However, except for a few cases, for example collection and processing of marula in Zimbabwe, there is little involvement of large corporates in the production and collection of non-timber forestry products.

Indigenous food products are either sold in their raw form directly to other community members, at informal roadside and community/village and urban markets or are taken up by middlemen or collectors, who then supply urban consumers, retail outlets or processors. Processing is rudimentary and is done by SMMEs, mostly in the villages, for example milling of cereals or drying and packaging of leafy vegetables, cassava and other products. In a few cases, large agri-business firms work with outgrower schemes to bulk production from smallholders, followed by processing into products or packaging for sale to retail outlets.

The limited involvement of the private sector has been ascribed to limited awareness as many private sector actors lack understanding of the unique opportunities and challenges of indigenous food systems and do not perceive a business case for investment into the sector. One of the main limitations is the lack of information on current and potential demand for different indigenous food products. Building trust and effective collaboration between government, private sector, and small-scale producers is crucial for navigating regulatory complexities.

As noted above, SMMES play a crucial role in indigenous food value chains, providing inputs, processing and market linkage services. At the village level, milling services are provided by SMMEs, while SMMEs work with community trusts, cooperatives and NGOs, with support from governments, to promote indigenous food value chains, especially production, processing and marketing. The involvement of SMMEs in indigenous food value chains may offer a great opportunity for rural industrialisation and creation of employment, especially for youth.

3.8.2. Market conditions

Poor road infrastructure affects movement of agricultural produce from farms to markets, while poor storage and lack of cold chain facilities lead to product spoilage. Market information, for example prices, is very poor and largely services well established value chains and is controlled by government marketing boards. Government policies on subsidies of different commodities affect market conditions and generally favour commodities such as maize and to a lesser extent sorghum. While there is potentially high demand for indigenous foods, supply and quality are not consistent. This makes it difficult to have dedicated customers and negatively affects the profitability of indigenous food value chains, resulting in less farmers and other value chain actors' unwillingness to invest. Although there is great potential for indigenous foods based on the rising demand for healthy, organic and sustainable products, there is still a low level of awareness of the nutritional benefits of indigenous foods among most consumers. Lack of traceability schemes for most indigenous foods also discourage consumers.

3.8.3. Optimisation of the role of private sector, financial models and investment opportunities

Several initiatives have been proposed and used to improve the role of the private sector in indigenous food value chains. These include provision of loans based on individual or group lending as well as

subsidies for selected crops for smallholders to go into commercial production in Botswana, fostering market linkages among different actors such as producers, processors, distributors and retailers for efficient supply chain management, capacity building of SMMEs, and supporting cultivation of non-timber forestry products instead of relying on collection from the wild. However, some conditions for accessing funding and other support, for example matching funds, still remain beyond the reach of most smallholder farmers and SMMEs.

Financial and business models include provision of both loans and subsidies for smallholder commercial production of indigenous foods, public-private partnerships, microfinance initiatives, value chain financing schemes, cooperatives and contract farming and outgrower schemes for accessing inputs, technical and financial services and bulking produce by smallholders. Other measures by governments include risk sharing models targeted at the private sector to provide incentives for investment, for example, credit guarantees, fiscal measures such as tax breaks for specified investments, and organising smallholders into production and marketing groups or cooperatives. In some cases, development partners and civil society organisations have partnered with government to promote participation of smallholder farmers and SMMEs in indigenous food value chains for sustainable livelihoods, for example, baobab and marula fruit processing in Zimbabwe.

3.9 Role of Research and Development

Most of the research and development work on indigenous foods is being undertaken by public research institutes and universities. This includes research on production challenges such as improved varieties and genetics, agronomic practices, ecology and harvesting practices for NFTPs, processing techniques and product development (seed, animal feed, and novel food products). In some cases, this is done in conjunction with social protection programmes, with the aim of diversifying livelihoods, targeting youth and women. Given the informal nature of indigenous food value chains, there is a dearth of information on production levels, prices of inputs and produce and demand of different products, among other factors. The research needs are discussed below under the research and development recommendations.

4. CASE STUDIES OF SUCCESSFUL INDIGENOUS FOOD VALUE CHAINS

4.1. Description of selected value chains

Country study teams selected examples of successful indigenous food value chains. These included honey bee keeping in Botswana, octopus and reef fish in Comoros, mushroom in DRC, traditional leafy vegetables in Eswatini and Zambia, cassava in Madagascar, Mozambique and Seychelles, pearl millet in Namibia and marula in Zimbabwe, among others.

4.2. Success factors related to different parts of the commodity value chain

The success factors associated with these value chains included the following:

i) The production success factors included capacity development for smallholder farmers; diversified products from a single commodity; development and provision of improved seed, planting material and animal breeds; use of bulking and market linkage models such as outgrower and hub and spoke schemes; quality control and traceability schemes run by offtakers; sustainable harvesting of food from the wild; and community involvement.

ii) Minimal processing with attention to improved quality to increase shelf life and seasonality of supply; and access to processing technologies for increased economies of scale.

iii) Understanding consumer preferences, use of diverse marketing channels, market segmentation; food tourism; and creating compelling brand identity and stories.

iv) Equipping consumers with knowledge and recipes of how to use indigenous foods; and creating awareness of the nutritional, medicinal and health benefits of indigenous foods.

v) Demand for indigenous foods can be created through generic promotion; food tourism; consumer education campaigns, and advocacy, creating conditions for increased volume and consistency of supply; use of road shows and food fairs; value addition and convenience; and promotion of women and youth entrepreneurs.

vi) Within the SADC region, supportive policies and legislation play a pivotal role in promoting sustainable agricultural and indigenous food production, vital for preserving the rich biodiversity and traditional knowledge embedded in local food systems.

4.3. Key Lessons for Other Value Chains

Apart from the foregoing success factors, other lessons included the following:

i) The importance of sustainability measures, integration of technology, value addition, collaboration and partnerships through public-private partnerships (PPPs), market diversification, consumer education and awareness, and policy support.
ii) Cultivation of wild products that can reduce product seasonality and ensure reliable supplies throughout the year.
iii) Seed production and constant supply are necessary for most indigenous food value chains and smallholder producers can participate in seed multiplication, packaging and marketing for a sustainable industry.
iv) Farmers grouped in cooperatives or similar structure have high negotiation power and can achieve improved access to competitive markets for inputs, produce and financial services.
v) Governments can reduce entry barriers for smallholder producers and entrepreneurs by providing support in form of risk sharing instruments and tax breaks, among other policy instruments, to investors in key indigenous food value chains and achieve a more inclusive system.

5. RECOMMENDATIONS ON KEY AREAS OF DEVELOPMENT OF INDIGENOUS FOOD VALUE CHAINS

The key areas of focus to promote the development of indigenous food value chains cover production, nutrition, demand and consumption, marketing and product diversification, capacity building, investment and infrastructure development, research and development, and policy and regulatory environment. The recommendations are organised as a call to action by different actors, covering short-term (1–3 years), medium-term (3–7 years), and long-term (7+ years) actions.

Policy makers

Short-term

i) Develop policies and strategies to integrate indigenous foods into national food systems.
ii) Extend government agricultural input support programmes to include indigenous foods such as sorghum and cowpeas, among other key commodities.
iii) Work with agripreneurs to develop indigenous food seed systems based on released improved varieties, for example, sorghum, cowpea, finger millet, Bambara ground nut, and ensure participation of women and youth in seed multiplication.
iv) Integrate indigenous foods in public institution feeding programmes, for example, schools, hospitals, prisons and humanitarian food aid, based on the Ministries of Health nutrition guidelines, thereby creating a market for local produce, fostering growth among farmers and home gardeners.

v) Work with the private sector and civil society to develop policies and strategies to support access to local, regional and continental markets for small-scale indigenous food producers through market linkage models, for example, marketing hubs, contract farming or cooperatives to facilitate product bulking, storage, processing, packaging and branding through established formal market offtakers, wholesalers and retailers.
vi) Develop and implement a policy to protect the intellectual property rights (IPR) over indigenous foods and implement the Access and Benefit-Sharing (ABS) agreement that requires any entity seeking to use indigenous foods or associated knowledge to obtain prior informed consent (PIC) from the relevant communities and agree on fair compensation and benefit-sharing arrangements.
vii) Work with development partners and the private sector to develop innovative financing mechanisms, for example public-private partnerships, blended financing, and risk sharing mechanisms such as credit guarantees, among others, to support development of indigenous food value chains.
viii) Develop fiscal and financial policy incentives to promote participation of the private sector in indigenous food value chains, for example through tax breaks for investing in indigenous food value chains, and risk sharing mechanisms, for example, provision of credit guarantees.

Medium-term

i) Incorporate indigenous foods in national food-based dietary guidelines.
ii) Promote sustainable climate-smart and ecological production techniques, for example, the use of organic fertilisers.
iii) Work with relevant private sector actors to develop and implement food safety and quality standards for indigenous foods covering production, processing, packaging, distribution and traceability systems.
iv) Work with relevant private sector actors to train all value chain actors on food safety and quality standards.

Long-term

i) Put in place policy measures to improve rural infrastructure such as transportation networks, electricity, and water supply to facilitate the distribution, processing, and marketing of indigenous food products.

Agriculture and health extension services

Short-term

i) Provide training-of-trainers programmes for agricultural extension service staff on the value of indigenous foods and production and utilisation techniques.
ii) Develop agronomic packages and guidelines for each major indigenous food type.
iii) Promote use of digital technologies to disseminate technical and market information on indigenous foods, incorporating youth participation to create employment and business opportunities.
iv) Develop recipes and share knowledge on the utilisation and preparation of indigenous foods in household diets.
v) Provide training to local communities on sustainable harvesting, processing, and marketing of indigenous foods from the wild.

Medium-term

i) Promote consumption of indigenous foods, especially by vulnerable populations at risk of malnutrition, by implementing targeted campaigns and use of champions and influencers to raise the awareness of the population on the nutritional and therapeutic value.

ii) Partner with development partners, private sector and civil society to develop the capacity of indigenous food value chain actors with the necessary skills and knowledge through provision of technical training and mentorship programmes in production, processing, distribution and marketing.

Research institutions

Short-term

i) Assess current and potential demand for different indigenous foods under different scenarios.
ii) Conduct analysis of indigenous foods for nutrient and medicinal active ingredient content to facilitate their incorporation into national food-based dietary guidelines.
iii) Conduct research on post-harvest loss management, including storage, preservation and value addition to extend shelf life of products and food safety.
iv) Conduct research on different labour-saving technologies for different indigenous foods value chains.

Medium-term

i) Partner with regional and international research institutions to develop innovative products from indigenous foods, taking into account consumer preference, convenience and nutritive value.
ii) Conduct research and work with the private sector to develop a wide range of products from indigenous foods, for example to make flours, snacks, beverages, cosmetics, and herbal remedies to increase market appeal and profitability.

Long-term

i) Document traditional knowledge systems on indigenous foods and use in design of research programmes.

Tourism agencies

i) Promote use of indigenous foods as part of cultural heritage and indigenous food tourism, working with influencers and celebrity chefs.

Development partners

Short-long-term

Work with governments, private sector and civil society to support initiatives across all indigenous food value chains.

6. CONCLUSION

This regional synthesis report has covered different aspects of the status of indigenous foods in the SADC, including the challenges, priority commodities, production and production practices, post-harvest management, utilization and consumption, enabling environment, private sector engagement and finance and the role of research and development. With a few exceptions, for example the sorghum value chain, indigenous food value chains are underdeveloped, resulting in low participation of these foods in markets and the food systems. Production is mostly in the hands of smallholder farmers who use traditional practices and supply is largely seasonal and unreliable. Farmers tend to sell raw produce, either locally within the communities, roadside markets or to middlemen who then either sell to urban markets or supply processors and retail outlets such as supermarkets. Due to poor access to post-harvest infrastructure such as packhouses, storage facilities, cold chain, product quality and shelf-life is compromised, while there is high waste of perishable products.

While there are general policies on agriculture, there are not many policy measures specifically targeted at supporting indigenous foods as most resources are focusing on well-developed value chains such as maize, wheat and rice, among others. Private sector involvement is minimal, with SMMEs playing a greater role in providing inputs, processing and market linkages. This is largely because of low levels of awareness of potential business opportunities and lack of information on current and potential demand of indigenous foods as well as the perceived high risk and transaction costs associated with smallholder production systems. In addition, there are not enough policy incentives to improve the business case for indigenous foods.

While these challenges are noteworthy, there is great potential to develop indigenous foods, especially given their nutritional, health and environmental benefits. A strategy to develop indigenous food value chains would need to address many issues simultaneously, including ensuring efficient and sufficient primary production and regular supply of products and addressing post-harvest management and processing, assessing and creating demand (through product development, food safety, and awareness creation among consumers), market linkage business models and adequate incentives for the private sector.

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