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Review

A Systematic Review of Indigenous Food Plant Usage in Southern Africa

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Abstract: Indigenous food plants provide various social functions; they are crucial to food supply diversification efforts, and they improve food and nutrition security. Research has shown that indigenous foods' nutritional potential and advantages have yet to be adequately appreciated and explored. This systematic review discusses the various elements contributing to IF promotion, which may help increase their intake. Therefore, a systematic literature review was conducted to determine the availability, regularity of consumption, utilisation, preparation, harvesting, and preservation of indigenous foods. Additionally, this review details the knowledge, perceptions, and beliefs of IFs under these themes. The findings of this systematic review highlight the importance of promoting IFs through policies, the development of capabilities and skills, in-depth research, and an extensive indigenous food plant composition. The fact that Southern African populations do not value indigenous foods and their potential advantages appears to be a significant barrier. Furthermore, the younger generation has lost access to the older generations' indigenous food knowledge. Thus, the preservation of indigenous food knowledge in books and continuing education of the younger generation about the importance of consuming indigenous foods and the nutrition content they contain may help with its uptake.

Keywords: indigenous food plants; indigenous foods; indigenous food knowledge; promotion

Citation: Nxusani, Z.N.; Zuma, M.K.; Mbhenyane, X.G. A Systematic Review of Indigenous Food Plant Usage in Southern Africa. *Sustainability* **2023**, *15*, 8799. https://doi.org/10.3390/su15118799

Academic Editors: Ada Margarida Correia Nunes Da Rocha, Hanna Dudek, Joanna Myszkowska-Ryciak, Marzena Jeżewska-Zychowicz and Ariun Ishdorj

Received: 27 February 2023
Revised: 11 May 2023
Accepted: 16 May 2023
Published: 30 May 2023

1. Introduction

Approximately 820 million people globally are undernourished [1]. The Food and Agriculture Organization (FAO) estimates that 239 million of the 820 million malnourished people are from Sub-Saharan Africa (SSA). Hunger has been reported as rising in almost all sub-regions of Africa, Latin America, and Western Asia, with approximately 11 million annual deaths attributed to dietary risk factors [1]. Approximately two million deaths were reported to be associated with an inadequate intake of fruit and vegetables. South Africa was said to have accounted for approximately one-half million of these deaths, with a deficient intake of fruits and vegetables [2]. Okop et al. [3] asserted that an inadequate intake of fruits and vegetables contribute to a burden of diseases, resulting in death from gastrointestinal cancer, ischaemic cardiac disease, and strokes. However, there is a significant proportion of diverse indigenous foods (IFs) available in Southern Africa that has been neglected, resulting in food insecurity in the countries [4–6]. Historically, these foods were once the sole dietary components of humankind in Africa, serving as food and medicine [7,8].

IFs have been receiving worldwide attention recently due to their ability to contribute to higher-quality nutrition, more sustainable diets, and food and nutrition security [8,9]. A study conducted in India found that communities consuming diverse IFs had an increase in macro-nutrients (protein) and micro-nutrients (calcium, vitamin A, iron, thiamine, riboflavin, and folate) [10]. Their study was supported by other studies conducted in Africa (Kenya, Botswana, South Africa, Eswatini, and Zimbabwe) [11–13], where IFs were reported to be rich in macro-nutrients (protein) and micro-nutrients (calcium, vitamin A, potassium, magnesium, zinc, and iron). These foods were said to have the ability to improve food security through their availability, accessibility, sustainability, and utilisation [11–13]. The nutritional superiority of these foods over exotic foods has been established [14–16].

Other essential contributions of indigenous food plants (IFPs) to local economies and diets compared with exotic foods are drought resistance [6], conservation of biodiversity [17], indigenous food knowledge (IFK) [18], and provision of household income [19]. These findings contradict the assumption that Africans have little interest in traditional foods.

However, despite the benefits and knowledge mentioned above, IF production and consumption have declined since the olden days. Commercial farming, research, and development have significantly ignored these foods, making them less competitive than established major crops [20]. They are "usually excluded from official statistics on economic values of natural resources" [16]. This under-utilisation of IF stems from limited knowledge of these foods' nutritional content and health benefits, loss of IFK, and paucity of knowledge transfer across generations. This may be due to IF being associated with poverty in communities where they are grown and low self-esteem by those consuming them in these communities. Additionally, the lack of cultivation of these plants at a larger scale in modern commercialised and industrialised economies, i.e., the westernisation of agriculture, has significantly impacted the exclusion of these crops from commercial farming. Lastly, the shifting of dietary ideals and attitudes, cultural changes among African people, or lack of research and development of traditional recipes that are easy to prepare has also contributed to the disappearance of these crops from the everyday diet [6,16,21].

Crane et al. and Van Wyk [22,23] stressed the need for a comprehensive and systematic reference source for IF use. These authors highlighted the need for scholars to value, document, and protect IFs and IFK about plants and nature. There has yet to be a known comprehensive study on an ethnobotanical survey of indigenous or traditional plants of Southern Africa. Welcome and van Wyk [24] conducted the most recent extensive inventory on this topic. However, the authors focused only on the Southern African flora, excluding other Southern African countries, such as Angola, Malawi, Mozambique, Zambia, and Zimbabwe.

This paper aims to systematically review existing empirical studies and synthesise the findings regarding the availability of IFs in Southern Africa, including factors leading to their utilisation. We explore and reveal the current ethnobotanical information regarding the availability, accessibility, consumption, utilisation, preparation, preservation, knowledge, and perception patterns of IF. Specifically, we use this systematic review to answer two key questions: (1) which IFs are available in Southern Africa and what is their usage? and (2) what are rural communities' perceptions regarding factors contributing to the barriers leading to the availability, accessibility, consumption, utilisation, preparation, preservation, knowledge, and perception patterns of IF in Southern Africa?

The lens utilised for this research is an indigenous knowledge system (IKS). It is understood that IFK is a significant part of Africa's cultural heritage [25]. The use of IFK in the African continent goes back to the history of humankind. Ghosh-Jerath et al. [26] asserted that, for millennia, indigenous plants have served humanity as food and medicine in almost all societies. Therefore, it is essential to retain IFK, as there is a fear of losing this knowledge reservoir. It is reported that older generations, who are the carriers of indigenous knowledge, may only die by passing this reservoir of knowledge to the younger generation [27]. We posit that the IFK transfer may assist in promoting IFs' utilisation through consumption, preparation, and preservation. For this review, "indigenous foods" refers to indigenous/traditional vegetables and fruit.

2. Review Author's Reflexivity

All systematic review authors have extensive knowledge of IF. They grew up consuming these foods and are still consuming some of them (Zoe Nomakhushe Nxusani (Z.N.N.)

of Eastern Cape; Xikombiso Gertrude Mbhenyane (X.G.M.) of Limpopo, and Mthokozisi Kwazi Zuma (M.K.Z.) of KwaZulu Natal. X.G.M. has conducted numerous types of research on the health benefits of these foods [16,28–30]. They all believe in their promotion to combat food insecurity and malnutrition. All these factors may influence how the review was conducted and how findings were interpreted. However, we kept reflecting on our disciplinary backgrounds, past knowledge, and pre-conceived assumptions and opinions throughout the study. We encouraged each other to think critically about how these might influence the review procedures. The team discussed preliminary findings regularly to identify assumptions in the data synthesis, explore different perspectives among review authors, and document judgments made during the review process.

3. Methodology

A systematic review approach was employed to acquire and synthesise information on IFs in the Southern African context. Our review qualifies as a systematic map that summarises the existing data regarding the different aspects of a particular subject and identifies knowledge gaps since we have broad research questions.

3.1. Eligibility Criteria

The SPIDER (Sample [S], Phenomenon of Interest [PI], Design [D], Evaluation [E], and Research type [R]) tool was utilised to conduct a non-interventional review of existing studies to describe the eligibility criteria [31]. The framework was employed to expand thinking beyond the PICO (Problem [P], Intervention [I], Comparison [C], and Outcome [O]) framework, as it is more appropriate when exploring a non-intervention question and has practical application to qualitative and mixed-methods research [31]. We captured the topic of the review by adhering to the critical aspects of the SPIDER tool; thus, in the sample, we focused on studies conducted in rural communities of Southern African countries. Communities included, but were not limited to, elders, men and women, youth, traders, and farmers. The PI was studied by investigating the availability, accessibility, consumption, preparation, preservation, and utilisation of IFs. Perceptions, views, experiences, and practices were included in the selection. Qualitative, quantitative, and mixed research methods were included in the review process (see Table 1). The SPIDER tool has been used in several systematic reviews [32–34], making it an appropriate tool for this specific review.

Table 1. Systematic review eligibility criteria according to SPIDER criteria.

Spider Tools [1]	Search Terms
S	Southern African rural communities
PI	Studies investigating the availability, accessibility, consumption, preparation, preservation, and utilisation of indigenous foods
D	All study designs
E	Perceptions, views, experiences, and practices of the participating groups
R	Qualitative, quantitative, and mixed-methods

[1] S: Sample; PI: Phenomenon of Interest; D: Design; E: Evaluation; R: Research type.

3.2. Literature Search

The literature search for this review encompassed electronic resources, such as Medline/PubMed, ScienceDirect, African Digital Research Repositories, Google Scholar, and Ebscohost. In total, 14,111 studies were identified from the search process. These include Google Scholar (n = 5180), ScienceDirect (n = 157), Africa-Wide Information (n = 1405), CINAHL (n = 1224), Medline (n = 3160), African Digital Research Repositories (n = 669) and Registers (n = 2316). Both published and unpublished scientific articles (papers, conference proceedings, and theses) and public articles (government and non-government gazettes and reports) formed part of the search. The keywords used to search for relevant studies included: ((rural*) AND (youth* or children* or adolescence*) AND (elders* or seniors*) AND (farmers* or agriculturalists* or growers* or cultivators*) AND (indigenous foods* or traditional foods* or underutilized* plants* or neglected foods* or African vegetables*) AND (availability* or accessibility* or access*) AND (preparation* or preparedness* or readiness*) AND (consumption* or intake* or eating*) AND (utilization*) AND (perceptions* or views* or opinions*) AND (experiences* or practices* or knowledge*)). A string of several combinations of search terms were used to provide a wide variety of searches in the database (see Table 2). These terms were searched for and identified in abstracts and subject descriptors. A combination of databases that included electronics, books, and hand-searched journals were explored using the specified keywords. Only papers published from 2011 to 2021 were included in the search criteria. Additionally, documents from reference lists and bibliographies were searched.

Table 2. Search algorithm.

Variation	**Setting**		**Population**			**Phenomenon of Interest**	**Evaluation**	
Indigenous foods	Rural communities	Southern Africa	Youth	Elders	Farmers	Availability	Perceptions	Experience
Traditional foods	Rural areas	Angola	Children	Seniors	Agriculturist	Accessibility	Views	Practices
Underutilised plants		Botswana	Adolescent	Older people	Growers	Consumption	Opinions	Knowledge
Neglected foods		Lesotho	Young people		Cultivators	Preparation	Attitude	Awareness
African foods		Mozambique	Young adults		Ranchers	Preservation	Beliefs	
Native foods		Namibia				Utilisation		
		South Africa						
		Swaziland						
		Zambia						
		Zimbabwe						

3.3. Inclusion and Exclusion Criteria

Several inclusion and exclusion criteria had to be met for the studies to be included in this review.

(a) Inclusion criteria

The inclusion criteria for the review were: qualitative, quantitative, and mixed-methods articles published between 2011 and 2021, articles exploring barriers, and knowledge of rural communities of indigenous plants in Southern Africa. Southern Africa consists of nine countries: Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Eswatini, Zambia, and Zimbabwe (see Figure 1). All IFPs found in these Southern African countries, along with their uses, were included in the review.

This study defines the following terms:

- Rural inhabitants: includes elders, women, youth, food traders, and farmers.
- Barriers: includes preparation, preservation, availability, acceptability, and consumption of IFs.
- Knowledge: refers to perceptions, beliefs, attitudes, and practices.

Figure 1. The map of Southern African countries with indigenous food plants and knowledge discussed in this review [35].

(b) Exclusion criteria

Studies were excluded if they were (1) published outside the 2011 to 2021 study period; (2) reported findings on communities residing in urban areas; (3) reported on indigenous birds, insects, and sea mammals; (4) reported findings from countries outside the Southern African region; (5) published in languages other than English or IsiXhosa; and lastly,(6) were conducted on children aged 13 or less.

3.4. Data Collection

Title and abstract screening were carried out to retrieve relevant articles for the review. A single reviewer selected relevant articles (Z.N.N.), and they were double-checked by another reviewer (M.K.Z.). The chosen studies underwent the full-text screening stage, where extensive study screening occurred. Both screening processes were duplicated to ensure the synthesis process's reliability and eligibility (Z.N.N. and M.K.Z.). After screening completion, data were presented in the Preferred Reporting Items for Systematic Reviews and Meta-Analyses (PRISMA) flow chart diagram [36]. The PRISMA Statement included a 27-item checklist and a 5-phase flow diagram representing the review's search process [36].

3.5. Definition of Key Terms

Indigenous food: These crops originate in South Africa, either in that particular country or region. These foods were introduced into the country over centuries and are now known as naturalised or conventional harvests mentioned by the Department of Agriculture cited in van Rensburg [37]. For this review, "indigenous foods" is defined as native fruits and vegetables, those introduced to a region a long time ago, and traditional recipe foods.

Exotic food: These plants are imported from one country to another. They are not naturally found in the environment in which they currently exist [38].

Food utilisation: This is defined by the United States of International Development (USAID) as “food is properly used, proper food processing and storage techniques are employed, adequate knowledge of nutrition and childcare techniques exists and is applied, and adequate health and sanitation services exists. Thus, utilisation includes food storage, processing, health and sanitation, and related to nutrition” [39].

Food preservation: This is characterised as the procedures or methods used to control internal and external elements that could lead to food spoilage [40].

Indigenous knowledge system: Indigenous knowledge systems provide a knowledge system and know-how relevant to a particular community or culture that combines local people’s cultural customs, morals, views, and worldviews [41].

3.6. Quality Appraisal

A quality appraisal tool was adapted from qualitative and quantitative research studies tools [42]. According to the authors, a critical quality appraisal is empirical in systematic reviews, as it emphasises the high-calibre quality of the included studies.

The reason for this adaptation is that the review did not focus only on one research type but covered all three (qualitative, quantitative, and mixed methods). Therefore, a critical appraisal tool that covers all research designs needed to be developed (see Table 3). During the adaptation process, specific components were either omitted or merged. These concepts expressly referred to each methodological framework (qualitative or quantitative). For instance, features such as time scale, group comparability, and outcome measures in the quantitative and theoretical framework in qualitative were removed, and other sections, such as sample, were merged.

Table 3. GRADE-CERQual approach to systematic reviews.

Number	Themes	Confidence in Findings	Explanation in Confidence
1	Availability of indigenous foods	Moderate	Findings were reported by 26 studies with minor adequacy concerns on limited richness of data and moderate methodological limitation concerns.
2	Consumption of indigenous foods	High	Finding supported by 28 studies with rich data, and minor methodological and coherence concerns.
3	Utilization and consumption of indigenous foods	High	Findings were reported by 21 studies with rich adequate and relevant data with minor methodological limitations concerns.
4	Accessibility of indigenous foods	High	Only 9 studies reported this component. However, the data from these studies was rich, relevant and from a diverse population.
5	Harvesting and preservation of indigenous foods	Low	Only 6 studies reported this component with moderate adequacy concerns on limited richness of data, coherence of data and methodological limitation concerns.
6	Preparation of indigenous foods	Moderate	Findings reported by 13 studies with minor data richness and relevance concerns, and moderate methodological and coherence concerns.
7	Knowledge of indigenous foods	High	Finding supported by 20 studies with rich data and minor methodological concerns.
8	Beliefs and values towards indigenous foods	Low	Finding supported by 4 studies with limited richness in data, and some relevance, coherence, and methodological concerns.

Table 3. *Cont.*

Number	Themes	Confidence in Findings	Explanation in Confidence
9	Perceptions and attitudes regarding indigenous foods	High	Finding supported by 13 studies with rich data, and minor methodological and coherence concerns.
10	Frequency and acceptance and preference of indigenous foods	Moderate	Finding supported by 6 studies with rich data and minor methodological concerns, but with moderate coherence concerns.

This tool rated each study on the basis of two criteria. For each measure, a score was assigned. For instance, 2 denotes "Yes", and 1 denotes "No". A study-specific goal score ranging from 1 to 40 was calculated by summing up scores across all criteria. However, a comment section was provided to elaborate on the reasoning for scoring. This section provided a detailed and transparent assessment where methodological strengths and limitations were reported—these tools provided assessment of the methodological limitation component of the CERQual approach.

Studies that scored 80% and above were deemed high-quality papers. In contrast, those that scored between 60% and 80% were categorised as medium-quality papers. Those that scored below 60% were considered low-quality papers. Figure 2 summarises the quality assessment on the basis of the information reported in each study. The majority (30/34) of the selected studies scored above 80%, 3/34 scored medium to high, and only one study scored low (<60%). Of the eleven concepts, most studies indicated the bibliographic details, purpose, key findings, type of study, study settings, population, data collection, and data analysis. Most studies' other poorly reported concepts were ethics approval, issuing informed consent addressing validity or reflexivity, and outlining the researcher's potential biases. Two reviewers (Z.N.N. and M.K.Z.) conducted the assessment in duplicate.

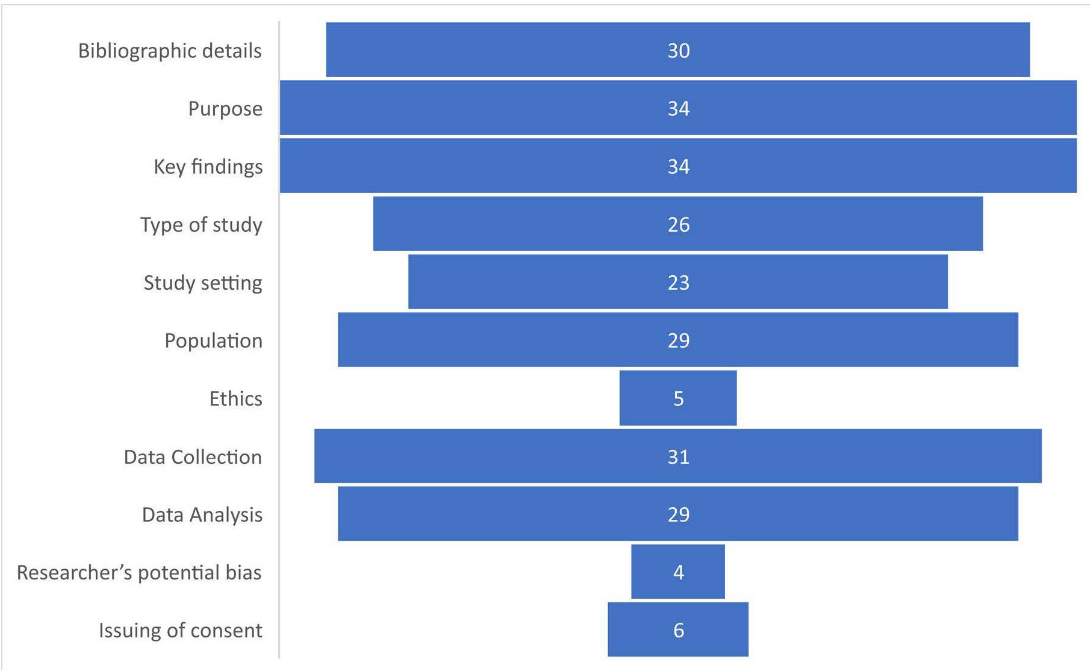

Figure 2. Quality appraisal concepts.

3.7. Assessment of Confidence in the Review Findings

The Confidence in the Evidence from Reviews of Qualitative Research (CERQual) technique was used to establish how much confidence to place in each review conclusion [43]

The Grade-CERQual approach includes four components: methodological limitations, coherence, adequacy, and relevance of data in assessing how much confidence to place in qualitative evidence synthesis.

Each criterion was assessed on three levels: (1) high (the phenomenon of interest is fully represented), (2) moderate (the phenomenon of interest is reasonably defined), and (3) low (the phenomenon of interest is not adequately represented). Of the seven phenomena of interest, utilisation and consumption, accessibility, and cultivation or production of IFs were adequately described. Likewise, the identification, availability, and preparation of IFs were reasonably represented. In contrast, the preservation of IFs could have been better defined. This shows that more research needs to be conducted on preserving these foods, as this is one of the components that will assist in the accessibility and stability of utilising IFs.

3.8. Data Extraction

Studies included in this systematic review underwent a rigorous data extraction phase. A standardised Google form was developed to systematically extract information from the articles (see Table 4).

The forms included the following key areas:

- Authors;
- Publication year;
- Study setting;
- Study design;
- Study population;
- The phenomenon of interest (availability, accessibility, cultivation, preparation, preservation, consumption, and utilisation);
- Evaluation (beliefs, acceptance, knowledge, frequency, and experience);
- Research type (qualitative, quantitative, or mixed methods).

This form was used for the synthesis and analysis of the impact of the evaluation on the phenomenon of interest. This process entails discovering patterns in data, with themes emerging as categories to aid analysis. Therefore, not all variables were applied to all studies represented in each work.

Table 4. Summary of the characteristics of the reviewed data.

Authors	Year of Publication	Study Period	Geographic Focus	Research Design	Sampling	Age		Sample Size	Availability	Consumption Frequency	Utilization	Accessibility	Harvest & Preservation	Preparation	Knowledge	Beliefs & Values	Perceptions & Attitudes	Frequency& Acceptance
Maroyi, A. [44]	2011	8 months	Zim	Qualitative	n/p	13–82	males, females, youth & community leaders	87		x	x			x				
Maroyi, A. [45]	2013	2 months	Zim	Qualitative	n/p	n/p	Households	147	x	x				x				
Bvenura, C., et al. [46]	2015	n/p	SA	Review	n/a	n/a	n/a	n/a	x	x				x				
Cloete, P., et al. [6]	2013	6 months	SA	Qualitative & quantitative	n/p	n/p	Households	600	x	x							x	
Kasimba, S., et al. [11]	2019	3 months	Bots	Qualitative	Random	18–49	253 females	253		x	x	x					x	
Taruvinga, A., et al. [47]	2015	n/p	SA	Quantitative	n/p	n/p	n/p	100	x	x				x			x	x
Kwinana-Mandindi, T.N. [48]	2014	12 months	SA	Qualitative & quantitative	Convenience	>18	Males and females	100	x	x	x	x	x	x	x	x	x	
Bruschi, P., et al. [49]	2019	7 months	Moz	Quantitative	n/p	16–90	30 males & 22 females	55	x		x				x			
Job, M. [7]	2018	n/p	Zim	Qualitative	Snowballing	60–90	females	n/p	x		x		x	x	x			
USAID [50]	2017	5 years	Mal & Zam	Qualitative	n/p	n/p	Mothers, fathers, health promoters, community leaders, health ministries & marketers	248,200	x	x			x				x	x
Welcome, A.K. and Van Wyk, B.E. [24]	2019	n/p	Bots, Les, SA, Swaz and Nam	Review	n/a	n/a	n/a	n/a	x	x								
van der Hoeven, M., et al. [51]	2013	n/p	SA	Qualitative & quantitative	Purposive	>18	Males and females	120	x	x	x	x	x	x	x	x	x	
Mbhenyane, X.G., et al. [29]	2013	n/p	SA	Quantitative	Convenience	>18	380 females & 323 males	703		x					x			

Table 4. *Cont.*

Authors	Year of Publication	Study Period	Geographic Focus	Research Design	Sampling	Age		Sample Size	Availability	Consumption Frequency	Utilization	Accessiblity	Harvest & Preservation	Preparation	Knowledge	Beliefs & Values	Perceptions & Attitudes	Frequency& Acceptance
Mahgoub, S.A., et al. [52]	2013	n/p	Bots	Qualitative	Convenience	21–60	106 males & 106 females	212		x	x				x			
Dlamini, V.V. [5]	2017	n/p	Swaz	Mixed method	Convenience	>24	females	102	x	x	x	x	x	x	x			
Matenge, S.T., et al. [53]	2011	n/p	SA	Qualitative & quantitative	n/p	>20	Males & females	400	x	x	x				x	x		x
Mavengahama, S. [15]	2013	2 months	SA	Mixed method	Purposive	n/p	Males & females	99		x	x	x					x	
Nengovhela, R. [54]	2018	n/p	SA	Quantitative & qualitative	Random	n/p	Households	200	x	x	x	x			x		x	
Kasimba, S.N. [14]	2018	3 months	Bots	Qualitative & quantitative	Random	18–49	400 HH; 253 women; 18 street vendors	671	x	x	x	x					x	
Mungofa, N., et al. [55]	2018	3 months	SA	Qualitative	Random	18	Households	854	x	x		x			x		x	x
Masekoameng, M.R. and Molotja, M.C. [56]	2019	4 months	SA	Qualitative	Purposive	n/p	Households	168	x	x	x	x			x			
Matenge, S.T., et al. [57]	2012	4 months	SA	Quantitative & qualitative	Purposive	>20	Males and females	12	x	x	x	x			x		x	
Bultosa, G., et al. [58]	2020	n/p	Bots	Quantitative	n/p	40–87	Males and females	39	x						x			x
Rankoana, S. [59]	2021	12 months	SA	Qualitative	Purposive	32–97	20 males, 49 females & 20 cattle headers	89	x	x					x			
Omotayo, A.O., et al. [60]	2020	n/p	SA	Quantitative	n/p	20–70	Males & females	180	x	x	x				x			
Semenya, S.J. and Mokgoebo M. [61]	2021	n/a	SA	Review	n/a	n/a	n/a	n/a		x	x					x		
Mbhatsani, H., et al. [62]	2011	7 months	SA	Quantitative	Convenience	9–14 years	Children	172		x					x			x

Table 4. *Cont.*

Authors	Year of Publication	Study Period	Geographic Focus	Research Design	Sampling	Age		Sample Size	Availability	Consumption Frequency	Utilization	Accessiblity	Harvest & Preservation	Preparation	Knowledge	Beliefs & Values	Perceptions & Attitudes	Frequency& Acceptance
Lewu, F.B. and Mavengahama, S. [63]	2011	2 months	SA	Quantitative & qualitative	n/p	>59	Households	99	x	x	x						x	
Munsaka, C. [4]	2018	n/p	Zim	Qualitative	Purposive	>18	11 males; 24 female & 21 youth	56	x	x	x			x			x	
Urso, A., et al. [64]	2017	3 years	Ang	Qualitative	Snowballing	n/p	26 females; 40 males	66	x	x	x			x	x			
Mawunu, M., et al. [65]	2022	2 months	Ang	Qualitative	n/p	18–53	35 females; 30 males	65	x	x	x		x	x	x			
Aparicioa, H., et al. [66]	2021	3 months	Moz	Qualitative	Random	40–86	14 females & 11 males	25	x		x			x	x			
Thandeka, N., et al. [67]	2011	n/p	SA	Quantitative & qualitative	Convenience	31–60	42 females & 22 males	64	x					x	x		x	
							TOTAL		26	28	21	9	6	13	20	4	13	6
							Percent of 33 studies		78	85	64	27	18	39	61	12	39	18

n/p: not presented; n/a: not applicable.

4. Data Analysis Section

Data were analysed qualitatively, making use of thematic analysis. Thematic analysis refers to various text readings and refining findings into key themes [68]. These can be derived through critical messages and coding, utilising grouping codes into descriptive themes and further interpreted to analytical themes [69].

4.1. Study Screening and Selection

Figure 3 provides a visual representation of the methodological and screening process. The systematic search of the literature yielded 11,795 studies (Google Scholar: (n = 5180), ScienceDirect: (n = 157), Africa-Wide Information: (n = 1405), CINAHL: (n = 1224), Medline: (n = 3160), and African Digital Research Repositories: (n = 669)), with 10,888 excluded as duplicates or not relevant to the current study aims on the basis of using specific filters in the various search engines. All the 3223 studies that remained after all filters were implemented went through the abstract screening, where 2098 studies were excluded, resulting in 1125 studies that proceeded to the title-screening phase. Of these, 1032 were excluded for various reasons, as shown in Figure 2. Thus, 93 studies passed the full-text screening, leaving 45 eligible studies to be reviewed.

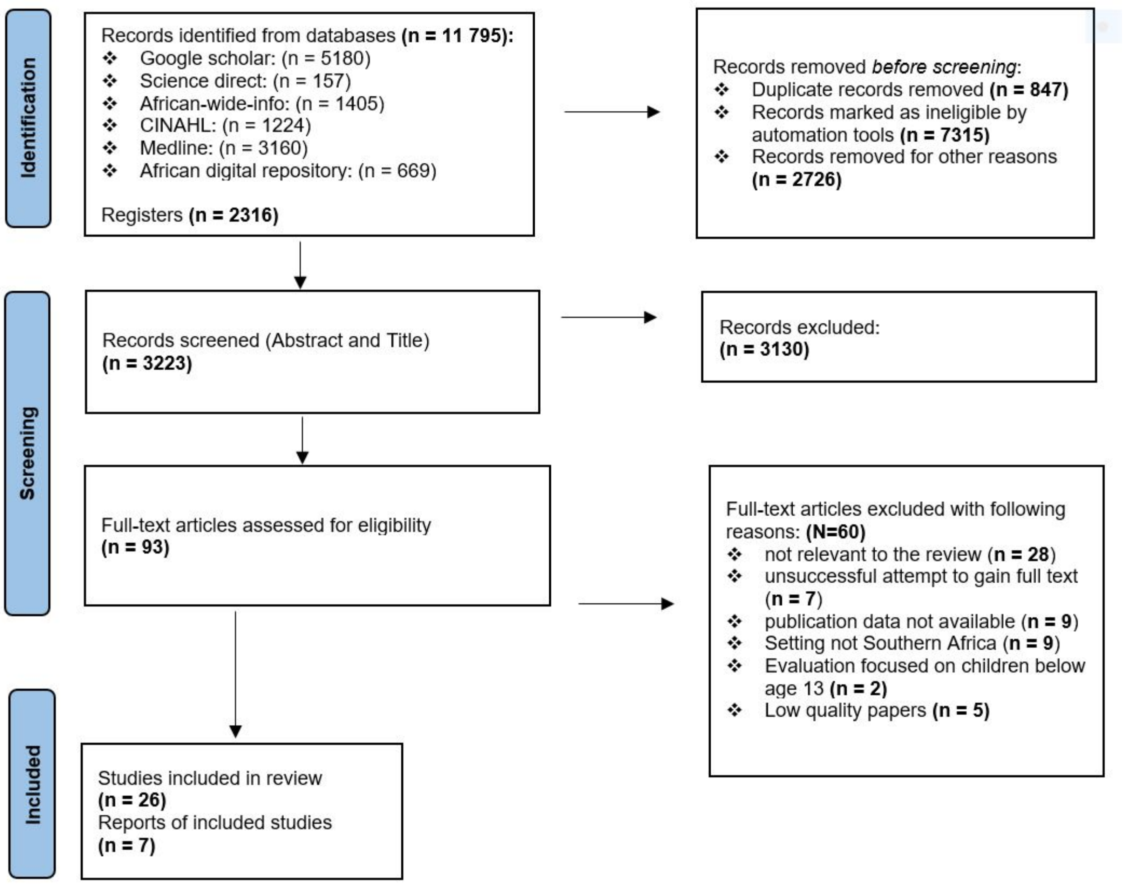

Figure 3. PRISMA flow diagram showing the process followed during the literature search and selection of included studies.

The 45 reviewed articles went through the GRADE-CERQual approach, where 12 were excluded, leaving 33 reviewed articles for analysis. Following a thorough evaluation of the entire texts of the 33 studies using the data inclusion/exclusion sheets, the second reviewer examined these studies and established 100% agreement on inclusion/exclusion.

4.2. Description and Characteristics of Included Studies

The review yielded 33 studies (3 reviews, 23 articles, and 7 theses). A summary of the descriptive characteristics of these datasets and studies is shown in Table 4. Of these datasets, 79% are from journals, and only 21% are from academic theses, which were not published in journals. Experience from 10 Southern African countries (Angola, Botswana, Lesotho, Malawi, Mozambique, Namibia, South Africa, Eswatini, Zambia, and Zimbabwe) was documented. The majority of the studies were published between 2011 and 2016. The age range of participants in this review varied greatly, ranging from 9 to 90 years. The 33 studies had 253,938 (range: 12–248,200) participants, including 1204 females, 593 males, and 252,141 non-specific genders. Most studies (79%) used primary data, and only seven (21%) presented secondary data. The three main sample selection strategies were convenience, snowball, and purposeful sampling. Most studies were conducted in South Africa (55%), followed by Botswana and Zimbabwe (12%), and Angola and Mozambique (6%). In contrast, Lesotho, Malawi, Namibia, Eswatini, and Zambia were least represented, with only 3% of articles included in the review. A variety of data methods and designs were represented from qualitative and quantitative (27%), qualitative (39%), quantitative (18%), and mixed-methods (6%) in the various studies.

4.3. Descriptive Themes Emerging from the Literature

The main findings from each study are summarised in Table 4. Not all variables applied to the studies were represented in each study. Table 4 shows how the other elements were distributed throughout the studies. This process entailed discovering patterns in the data, with themes emerging as categories to aid analysis. For each study, the identified factors were availability, consumption frequency, utilisation, preparation, harvesting and preservation, knowledge, perceptions, and beliefs. Of the 33 studies, only one identified all factors involved in using IFs. Most (85%, n = 28) studies reported the consumption of IFs, followed by availability (78%, n = 26 studies), utilisation (64%, n = 21 studies), knowledge (61%, n = 20 studies), preparation, perception, and attitudes (39%, n = 13), accessibility (27%, n = 9 studies), preservation, frequency, and acceptance (18%, n = 6 studies), with beliefs and values being the least represented variables (12%, n = 4 studies).

4.3.1. Availability and Accessibility of Indigenous Foods

One of the most common factors affecting the use of IFs is availability (71%), whereas accessibility (29%) was identified in several studies. It has been observed that IFs are accessible and available from various sources, [4–6,14,15,53,54] to name a few. Availability of IFPs has been reported to be found during three seasons (summer, autumn, and winter) [4,5,7,11,55–60]. Communities in Botswana [58] reported that during the rainy season, some green vegetables, such as morogo wa dinawa (cowpea leaves), were frequently accessible in summer.

According to a review by Welcome and van Wyk [24] and other studies [60,63–67,70,71], Southern Africa has a large diversity of IFPs. The review was conducted in five Southern African nations (Botswana, Lesotho, Namibia, South Africa, and Eswatini) and listed 23,000 different plant species found in these southern African nations. The same study found that 156 of these plant species' families belonged to IFPs species. They featured 137 edible species, Apocynaceae, which is reported to be at the top of the list. More surprisingly, the Fabaceae species, which includes 135 species, also appeared prominently in this review.

At least 35 native plants, spanning 29 genera and 23 botanical families, were identified by Mawunu et al. [72] in Angola. The top list of edible species included members of the Apocynaceae, Fabaceae, and Zingiberaceae families. These results are consistent with those of Göhre et al. [73], who carried out a similar survey across the entire Bakongo tribes in Uíge, Northern Angola, and listed 122 species spread across 28 botanical families, with Apocynaceae and Fabaceae being the two groups with the highest reported species numbers.

Fabaceae, Moraceae, and Annonaceae have the highest IFPs from 89 wild food plant species belonging to 47 families and 65 genera. In Zimbabwe, Mujuru et al. [74] demonstrated parallels with the studies described above. While Anacardiaceae, Moraceae, and Fabaceae families had excellent representation, Maroyi [45] counted 67 wild plant species in the Nhema communal area of Zimbabwe, and Fabaceae, Moraceae, and Annonaceae were reported to have the highest number of IFPs from 89 wild food plant species belonging to 47 families and 65 genera. In Zimbabwe, Mujuru et al. [74] demonstrated parallels with the studies described above.

Maroyi [45] found 21 edible IFPs in the Shurugwi district in Zimbabwe spread across 11 families and 15 genera. *Amaranthus* spp., *Corchorus* sp., and *Cleome* sp. Were the genera with the most edible species, while 108 edible IFPs were found by Bruschi et al. [49] in Mozambique, consistent with these findings. *Amaranthus* spp. Was reported to have the most significant number of edible species among IFPs [50]. Ochieng et al. [75] stated that IFPs such as *Amaranthus* spp., *Abelmoschus esculentus*, *Ipomoea batatas*, *Solanum nigrum*, and *Cleome gynandra* are frequently marketed in Zambia. *Amaranthus* spp., *Bidens pilosa*, and *Gynandropsis gynandra* were the three most widely accessible indigenous vegetables in Malawi, according to a survey by Kwapata and Maliro [76]. *Amaranthus* spp., *Bidens pilosa*, and *Cleome gynandra* topped the list of the seven most commonly referenced IFs in another USAID et al. [50] survey. The prevalence of the Apocynaceae is said to be unique to Africa [24]. On the other hand, Apocynaceae and Fabaceae are thought to have the highest species populations throughout the nine Southern African nations.

4.3.2. Consumption Frequency of Indigenous Foods

Even though the majority (85%) of the research studies covered IFPs consumption, just five research studies from various countries identified IFPs as being commonly consumed: cowpeas, *Cleome gyndra*, *Amaranthus* spp., pumpkin leaves (*Cucurbita pepo*, *C. moschata*, and *C. maxima*), and *Bidens pilosa* (e.g., 6,28,45,50,64,74). Similarly, these findings show that *Amaranthus* spp., *Cleome* sp., and sweet potatoes are reported to be the most common IFPs traded in Zambia [45], while *Bidens pilosa* is the most common IFP traded in Malawi [76].

These findings are supported by Dweba and Mearns [21] in South Africa, who identified 33 commonly consumed IFPs and reported *Amaranthus* spp., *Cleome gynandra*, *Citrullus lanatus*, and blackjack as the most popular IFPs. On the other hand, due to their regular commercial production and ease of accessibility, cowpeas and sweet potatoes are seen as the most traditional IFs in South Africa. A recent study in Angola by Mawunu et al. [65] reported IFPs being frequently consumed (weekly) [28]. Mbhenyane et al. [28] reported that IFs were consumed 2–3 times per week in Limpopo, which supported the current results. These vegetables were reported to be consumed more frequently in rural than peri-urban areas, mainly by the older generation compared with young people, and by unemployed people compared with employed people [48].

Many pregnant women were reported to consume IFs in Malawi and Zambia, as they perceived them to have a high nutritional value [50]. Additionally, these dishes were reportedly consumed by toddlers under the age of two as side dishes with maize porridge. At the same time, parents were reportedly feeding infants between the ages of six months and one-year IFs by chopping up vegetables, adding water to porridge, and grinding up traditional leaves to add to the porridge. Parents identified moringa and pumpkin leaves as crucial vegetables for young children to eat [50].

4.3.3. Utilisation Practices of Indigenous Foods

One of the most reported components influencing the promotion of IFPs is utilisation [4,7,11,44,48,49,51,55,57,63–66]. According to a study conducted in Zimbabwe, edible plant components identified as significant food sources included edible fruits, leaves, and young shoots that may be cooked into vegetables; edible roots, tubers, and corns; edible inner bark; edible kernel; and fruit juices that can be brewed into beer [44]. There is a clear distinction among the plant parts that are used (whole plants, underground storage organs, stems, etc.) and the categories of use (snacks, moisture sources, vegetables, meal, tea substitutes, coffee substitutes, alcoholic and non-alcoholic beverages, etc.) [77].

Studies in this systematic review revealed that some indigenous vegetables obtained from multi-purpose plant species are consumed as food and medicine to promote health [16,48,49,63,74]. These species' most frequently reported medical uses were digestive issues, respiratory illnesses, obstetric and puerperal issues, venereal disorders, and colds and flu [49]. One South African study found that 14 native plants were consumed and had both medical and nutritional properties [48]. *Bidens pilosa*, for instance, is consumed as umfino (the plant), cooked with maize meal, and may be eaten as a side vegetable, stir-fried, or boiled in a small amount of water, but it is also used medicinally. In traditional medicine, *Bidens pilosa* is frequently used as an antiviral to manage diabetes and treat gastroenteritis [52,71,78].

A Zimbabwean study by Munsaka [4] found that 10 IFPs, including fruits, tubers, and leafy vegetables, had medicinal properties. The same study reported that *Cleome* is eaten as food and used to treat the eyes. On the other hand, *Amaranth* leaves were said to be high in antioxidants, which protect one's cells against free radicals and play a role in heart disease, cancer, and other diseases [79]. These results support Lewu and Mavengaham's [63] finding that the three indigenous plants most commonly used for food and medicine are *Amaranthus* spp., *Chenopodium album*, and *Bidens pilosa*. In contrast, blackjack *(Bidens pilosa)* has been reported to be a potential IFP, which may serve as a food and medicine for lowering high blood pressure [4]. The same study reported that blackjack and *Amaranth* leaves have medicinal properties that help HIV patients recover and live longer, encouraging IFP consumption.

Additionally, various drinks made from IFPs are available, including traditional beer, fermented non-alcoholic beverages, and herbal teas [80,81]. Kobisi et al. [82] published a study on an IFP used to produce herbal teas in Lesotho. According to the same survey, sorghum is just as popular as malt in the country for making traditional beer, while in Angola, the *Raphia* spp. is utilised as a standard local drink (raphia wine) because of its cultural significance. According to Brushi et al. [49], consumption of homemade beverages prepared with traditional plants is common in Mozambique, particularly in rural areas, which likely explains the high alcohol consumption rate in that country. In Europe, Chen et al. [83] reported on IFPs used as hot beverages, which are thought to have some antioxidant, anti-inflammatory, antimicrobial, and anticancer properties.

In contrast, Bruschi et al. [50] reported that IFPs such as *Strychnos spinosa* and *Amblygonocarpus andongensis* are used in food and fishing in Mozambique. The latter's usage as fish poison and for making flour has been documented in South Africa. In Zimbabwe, Munsaka [4] reported that multiflora is used to make herbal tea and that local vegetable leaves are used to prepare sauces.

4.3.4. Preparation of Indigenous Foods

A few studies [4,5,14,44–48,51,65], which reported on IFs' preparation, claim that there are numerous ways to prepare and use IFPs. According to reports, cooking is the most popular method for preparing IFs to improve their digestibility and flavour [5]. In Malawi, preparation of IF was reported as either boiling the leaves or frying the vegetables. Women described the preparation of the indigenous vegetable process as gathering the plants from the garden, separating the leaves, cutting them into pieces, washing them in a colander basket and cooking with just a small amount of water [50]. This practice is distinctive in Southern Africa and other parts of Africa [83]. These results are consistent with those of Munsaka [4], who reported that vegetables are cooked in salty water for a short time in Zimbabwe and South Africa [48]. In many traditional African societies, most IFPs are consumed as a supplement (relish) to a starchy meal [48]. To cook wild sweet potato leaves and *Amaranth*, the leaves are rolled between the hands to remove the white sap, dried in the sun for 10–15 min, and then fried with tomato and onions [50]. Depending on the leaf's texture, the plants' cooking time ranges from 5 to 10 min. Due to their thicker texture, vegetable leaves, including cowpeas and cleome, require more time to cook [4].

Conversely, during the preparation phase, IFPs are combined with others. Most of the time, mixed plants are prepared as a single dish to reduce their bitterness and sliminess and increase their acceptability [51]. It is believed that combining IFPs in a meal increases the health benefits resulting from their synergistic complementarity in terms of nutritional and medicinal qualities. *Amaranthus dubius*, for instance, is frequently used individually, both in *imifino* and as *ulaxa* (ulaxa is a traditional term for numerous wild edible plants boiled in a small amount of liquid and served as a side complement to *imifino*, a collection of diverse wild dark green vegetable leaves) [48]. Some women reported eating indigenous vegetables as a relish with thick porridge made primarily of the staple grains, millet, sorghum, and maize [14,48].

In addition, IFPs such as *Monodora myristica, Piper guineense*, and *Xylopia aethiopica* can be used whole or crushed to make a spice for the creation of sauces or sprinkled on pork, chicken, or fish before they are butchered [14]. The primary ingredients are water, salt, peanut butter, and cow's milk or cow's milk cream, without a strong preference for either. Vegetables—including tomatoes, onions, or whatever is available—and other soups, can be added. While cooking oil may be used, peanut butter is preferable since it increases nutrient density and improves palatability [4].

To avoid starving during the famine, women in Zambia learned the abilities and methods for turning a variety of poisonous native food plants into edible food [49,64]. While *Dioscorea cochleariapiculata* and *dumetorum* tubers are harvested and consumed only during food scarcity in Zambia, these yams are recognised as meals in East Africa [49]. *Dioscorea cochleariapiculata* and *dumetorum*, when consumed uncooked in East Africa, are known to cause vomiting and even death [19]. However, the tubers of these plants can be consumed after proper preparation, such as "peeling the tuber, cutting it into thin slices, drying and washing for many hours in a river, constantly changing the area". Alternatively, boiling the ingredients with *mukuma* (a natural soda derived from the ash of the plant's *millettia stuhlmannii*, *afzelia quanzensis*, *Tabernaemontana ventricosa, or piliostigma thonningii*) can also help to remove the poisonous elements in this plant [49].

On the other hand, fruits, which are not poisonous, are typically consumed as soon as they are picked in the field [4]. These findings are consistent with another Zimbabwean study, which reported that *miombo* (fruit) were ingested unprepared and raw [74]. The *xima* plant is a common African food native to Mozambique and well-liked throughout the continent. It is a type of corn–flour porridge that is frequently served with sauce. This plant does not require the complex preparation techniques needed for other IFPs and is not harmful [49]. However, in other species, such as *Adansonia digitata*, the mealy pulp surrounding the seeds can be eaten raw or turned into juice by boiling or soaking it in water at room temperature; the mucilage or pulp can be ingested directly [14]. On the other hand, some seasonal fruits require boiling as part of the preparation process, such as *Canarium schweinfurtii* [49]. Of all the individuals surveyed in the various studies, rural women appear to favour IFs since they are quick and straightforward, making them popular [5].

4.3.5. Harvesting and Preservation of Indigenous Food Plants

Only 6 of the 33 studies discussed IFPs' harvesting and preservation [7,48,50–52]. According to these studies, women and children handled most IFP harvesting and preservation, as most men were out in the fields tending to cattle or cultivating the fields. There are many ways to harvest and collect IFPs locally, including obtaining only those abundant in that area. When gathering, it is essential to treat leaves and flowers carefully because their tissues make them considerably more susceptible to deterioration than roots [15]. According to Mawunu et al. [65], harvesting is one of the methods most frequently utilised to obtain IFPs. Dlamini [5] asserted that IFs are best harvested by hand while fresh and soft in the morning. Some indigenous green leafy vegetables, including *Amaranthus*, blackjack, nightshade, and bitter gourd, are typically harvested and consumed while young and succulent [14]. Other harvesting methods include tree felling, uprooting, defoliation, and peeling [70]. The last three methods, however, are not viable, as they may lead to the genetic erosion of locally cultivated edible plants [84].

Most people, especially those in rural areas, rely on locally grown food, so employing conventional food preservation techniques is necessary to guarantee that food is available in their homes all year round [55]. Some of these preservation techniques include sun-drying, minimal processing, canning, vacuum-packing, refrigeration, freezing, and irradiation [85].

Many studies reported sun-drying as a popular preservation method used by women because it is an affordable and practical way to preserve native food plants in bulk shortly after harvesting [5,48,50,51,55]. However, according to Dlamini [5], this preservation method can result in a significant loss of vital micronutrients, including vitamins A and C. Therefore, fresh leaves are first blanched or fried before being dried in the sun to preserve their nutrient content. This is congruent with findings from van der Hoeven et al. [51], who reported that all vegetables should be blanched in steam before drying to stop the action of enzymes and the loss of some nutrients.

Steam-blanching followed by dehydration [86] achieves ascorbic acid retention in vegetables. Matenda et al. [56] stated that *Cleome gynandra*, mbuya, *muchacha, munyemba*, and *mutsine* are blanched before sun-drying on either reed mats or sacks on elevated platforms. Drying surfaces are set up on platforms to shield vegetables from dust and domestic animals. The common belief is that vegetables dried from a stone are more delectable. This drying process is quicker on the rock than on the mat or sack, possibly better preserving the nutrients [50]. Other plants, such as beans, can be employed as preservatives for the plants being stored throughout storage [83].

According to the USAID report, Zambian IFP seeds of cultivated vegetables are available all year [50]. Women described preserving plants in their homes by drying them on mats in the sun and then putting them in grain bags. This is consistent with a Malawian community reporting that pumpkin and cowpea leaves were dried on a mat and then preserved in sacks within one's home. Wild sweet potato leaves are separated from the stems, briefly blanched, and then dried in the sun before being put away in a bag for consumption when indigenous vegetables are scarce [50].

Another traditional preservation technique involves using a storage ball called a *chikwati in Chewa/Tumbuku* in Zambia. Large leaves are typically used to create a storage ball, which is then twined up and hung from the rafters of a house, with stored items lasting up to a year. Using a clay pot is another method of preserving IFPs. For example, green leafy vegetables are stored in a clay pot, which is tied shut and covered with a plastic bag [50]. In addition to lowering post-harvest losses, IFPs preservation guarantees a steady food supply to fight hunger and disease, mainly in the rural population where medical facilities are scarce and not well-equipped [16]. This type of indigenous knowledge (IK) is typically passed down from elders, who were raised using the techniques, to the younger generation. If not passed down, this knowledge dies with that particular individual, as there is nothing written down to preserve it.

4.3.6. Knowledge of Indigenous Foods and Benefits

IFP knowledge has been the subject of much research conducted throughout Southern Africa, including in Zimbabwe [4,44,67,74] and Botswana [11]. Of the 33 studies reviewed, only 19 studies reported on IF knowledge. According to Kasimba [14], IK is learned chiefly through social interaction and is typically passed down from generation to generation through conversations. The use of IK to prepare or consume certain IF types can be seen in a society's religious and cultural beliefs, such as the notion that individuals enjoy particular foods because their ancestors or elders consumed them. Numerous food preservation and storage methods have been created and successfully used in specific traditional communities. For example, indigenous vegetables are cooked before consumption, while indigenous fruits are typically consumed raw in most African countries [65].

In many African communities, IK in food preparation and preservation is highly developed [14], making the process much easier. IFs are preserved for years without losing too much of their nutrient content. Maroyi [44] asserted that Zimbabwe's IFPs availability needs to be sufficiently recorded despite the country's wealth of IK, possibly because there need to be more academics conducting research in this area. For the comprehension, interpretation, and distribution of IK, it is essential to comprehend the role of gender and how it influences the intrinsic value of the local knowledge system. There is a separation of household duties in most rural communities (i.e., women are generally the chefs in the home), and this gender disparity and specialisation is thought to be the reason why women have more knowledge of IFP than do men [44]. These results are consistent with those of Munsaka [4], who found that women across different communities had joint expertise in cooking fresh and dried vegetables. For instance, the other rural communities reported that indigenous vegetables were primarily cooked and consumed soon after or immediately after gathering them [14], unless there was excess to store for consumption during the dry seasons.

However, a study by Maroyi [45] suggested that most community residents were aware of IFPs but needed help finding them because the landscape has changed, with most areas needing more fields for planting or vegetation in the surrounding area due to the modernisation/commercialisation of the nearby lands. In contrast, Matenge et al. [57] found that awareness of IFPs, their advantages, and their consumption was scarce among South African populations in the Limpopo Province, possibly for the same reason mentioned above. Nengovhela [47] suggested that the IFK level influenced consumers' views of IFPs. As a result, as consumers become more knowledgeable of IFPs and their advantages—because of the knowledge being passed down to younger generations and the willingness of the younger generation to use this knowledge to their benefit—their perceptions of these IFs may improve, which will raise the utilisation levels [47].

4.3.7. Perceptions and Beliefs towards Indigenous Foods

The USAID et al. [50] report asserted that Mawa villages in Zambia favour IFs. The latter was possible since these foods are believed to have health benefits, have a pleasant flavour, and are easily accessible. The people praised indigenous vegetables as being nutritious, high in vitamins, and effective at preventing illnesses. The same observation was noted in Malawians and the Mawa populations, who perceived IF usage similarly. Additionally, Mawa people mentioned that they commonly ate IFPs due to their accessibility, cost-effectiveness, pleasant flavour, and vitamin content [51]. However, this report contradicts van Hoeven et al. [51], who reported that taste was one of the reasons for reducing IF consumption in South Africa; however, IFPs found in Malawi and Zambia may be different from those found in South Africa, resulting in the other flavours.

A study by Nengovhela [47] suggested that communities in Limpopo view IFs favourably. These communities did not consider IFs to be food for the underprivileged, as did the findings by Cloete and Idsardi [6], who reported that IFs were considered poor people's food amongst communities of the North West Province of South Africa. In contrast, Limpopo communities recognised these foods as healthier and more reliable sources of nutrition and energy [47]. Another study by Kasimba [14] reported that communities in Botswana perceived IFs as more nutritious than exotic foods. The same study stated that these foods were characterised as natural foods that did not require using any chemicals or additives during production and processing other than salt, when necessary. These foods have a favourable impact on satiety, with an acquired taste in some of these communities. On the other hand, Mavengahama [15] agreed with the finding that IF is of superior quality, particularly in terms of freshness, nourishment, being natural, unprocessed, and produced locally, and having many health-related benefits.

Another study by Munsaka [4] suggested that participants in Zimbabwe had a positive attitude towards IFs, which may contribute to the high intake of these foods in that country. The same study reported that indigenous vegetables have natural, social, and cultural values and are crucial for meeting the daily dietary needs of most inhabitants in those communities. Most Zimbabweans share a common view that supports the assertion that cultural norms and people's beliefs about particular foods significantly influence their dietary choices when it comes to IFs [4]. The author also reported health and nutrition as the most significant reason for the consumption of IF by most participants from the studied area in Zimbabwe. Frequent response on the value and significance of IFs was that these foods formed part of their ancestors' diets, helping them have healthy lives and live longer [4].

On child-feeding beliefs and practices, mothers in Zambia agreed that they were responsible for feeding their children IFs, which meant giving them a healthy diet. These findings are consistent with findings in the USAID et al. [50] report. It was reported that pregnant women consumed IFs and fed indigenous vegetables to their infants starting at six months old, with the understanding and belief that the food was nutritious and healthy for the baby. In contrast, communities in Zimbabwe openly voiced their thoughts and convictions regarding their communities' child-feeding habits. The issues mentioned were unhealthy eating habits being modelled by others. Parents' perspectives on handling children who refuse to eat IFs differed significantly [14]. As a result, eating IFs has become a custom that most cultures share, which can be reinforced with positive attitudes and encouragement from the elders and the conveyance of the benefits of eating these foods.

5. Discussion

This review summarised and synthesised the findings from 33 studies examining the factors that influence IF consumption and its utilisation in Southern African countries. Many Southern African countries depend heavily on IFs in their diets, mainly in rural areas, which have been the focus of this study. Despite the importance of IFs in ensuring food and nutrition security, more research is needed on these foods in most Southern African countries. This is unexpected, given the significance of IFs in achieving SDG 1–3′s objectives to eradicate poverty and hunger and promote health and nutrition [87].

This review demonstrates that South Africa has led the way in promoting IF research. IFs in South Africa are being scaled up with financial assistance from several research organisations, including the Department of Science and Technology and the Agriculture Research Council [88,89]. The South African National Food and Nutrition Security Policy's strategic goal is to ensure that affordable, readily available, and nutritious food is available at the national and household levels. This goal includes using IFPs to support a variety of diets, including those containing *Amaranthus dubius*, *Cleome gynandra*, *Vigna subterraneae*, *Colocasia esculenta*, and *Vigna inguiculata* [88]. In this regard, other Southern African nations need policies for IF research and funding, as they possibly have the largest per capita consumption [90]. While there is so much research in South Africa and more government funding to support the uptake of IFs, there is still less consumption compared with other countries where there is no funding or support from the government.

The findings of this review suggest that Southern Africa has a wealth of IFPs. The availability of these IFPs in nearly all of the represented countries was reported in at least 24 (70%) publications. According to Welcome and van Wyk [24], the world's most prominent families are *Poaceae*, *Fabaceae*, and *Brassicaceae*, which somewhat correspond to the existing pattern in Southern Africa. While a total of 150 wild plant species have been recognised as emergency foods worldwide, including 87 species in Thailand and roughly 150 species in India, Malaysia, and Thailand [91], 211 species have also been reported in China [92]. These data demonstrate the widespread availability of IFPs. This analysis shows that IFPs are widely available in Southern Africa, encouraging consumer demand, especially among the youth.

These IFPs are not only accessible, but they are also consumed to provide both nutrition and health benefits in various communities. This is particularly important given that most rural areas in Southern African countries have little to no access to medical facilities or have to walk long distances to access medical facilities. Therefore, consuming a healthy diet of IFs keeps these individuals healthy, without the need to frequent medical facilities for medical assistance. Nearly all research discussed the frequency component of IF consumption (Table 2). Evidence from 19 studies revealed that availability and knowledge were critical determinants of IF intake. This was followed by the belief that IFs are more nutrient-dense than foreign foods. Other studies indicated that some IFPs contribute to various phytoconstituents, including antioxidant molecules and phytochemical composition [11,29]. These consist of protein and calorie content, minerals, vitamins, and other hormone precursors [48]. According to Ghosh-Jerath et al. [26], eating various IFs is linked to higher intakes of iron, calcium, carbohydrate, riboflavin, thiamin, vitamin A, beta-carotene, and folate, all of which are essential to maintaining a healthy body.

On the other hand, most Southern African countries value IFPs for their nutritional and medicinal properties [4,29,49]. These foods are used in numerous medications that treat illnesses and infections [4]. For example, *blackjack* is recommended as a food and medicine for reducing high blood pressure. The same study suggested that *Amaranth* and *blackjack* leaves are considered medicinal plants that assist HIV patients in their recovery and in living longer [4], making IFPs more important. This is important because it helps rural communities spend the little money they earn on other essential household responsibilities; as the saying goes, "let the food you eat be the medicine to all your ailments, rather than having to take medicines to treat those ailments". This further cements the importance of IFs in an individual's diet and calls for IFP knowledge to be transferred from one generation to another and IF consumption to be encouraged.

On the other hand, *Amaranth* leaves are reported to have antibacterial and antioxidant qualities in Zimbabwe, which help promote health by raising blood levels and preventing cancer and other chronic diseases [93]. Gowele et al. [94] claimed that *Solanum nigrum*, *Corchorus* sp., and *Amaranthus* spp. are all grown in Tanzania and are abundant in dietary fibre, vitamins, minerals, and other macro- and micronutrients. Oyetayo [95] from Nigeria described the widespread usage of local mushrooms as a medicine to cure gastrointestinal issues, headaches, and colds and fever, reinforcing the importance of IFPs in different regions.

Furthermore, Chang et al. [96] reported that *Bidens pilosa* is an extensively used indigenous vegetable in China for the treatment of several ailments, including influenza, gastroenteritis, and the management of diabetes. These global data suggest that IFs and dietary diversity benefit the defense against most ailments and disorders. Comprehensive data on IFs composition are critical in encouraging and incorporating these foods into daily diets. Mbhenyane [18] proposed that nutritional value composition data could be used to develop strategies for facilitating the intake, acculturation, and marketing of indigenous vegetables. Bvenura and Afolayan [46] suggested that adding more IF items to the IF database may facilitate the acceptance and consumption of IFs in communities' daily diets. This process can be achieved through awareness and promotion programmes across Southern Africa, creating a database that is freely accessible and working with government institutions to promote the uptake of IFs. It may also help to have the information of the published article broken down into lay terms and published in easily accessible newspapers and to have radio and TV programmes that can improve awareness and show people different ways of preparing and preserving such foods. This will ensure that a method which has been utilised in one region can be replicated easily in another area that would otherwise not have benefited from such a technique or preparation method.

Only a small number of research works addressed IFs' preservation. This explains why the IFP seed supply business in Southern African countries is underdeveloped. Food preservation involves storing food at off-peak times to provide a steady supply of nutritious foods [97]. IFPs, especially vegetables, are more readily available during wet seasons but become scarce during dry seasons [98], and their high moisture content makes them susceptible to spoilage after harvesting [99]. As a result, it is impossible to consume them all year long in their fresh state. Thus, they are usually dried and preserved for consumption during the dry period of the year. Due to the seasonal nature of most IFs and the lack of tools for processing or adding value to reduce food waste, indigenous people conserve their IFs (seeds, vegetables, and grains) [100]. According to Taruvinga and Nengovhela [47], indigenous people are highly knowledgeable about IF preservation methods. Although the majority of IFs are perishable, rural areas were able to extend their shelf life by using various preservation methods. Most IFPs are preserved for use in winter when supplies are low, which helps ensure household food security [101,102].

Regarding food security, Kamwendo and Kamwendo [84] stated that access to and availability of food remains a significant issue in most African countries. Stocking and storing food help ensure that households have access to it later and that it is safe to use. The type of preservation technique used [47] influences the nutritional value of the IFs. The long-term storage of IFs is significantly hampered by the lack of scientifically validated preservation techniques. Hence, conducting scientific testing on these techniques is essential to ensure that no nutrients are lost. This requires new and further development of existing IFP preservation strategies.

However, in-depth research and development are needed, even with modifying preservation technologies on exotic fruits and vegetables; for farmers to produce IFPs in large quantities and for households that choose to grow IFPs for their consumption and local sale, access to such information could have considerable influence. In addition, the availability, productivity, consumption, and quality of IFPs will all rise as more people become aware of the best preservation strategies to maintain the high nutrition components stored in the specific IFs. This study revealed a wide range of factors that encourage the uptake of IFs in Southern Africa. However, very little research is being conducted to preserve this knowledge in academic settings. For example, in Zambia, IFs were perceived to have good taste, ease of access, good availability, and health benefits [50]. In another study, Kasimba [11] noted that Botswana communities perceived IFs as healthier than exotic foods. IFs are thought to be nutritive, natural, and endowed with health advantages, according to Mavengahama [66].

On the other hand, Van Hoeven et al.'s [51] study contradicted the conclusions of USAID et al. [50] and identified drawbacks, citing taste as one of the reasons for the decline in IF consumption in South Africa; however, these findings have not been replicated in other studies. While some of these variables encourage the consumption of IFs, other factors are to blame for the decline of IFs' consumption, particularly in South Africa, given that there are concerted efforts by various organisations to encourage IF uptake in communities. The seasonal availability [60], lack of access to IFPs [84], the distance needed to collect IFPs [63], lack of knowledge of preparation, preservation, and nutritional content [47,102,103], and their nature of harvesting [15] also serve to discourage communities from exploring IFPs.

Even though IFPs are abundant in Southern Africa, many academics [14,16,29,30,79,81] have studied IFPs mainly for their nutritional and therapeutic benefits. Consumption of IFs is declining in most Southern African countries. This decline has been attributed to several factors, including the westernisation of African diets [57], the bitter and discouraging taste of wild vegetables [45], culture [14], and the perception that wild vegetables are low-income foods [48]. According to Ayua et al. [104], young people prefer exotic vegetables, as they claim them to be less bitter. For instance, Cloete and Idsardi [6] stated that in South Africa, the younger generation thought that IFs were a bitter food that only the poor would eat because they could not afford alternative options [51].

Additionally, a lack of interest in learning about IF or the absence of the older generation passing on information to the next generation about IFP identification, harvesting, preparation, and preservation has contributed to this decline [103]. Rural parents have even been reported to use various techniques to persuade their children to eat IFs [4]. Despite these negative perceptions of IFs, this review shows that IFs consumption is still ongoing, albeit not at the level that IFPs used to be consumed in the past. It is estimated that more than one billion people still rely on IFs globally [16,100].

In South Africa, the degree of urbanisation, the distance to fresh produce markets, and the time of year all have an impact on the consumption of IFPs [101], whereas in Kenya, it has been observed that ethnicity affects the decision to purchase and consume traditional leafy vegetables [102]. Little effort is being made to encourage IFP usage, given that more exotic plants are being cultivated, which has resulted in IFPs being neglected and nearing extinction in the areas where they used to be endangered.

The promotion of IFs is consistent with SDG 1–3, which deals with poverty, food security, and health concerns. The effectiveness of international, regional, and national policies will determine how well IF promotion is implemented and whether it succeeds. These policies should promote IFs to broaden dietary diversity and address other pressing issues, such as supporting rural communities' capacity building through developing relevant skills [102] and providing adequate and dependable infrastructure [105], as well as allocating sufficient funds for advertising campaigns that will assist in promoting IFPs that are less expensive, readily available, and do not taste bitter. Inclusion of various technical activities that incorporate IK of IFPs in a particular local community ensures that all communities have their IFP knowledge transferred from one generation to another [106]. This programme will increase the importance of rural communities to ongoing Southern African and national growth initiatives and encourage communities to take responsibility for promoting the use of IFs and marketing them to outside communities that could benefit from trading in these IFPs. Additionally, by utilising processing technologies that enhance the value of the completed products, farmers can boost their income from IFPs. IFs might become well-known through this popularisation for various functions, and improved packaging may improve their appeal, such as the aloe-vera-based products in Asia.

6. Conclusions

This review investigated the perspectives of factors influencing Southern African IF availability, consumption frequency, utilisation, preparation, harvesting, preservation, knowledge, perceptions, and beliefs. IFPs were reported in all of the studies in nine Southern African countries. Even though the assessment noted that IFs were consumed, it also stated that several Southern African countries were significantly cutting back on the intake of these foods, possibly because of modernisation or scarcity of IFPs in the areas where communities have been resettled. Patterns of consumption were noted across studies, with IF consumption generally more common in older generation groups. The various studies attributed the decline in consumption to urbanisation, decreased accessibility, lack of preparation and preservation knowledge, and nutritional content, to name a few.

This review also emphasises the significance of successful global, regional, and national policies in promoting IFs, with little to no supporting policies in most Southern African nations, save for South Africa. To reverse a decline in the utilisation of IFPs, these policies should also address concerns such as assisting rural populations in developing necessary capacity-building skills, providing suitable infrastructure, and devoting enough money to comprehensive research and marketing so that those involved in the growing of IFPs can earn a living through their jobs. Additionally, encouraging and incorporating these foods into everyday meals requires extensive information on the composition of IFs. This process can be achieved through awareness and promotion programmes across Southern African countries through workshops and programmes on the radio and TV stations, as well as having relevant governmental organisations involved in promoting the uptake of these foods in schools, hospitals, and many other facets of life.

Author Contributions: Z.N.N. developed the protocol and study design, performed the data extraction and collation, wrote the first draft, and edited the manuscript; M.K.Z. contributed to the document screening, editing, and approval of the manuscript; X.G.M. oversaw the review for the project's duration as an independent reviewer, acted as a second independent reviewer during the screening process, and was involved in the editing and manuscript approval process. All authors have read and agreed to the published version of the manuscript.

Funding: This research was funded by the National Research Foundation (NRF) (Grant number: 98954).

Institutional Review Board Statement: The protocol was reviewed by the Health Research Ethics Committee of Stellenbosch University via expedited review procedures on 05/10/2021 and was approved with HREC Reference No: S21/03/053 (PhD).

Informed Consent Statement: Not applicable.

Data Availability Statement: Not applicable.

Conflicts of Interest: The authors declare no conflict of interest.

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