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The Determinants of Formal Market Access for Indigenous Floral Foods among Rural Households in the Amathole District Municipality of South Africa: A Crucial Investigation for Understanding the Economic and Nutritional Dynamics of Rural Communities

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Abstract

Paradoxically, indigenous foods contribute to rural household income generation, health, food, and nutrition. Even so, research must investigate their market access, especially the formal market. A cross-sectional research method was used to collect data from the respondents. Descriptive and inferential statistics (logistic regression) were used to analyse indigenous food market access determinants. There is evidence of poor market participation and sales of indigenous floral foods (IFFs), with many indigenous foods facing the risk of extinction from the market due to poor involvement by most households in their sales, especially in formal markets. The result shows that 89% of rural households consume indigenous foods, but only 14% participate in selling these foods in formal markets. Indigenous floral foods are not sold at the farm gate, but the rural households sell more IFFs in the informal market as vendors, with few sold to registered markets. The trend results show that rural

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households' entry into the indigenous food market may decrease despite the growth witnessed in the past decade (2000-2012). The number of people consuming indigenous foods might further reduce due to challenges in getting them to urban and export markets, which arises from difficulty accessing the formal market. The rural household heads' level of education, involvement in other occupations, household size, experience in the involvement of IFF, and access to IFF-related information significantly influence their participation in the formal market for IFF sales. Poor demand, seasonality, and other factors are some challenges indigenous food marketing faces. Socioeconomic characteristics of indigenous food farmers, awareness, general information, and policies targeting indigenous foods should be improved, adopted, and implemented. Indigenous foods-related details and other factors that affect the market penetration of IFFs should be addressed to unlock IFFs access to formal markets.

Keywords: Trend, growth, experience, education-status, farmgate, harvest

Introduction

Poverty and food security are increasingly becoming a global challenge— with 10% (not less than 700 million) of the world's population depending on an income of less than $1.90 per day, which means a majority of households live in extreme poverty (United Nations Global Compact, 2023). Ironically, the report also stated that many households will further fall into poverty due to climate change, COVID-19, and poor income generation, stimulating the poverty projection on the upward trajectory trend (United Nations Global Compact, 2023). This trend will affect third-world countries most, with poverty more prevalent in Africa and Asia, especially among rural households (Baah et al., 2023). Unfortunately, many rural households have not utilised resources such as arable land, available extension service providers and general agricultural resources optimally to curb surging poverty, resulting in them depending largely on grants (Perret et al., 2005).

Like many other rural households in developing nations, most families in rural and less developed areas in South Africa are seriously affected by poverty (Gumede, 2021; Stats SA, 2017). For instance, Mathebula et al. (2017) found that most households lived in poverty in three provinces (Limpopo, Eastern Cape, and KwaZulu-Natal) in South Africa, mainly in settlement areas. Given the proportion of impoverished people, their findings revealed that many poor households are in these rural and less developed locations, with an average of 84, 89, and 93%, respectively. The reason behind household poverty is an interwoven problem that is also associated with a poor income diversification challenge (Mathebula et al., 2017).

Indigenous foods (IFs) are among the rural resources which remain poorly utilised by rural households due to poor diversification challenges amidst other pitfalls, limiting the adequate utilisation of indigenous foods (Ghosh-Jerath et al., 2021; Kaya, 2014; Onomu, 2023). Nevertheless, indigenous foods are critical in some rural household food security (Onomu et al., 2023). For instance, research in Tanzania showed that up to 114 indigenous food species consumed by different households helped achieve food security (Msuya et al., 2010). A study in Gaborone, Botswana, revealed that despite the decline in the proportion of those consuming indigenous foods, more than half of the households sampled consumed different types of indigenous foods (Kasimba et al., 2018). In another development, Street and Prinsloo (2013) stated that 80% of South Africans consumed indigenous foods for medicinal purposes. These views are supported by Gido et al. (2017), who found that indigenous floral foods (IFFs) are widely accessed by rural households mainly for local consumption, either for food or medicinal purposes.

A review by Onomu et al. (2023) showed that many indigenous foods have several beneficiary attributes, including rich nutritional contents that should ordinarily make them compete in the market with their exotic crop counterparts.—In reporting the need for consuming indigenous foods to mitigate food insecurity in South Africa, the South Africa Department of Agriculture, Forestry and Fisheries (SADAFF, 2014) stated that indigenous crops, including Spider plant (cleome gynandra) and "Amaranth"

(amaranthushypochondriacus) have higher nutritional content than exotic vegetables like lettuce and cabbage. Furthermore, comparison research on the dietary contents of selected indigenous vegetable foods with exotic vegetables shows that some indigenous vegetable foods appear to have equal or more nutritional contents than the exotic ones (Alozie and Ene-Obong, 2018). Besides the nutritional richness advantages of some indigenous foods, they are seemly favoured by and adaptable to local conditions much better than exotic floral foods being domesticated (Wilson and VanBuren, 2022). A study of 100 household heads in rural Nigeria showed that each household head generated more than 25% of their income from selling indigenous foods harvested from the wild (Oladele, 2011). Also, revenue generated from the sales of harvested indigenous foods by farming households in Kenya during a drought period was used to improve rural household welfare (Mwema et al., 2013). Irrespective of the numerous benefits of indigenous foods, their market performance, access, and household involvement remain a dilemma in many areas (Onomu, 2023a). For example, while there is a report of income generation from the marketing of indigenous foods on one part, there is also a report indicating a decline in their consumption, which poses risks and signals a reduction of market access for indigenous foods (Oladele, 2011). Concerns have been raised that the gap lies in a dearth of scholarly research that fails to address the holistic challenge of the indigenous foods market (Akinola et al., 2020). Markets have been another factor affecting rural households, with many struggling to access markets. Ironically, solid markets and societies are two sides of the same coin that go hand in hand (United Nations Global Compact, 2023). The market and market network are the bedrock of product commercialisation (Gans and Scott Stern, 2003). A need, therefore, arises to understand the drivers of formal market access among rural households, given the low participation and the reported potential income.

Problem Statement

Market access is significant to agricultural organisations and producers, but most rural market failures have been linked to market access challenges, resulting in liberalisation and adjustment in Africa (Shiferaw et al., 2011). The determination to promote better and more efficient market access railroaded government intervention in

developing countries between the 1960s and 1970s to get price and institutional policies in place (Barrett and Mutambatsere, 2008). Various policies and programmes in South Africa have been proposed and implemented to address challenges to exotic crop farmers' market access (Bahta and Bauer, 2012). However, these policies and programmes must focus more on indigenous food crop market access. For example, before the market board's abolition, the market board was identified as an institutional challenge that limited market access of exotic crop farmers, especially smallholder farming households (van Tilburg and van Schalkwyk, 2012). On the contrary, the lack of policies discussing the benefits of most indigenous foods has limited their consumption (Cloete and Idsardi, 2013). Policies not targeting the promotion of indigenous food market access could be attributed to a lack of research identifying their challenges and contributions (Weinberger and Pichop, 2009).

In another report, supply-side issues and production methods have been identified as barriers to smallholder exotic crop farmers' formal market access (supermarkets), but that of indigenous food still needs to be investigated (Heijden and Vink, 2013). This has stimulated different research, leading to the identification of crowded vendors that sell indigenous food around major malls (Weinberger and Pichop, 2009). Besides the trade of most indigenous foods taking place in the informal sector, evidence shows that many of them are mainly used for household consumption, creating a disincentive signal to sellers (Botha et al., 2004; Heijden and Vink, 2013; Kasimba et al., 2018). Another observation suggests that most indigenous food markets are unorganised or lack formalisation (Kasimba, 2018).

While research seeks to address the problem of poor indigenous food policies (Gumede, 2021; Hermann, 2009; Schönfeldt et al., 2018), there is evidence of a decline in the consumption of indigenous foods among urban households (Njume et al., 2014; Oladele, 2011), and overcrowded street vendors in the market chain of indigenous foods (Weinberger and Pichop, 2009). This indicates a gap in many households' sales of indigenous foods in formal markets.

More so, rural households not taking advantage of the market and the availability of indigenous foods to improve their income despite their high poverty level could probably be due to limited

information on the indigenous foods market that must be overcome to ensure access to indigenous foods' formal market. This shows a lack of information on factors affecting their access to formal markets. Against this background, this research investigates the determinants of rural household heads' access to formal markets of indigenous floral foods (IFFs).

The Objectives of the Research are to:

- Investigate the types of indigenous floral foods marketed by rural households from the study area;
- Analyse the types of markets accessed by indigenous floral food sellers in the study area;
- Investigate the trend in indigenous floral food market entry and exit by rural household heads in the study area and
- Investigate the determinants of formal market access for indigenous floral foods by rural households from the study area.

Methodology

The study was conducted among households in the Amathole district municipality of the Eastern Cape, South Africa. The district's name (Amathole) is coined from isiXhosa, which means forest and is located along the coastal area of the province (Amathole District Municipality, 2016). Hence, Amathole municipality has reasonable amounts of forest land scattered across the area, providing habitat for fauna and flora indigenous to South Africa (Amathole Forestry Co, 2017). The municipality is among the poor municipalities in South Africa, with many rural areas (Eastern Cape Socio Economic Consultative Council (ECSECC), 2017).

Sample and Sampling Techniques

An open and closed questionnaire and interviews were used for the data collection. The sampling procedure involved a multistage sampling technique of data collection from different household heads across the area's six local municipalities (Mnquma, Mbhashe, Amahlathi, Ngqushwa, Great Kei, and Raymond Mhlaba). The six

local municipalities were sampled to ensure data was collected from household heads in the different municipalities of Amathole. Five villages/communities from each local municipality were randomly selected, and eight household heads from each municipality were randomly selected. Hence, 240 respondents were sampled, but information from 211 household heads was used for the analysis because some questionnaires were incomplete. Three students at the master's level were trained and utilised as enumerators.

Logit Theoretical Framework and Modelling of Indigenous Food Formal Market Access

Logistic regression is the method of modelling a relationship that enables inference of outcomes between criterion dichotomous variables and other predictor variables (Wooldridge, 2010). In logistic regression, the criterion variable follows the probability function because it involves characteristics that express an action's presence or absence (Braun & Oswald, 2011). It could be used to model whether a household head sells indigenous foods in a formal market or not. The logistic regression aims to estimate the probability of occurrence, which is the probability of households selling indigenous food in a formal market. Therefore, the likelihood of the sales of indigenous food is measured. The probability that a household head sells indigenous food in a formal market, which takes the value of 1, is estimated from equation 1 (Çokluk, 2010). The logistic function takes the value between 0 and 1, which could be expressed as:

$$f(x) = \frac{1}{1+e^{-z}} \text{.....1}$$

Where e is the exponent of the scale parameters of the independent variables, also known as the log base, and z is the parameters of the dependent variables.

Because the parameters of the dependent variables are linked to the logistic function, the equation is used as presented in equation (2) (Udofia, 2011).

Therefore, $f(x) = \frac{1}{1+e^{-z}} = \frac{1}{1+e^{b_1x_1+b_kx_k+a}}$ 2

This means that the probability that the household head participates in selling indigenous food plants in the formal market is 1 for a given value of the independent variables presented in equation 3.

Therefore, $P(Y = 1|x_1 \ldots . x_n) = \frac{1}{1+e^{b_1 x_1 \ldots + b_k n_k + a}} \ldots \ldots \ldots \ldots \ldots 3$

Therefore, the probability of the household head selling indigenous food (IF) in the formal market is a function of the dependent variables. x_1 to n_k such as age, gender, and education level.

Description of Variables and Research Design

The study used a cross-sectional research design. An open and close-ended questionnaire was administered to the rural household head. The household head's socioeconomic characteristics and institutional variables, such as access to information, were used to investigate factors influencing formal market access for indigenous floral food sales. The variables are presented in Table 1. Qualitative and quantitative research designs were used to analyse the data.

Table 1: Variables measurement and description

Variable		**Description and measurement**
Dependent Variable	The dependent variable for the logit regression is a type of market access for the sales of indigenous food.	Dummy variable, If sold in/to formal market = (1) and otherwise = 0. The formal market covers the export market, registered individuals, and significant markets such as Spar, Shoprite, Pick and Pay, etc.
	Gender	Sex of household head, male = 1 and 0 otherwise
	Age	Actual years of the respondent at last birthday (continuous)
	Marital status	Collected as categorical but converted to a dummy

Variable		Description and measurement
Independent Variable		variable. Married = 1, otherwise = 0
	Educational level	Year(s) spent in formal education (continuous)
	Occupational status	If the household head is involved in an occupation other than correction of IF(s) = 1, otherwise 0
	Indigenous food market information	Dummy, if household head received market information including market price, demand, or awareness on indigenous food = 1, and otherwise = 0
	Household size	Total number of members living with the household head when the data was collected
	Experience	Experience is measured in the number of years (s) household heads have been engaged in indigenous food activity. For example, how long have you been cultivating/harvesting and marketing indigenous food? (Continuous variable starting from zero, with a household head who has never been involved in indigenous food-related activity scoring zero)

Source: Authors' compilation

Result and Discussions

This section presents the results and the interpretation of the findings. It commences with a presentation of the primary sample statistical summary of the respondents, which covers their distribution in formal and informal indigenous floral foods markets. This is followed by the major types of indigenous floral foods marketed by rural households in the study area. Next is the presentation of the kinds of markets accessed by indigenous floral food sellers in the study area. Lastly, the determinants of formal market access for indigenous floral foods by rural households are presented.

Summary of Basic Sample Statistics of the Respondents

A summary of the primary sample statistics of the study's respondents is presented in Table 2. A total of 211 rural household head participants were used to analyse the data, of which the majority (54%) were female. The results of the primary sample statistics indicate that at the time of the study, the respondents' mean age was 50 years, and the majority (56 %) were single, which could be due to divorce and the death of a spouse. The respondents' mean years spent in formal education was eight years, although Table 2 also suggests some respondents did not have formal education.

Table 2: Basic sample statistics summary

Dummy variable	**Frequency (sample size = 211)**	**Percentage (%)**
Gender		
Male	97	46
Female	114	54
Marital status		
Currently in married (yes)	92	44
Otherwise (no)	119	56
Currently involved in another occupation		
Yes	85	40
No	126	60

Dummy variable	**Frequency (sample size = 211)**	**Percentage (%)**	
Accessed information on IF Yes No	 149 62	 70.62 29.38	
Continuous variable	Min	Mean	Max
Age	21	49.6	80
Level of education	0	8.6	16
Household size	1	5	12
Experience	0	9.1	62

Where IF means indigenous food

Source: Computed from field survey data, 2023

Table 2 shows that, at the time of the study, the majority (60%) of the respondents were solely involved in farming, including indigenous floral foods activities, and their household size comprised an average of five members. Furthermore, the primary sample statistics distribution in Table 2 reveals that the rural household heads had an average of nine years of experience in indigenous floral foods activities. Still, some have had up to 60 years of experience in one or more forms of indigenous floral food activities, with the majority (71%) of the respondents having one or other form of access to indigenous floral food information.

Types of IFFs Marketed by Rural Households from the Study Area

This section presents various kinds of IFFs commonly marketed by rural households in the study area. The description of IFFs, including local/vernacular and common/scientific names, as well as their utilisation, is presented in this section. Figure 1 presents the overview of the commonly sold and consumed IFFs.

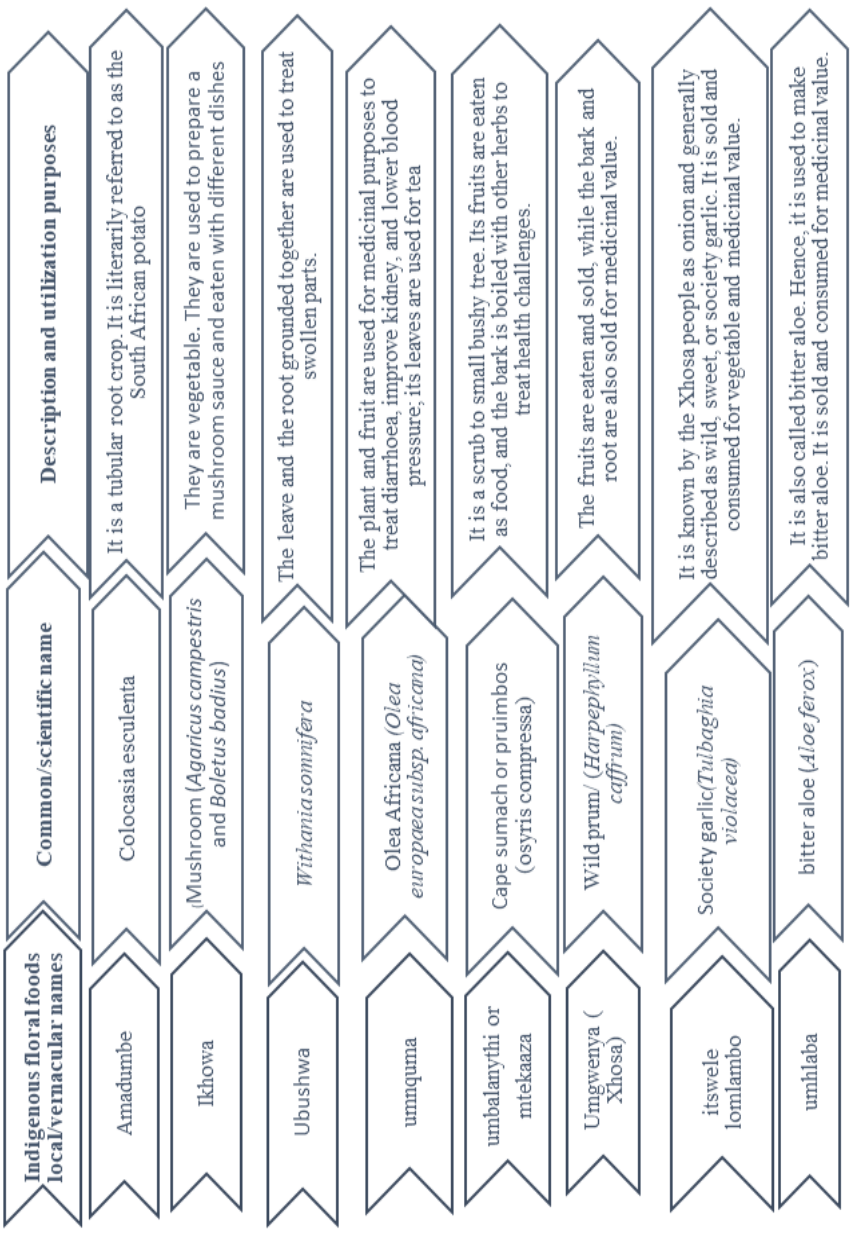

Figure 1: Types of IFF marketed by rural households from the study area

Where IFFs stands for indigenous floral foods

Source: Computed from field survey data, 2023

Figure 1 reveals that rural households sell vegetables, fruits, medicinal and root tuber IFF crops. However, Figure 1 indicates that rural households sell few indigenous root tuber crops. For instance, it appears that Amadumbe (*Colocasia esculenta*), as shown in the figure, is the only root tuber crop indigenous to the area sold by rural households. Figure 1 also reveals that most IFFs are sold for their medicinal value. This result is in line with the findings of Street and Prinsloo (2013) which states that many indigenous medicinal plants are traded and consumed in South Africa, with 80% of the South African population purchasing indigenous medicinal plants. This finding also corroborates the review of Onomu et al. (2023) which revealed that while not less than 80% of South Africans' household heads used indigenous food plants for their health, some of them also applied indigenous food plants for the treatment of their animals. More growth in terms of sales and consumption purposes is observed in indigenous medicinal crops than in other IFFs. Furthermore, the result reveals that rural households harvest IFFs for consumption purposes and sales to generate income. For instance, 65% of the sampled respondents admitted to harvesting IFFs, and 89% to consuming IFFs. Since the percentage of households harvesting IFFs is less than the percentage consuming IFFs, it indicates that some rural households purchased IFFs.

Regarding the consumption of IFFs that are not sold in the area, Ihlaba (*Sonchus oleraceus*) is a typical example. It is a vegetable prepared by frying or boiling water and adding salt, animal fat, or cooking oil. The cooked Ihlaba is eaten with bread, maise meal, or rice. Besides the consumption of Ihlaba for nutritional value, most of the respondents believe Ihlaba is utilised for medicinal purposes to treat liver and stomach ailments and cancer.

Types of Markets Accessed by Indigenous Floral Food Sellers in the Study Area

Figure 2 presents two broad (formal and informal) categories of market outlets rural households accessed to sell their indigenous floral foods. The rural household heads were asked to identify all markets where they usually sell indigenous floral food. The percentage distribution of the rural households who access specific market types is also presented in Figure 2. The percentage does not

sum up to 100%; rural households could have multiple markets for selling their indigenous floral foods. Hence, the percentage is based on the fraction of the market in which an individual rural household head reportedly sold IFF. The question that probed the categories of markets or buyers where the rural households sell IFFs is described as follows. For the informal market sales categories, the rural households were asked if they sell IFFs at farmgate sales, sell to individuals in the street, around the Mall, or in the motor park, or sell to unregistered intermediaries who resell. For the formal market categories, they were asked if they sell to the local registered market/market agent, supermarket, or export/international market.

The result in Figure 2 shows that, regarding the market access for the sale of indigenous floral foods, rural households do not sell their indigenous floral foods at the farmgate market. Based on this study, and as also described by Onomu (2023b), the farmgate market is used for the sales of farm or agricultural products at the farm. Farmgate sales mainly occur in developing countries, especially among smallholders. However, this result indicates that rural households do not sell IFFs at the farm gate. This could be because most IFFs are not farmed at a specific farm but are mainly harvested from the wild.

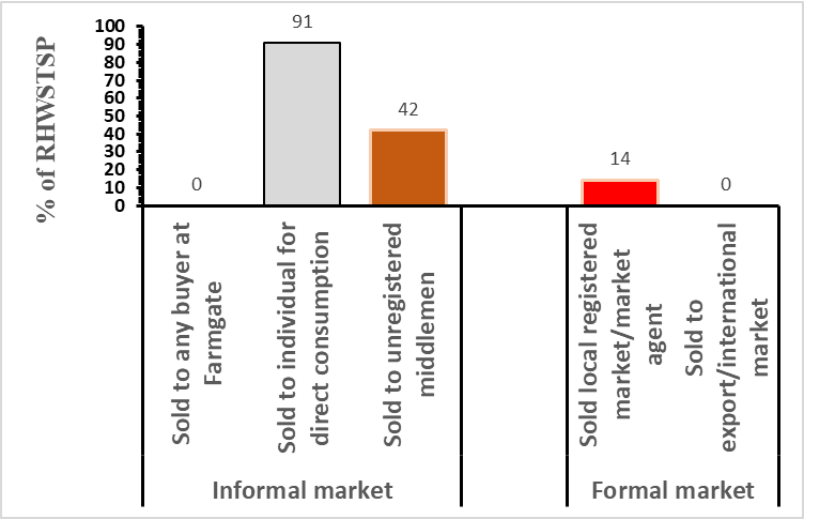

Figure 2: Graph showing types of markets accessed by the respondents
% of HWSTSP implies the percentage of rural households sold to a specific market channel.
Source: Computed from field survey data, 2023

Figure 2 reveals that most rural households (91%) sell indigenous foods in informal market outlets directly to the individual final consumers around the mall, motor park, and on the streets. This result is closely related to the findings of Kasimba (2018), who observed that many households sell indigenous foods in the street and around the mall. Regarding other market outlets, a fair number (41%) of the rural household indigenous floral foods market participants also sell to some market agents they consider unregistered vendors. The rural household heads believe that the unregistered vendors resell the indigenous floral foods in semi-urban areas and cities where some indigenous foods, especially fruits and medicinal plants, are not found. There are no rural households that sell IFFs to the export market. This indicates poor market participation and sales of IFFs in the formal market. However, Figure 2 shows a welcoming development, with 14% of the rural indigenous food market participants selling to local registered market/market agents or supermarkets. For example, some respondents admitted to harvesting and selling directly to registered Phytomedicine and food processor experts. However, of the small number of households selling IFFs, that tiny fraction sold to formal markets might reduce the availability of IFFs in urban and export markets, reducing the number of people having access to them for consumption.

Rural Households' IFF Market Entry Trend

Figure 3 presents the number of rural households involved in IFF market participation using five-year intervals. Figure 3 shows the results of rural households who enter and sell as formal market participants of IFFs only and the combination of both informal and formal IFF market participation. To achieve the trend in IFF market participation over the years, the start year of household heads, which served as the most extended IFF market participants and were currently selling, IFFs were used as a benchmark to investigate the trend of the IFF market participation entry and growth. The household head with the most extended history of IFFs sales, but currently participating in IFFs market sales, started in 1989.

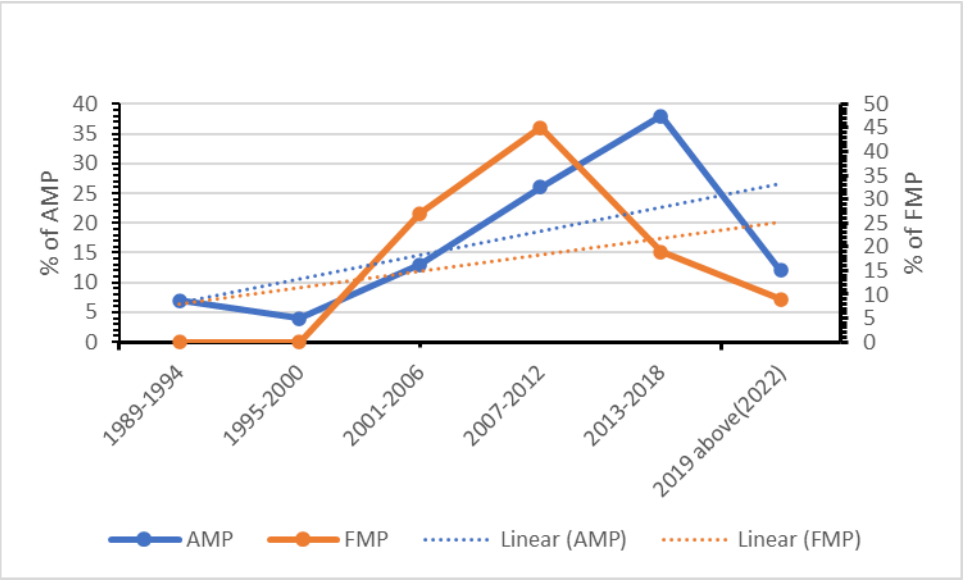

Figure 3: Trend and percentage of rural households who entered the indigenous foods market

Source: Computed from field survey data, 2023

FMP is a formal market participant in indigenous floral foods, and AMP participates in indigenous floral foods. This result revealed one crucial point: before 2000, the study participants were not involved in formal market sales of indigenous foods in the study area. This trend could be due to previous policies, laws, or competition excluding/preventing rural households, especially black South Africans. This result corroborates the finding of Musinguzi et al. (2006).

On the other hand, the result in Figure 3 shows that there has been an increase in the number of people getting involved in indigenous floral food market participation between 2000 and 2012. The results contrast the findings of Musinguzi et al. (2006), who found that rural and peri households, especially rural emerging and commercial farmers, are shunning getting involved in indigenous food markets. The contrary observations in growth findings for the number of people entering the market of indigenous floral foods, especially between 2000 and 2012, could be due to a need for more job opportunities in other sectors, including formal jobs. In addition,

this could be linked to the fact that the indigenous floral foods market is currently yielding improved financial rewards. It is important to note that the growth in the analysis should have considered the number of household heads who would have dropped from participating in the indigenous floral foods market over the years in the study area.

The increase in the percentage of people entering the indigenous food market indicates growth, but the growth is more informal than formal. Moreover, there is also a risk that the growth might be short-lived due to urban dwellers' declining demand for indigenous foods. This risk follows the law of demand and supply, which says supply falls when demand falls. For example, Njume et al. (2014) stated that most urban households abandon indigenous foods for their exotic foods.

Again, despite the participation of some rural household heads in the indigenous foods formal market, the results showed that there is a wide margin between the rate at which rural households entered the IFFs informal market and the formal market, with the forecast result showing that the margin is likely to be more comprehensive.

Determinants of IFF Formal Market Access by Rural Households

This section presents the determinants of formal market access for indigenous floral foods by rural households. The rural household access to the formal market was measured as a binary variable. The rural households not selling IFFs were assumed not to participate in the formal IFF market. Rural household heads who access the formal market for indigenous floral foods were measured as 1 and 0 otherwise. Whether the rural household heads sell IFFs to the formal market or otherwise was used as a dependent variable to investigate the determinant of the indigenous floral food formal market. A logit regression was used as the analytical tool to determine the factors influencing rural households' access to the formal market for indigenous floral foods. Since logit regression was used, a diagnostic check using the variable's variance inflation factor (VIF) was performed to ensure a consistent, reliable, and accurate result. The mean VIF value is 1.34, indicating the variables are relatively less correlated. The parenthesis of the logit regression results in Table 3

shows the model fitness statistics level of the number of observed respondents of 211, Likelihood Ratio, Chi^2, and Pseudo R^2 values. The Pseudo R^2 is high (0.513), which shows that the model explains 51% variability in the outcome. Though the Pseudo R^2 is not precisely interpreted as the R^2 in logit regression, it has an excellent interpretation, as does the R^2 in linear regression. The model's Chi-square (chi^2) result is significant ($chi^2 = 0.000$). This expresses a good fit of the result, which reflects that the whole model predicts substantial improvement in the determinants of rural households' access to a formal market of IFFs over the null model.

As presented in Table 3, the likelihood of rural household heads participating in the formal market of IFFs is influenced by the level of education, involvement of the household head in other occupations, the household size, experience of the household head in IFFs activities and access to information about indigenous floral foods.

Table 3: Binary logit regression results of IFF formal market access determinants

Variable	**dy/dx**	**Delta-method Std. Err**	**T**	**P>|t|**	**95% Conf**	**Interval**
Gender	-.010397	.0309424	-0.34	0.737	-.071043	.050249
Age	-.0009868	.0016089	-0.61	0.540	-.0041402	.0021666
Marital status	-.0226737	.0269986	-0.84	0.401	-.0755899	.0302425
Level of education	.0101498	.0049506	2.05	0.040**	.0004468	.0198528
Involvement in other occupations	.0795028	.0397412	2.00	0.045**	.0016115	.1573941
Household size	.0245549	.0060414	4.06	0.000***	.012714	.0363958
Experience	.0056915	.0015818	3.60	0.000***	.0025913	.0087917
Information	.0865773	.0327867	2.64	0.008***	.0223165	.1508381

***, ** and * represent significant 1, 5 and 10% levels, respectively.
Source: Computed from field survey data, 2023

Number of obs = 211, LR $chi^2 = 44.35$, Prob > $chi^2 = 0.0000$, Pseudo $R^2 = 0.5133$

The results in Table 3 indicate that an increase in formal education positively correlates with rural households' formal market access to IFF sales at the 5% significance level. The result shows that an increase in formal education by a year increases the household's formal market access opportunity by 1%. The low influence of association observed between formal education and access of rural household heads to the formal market of IFFs is most likely due to a low level of formal education attainment by most rural households. Nevertheless, an increase in formal education benefits rural households, possibly through acquiring adequate knowledge and access to information to stimulate and navigate formal market participation, including indigenous floral foods. This result is similar to the findings of Van Crowder et al. (2007). Formal education, significantly higher education, was noted to improve rural households' productivity and agricultural market access. The emphasis is on acquiring and applying the potential of education to promote agriculture while ensuring that non-formal educated farming households harness the benefits of schooling alongside their farming activities (Van Crowder et al., 2007).

The determinants of indigenous floral foods formal market access result in Table 3 reveals that involvement in other occupations positively influences rural householders' access to indigenous floral foods formal market at a 5% significance level. In other words, rural household heads, especially indigenous food market participants involved in other occupations, are more likely to access an agro-food formal market for indigenous floral foods than those who solely depend on harvesting indigenous floral foods as their only activity. This result further indicates that compared to household heads who solely rely on the harvest of IFFs, the household head who engages in other occupations has a 7% chance of accessing the IFF's formal market. The reason the rural household head's involvement in another activity has a positive relationship with access to the formal market of indigenous floral foods could be attributed to different factors. Firstly, some indigenous floral foods are only available seasonally. For this reason, the rural household head needs to be involved in other activities besides harvesting and selling indigenous foods to get into mainstream agricultural activity, such as farming to sustain the agro-foods formal market. Involvement in agriculture and other rural activities and adding value to harvested

indigenous floral foods could aid and maintain the marketing of indigenous floral foods in the formal market. Secondly, being involved in other activities could provide an alternative source of income that the household head could use for other logistics and to acquire value-added skills for entry into and sustainability of the formal market. This result is closely related to the findings of Mwema et al. (2013) on general market participation (not isolating those who sell to formal) of indigenous foods that involvement in other occupations has a positive relationship with the marketing of indigenous foods.

The result of formal market access determinants in Table 3 also shows that at a 1% confidence level, the household size of the rural household head has a positive association with formal market access to indigenous floral food sales. This result indicates that as the household size of the rural household heads increases by one additional person, they will likely participate in the formal market of indigenous floral food increases by 2%.

Under normal circumstances, a larger family size ought to negatively influence rural household heads' access to a formal market of IFFs due to the tendency to consume more of the harvested produce than sell it because of more household members to feed. On the contrary, the positive association of household size with the formal market access to indigenous floral foods could be that the large household might take advantage of many available household members to harvest more indigenous floral foods, which could be large enough to sell to the formal market.

Table 3 shows that the experience of rural households in the study area positively influenced formal market access for indigenous floral foods. It reveals that knowledge gained through experience in one additional year of involvement in indigenous floral foods-related activity stimulated formal market access to indigenous food by 0.5%. This implies that in comparison to rural household heads with zero or less experience in indigenous floral food activity, additional experience gained by rural household heads who, through involvement in one form or the other in indigenous food activities such as harvesting, processing, and general value addition is more likely to lead to access to the indigenous food formal market. As in a real-life situation, experience gained over the

years for being involved in indigenous foods activities appears to play a crucial role in influencing rural households to access the formal market of indigenous floral foods. In this view, Ainembabazi and Mugisha (2014) observed that farming experience significantly influences agricultural production, including adopting technology, which influences more output for the formal market.

Table 3 shows that access to information on indigenous floral foods is a critical determinant that positively influences the formal market access of rural household heads to indigenous floral foods. As revealed in Table 3, the household head who is exposed to indigenous food prices and general market information on indigenous floral foods' developmental changes, knowledge, and benefits has an 8% higher chance of accessing and participating in the formal market of indigenous food than the household head without access to such information. In addition, relative to rural households with access to indigenous floral foods information, receiving information on market opportunities and health benefits of indigenous food promotes the likelihood of the rural household head harvesting more indigenous floral foods, which could stimulate their effort in accessing formal markets of indigenous food for sales. In other words, the lack of information on indigenous floral food markets negatively results in most rural households not accessing their formal market. A report by Rampa et al. (2020) They stated that more market information is needed to improve the commercialisation of indigenous foods, which most often emanates from access to formal markets. While rural households' access to information promotes their access to formal market IFFs, some rural households do not have access to this information (See Table 2). The information's frequency, sources, and credibility could also impact production efficiency and integration of rural household heads into the market.

Challenges Associated with the Sales of Indigenous Floral Foods in Formal Markets

The respondents pointed out some of their challenges and concerns during the data collection, such as poor government support regarding training, financing, or advice. They stated that no government official or agency has approached them about

improving indigenous food products, seeds, or formal market access. The seasonality of indigenous food production also affects their continuous sales. This is more severe because they need improved IFF seed techniques for cultivation during the off-season. They stated they had yet to receive any form of improved seed of indigenous foods for cultivation. They also need help with poor and inconsistent demand in the formal market.

Conclusion and Recommendations

Indigenous floral foods contribute to rural households' income generation through their sales in informal and formal markets. However, some rural households do not participate in the IFFs market, with rural market participants selling mainly in the informal market rather than the formal market. This means that many rural households have not effectively harnessed the income potential of indigenous floral foods through their active market participation. Until recent times (years 2000 and above), most rural households in South Africa were not integrated into the formal market of indigenous foods. Despite most of the indigenous foods not being sold in formal markets, it seems there could be an increase in the number of rural households entering the marketing of indigenous floral foods. However, there is a need for a pragmatic and sustainable approach to prevent a decline in the number of rural households entering the IFFs market. The rural household heads' education status, household size, and experience in farming, including that of IFFs, are among the factors that influenced their participation in the indigenous floral foods market. Access to IFF-related information, the involvement of the household head in other occupations, and the household size exhibit a higher influence as the most likely stimulants of rural household heads' access to a formal market of IFFs. Despite the participation of some rural household heads in the formal market for indigenous foods, the results showed a wide margin between the rate at which rural households entered the IFF's informal market and the formal market. The forecast result shows that the margin is likely to be more comprehensive. The trend of market entry for the sales of IFFs by rural households is not linear. Hence, the number of rural households marketing IFFs is not growing in a linear upward trend. The result shows that, at a time, few rural households were involved in marketing IFFs in the

informal market only. In another period, the number of rural households marketing IFFs increased but decreased again.

Recommendations

Efforts should be made to address the rural households' socioeconomic characteristics and other factors influencing their formal market access to indigenous floral foods. Indigenous food benefits awareness campaigns through extension offices, print, and broadcast media should be increased and sustained for the diffusion of indigenous information. More resources, including financial resources, should be made accessible to rural households, especially those involved in IFF marketing, as this could prevent their involvement in another occupation, which can reduce their determination to engage in the sales of IFFs, especially in the formal market.

Policies and training, such as value-added training that could integrate rural households into the formal market of indigenous foods, should be prioritised by the government, rural community leaders, and all stakeholders in the agricultural sector. Improving rural household heads' skills through agricultural training to make their experiences more beneficial could also enhance their efficiency, reducing their dependence on household labour.

Key Findings, Policy, and Research Implications of this Study

- Many indigenous foods are consumed but not sold at the market.
- Many rural households consume indigenous floral foods, but very few participate in their market. Indigenous foods are sold more in the informal sector.
- Most sellers of indigenous foods are vendors who mainly sell to indigenous buyers. Therefore, the research shows the trend of market entry by indigenous floral food market participants and that indigenous floral foods are rarely sold at the farmgate despite being regularly sold in the informal market.

- The trend analysis indicates that the number of rural households selling indigenous floral foods might decrease, exacerbating the decline in indigenous food consumption. Therefore, many indigenous foods face the risk of extinction.
- Irrespective of the poor market participation, some households sell indigenous floral foods, generating income.
- More research is needed to investigate the lack of support for indigenous foods.
- More financial support, commitment, strategy, and holistic urgent policies are needed to sustain and revitalise indigenous floor foods agribusiness.

Conflict of Interest Declaration

The authors declare that there are no competing interests in this research. All authors made a significant contribution to this research paper.

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