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EXPLORING THE DETERMINANTS OF INDIGENOUS LEAFY VEGETABLES UTILIZATION AS A DEVELOPMENT STRATEGY FOR ENHANCING FOOD AND NUTRITION SECURITY IN ALFRED NZO DISTRICT, SOUTH AFRICA

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ABSTRACT

Indigenous leafy vegetables (ILVs) play a role in food security, health, and income generation. Most of these vegetables are a treasured source of vitamins and are frequently used as a supplement for staple diets. However, there are concerns regarding the determinants that condition the use of ILVs for different purposes among rural households. As much as South Africa is known to be food-sufficient at the national level, the same cannot be said at the household level. This is because some households, particularly in rural areas, have been battling with food insecurity and lacking means of earning a living. One way some rural households may seek to cope with the threat of food and nutrition insecurity is to include indigenous vegetables in their daily diets. Therefore, this study analyzed the determinants of the use of ILVs by rural households in Alfred Nzo District, Eastern Cape Province of South Africa. A sample of 106 rural households was considered using a simple random sampling method through a lottery technique, and cross-sectional primary data was collected using a questionnaire via face-to-face interviews. Household heads were used as units of analysis. The study used a multinomial logistic regression model to analyze the determinants for different uses of ILVs. Results revealed that the age of a household head, education status, nutrition, and health benefits from ILVs positively influence the households to use ILVs as an income or food source. Household size, gender of a household head, farm income, employment status of a household head, and seasonal production or availability of ILVs negatively influenced households to use ILVs as an income or food source. The results further revealed that the age of a household head, farm income, nutrition, and health benefits from ILVs positively influenced the households to use ILVs as a medicinal or food source. On the other hand, household size, education status, employment status of a household head, and seasonal production or availability of ILVs negatively influenced households to use ILVs as medicinal or food sources. The study recommends that South Africa use public governments to encourage and create awareness of the economic and social value of ILVs and strengthen the use of ILVs in the communities, particularly vulnerable communities, and groups.

Key words: Consumers, development, Eastern Cape, food security, income, indigenous, nutrition, well-being

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INTRODUCTION

Globally, indigenous leafy vegetables (ILVs) are recognized to be vital sources of nutritional components, improve dietary diversity, alleviate food insecurity, and provide a significant source of income to many households [1, 2]. In South Africa, many rural communities are associated with poor nutritional status and poverty [3]. For instance, between 2018 and 2021, the observed number of undernourished persons in South Africa amounted to 4.1 million [3]. Again, Stats SA [3] reports that, as of the year 2023, about 55.5% (30.3 million people) of the population of South Africa is living in poverty at the national upper poverty line of 992 ZAR, while 25% (13.8 million people) are experiencing food poverty. The ILVs have been reported to be alternative vegetables to many communities in rural areas of South Africa owing to their potential in reducing poverty and food insecurity at the household level [4, 5]. Therefore, the use of ILVs in South Africa cannot be overemphasized. These vegetables have been used as food, as alternative medicinal sources and provide income among small-scale vendors and households [5]. Although there has been reported use of ILVs by communities for several nutritional needs and health benefits, the use of these vegetables has not been fully exploited [4].

The ILVs are used for various purposes like food and health purposes, and their collective value to people's welfare is significant [5]. For example, countries like Malawi, Ethiopia, Nigeria, Mozambique, Zimbabwe, and South Africa (in some regions) are among the African countries that use ILVs for various purposes. The most used ILVs for food, medicinal, and income purposes include; Amaranth, Pigweed, Nightshade, Cowpea, Bitter Melon, Pumpkin leaves, Blackjack, and Jute Mallow [6, 7]. In addition, ILVs provide nutrition and food security to any population group that relies on the consumption of these vegetables for food [4]. For medicinal benefits, Shegelman *et al.* [6] allude that ILVs are rich in nutrients that are a requisite for people's health, and as such, these vegetables can help address mineral deficits. Again, several authors also agree that ILVs could be used for generating income through their sales by households [8, 9]. The available studies only analyzed the determinants of preferences on different ILVs for food. Different studies in the African continent including South Africa discovered socio-economic characteristics such as age, ethnicity, gender, employment status, and household income, to be determinants of ILVs preferences [5, 8, 9].

Previous studies in Africa and South Africa about ILVs mainly focused on production, consumption preferences, and market opportunities for ILVs, while in South Africa there is little research done on the value chain system of these vegetables when compared to other African countries [4, 5, 8, 9]. Previous studies in Africa and South Africa have reported the use of ILVs by many rural households

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[5, 8]. However, there is a paucity of information on the determinants of a household's choice to use ILVs for food, medicinal purposes, and sources of income. Therefore, the study aimed to analyze determinants for using ILVs for food, medicinal, and income purposes by rural households within the Alfred Nzo District Municipality (ANDM), Eastern Cape Province of South Africa.

MATERIALS AND METHODS

Description of the study area

Alfred Nzo District Municipality (ANDM) is situated in the Eastern Cape Province, South Africa, and is located on the northeastern side of the province [10]. The municipality is one of the municipalities characterized by high poverty within the province, with most of its residents depending on agriculture to earn a livelihood [11]. About 84.38% of the population in the municipality experiences poverty, with 28.9% of the rural populace depending on subsistence farming [11], thus, making the district highly poverty-stricken and relying on practicing farming in their small home gardens to earn a living. For example, vegetable production activities contributed to the availability of indigenous leafy vegetables [10]. Therefore, households would be expected to consider using ILVs as alternative vegetables to address food insecurity and lessen poverty, hence, the district was chosen for analysis. A map showing the study area is indicated in Figure 1.

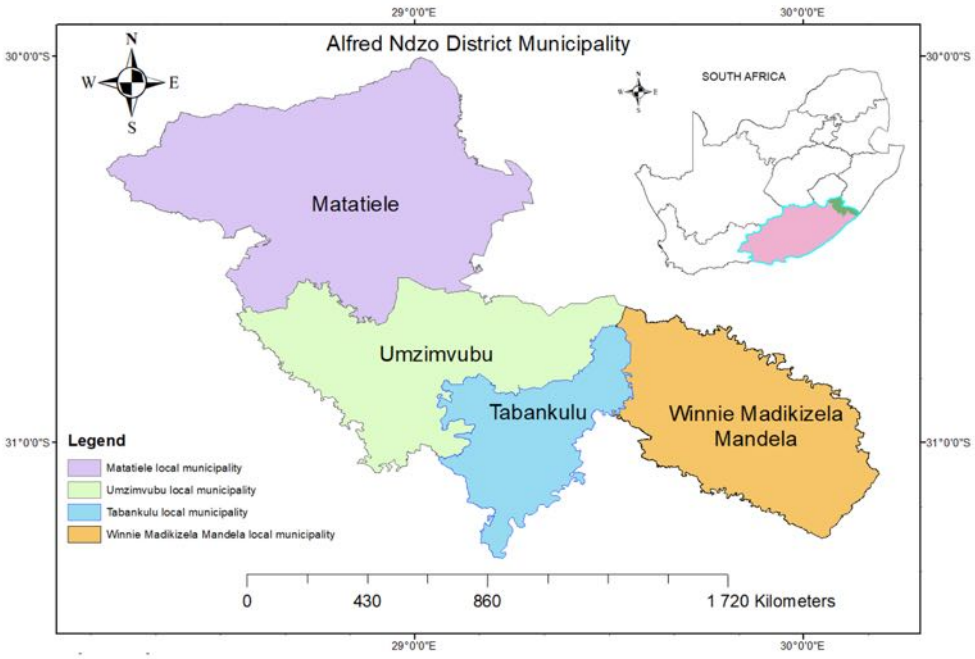

Figure 1: Map of Alfred Nzo District Municipality
Source: ArcGIS 10.4.1 (2023)

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Ethics

Ethical clearance was obtained from the University of Limpopo's Turfloop Research Ethics Committee (reference number TREC/397/2019:PG). The study involved human participants; therefore, ethical approval was required to ensure the participants' safety and protection. Informed consent was obtained from each participant after the research aim had been explained. Privacy and confidentiality were carefully maintained. After data was collected, administered questionnaires were kept in a secured cabinet and locked room to protect the participants' information.

Data collection methods

The study used a cross-sectional research design where quantitative primary data was collected through face-to-face interviews using a structured questionnaire. A simple random sampling method was used to select rural areas to achieve the aim of the study, where villages were randomly selected, and household heads were units of analysis. Data collection was completed in January 2020. Based on the number of households in ANDM, the sample size was calculated using the Rao soft sample size calculator. According to Stats SA [3], there are 195,975 households in ANDM with 53% (103,867) of these households classified as rural households. From Qualtrics sample size calculator, n = sample size; N = population size (103,867); and e = margin of error (0.05=5%). Therefore, the calculated sample size was equal to 106, at a 95% confidence level. The calculator gave a total sample size of 106 rural households.

Data analysis

Data were coded and analyzed using Stata 15 software. Descriptive statistics and a Multinomial logistic regression model were used for data analysis. Descriptive statistics were used for profiling the socioeconomic characteristics of households and describing different uses of ILVs. To determine socioeconomic factors influencing the use of ILVs by households, a Multinomial Logistic Regression (MLR) model was used. The assumption for the model is that the odds ratio of any two categories is independent of all other response categories. A MLR model is an extension of the binomial (Binary) logistic regression model [12], and this model is used when the dependent variable has more than two nominal or unordered categories [13].

For this study, the ILVs' use as food, medicinal, and income sources, were taken as dependent variables in the MLR model, and the model estimated the socioeconomic factors influencing the use of ILVs. The use of ILVs for food was used as a reference term during data analysis and results interpretation. During data collection, respondents were asked to choose from the three choices of use,

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the one that is mostly considered by a household. A general multinomial logistic regression model can be expressed as follows [14]:

$$f(k, i) = \beta_k . X_i \quad \text{.....1}$$

B_k is the set of regression coefficients associated with outcome k, and X_i is the set of explanatory variables associated with observation i. The variables used in the MLR model are indicated in Table 1.

RESULTS AND DISCUSSION

The section describes and discusses the results of descriptive statistics and empirical analysis.

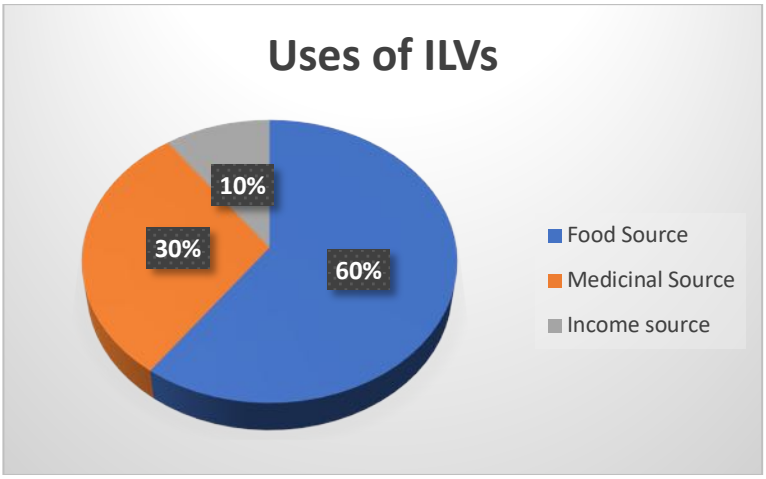

Figure 2: Uses of indigenous leafy vegetables by households of ANDM
Source: Stata Results (2023)

Figure 2 shows that most of the households at ANDM preferred to make use of ILVs for food purposes 60%, 30% for medicinal sources, and 10% as an income source. The results suggest that ANDM households have significant knowledge about the ILVs, and they can use the vegetables for various purposes, thus deriving a livelihood from these vegetables. Dlamini and Viljoen [8], and Mungofa *et al.* [15] observed similar findings and stated that ILVs can be a food source because of their health and nutrition-related benefits. On the other hand, health-related benefits have been identified by many scholars such as Otieno *et al*. [9], Ndhlovu [16], and Mahlangu *et al.* [17] to be the main reason for the consumption of ILVs. Such benefits include micronutrients like vitamins A and C, iron, zinc, and magnesium which are essential for people's health in reducing blood pressure and boosting the immune system of those living with sickness among other benefits.

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Income source vs food source

Factors influencing the use of ILVs positively

Age

There was a positive significant relationship between the age of a household head and the use of ILVs as an income source or food source with a p-value of *0.000* as shown in Table 3. The results suggest that, as the household head age increases there is a likelihood that households would consider using ILVs as a food source instead of income source. This could be a result of the fact that older people tend to be knowledge holders concerning the utilization benefits of ILVs, and this perhaps influences other household members to use more of these vegetables for food purposes. Likewise, Omotayo and Aremu [18] allude that when households are headed by older people and include ILVs in their diets, there could be chances of food and nutrition security through the utilization of ILVs.

Education

There was a positive correlation between education status and the use of ILVs as an income source or food source at a 1% significance level (*p=0.003*) as indicated in Table 3. The results could mean that, as the level of education goes up there is a chance that household members may shift from using ILVs as an income source to using ILVs as a source of food. This could be promoted by highly educated household members understanding the nutritional and health benefits linked to the consumption of ILVs and consequently influencing other household members to use ILVs as food sources. Similarly, Senyolo *et al.* [19] recommend advocacy by the Department of Education through schools to bring awareness that influences consumption of ILVs, particularly in rural households.

Awareness about the nutritional benefits of ILVs

Regression results in Table 3 confirm that there is a positive link at a 1% significance level (*p=0.007*) between awareness about nutrition benefits and ILVs as an income or food source. The results may mean that if individual household members are aware of the nutrition benefits associated with ILVs, there is a greater chance of households shifting from using ILVs as sources of income to using ILVs as food sources. In support of the results, most (69.3%) individual household members were aware of the nutrition benefits associated with ILVs. Many studies also confirm that people use ILVs to improve their nutritional intake while diversifying diets for their households and eventually improving food security. For instance, Bobo, Zulu *et al.* [20, 21] argue that ILVs play an integral role in rural livelihoods, expressively in rural areas where these vegetables complement and diversify diets. On the other hand, Shayanowako *et al.* [22] supports that awareness about ILVs may help in responding to the food insecurity crisis in underprivileged communities of South Africa.

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Awareness about health benefits from ILVs

Table 3 shows a positive correlation between awareness of health benefits and ILVs as a source of income or food at a 5% significance level (*p=0.016*). The results imply that when individual household members are aware of the health benefits associated with ILVs, there is a higher probability that household members may choose to use ILVs as a source of food over the source of income. This could mean that household members would be more likely to consume ILVs as sources of food because these vegetables are acknowledged by many researchers to contain vitamins and minerals that are beneficial to people's health. This complements the proportion of individuals that are aware of the health benefits of ILVs from the study area which is approximately 63.5%. Recently, Ndhlovu [16] published that in some African countries such as Kenya, Zimbabwe, Ethiopia, Nigeria, and some regions of South Africa, these vegetables are noted for their good health benefits such as antioxidants, vitamins, and minerals essential for people's health.

Factors influencing the use of ILVs negatively

Household size

Table 3 shows a negative link between household size and the use of ILVs as an income or food source and household size was significant at 1% (*p=-0.000*). The results imply that as household size increases, there is a probability that the households would choose to use ILVs as income sources rather than using ILVs as food sources. This means that households would prefer to consider ILVs for generating income to acquire money that may assist households in maintaining other household needs. The inclusion of indigenous vegetables by households could serve as an additional source of income as well, and consequently a way for better food and nutrition within the marginalized rural poor of South Africa [5, 19].

Gender

For the gender variable, women were used as the base category and compared against men counterparts. Regression results revealed a negative (*p=-0.000*) significant association between gender and the use of ILVs for income or food sources as indicated in Table 3. The results may mean that men are likely to use ILVs as an income source, while women would use ILVs as a food source. This could be true because men were less dominant from the sampled population with a proportion of 42%, while women dominated about 58% of the participants. Again, from the 42% of men, about 27% indicated that they were not using ILVs for food, whereas from the 58% of women, approximately 48% used ILVs as their source of food. A study conducted by Zulu *et al.* [21] on determinants of consumers' acceptance of indigenous leafy vegetables in Limpopo and Mpumalanga provinces of South Africa also reveals that there is women dominance (62%) in consumption

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of ILVs when compared to men (38%). Thus, making women a recognizable gender in terms of activities linked to the utilization of ILVs.

Farm income

Table 3 shows a negative association between farm income and the use of ILVs as a source of income or food at a 5% significance level (*p=-0.024*). The negative coefficient suggests that as farm income increases, households may choose to use ILVs more as an income source over the source of food. Also, ILVs are gaining economic value in the view that these vegetables are used as a strategy for generating income besides nutritional and health benefits gain. Similar findings were also discovered by Shayanowako *et al.* [22] stating that in some communities, ILVs are widely used for income that assists in maintaining other households' needs besides dietary diversity and improving food security. Therefore, there comes an opportunity for households to consider ILVs for small-scale vending as a way of expanding their sources of income to supplement purchasing other food items for healthy diets.

Employment status

There was a negative relationship at a 1% significance level (*p=-0.000*) between the employment status of a household head and the use of ILVs as a source of income or food as shown in Table 3. This implies that, for employed household heads the chance of using ILVs as an income source may increase and as such, households with employed household heads could choose to use ILVs as an income source with the idea of generating additional income for their families instead of food sources. A study by Shayanowako *et al.* [22] contradicts the results in that, as much as ILVs have the potential to generate income, households prefer to use ILVs for food consumption instead of marketing.

Seasonal production or availability of ILVs

There was a negative relationship between the seasonal production/availability of ILVs and the use of ILVs as an income or food source at a 1% significance level (*p=-0.006*). The results may mean that if ILVs are available on a seasonal basis, there could be a higher probability of increased use of these vegetables as a source of income over food sources. This could mean that households would choose to use ILVs as an income source rather than use ILVs as food sources. Likewise, Senyolo *et al.* [19] argue that the seasonal availability of ILVs presents an opportunity to add value to these vegetables during times of abundance so that in a conserved form, ILVs can be made available throughout all seasons to be used for food purposes while surplus could be considered for small-scale marketing. This could be possible if the ILVs were to be produced conventionally or avail conservative ways of making the vegetables available all around the year.

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Medicinal source vs food source

Factors influencing the use of ILVs positively

Age

The results in Table 3 show a positive relationship between age and the use of ILVs for medicinal or food purposes at a 1% significance level (*p=0.000*). The results imply that as the age of a household head increases there is a possibility that the households could consider using ILVs as food sources instead of medicinal purposes. That could condition this as the household heads get older the more, they are likely to acquire and hold knowledge (indigenous) about the benefits of consuming ILVs for food and perhaps transfer the knowledge to other household members and eventually influence the use of these vegetables as a food source. Contradictory, Omotayo and Aremu [18] theorize that ILVs are regarded as good vegetables and, if an individual does not use the good (indigenous vegetables), the only relationship between the good and the individual's well-being is the knowledge they hold about the product or the good to use it. This explains that there is no direct relationship between age and knowledge for an individual to use ILVs as a source of food.

Farm income

Table 3 indicates a positive association at a 5% significance level (*p=0.011*) between farm income and the use of ILVs for medicinal or food purposes. These results may mean that as household farm income increases there is a probability that households could use ILVs more as food sources than medicinal sources. The reason could be that households are likely to choose to use ILVs as a food source because such households perhaps lack the resources to acquire food from retail stores and find ILVs as alternative sources of vegetables for supplementing their diets. The ILVs are mainly used as food due to their valuable nutrition components to people's health, especially by communities with low-income levels [1, 23].

Awareness of nutritional benefits from ILVs

Table 3 shows that there was a positive significant relationship (*p=0.012*) between awareness about the nutritional benefits of ILVs and the use of these vegetables as medicinal or food sources. The results suggest that, when households are aware of the nutrition benefits associated with ILVs, there could be an increased use of these vegetables for food purposes by households. Thus, households are likely not to consider using ILVs for medicinal purposes. This might have been prompted by the fact that some households perceive ILVs as viable food sources that are beneficial for their nutrition. Equally, Nyaruwata [5], Shegelman *et al*. [6], Mayekiso [24] state that the use of ILVs as a vital source of food is recognized by many stakeholders, including rural communities that could highly benefit from these vegetables in terms of nutrition intake and nourishment of diets. This means

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that, in a highly utilized manner, ILVs could potentially improve food and nutrition security, especially in marginalized areas.

Awareness about health benefits from ILVs

A positive connection at a 1% significance level (*p=0.004*) between awareness of health benefits and ILVs as a source of medicine or food was discovered as indicated in Table 3. The results could mean that if individual household members are aware of the health benefits associated with ILVs, there is a greater chance that household members may choose to use ILVs as a source of food over medicinal purposes. This could be true because various studies confirm several health benefits linked with the consumption of ILVs as a source of food. Besides, the study also shows that several participants acknowledged nutritional benefits linked to ILVs, with a proportion of approximately 63.5%. There is increasing positive attention concerning ILVs for healthy diets and the prevention of micronutrient deficiencies and diet-related non-communicable diseases, thus calling for food production systems to include these vegetables in conventional production, marketing, and consumption systems [25, 26, 27, 28].

Factors influencing the use of ILVs negatively

Household size

Regression results from Table 3 show a negative association at a 1% significance level (*p=-0.001*) between household size and the use of ILVs for medicinal or food purposes. The results imply that, when a household size increases, there is a higher chance that households could use more ILVs for medicinal purposes instead of using ILVs as a source of food. The reason could be that larger households lack the means to purchase medication when one or more household members are ill, and consequently opting to use ILVs for medicinal purposes to minimize the expenses of purchasing medication from retail shops or pharmacies. As the household size increases, the household members are likely to be discouraged from diversifying the vegetables that they consume [21, 29]. Such households may choose to use major staple crops rather than ILVs, which could be the reason these vegetables are consumed for medicinal purposes given that several individual household members are aware of the health benefits linked to ILVs.

Education

A negative correlation between education status and the use of ILVs as medicinal or food sources was revealed at a 1% significance level (*p=-0.000*). The results suggest that, as the level of education goes up there is a higher possibility that household members may choose to use ILVs more for medicinal purposes than using ILVs as food sources. This could be the reason that household members

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who never attended school or hold lower education (primary) could not be aware and perhaps lack understanding of what is associated with the benefits of consuming ILVs as food. While households with higher levels of education (secondary and tertiary) may have awareness about the benefits of ILVs, they could have skills that allow them to participate in labor markets and perhaps lack time to participate in ILV activities and eventually compromise these vegetables' utilization for food. The ILVs are widely available to consumers, and households with poor backgrounds, generally hold low skills and poor educational backgrounds that can support them in understanding the nutrition and economic benefits of ILVs [20]. This eventually diminishes the utilization of ILVs by individuals and households.

Employment status

Employment status was measured by asking household heads if they were employed or not. The results in Table 3 show a negative significant association between employment status and the use of ILVs for medicinal or food purposes at *p=-0.000*. The results imply that when household heads are employed there is a probability that households could use more ILVs for medicinal purposes than food purposes. This could mean that such household heads could afford other food items, and their social standards allow them to eat fewer ILVs since some people perceive ILVs as food for the poor. Correspondingly, N'Danikou *et al.* [30] discovered that ILVs are perceived as food for the poor, particularly by employed individuals. Thus, compromises household consumption of ILVs as indigenous food and vegetables that are vital to daily diets.

Seasonal production or availability of ILVs

A negative significant relationship between seasonal production/availability of ILVs and the use of these vegetables for medicinal or food purposes with a p-value of -0.079 was observed as indicated in Table 3. The results submit that as the availability of ILVs is on a seasonal basis, there could be a higher likelihood of increased use of these vegetables for medicinal purposes over the use of these vegetables for food purposes. This means that a decrease in the availability of ILVs may likely promote lower use of these vegetables for food purposes. The limited availability of ILVs to specific vegetable species might have affected the availability of these vegetables, thus eventually translating to lower use of ILVs for food by households [6, 29].

CONCLUSION, AND RECOMMENDATIONS FOR DEVELOPMENT

Empirical results established that, for households to use ILVs for food and income source, variables such as the age of a household head, education status, nutrition, and health benefits positively influence the households to use ILVs as an income

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or food source. Household size, gender of a household head, farm income, employment status of a household head, and seasonal production or availability of ILVs are variables that negatively influence households to use ILVs as an income or food source. The results further revealed that the age of a household head, farm income, nutrition, and health benefits from ILVs positively influence the households to use ILVs as a medicinal or food source. On the other hand, household size, education status, employment status of a household head, and seasonal production or availability of ILVs negatively influence households to use ILVs as medicinal or food sources.

From the established results, government institutions such as the Department of Health (clinics and hospitals), Department of Agriculture (extension personnel), Department of Education (schools), and policymakers need to work together in ensuring and strengthening the inclusion of ILVs into food systems. For starters, schools can support inclusion of the vegetables into school feeding programs, while clinics and hospitals could advocate for nutritional and health benefits associated with the consumption of ILVs for individuals' well-being. The government through extension personnel should focus on developing and implementing more programs that support and enhance the production of ILVs by farmers and farming households so that farmers can benefit from selling the surplus for small-scale marketing while using the vegetables for subsistence purposes. The programs should empower youth, women, and men so that all genders, and age groups of the communities could be involved in promoting both production and consumption of ILVs for food. The success of this is likely to mainstream these vegetables into formal production and marketing streams for sustainable livelihoods and food availability. Also, the success of this could support in achieving some of the sustainable development goals like no poverty, zero hunger, good health, and well-being.

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Table 1: Description of explanatory variables in the Multinomial Logistic Regression model

Variables	Description	Units of measure
Uses of ILVs (Dependent Variable)	0=Food; 1=medicinal; 2=income source	Categorised variable
Gender of a household head	Male=1; Female=0	Dummy variable
Age of a household head	Actual age	Years
Household size	Members of a household	Actual household size
Education	Attended school=1; zero otherwise	Dummy variable
Sources of income	Source of income=1; zero otherwise	Dummy variable
Level of farm income	Household farm income per month	South African Rands (ZAR)
Employment status	Employed=1; Unemployed=0	Dummy variable
Awareness of nutrition benefits	Aware about the benefits=1; 0 Otherwise	Dummy variable
Awareness of health benefits	Aware about the benefits=1; 0 Otherwise	Dummy variable
Seasonal availability of ILVs	ILVs are available seasonal=1; 0 Otherwise	Dummy variable
Access to information about the uses of ILVs	Access to information=1; 0 Otherwise	Dummy variable

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Table 2: **Descriptive Statistics of Household Demographics**

Variable	Age	Household size	Household farm income- per month (ZAR)
N	106	106	106
Mean	51.30	7.09	
Minimum	28	3	625
Maximum	77	14	2600
Index	**Outcome**	**Percentage (%)**	
Gender of a household head	Male	42%	
	Female	58%	
Education	Never went to school.	23.2%	
	Attended school	76.7%	
Sources of income	No source of income	64%	
	Have a source of income	36%	
Employment status of a household head	Employed	23.9%	
	Unemployed	76.1%	
Awareness about nutrition benefits	Aware about the benefits	69.3%	
	Not aware about the benefits	30.7%	
Awareness about health benefits	Aware about the benefits	63.5%	
	Not aware about the benefits	36.5%	
Seasonal availability of ILVs	ILVs are available seasonally.	62%	
	ILVs are not available seasonally	38%	

Table 3: Determinants for different uses of indigenous leafy vegetables

Variables	Outcome1: Income Source			Outcome 2: Medicinal Source		
	Coeff	Z value	P value	Coeff	Z value	P value
Age	.0376048	4.51	0.000*	.0487241	4.44	0.000 *
Household size	-.2507844	-4.23	0.000*	-.5651635	-3.47	0.001*
Education level	.990996	3.02	0.003*	-1.97872	-3.51	0.000*
Gender	.302735	-3.80	0.000*	-.2658743	-0.96	0.337
Farm income	-.106962	-2.26	0.024**	.5254619	2.53	0.011**
Employment status	-.734497	-3.92	0.000*	-2.427746	-4.03	0.000*
Awareness of nutrition benefits	.2215022	2.71	0.007*	.1222882	2.51	0.012**
Awareness of health benefits	.348058	2.41	0.016**	3.62586	2.86	0.004*
Seasonal production of ILVs	-1.73453	-2.77	0.006*	-.753498	-1.76	0.079***

*Note: **, *, and *** indicate significance levels at 5%, 1% and 10%, respectively*

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