AN EXPLORATION OF THE CONSUMPTION, CULTIVATION AND TRADING OF INDIGENOUS LEAFY VEGETABLES IN RURAL COMMUNITIES IN THE GREATER TUBATSE LOCAL MUNICIPALITY, LIMPOPO PROVINCE, SOUTH AFRICA

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ABSTRACT

Indigenous leafy vegetables (ILVs) have been found to be as good as conventional vegetables to provide essential nutrients to sustain human health. Hence, the objective of this study was to investigate the consumption, cultivation and trading of ILVs in rural communities. A cross-sectional survey was conducted and data were collected from 854 respondents representing 854 randomly selected households. Data collection was conducted by using a questionnaire designed specifically for this study, through personal interviews with respondents. Up to 72.8% of the households were located in rural settlements as opposed to about 24.5% in urban areas, with only about 2.7% in informal settlements. 58% of respondents' households had more than three members per household, whereas 24% of households had two members per household. 92% of respondents indicated that they consumed indigenous leafy vegetables because they were cheap (35%), healthy and nutritious (29%), easily available (22%) and tasty (8%). Up to 66% of respondents did not cultivate ILVs as they felt that there was no need to, because they grew in the wild. Jute (Corchorus spp), lerotho (Cleome gynandra), mokopu (Cucurbita maxima) and thepe (Amaranthus thunbergii) were the most consumed ILVs in this region. However, most of the few who cultivated ILVs, sold them to generate income. The consumption and cultivation of ILVs has the potential to improve food security and boost income generation in households in rural communities.

It is recommended that relevant governmental and non-governmental bodies should ensure the availability of ILV seeds and educate households on the ways to cultivate, preserve, prepare and consume ILVs.

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INTRODUCTION

Food insecurity and malnutrition can be alleviated in many rural communities if the cultivation, distribution and consumption of indigenous leafy vegetables (ILVs) all year round can be assured (Bvenura & Afolayan 2015). ILVs, also called "traditional leafy

vegetables", comprise the collective of leafy vegetable species that form part of the culinary repertoire of particular indigenous communities (Motsa et al. 2015). The consumption of ILVs has always been a traditional practice in many rural communities in Africa (Faber et al. 2010). The cultivation of ILVs has been reported in a number of communities in the Limpopo and KwaZulu-Natal provinces of South Africa (Jansen van Rensburg et al. 2007; Uusiku et al. 2010). ILVs have been found to be as good as conventional vegetables to provide essential nutrients to sustain human health (Van der Hoeven et al. 2013). There is general agreement among several researchers that indigenous vegetables are good sources of micronutrients such as vitamin A, vitamin C and iron, with some of them having a superior nutritional composition compared to some conventional vegetables (Ramos et al. 2013).

In the past, ILVs used to be one of the principal sources of food for households in many rural communities. However, the introduction, production and consumption of conventional vegetables have led to the underutilisation of ILVs and changes in the dietary pattern of many people in rural communities (Van der Hoeven et al. 2013). In South Africa, indigenous leafy vegetables are underutilised and have received little attention from stakeholders in the fight against malnutrition and to improve food security (Rocha & Liberato 2013; Seeiso & Materecha 2014). These vegetables have been utilised as food for centuries by many people in rural communities; however, in spite of their good nutritional value, they are not widely produced and consumed on a large scale compared to conventional vegetables (Mavengahama 2013). The consumption pattern of ILVs in many rural communities in South Africa is highly variable and depends on factors such as poverty status, degree of urbanisation, distance to fresh produce markets and the season. Poor households have been found to utilise ILVs more than their wealthier counterparts (Jansen van Rensburg et al. 2007). Furthermore, ILVs can be used to fight food insecurity and malnutrition during periods of drought and hunger, considering that most of these vegetables are resistant to pests and diseases and require less agricultural inputs to cultivate than conventional vegetables (Ebert 2014). Many studies have found that ILVs have the potential to contribute in alleviating food insecurity, malnutrition and poverty in impoverished rural communities (Aju et al. 2013; Babalola & Akinwande 2014), hence the aim of this study was, therefore, to investigate the consumption, cultivation and trading of ILVs in rural communities in the Greater Tubatse Local Municipality, Limpopo Province, South Africa.

METHODOLOGY

The study area

Based on figures from the 2011 census, the total population of the Greater Tubatse Local Municipality was approximately 335,399 with 83,199 households (Statistics South Africa 2011), most of which were located in rural settlements where the main economic activities were agriculture, mining, trade and tourism (Greater Tubatse Municipality 2013).

Research design and sampling

A cross-sectional survey was conducted in which a questionnaire was used to collect data from 854 respondents (individuals who were 18 years and who lived permanently in the Greater Tubatse Local Municipality) representing 854 households were selected randomly from a list of households generated from a survey. A cluster sampling technique was used in which the study area was divided into five clusters (North, East, West, South and Center) based on geographical distribution. From each cluster at least 170 respondents, individuals who were 18 years and who lived permanently in the Greater Tubatse Local Municipality were selected.

Questionnaire instrument

Information from literature and pilot interviews were used to design the questionnaire that was use specifically for this study (Muhanji et al. 2011; Mpala et al. 2013; Van der Hoeven et al. 2013). The questionnaire consisted of two sections: section A was used to collect data on the socio-biographic details of respondents, and section B was used to collect data relating to the consumption and cultivation of ILVs. The reliability and validity of the research instrument were tested during the pilot study and the

Cronbach's alpha for the different constructs ranged from 0.773 to 0.882. Data from the pilot study were not included in the final data of this study.

Data collection

Data collection was done through personal interviews with respondents conducted by a research assistant in the Sepedi language. Respondents who were not proficient in English were assisted with filling in the questionnaires. All respondents gave their consent by signing the consent form before the interview. The questionnaire of each respondent was coded to ensure anonymity. Each interview session lasted about 15 minutes. The University of South Africa granted ethics clearance and permission to carry out the study was granted by the manager of the Greater Tubatse Local Municipality. Data collection took place from May to July 2015.

Statistical analysis

Statistical analysis of the data was performed by using SPSS software (version 11.0). Descriptive statistics was used to summarise the variables of interest and determine relationships between them. Analysis of variance (ANOVA) was used to investigate socio-demographic differences in the utilisation and attitude towards the consumption of ILVs. Statistical significance was identified at the 95% confidence level ($P \leq 0.05$).

RESULTS AND DISCUSSION

Socio-biographic details of respondents

Regarding the socio-biographic details of respondents, it was found that the number of female respondents (57%) who participated in the study was slightly above the number of male respondents (42.7%) (Table 1). This could be because the natural population dynamics in the Greater Tubatse Local Municipality include more women than men (Statistics South Africa 2013). Furthermore, women in rural communities are often responsible for ensuring that households have access to food, hence they were more likely to be the household respondent (Van der Hoeven et al. 2013). Most respondents (48.4%) were younger than 45 years old and 97% of respondents were black, whereas the coloured, white and Indian/Asian races constituted only 3%. People younger than 45 years of age in these communities are mostly blacks in their active working age and able to cultivation ILVs in subsistence farming (Mayer 2011; Daniels et al. 2013). It is not surprising that most of the respondents were black, considering that they constituted 97.8% of the Greater Tubatse Municipality population, compared to 1.6% white people and 0.7% people of other races (Greater Tubatse Municipality 2013). Up to 84.7% of respondents had at least a primary education while 15.3% had no formal education and could not read or write (Table 1). This finding was consistent with research showing that there had been an increase in the number of people receiving formal education in South Africa (Statistics South Africa 2016). Up to 63% of respondents received an average monthly salary of less than R5,000. Up to 30% of respondents were unemployed and only 27% of the respondents had formal employment. The rest were either pensioners (10.8%), self-employed (13.1%), involved in casual labour (14.3%) or practising subsistence farming (4%) (Table 1). The lack of higher education qualifications and skills of most individuals in rural communities implied a low employability and low income from employment (Baiyegunhi & Oppong 2015). Unfortunately, households with a low income were likely to find it difficult to purchase exotic vegetables (Aliber & Hart 2009). ILVs could provide a cheap alternative source of food and alleviate food insecurity (Dweba & Mearns 2011; Mavengahama 2013; Bvenura & Afolayan 2015).

Residential and household information of respondents

Regarding the residential details of respondents, up to 72.8% of the households were located in rural settlements as opposed to about 24.5% in urban areas, with only about 2.7% in informal settlements (Table 2). Most respondents lived in rural settlements and as such were more likely to utilise ILVs, considering that they could access these vegetables for free in the wild (Mavengahama 2013; Taleni & Goduka 2013). Up to 57.9% of respondents' households had more than three members per household while 71.5% of households had two adults or more per

TABLE 1: BIOGRAPHICAL INFORMATION OF RESPONDENTS (N = 854)

Variables		Frequency (%)
Gender	Female	487 (57.0)
	Male	365 (42.7)
	Missing system	2 (0.3)
Age	Under 25	198 (23.2)
	25-35	208 (24.4)
	36-45	205 (24)
	46-55	128 (15)
	56-65	83 (9.7)
	66-75	32 (3.8)
Race	Black	824 (96.6)
	Coloured	11 (1.3)
	White	10 (1.2)
	Indian/Asian	8 (0.9)
Level of education	No formal education (Illiterate)	131 (15.3)
	Primary education (Grade 9)	113 (13.3)
	Secondary education (Grade 12)	399 (46.7)
	Tertiary education	211 (24.7)
Average monthly income	No salary	99 (11.6)
	Below R1,000	168 (19.7)
	R1,000 – 2,999	275 (32.2)
	R3,000 – 4,999	93 (10.9)
	R5,000 – 6,999	65 (7.6)
	R7,000 – 8,999	43 (5)
	R9,000 – 15,000	59 (6.9)
	Above R15,000	52 (6.1)
Employment status	Pensioner	92 (10.8)
	Formal employment	233 (27.3)
	Self-employment	112 (13.1)
	Casual labour	123 (14.4)
	Farming (subsistence)	34 (4%)
	Unemployed	260 (30.4)

NB: Rural settlement = settlement consisting of houses built on native land to constitute a village. Informal settlement = groups of houses built on authorised land and without approved plan from the government.

household (Table 2). In most rural communities, a household's ability to feed itself depends on factors such as the number of active adults in households, availability of land and access to water. The larger the family size with fewer active adults, the lesser the available food per person in the household hence the likely hood of malnutrition (Olayemi 2012). Up to 55.2% were headed by the father as opposed to 25.8.2% headed by mothers while other relatives, grandfather (3.9%), grandmother (4.3%), uncle (2%), aunt (2.1) and others (6.7%) (Table 2). The fact that the fathers headed the majority of households was a positive indication, considering that male-headed households were unlikely to be resource-constrained, such as lacking access to productive assets (land, labour, capital); hence, the potential existed for these households to cultivate ILVs (Baiyegunhi & Oppong 2015). It has been found that males are more dominant in agricultural activities than females, who are considered to be weak (Oladele 2011). Results from previous studies done in the Limpopo Province indicated that more men and fewer women accessed large fields (Aliber & Hart 2009).

Consumption of indigenous leafy vegetables

In terms of the consumption of ILVs, up to 92.4% of respondents indicated that they consumed ILVs and the primary reasons for consuming them were that, they were cheap (35.1%), healthy and nutritious (29%), easily

TABLE 2: RESIDENTIAL DETAILS OF RESPONDENTS (N = 854)

Variables		Frequency (%)
Residential category	Urban (city/township)	209 (24.5)
	Rural settlement	622 (72.8)
	Informal settlement	23 (2.7)
Number of persons in household	1 (Live alone)	155 (18.1)
	2	205 (24)
	3	100 (11.7)
	4	122 (14.3)
	5	94 (11)
	6	69 (8.1)
	Above 6	109 (12.8)
Number of adults in household	1	244 (28.6)
	2	430 (50.4)
	3	82 (9.6)
	4	42 (4.9)
	5	17 (2)
	6	29 (3.4)
	Above 6	10 (1.2)
The head of household	Father	471 (55.2)
	Mother	220 (25.8)
	Grandfather	33 (3.9)
	Grandmother	37 (4.3)
	Uncle	17 (2.0)
	Aunt	18 (2.1)
	Others	57 (6.7)

NB: Rural settlement = settlement consisting of houses built on native land to constitute a village. Informal settlement = groups of houses built on authorised land and without approved plan from the government.

available (21.8%) and tasty (14.1%). On the other hand, only 64% indicated they do not consume ILV and the primary reasons given were that they disliked ILVs (57.8%), it is not accessible (21.8%) and they do not know how to cook it (20.3%). Regarding the frequency of consumption in the past year, only 22.7% indicated that they had never consumed ILVs compared to 40.6% who consumed ILVs once or twice per week, 26.6% who consumed it three to four times per week and 9.8% who consumed ILVs five or more times per week (Table 3). The fact that most respondents often consumed ILVs is an indication of the important role that ILVs can play in the food chain of many rural communities in South Africa (Jansen van Rensburg 2007).

The ANOVA of the consumption of ILVs indicated that respondents within the different demographic groups; race (ct1), monthly income (ct2) and residential area (ct3) differed significantly ($p \leq 0.05$) in the consumption of ILVs (Table 4). Of the 824 black respondents 94.8% indicated consumption of ILVs while only 0.5% white and 12.5% Indians consumed ILV. Within the monthly income groups, respondents with lower monthly income were found to consume more ILVs compared to those with higher monthly income. Within the residential area groups, more respondents living in rural and informal settlements consumed ILVs compared to those living in urban settlements (Table 4). ILVs, which are freely available to mostly black households in rural communities, are often perceived by the well-off as food for the poor (Faber et al. 2010; Kruger et al. 2015). ILVs still remain the vegetable of choice during periods of hunger and shortage of disposable income to many low income households in the rural and informal settlements (Smith & Eyzaguirre 2007). ILVs contribute to the food security and dietary diversity of many households these communities, since they are a good source of macro- and micro-nutrients (Oulai et al. 2014). LVs are mostly accessible in rural communities and has been part of their diets over many generations (Mpala et al. 2013). Furthermore,

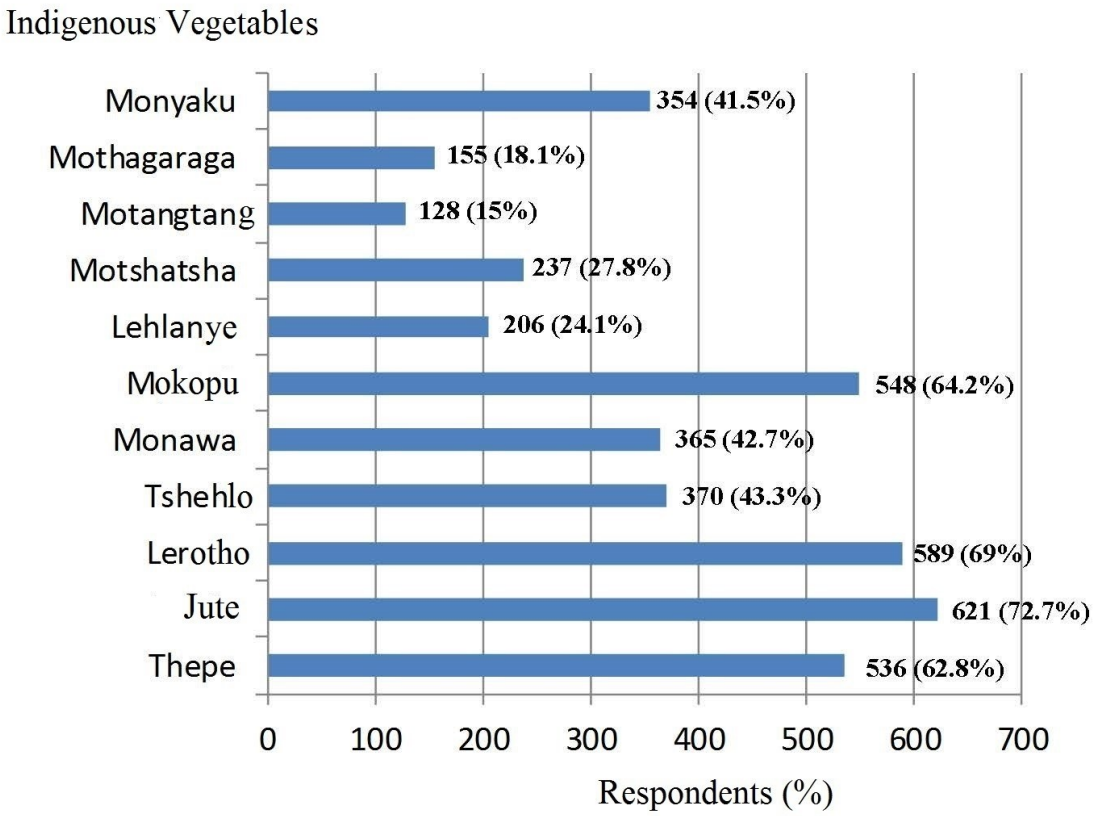
TABLE 3: CONSUMPTION OF ILVS AND REASONS FOR OR FOR NOT CONSUMING ILVS (N = 854)

A: RESEARCH QUESTION: Do you eat ILVs?	
Response	Frequency (%)
Yes	789 (92.4)
No	64 (7.5)
Missing system	1 (0.1)
Total	854 (100)
B: RESEARCH QUESTION: If no, why?	
Reasons	Frequency (%)
I dislike ILVs	35 (54.7)
Not accessible	9 (14)
I don't know how to cook	9 (14)
Total	64 (100)
C: RESEARCH QUESTION: If yes, why?	
Reasons	Frequency (%)
I like the taste	32 (4)
They are cheap	140 (17.7)
They are nutritious and healthy	115 (14.6)
Easily available	90 (11.4)
Total	789 (100)
D: RESEARCH QUESTION: How often did you consume ILVs in the past year?	
Response	Frequency (%)
Never	179 (22.7)
1-2 times per week	321 (40.6)
3-4 times per week	210 (26.6)
5 or more times per week	77 (9.8)
Missing system	2 (0.3)
Total	789 (100)

ILV= Indigenous leafy vegetables

under the apartheid government in South Africa, many black people were forced to live in impoverished rural and informal settlement built as far away as possible from economic city centres (Alam 2014) and this led to high unemployment among blacks compared to other racial group (Statistics South Africa 2014). The absence of well-developed social security systems, low monthly income and high birth rates, have lowered the quality of life of many people in these rural communities; hence, the lower the monthly income of households, the more the inclination to consume ILVs (Anyanwu 2013).

Of the ten most consumed ILVs, those consumed by more than 50% of the respondents were as follows: jute (Corchorus olitorius L.) was consumed the most by 72.7% of the respondents, followed by lerotho (Cleome gynandra) (69%), mokopu (Cucurbita maxima) (64.2%) and thepe (Amaranthus thunbergii) (62.8%). This is in consistence with ILV consumption in South Africa (Taleni & Goduka 2013). The least consumed ILV was motangtang (Momordica balsamina), consumed by only 15% of the respondent, followed by mothagaraga (Cucumis melo) (18.1%), lehlanye (Vernonia fatigiata) (24%) and mtshatsha (Citrillus lanatus) (27.8%) (Figure 1). The staple food with which ILVs were eaten the most by respondents was pap (cornmeal porridge) (88%), while potatoes and rice were consumed by only 2.3% and 1.3% of the respondents, respectively (Figure 2). ILVs are important sources of macro- and micro-nutrients for the maintenance of good health and prevention of diseases (Maroyi 2013). People in the Greater Tubatse Municipality greatly enjoyed the mucilaginous texture and taste of jute. It is easy to cook and requires a short cooking time. Jute also provides a glutinous consistency to stew and soup and thus facilitates swallowing of food such as cornmeal porridge (Taleni & Goduka 2013). In addition to its taste, lerotho was mostly consumed because it is perceived to be medicinal for blood pressure, toothaches,



Monyaku (*Cucumis africanus*), Mothagaraga (*Cucumis melo*), Motangtang (*Momordica balsamina*), Motshatsha (*Citrillus lanatus*), Lehlanye (*Vernonia fatigiata*), Mokopu (*Cucurbita maxima*), Monawa (*Vigna unguiculata*), Tshehlo (*Tribulus terrestris*), Lerotho (*Cleome gynandra*), Jute (*Corchorus olitorius L.*), Thepe (*Amaranthus thunbergii*).

FIGURE 1: THE TOP 10 MOST PREFERRED AND CONSUMED INDIGENOUS LEAFY VEGETABLES

common colds, stomach aches and fever (Kruger et al. 2011). Mokopu was also widely consumed because it is commonly grown in home gardens. The seeds are easily available from the fruit of the plant and people like the soft, fast-cooking leaves of this vegetable. On the other hand, thepe was mostly consumed because it is readily available, tastes good and is sometimes used on special occasions (Taleni & Goduka 2013). These crops are suitable for cultivation in rural communities because of their ability to adapt to adverse conditions such as drought as well as common plant pest and diseases pest resistant (Maundu et al. 2009; Achigan-Dako et al. 2010).

Cultivation and trading of indigenous leafy vegetables

In terms of the knowledge of the existence of ILVs, up to 76.6% of respondents indicated they have known ILVs from childhood, whereas another 20% indicated they have known them for more than five years (Table 5). This finding supports the view that indigenous knowledge of these vegetables was being passed on from generation to generation (Van der Hoeven et al. 2013) through observations and narrations (Chivenge et al. 2015). The transfer of indigenous knowledge to younger generations holds the key to the potential future use of ILVs in many rural communities (Dweba & Mearns 2011). The recording of indigenous knowledge transferred across generations in the past has

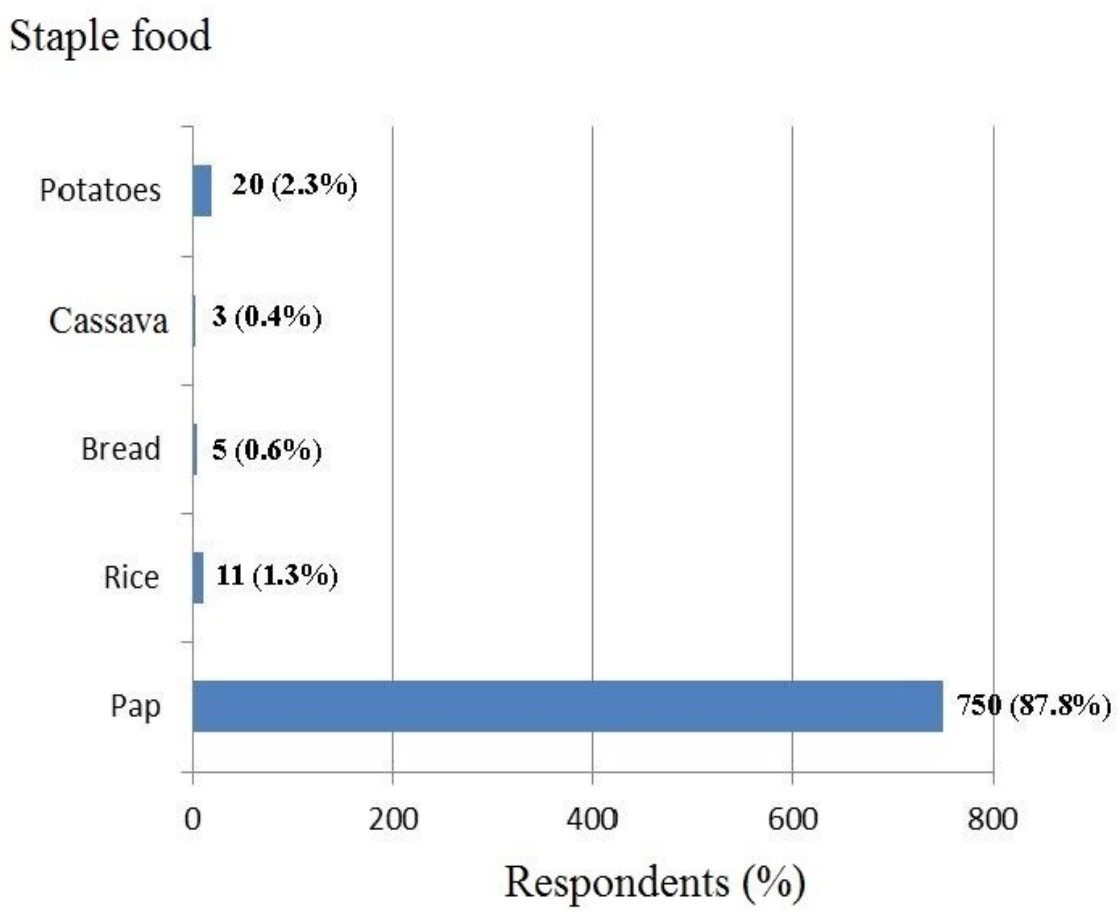


FIGURE 2: THE FOODS STUFF WHICH ARE EATEN THE MOST WITH INDIGENOUS LEAFY VEGETABLE

been problematic due to little or no documentation. In cases where documentation exists, there is sometimes a lack of consistency because many different dialects in different communities offer descriptions of similar products in different names (Aura 2013). Regarding cultivation, only 35% of respondents cultivated ILVs and the most-cited reason for not cultivating ILVs was that there was no need since ILVs grew naturally in uncultivated land, at roadsides and in the wild (Table 5). This, therefore, confirms the assertions by various authors that traditional ILVs grow in the wild and communities often retreat into the bush and emerge with a harvest (Darkwa & Darkwa 2013; Mavengahama 2013; Van Jaarsveld et al. 2014; Aworh 2015). The fact that most ILVs grow readily in the wild on an annual basis without being cultivated, makes it difficult for people in rural areas to take an interest in cultivating these vegetables (Bvenura & Afolayan 2015). Individuals who did not cultivate or purchase ILVs could only access them by harvesting in the wild (Karmakar et al. 2013).

Another challenge that can hamper the cultivation of these crops is the lack of access to irrigation water, limited infrastructure and a lack of technical knowledge for the development of irrigation (Chivenge et al. 2015). Furthermore, the cultivation of ILVs can also be hampered by the lack of commercial indigenous vegetable seed producers (Berinyuy & Fontem 2011) and climate changes that have caused a decreased productivity of some cultivated land (Kahane et al. 2013). The none-cultivation of ILVs can have a negative impact on the future availability and accessibility of these vegetables, thereby aggravating food insecurity in the Greater Tubatse Municipality. Furthermore, the uprooting and cutting of the entire ILV plant during harvesting in the wild by some individuals

in some rural communities can cause a decline in the availability of some of these crops (Seeiso & Materecha 2014).

Out of those who cultivated ILVs (n=276), 69.6% indicated that they sold them to passers-by at roadsides, 20.2% at local markets, 8.3% in townships and very few (1.8%) sold to shopkeepers (Table 5). The low supply of ILVs to local market is an indication of limited access to the mainstream supply chain. However, this also indicates the existence of some form of market accessibility within the communities that can be further develop (Alene et al. 2008).

Many households could potentially benefit from the cultivation and consumption of ILVs if productivity and market access are boosted (Fisher & Qaim 2012; Taleni & Goduka 2013). ILVs with available seeds, such as the drought resistant Vigna unguiculata (monawa) can be successfully cultivated on a large scale (Chivenge et al. 2015) and integrated into the food chain systems (Kahane et al. 2013). Jute, lerotho, mokopu and thepe have been found to be among the most common ILVs that are often available in both formal and informal retail outlets (Taleni & Goduka 2013) and roadside vendors have been found to be the main supplier of indigenous vegetables (Kruger et al. 2015).

Therefore, the commercialisation of ILVs can provide employment and income generation opportunities in rural communities (Kwenin et al. 2011). In general, fewer financial inputs are required for the cultivation of ILVs and the risk of financial loss is less than with exotic vegetables, thus a much higher profit margin is possible (Muhanji et al. 2011). Income generation from the cultivation and commercialisation of ILVs has been realised in many areas in Soshanguve and Durban, South Africa (Faber et al. 2010) and in Nairobi, Kenya (Maundu et al. 2013). ILVs offer a significant opportunity for the poorest people living in rural communities to cultivate and trade without requiring large capital investments (Adebooye & Opabode 2004; Aju et al. 2013; Oulai et al. 2014).

ANOVA of the consumption of ILVs indicated that respondents within demographic groups (age (ct1), monthly income (ct2), household head (ct3) and household size (ct4)) differed significantly ($p \leq 0.05$) on the cultivation of ILVs (Table 6). This is because the cultivation and consumption of ILVs constitute part of indigenous knowledge system, which is often orally transmitted from one generation to another to ensure survival and adaptation; hence, the older you are, the more experience you have with the cultivation of ILVs (Mavhura et al. 2013). Within monthly income, more respondents with lower monthly income cultivated ILVs than those with higher income and the percentages of those who cultivated ILVs seem to reduce as their monthly income increases. The poorer people in the rural and informal settlement are likely to cultivate ILVs as a source of their vegetable supply since they have limited cash to purchase exotic vegetable. ILVs can grow at drought condition with less costly chemical fertilisers and pesticides inputs (Van Vuuren, 2006). In terms of who is the household head, households headed by grandmothers tend to cultivate ILVs the most and this can be attributed the level of indigenous knowledge on ILVs and various coping strategies that they have acquired over the years. This has ensured the availability and utilisation of ILVs in resource-poor rural communities (Dweba & Means 2011).

Access, processing and preservation of ILVs by households

Regarding the acquisition of ILVs, 11% indicated that they bought ILVs, while 44.7% indicated that they harvest them from somewhere and 44.2% indicated that they buy and harvest ILVs (Table 7). Out of those who bough ILVs, the majority (39.1%) bought it from roadside vendors, while 37.9% bought it from informal market. Only 14.9% and 3.45% of respondents bought from supermarket and neighbouring housholds respectively. For those who harvest ILVs, most of the respondents often harvested them from their own garden (28.3%), followed by open uncultivated land (25.4%), fields in the wild (12.5%), roadsides in the wild (8.7%) and wetlands in the wild (7.7%) (Table 7). The cultivation and consumption of ILVS should be encourage because of the existing supply and demand chain in these communities (Mwaura et

TABLE 4: ANOVA OF THE CONSUMPTION OF ILVS WITHIN DIFFERENT DEMOGRAPHIC FACTORS (N = 854)

	ANOVA between groups (p-value)						
Research question	**Gender**	**Age**	**Race**	**Monthly income**	**Residential area**	**Houshold head**	**Household size**
Do you eat (ILVs) (morogo)?	0.086	0.139	**0.012** ct1	**0.004**ct2	**0.001**ct3	0.051	0. 101
If no, why?	0.871	0.497	0.421	0.176	0.469	0.035	0.789

ct1
Black [Yes: 94.8%, No: 5.2%]
White [Yes: 0.5%, No: 99.5%]
Coloured [Yes: 45.5%, No: 54.5%]
Indian/Asian [Yes: 12.5%, No: 87.5%]

ct2
Below R1000 [Yes: 92.9%, No: 7.1%]
R1000-2999 [Yes: 94.2%, No: 5.8%]
R3000-4999 [Yes: 92.4%, No: 7.6%]
R5000-6999 [Yes: 93.8%, No: 6.2%]
R7000-8999 [Yes: 84.4%, No: 11.6%]
R9000-15000 [Yes: 89.8%, No: 10.2%]
Above R15000 [Yes: 76.9%, No: 23.1%]

ct3
Urban [Yes: 86.6%, No: 13.4%]
Rural settlement [Yes: 94.4%, No: 5.6%]
Informal settlement [Yes: 95.7%, No: 4.3%]

¥ = Significance at p≤0.05, ILV = indigenous leafy vegetables; ct = cross tabulation

TABLE 5: CULTIVATION AND TRADING OF ILVS (N = 789)

A: RESEARCH QUESTION: How long have you known of the existence of your most preferred and consumed ILVs?	
Response	Frequency (%)
Less than a year	5 (0.6)
From 1 to 5 years	8 (1)
Above 5 years	163 (20)
From childhood	604 (76.6)
I can't remember	9 (1)
Total	789 (100)
B: RESEARCH QUESTION: Do you cultivate ILVs?	
Response	Frequency (%)
Yes	276 (35)
No	513 (65)
Total	789 (100)
C:RESEARCH QUESTION: If no, reason for not cultivating ILVs	
Reasons	Frequency (%)
No need, it grows in the wild	391 (76)
Lack of seeds	40 (7.8)
I never thought of cultivating ILVs	12 (2.3)
ILVs are difficult to cultivate	6 (1.2)
I cannot say exactly why	64 (12.5)
Total	513 (100)
D: RESEARCH QUESTION: If yes, do you sell part of your ILV harvest?	
Response	Frequency (%)
Yes	226 (81.9)
No	50 (18.1)
Total	276 (100)
E: RESEARCH QUESTION: If yes, where do you often sell your ILV harvest?	
Response	Frequency (%)
Roadside passer-by	192 (69.6)
Local market	56 (20.2)
Shopkeepers	5 (1.8)
In the township	23 (8.3)
Total	276

ILV= Indigenous leafy vegetables

TABLE 6: ANOVA OF THE CULTIVATION OF ILVS WITHIN DIFFERENT DEMOGRAPHIC FACTORS (ILVS) (N=854)

	ANOVA between groups (p-value)						
Research question	**Gender**	**Age**	**Race**	**Monthly income**	**Residen-tial area**	**Household head**	**Household size**
Do you cultivate ILVs?	0.095	**0.001**[ct1]	0.160	**0.001**[ct2]	0.175	**0.023**[ct3]	0.101
If no, why?	0.764	0.811	0.414	0.102	0.005	0.569	0.106

ct1	**ct2**	**ct3**
Under 25 [Yes: 23.8%, No: 76.2%]	Below R1000 [Yes: 45.8.9%, No: 54.2%]	Father [Yes: 36.6%, No: 63.4%]
25-35 [Yes: 32.3%, No: 67.7%]	R1000-2999 [Yes: 35.3%, No: 64.7%]	Mother [Yes: 38.8%, No: 61.2%]
36-45 [Yes: 32.3%, No: 67.7%]	R3000-4999 [Yes: 21.2%, No: 78.8%]	Grandfather [Yes: 19.4%, No: 80.6%]
46-55 [Yes: 27.9%, No: 72.1%]	R5000-6999 [Yes: 21.3%, No: 78.7%]	Grandmother [Yes: 58.3%, No: 41.7%]
56-65 [Yes: 50%, No: 50%]	R7000-8999 [Yes: 18.9%, No: 81.1%]	Uncle [Yes: 29.4%, No: 70.6%]
66-75 [Yes: 48.1%, No: 51.9%]	R9000-15000 [Yes: 15.8%, No: 84.2%]	Aunt [Yes: 50%, No: 50%]
	Above R15000 [Yes: 12.5%, No: 87.5%]	Others [Yes: 28%, No: 72%]

¥ = Significance at p≤0.05, ILV= Indigenous leafy vegetables; ct = cross tabulation

TABLE 7: ACQUISITION, PROCESSING AND PRESERVATION OF ILVS FOR HOUSEHOLD CONSUMPTION (N = 789)

A: RESEARCH QUESTION: How do you acquire ILVs for household consumption?	
Response	Frequency (%)
Buy	87 (11.)
I harvest them	353 (44.7)
I buy and harvest	349 (44.2)
Total	789
B: RESEARCH QUESTION: If you buy, where do you often buy ILVs?	
Response	Frequency (%)
Supermarket	13(14.9)
Informal market	33 (37.9)
Roadside vendors	34 (39.1)
Neighbouring households	3 (3.45)
Missing system	4(4.60)
Total	87
C: RESEARCH QUESTION: If you harvest, where do you often harvest ILVs?	
Reasons	Frequency (%)
Own garden	242 (28.3)
Open uncultivated land in the wild	217 (25.4)
Wetlands in the wild	66 (7.7)
Fields in the wild	101(12.5)
Roadside in the wild	74 (8.7)
Total	702
D: RESEARCH QUESTION: Do you often process and preserve ILVs for future use?	
Response	Frequency (%)
Yes	689 (87.3)
No	100 (12.7)
Total	789
E: RESEARCH QUESTION: If yes, indicate which method(s) you often used to process and preserve ILVs?	
Response	Frequency (%)
Cooked sun dry	342 (40)
Uncooked sun dry	398 (46.6)
Use the fridge	330 (38.6)

ILV = indigenous leafy vegetables

al. 2013). The majority of the respondents processed and preserved ILVs (87.3%) for future use. All the listed processing methods were fairly used; however, the method used the most to process and preserve ILVs was by drying. 46.6% of respondents used the sun-drying method for uncooked ILVs, whereas 40% used this method for cooked ILVs. 37% of respondents used the refrigerator for preserving ILVs (Table 7). Most respondents processed and preserved ILVs because these vegetables are available seasonally and are prone to deterioration after harvesting due to their high moisture content (Oulai et al. 2014). People in rural communities need to ensure that food is available in their households throughout the year by using drying, which is a traditional method of food preservation (Dweba & Mearns 2011). Furthermore, preservation ensures that there is less wastage of food during the harvest season (Bourne 2014). Preservation of ILVs does not only reduce post-harvest losses, it also ensures a constant supply of food to prevent hunger and diseases (Elimu 2013). Most of the respondents dried uncooked or cooked ILVs, which is a cheap and convenient way of preserving ILVs in bulk soon after harvesting (Uusiku et al. 2010; Dweba & Mearns 2011). Some researchers suggested all vegetables should be blanched in steam before drying, to deactivate the action of enzymes and to prevent the loss of some nutrients (Van der Hoeven et al. 2013). Steam blanching followed by dehydration, as indicated by some respondents in the Greater Tubatse Municipality, has been reported as the most effective preservation method in retaining ascorbic acid in vegetables (Uusiku et al. 2010).

CONCLUSION

This study looked into the socio-economic importance of the cultivation and utilisation of ILVs in mostly rural communities in the Greater Tubatse Local Municipality and it can be concluded that the majority of people who consumes or generates income from the sale of ILVs are black, most of whom are not formally employed. Most households are located in rural settlements with the majority of them harbouring more than three members per household. Most of the people consume ILVs principally because they are cheap, healthy and nutritious and are easily available. Jute (Corchorus spp), lerotho (Cleome gynandra), mokopu (Cucurbita maxima) and thepe (Amaranthus thunbergii) are the most consumed ILVs in this region. Most did not cultivate ILVs because they believe that it could be harvested in the wild for free. However, most of the few who cultivated ILVs, sold them to generate income. The consumption and cultivation of ILVs has the potential to improve food security and boost income generation in households in rural communities. Based on the main findings, it is recommended that relevant governmental and non-governmental bodies should ensure the availability of seeds and educate households on the ways to cultivate, consume and retail ILVs in rural communities, and in the country as a whole. More research needs to be done to assess the contribution of ILVs to the diet of people in rural communities in the Greater Tubatse Local Municipality.

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