A DOUBLE HURDLE ANALYSIS OF CONSUMERS’ DECISIONS TO PURCHASE AFRICAN LEAFY VEGETABLES IN LIMPOPO PROVINCE

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ABSTRACT
This study examines the factors affecting consumers’ decisions to purchase African leafy vegetables (ALVs) in the Limpopo province. The double-hurdle model was used because it accounts for whether or not consumers purchase ALVs and how much they spend on these vegetables. Purchasing and expenditure decisions were analysed, using cross-sectional data collected from 299 households during 2012. The results showed that perception factors (such as nutrition) and socio-economic factors (such as gender, education, marriage and urbanisation) influence only purchasing decisions, while age and distance to the market influence only the level of expenditure on ALVs. Factors that influence both the purchasing decision and the level of expenditure are socio-economic factors (dependency on social grants) and perception factors (perception that ALVs are relish, tasty and affordable). Interventions by retailers such as sorting, packaging and canning will promote the value of ALVs, reduce preparation time before consumption and encourage young, male, urban and educated consumers to purchase ALVs. Furthermore, by integrating awareness programmes with the media (such as local and national radio and television stations, and social media) using languages the viewers and listeners understand, might more effectively promote the consumption of ALVs.

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BACKGROUND

The World Health Organization (WHO) recommends the consumption of more than 400g of fruit and vegetables per person per day to reduce the chances of malnutrition (WHO, 2003). This recommended intake is approximately double the amount of fruit and vegetables consumed by the average South African (Ronquest-Ross et al., 2015; Backeberg, 2014; Rose et al., 2002). Smith and Eyzaguirre (2007) stated that African leafy vegetables (ALVs) can play a crucial role in the WHO’s global initiative to increase the consumption of leafy vegetables in sub-Saharan Africa. In this study, ALVs are defined as cultivated leafy vegetables native to a particular region, or having been introduced a long time ago and started to evolve through natural processes (Jansen van Rensburg et al., 2007).

In South Africa, ALVs are part of the day-to-day staple diet of many households, particularly in rural areas, and offer a rich source of iron, vitamin A and other nutrients. Although some ALVs are cultivated, most of them are non-cultivated. However, awareness about these vegetables is still poor and perceived by many South Africans as “food for the poor” (Venter et al., 2007). In terms of nutritional value, ALVs are perceived to be as good as or even better than conventional vegetables (Taruvinga & Nengovhela, 2015). During periods of food shortages, one of the coping strategies that consumers can apply is the use of ALVs. Almekinders and De Boef (2000) argued that the revival of communities’ utilisation of ALVs might ensure conservation thereof. Moreover, the consumption of ALVs can significantly contribute to dietary requirements in terms of human health and food security (Zoro et al., 2014).

Despite reports that ALVs contribute to health, food security and nutrition at household level in South Africa, research by Nesamvuni et al. (2001), Mbhenyane et al. (2005) and Faber et al. (2007) reported that the production and consumption of these vegetables had declined over time. This decline was influenced by negative attitudes toward ALVs, constraining efforts that focused on enhancing their consumption (Matenge et al., 2012). Negative attitudes likely stem from certain crops being considered weeds (Vorster & Van Rensburg, 2005), poor handling, unhygienic display at retail outlets (Amaza, 2009), and contradictory information about production sources (Yadav & Sehgal, 2004). This negative reaction is especially true among the youth and modernised members of the community. Yet, many rural people are unable to afford exotic leafy vegetables, as they are somewhat expensive by comparison with ALVs.

Many ALVs are high in nutritional content by comparison with exotic leafy vegetables (Keatinge et al., 2011). They are also rich in nutrients and represent the basis for diets in rural areas (Rudebjer et al., 2011). Studies such as De Benoist et al. (2008) recorded how ALVs could be used as a strategic ally to prevent food and nutritional insecurity. According to Ngigi et al. (2011), households in urban areas of Kenya care about the nutritional and safety attributes of ALVs.

In the case of ALVs, amaranth (Amaranthus) is a nutritious leafy vegetable in both its raw and cooked form. In addition, its nutritional value is higher in comparison with spinach and cabbage (Ebert et al., 2011). According to Lyimo et al. (2003), leaves of amaranth, pumpkins (Cucurbita moschata) and African nightshade (Solanum scabrum Mill.) contain higher levels of minerals and vitamins than exotic leafy vegetables. Msuya et al. (2009) and Usiku et al. (2010) added that ALVs are rich in iron, zinc and β-carotene. It is also believed that spiderwisp (Cleome gynandra) leaves improve eyesight and provide energy (Van den Heever & Venter, 2007). Similarly, African lettuce (Launaea taraxacifolia) is locally believed (indigenous knowledge) to have lactogenic, aphrodisiac, antibiotic and anti-malaria properties, and has blood pressure regulating and haemorrhoid treatment capacity (Dansi et al., 2008). Wild mustard (Brassica juncea), like many other ALVs, provides essential vitamins, trace elements (iron and calcium) and other nutrients that are important for good health (Chweya & Eyzaguirre, 1999). The seeds also have high oil and protein content (Burton et al., 1999) although this is dependent on environmental conditions (Si & Walton, 2004). According to Mariga et al. (2012), collard (Brassica oleracea) and mustard (Brassica
FACTORS AFFECTING THE PURCHASING AND EXPENDITURE DECISION

The question of how socio-economic and perception factors influence consumer behaviour is important to all actors involved in the ALV value chain, as insights in consumers’ purchasing decisions will inform the stakeholders and guide actions to enhance the role of ALVs. This section provides an overview of the socio-economic and perception factors affecting the demand for ALVs, drawing from the limited available literature.

Existing research has determined socio-economic factors that influence the consumption of ALVs. Only a few studies have examined the association between the gender of the household head and consumption patterns of ALVs. Women play an important role in the purchasing and consumption of ALVs as vegetable preparation is mostly considered as their job (Tumwet et al., 2014, Kimiywe et al., 2007). Regarding age, children (Kimiywe et al., 2007) and older people (Taruvinga & Nengovhela, 2015) are also consumers of ALVs. However, ALVs are not particularly consumed by the younger generation because of their unfamiliar tastes, or ignorance in preparing them (Orech et al., 2005). Education has a negative impact on the consumption of ALVs in the Eastern Cape of South Africa (Taruvinga & Nengovhela, 2015). In addition, a small proportion of urban households consume ALVs, and the level of income negatively influences the consumption of and purchasing behaviour in terms of ALVs. By comparison, lower income groups are the consumers of ALVs as opposed to groups with higher incomes (Kimiywe et al., 2007). Studies examining the relationship between awareness and consumption of ALVs are scarce. Raising peoples’ interest is likely to spur them on into taking conscious and favourable action towards vegetable consumption. Agbelemoge (2014) confirmed this for ALVs by showing that consumer awareness/knowledge about ALVs has a positive impact on consumption.

Public perceptions of ALVs appear to be associated with knowledge about the product gained through research, as well as the extent to which it is consumed. Despite many people
being aware of the benefits of ALVs, the literature suggests that a large number of consumers hold mostly negative perceptions about these vegetables. Generally, the literature suggests that positive perceptions about ALVs are more prevalent among older and rural consumers, while negative perceptions are more common among younger and urban consumers (Vorster et al., 2007). According to Vorster et al. (2007), ALVs are tastier than other vegetables, and capable of boosting the human immune system, hence extending life expectancy. They also act as a digestive cleansing agent. Acheampong et al. (2012) recorded that the majority of consumers in Ghana purchased ALVs because they believed that they are more nutritious than conventional market vegetables and easier to prepare. Tumwet et al. (2014) and Kimiywe et al. (2007) also found that the reason for consumers purchasing ALVs is that they believe them to be nutritious.

**METHODOLOGY**

**Study design, study area and sampling**

A cross-sectional, quantitative study design was conducted in the Limpopo province of South Africa. This province is located in the far northern part of South Africa and is divided into five districts, namely: Vhembe, Mopani, Capricorn, Waterberg and Sekhukhuni. Data was collected in the Vhembe, Capricorn and Mopani districts. These districts were selected purposively based on their accessibility and relevance to the study. Data were collected in January 2012 from a sample of 300 consumers. One rural and one urban area were selected from each of the three districts. A meeting was held with the chief/leaders of these areas for permission to collect data, which was granted. Convenience sampling was used to identify households from both rural and urban areas, and the head of the household was interviewed. Data were collected by means of a structured questionnaire that was pretested and administered by trained enumerators who could speak the local languages, i.e. Sepedi (Capricorn district), Tshivenda (Vhembe district) and Xitsonga/Sepedi (Mopani District). Household heads were interviewed about their level of awareness regarding ALVs and their perception towards ALVs. Only one questionnaire was excluded due to missing data, therefore 299 questionnaires were used for the analysis. Respondents were made aware that the ethical clearance had been granted to continue with the study.

**Data collection**

The data was collected between January and February 2012, using a pre-tested, structured questionnaire, which was administered by ten trained and experienced Agricultural Economics honours students from the University of Limpopo. The students were recruited and trained as enumerators by the principal researcher during a one-day training session. Apart from being able to speak the local languages, these enumerators had good knowledge of the rural development and farming systems. Training was meant to ensure the accuracy and reliability of the captured data. The enumerators were familiarised with the questionnaire to ensure that there was no interviewer bias. The questionnaire included two categories of information, namely socio-economic information and perception factors. Information on the socio-economic (interviewer-administered) section included age, gender, level of education, marital status, location, grocery purchaser, dependency on social grants, number of people eating ALVs in the household, awareness of ALVs, and distance to the ALV market. These questions were based on self-reporting and the answers were obtained at the beginning of the interview. The perception section (interviewer-administered) addressed the perception that ALVs are relish, tasty, easy to prepare, affordable, nutritious and medicinal.

The researcher used a questionnaire (Table 1) for all the respondents in relaxed settings using the language dominated in the specific district. That setting allowed the discussions to flow and elicit the respondents’ personal socio-economic and perceptions on the topic. Each question was asked, and respondents engaged with the enumerator until they felt it had been exhausted.

**Analytical model used in the study**

Descriptive statistics by way of means and standard deviation were used to summarise the
TABLE 1: SOME SURVEY QUESTIONS USED IN THE QUESTIONNAIRE

<table>
<thead>
<tr>
<th>Question</th>
<th>Responses</th>
</tr>
</thead>
<tbody>
<tr>
<td>How many people eat ALVs in your households?</td>
<td></td>
</tr>
<tr>
<td>Are you aware of any ALVs in your community?</td>
<td>Yes/no</td>
</tr>
<tr>
<td>How is the ALV market in kilometres?</td>
<td>km</td>
</tr>
<tr>
<td>Of those vegetables you regularly purchase, why was the vegetable purchased? (Tick all that apply)</td>
<td></td>
</tr>
</tbody>
</table>

where $y_{11}^1$ is a latent variable explaining consumers’ dichotomous decision whether or not to purchase ALVs; $y_{12}^1$ is a latent variable explaining household consumption of ALVs; $w_i$ is a vector of variables explaining purchasing (Yes/No) decision; while $x_i^1$ is a vector of factors explaining the expenditure decision; and $v_1$ and $v_i$ are the error terms assumed to be independent and distributed as $v_1 \sim N(0,1)$ and $v_i \sim N(0, \sigma^2)$. Table 2 shows the description of the variables used in both the purchasing decision model and the level of expenditure model.

RESULTS AND DISCUSSION

A check for the possible presence of multicollinearity of all the variables in the estimated models was conducted by means of a variance inflation factor (VIF). The results presented in Table 3 shows that the highest value is 2.86, implying that multicollinearity is not a concern in the estimated models.

Descriptive statistics analysis

Sample statistics of the independent variables used in the analysis showed that 73% (N=218) of the respondents purchased ALVs, when they are in season, at an average expenditure of R17.02 per week.

Table 4 shows the descriptive statistics of socio-economic and perception factors of the sampled households. In the sample, the average household head was approximately 44 years old.
TABLE 2: DEFINITION OF VARIABLES INCLUDED IN THE ANALYSIS OF BOTH MODELS, LIMPOPO PROVINCE, 2012

<table>
<thead>
<tr>
<th>Variable</th>
<th>Description of variables</th>
<th>Purchasing decision model</th>
<th>Expenditure level model</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>AGE</td>
<td>Age of the household head</td>
<td>x</td>
<td>x</td>
<td>Years</td>
</tr>
<tr>
<td>AGE&lt;sup&gt;2&lt;/sup&gt;</td>
<td>Age squared</td>
<td>x</td>
<td>x</td>
<td>Years</td>
</tr>
<tr>
<td>GEND</td>
<td>1 if the household head is female, 0 otherwise</td>
<td>x</td>
<td>x</td>
<td>Dummy</td>
</tr>
<tr>
<td>EDUC</td>
<td>Number of years household head spent in school</td>
<td>x</td>
<td>x</td>
<td>Years</td>
</tr>
<tr>
<td>MARR</td>
<td>1 if the household is married, 0 otherwise</td>
<td>x</td>
<td>x</td>
<td>Dummy</td>
</tr>
<tr>
<td>WOG</td>
<td>1 if the woman often does grocery shopping, 0 otherwise</td>
<td>x</td>
<td>x</td>
<td>Dummy</td>
</tr>
<tr>
<td>SOCG</td>
<td>1 if the household depends on social grants, 0 otherwise</td>
<td>x</td>
<td>x</td>
<td>Dummy</td>
</tr>
<tr>
<td>URBA</td>
<td>1 if the household is located in the urban area, 0 otherwise</td>
<td>x</td>
<td>x</td>
<td>Dummy</td>
</tr>
<tr>
<td>NEAT</td>
<td>Number of people in the family eating ALVs</td>
<td>x</td>
<td></td>
<td>Number</td>
</tr>
<tr>
<td>AWAR</td>
<td>1 if the respondent is aware of ALVs, 0 otherwise</td>
<td>x</td>
<td>x</td>
<td>Dummy</td>
</tr>
<tr>
<td>DIST</td>
<td>Distance to where ALVs are sold/bought</td>
<td>x</td>
<td></td>
<td>Kilometres</td>
</tr>
<tr>
<td>RELI</td>
<td>1 if ALVs are perceived by the household to be served as relish, 0 otherwise</td>
<td>x</td>
<td>x</td>
<td>Dummy</td>
</tr>
<tr>
<td>TAST</td>
<td>1 if ALVs are perceived by the household to be tasty, 0 otherwise</td>
<td>x</td>
<td>x</td>
<td>Dummy</td>
</tr>
<tr>
<td>EASP</td>
<td>1 if ALVs are perceived by the household to be easy to prepare, 0 otherwise</td>
<td>x</td>
<td>x</td>
<td>Dummy</td>
</tr>
<tr>
<td>AFOD</td>
<td>1 if ALVs are perceived by the household to be affordable, 0 otherwise</td>
<td>x</td>
<td>x</td>
<td>Dummy</td>
</tr>
<tr>
<td>NUTR</td>
<td>1 if ALVs are perceived by the household to be nutritious, 0 otherwise</td>
<td>x</td>
<td>x</td>
<td>Dummy</td>
</tr>
<tr>
<td>MEDI</td>
<td>1 if ALVs are perceived by the household to be medicinal, 0 otherwise</td>
<td>x</td>
<td>x</td>
<td>Dummy</td>
</tr>
</tbody>
</table>

Note: <sup>1</sup> R1 = $US 0.118 (2012)

TABLE 3: VARIANCE INFLATION FACTOR (VIF) FOR VARIABLES IN THE MODELS

<table>
<thead>
<tr>
<th>Variable</th>
<th>VIF</th>
</tr>
</thead>
<tbody>
<tr>
<td>TAST</td>
<td>2.86</td>
</tr>
<tr>
<td>EASP</td>
<td>2.78</td>
</tr>
<tr>
<td>AFOD</td>
<td>2.27</td>
</tr>
<tr>
<td>NUTR</td>
<td>1.90</td>
</tr>
<tr>
<td>RELI</td>
<td>1.60</td>
</tr>
<tr>
<td>URBA</td>
<td>1.53</td>
</tr>
<tr>
<td>AGE</td>
<td>1.47</td>
</tr>
<tr>
<td>EDUC</td>
<td>1.41</td>
</tr>
<tr>
<td>MEDI</td>
<td>1.27</td>
</tr>
<tr>
<td>DIST</td>
<td>1.27</td>
</tr>
<tr>
<td>NEAT</td>
<td>1.17</td>
</tr>
<tr>
<td>WOG</td>
<td>1.11</td>
</tr>
<tr>
<td>MARR</td>
<td>1.09</td>
</tr>
<tr>
<td>AWAR</td>
<td>1.07</td>
</tr>
<tr>
<td>GEND</td>
<td>1.07</td>
</tr>
<tr>
<td>SOCG</td>
<td>1.07</td>
</tr>
<tr>
<td>Mean VIF</td>
<td>1.56</td>
</tr>
</tbody>
</table>

Source: Survey 2012
See Table 2 for meaning of abbreviated variables.
old. About 42% of the household heads were males, 47% resided in urban areas, and the average school education was 10 years. On average 44% of the respondents were married and household grocery shopping was mostly done by women (59%). Approximately 15% of the households depended on social grants as their main source of income. Most of the respondents (96%) were aware of ALVs and travelled an average of 6.5 km to buy them from the market. The descriptive results revealed that more than 50% of the respondents consumed ALVs as relish and believed that ALVs are nutritious, while less than 50% of the respondents believed that ALVs are tasty, easy to prepare, affordable and of medicinal value.

**Factors affecting sample households’ purchasing of and expenditure decisions regarding ALVs in the Limpopo Province**

Table 5 shows the maximum likelihood estimates of the double-hurdle model in terms of the decision to purchase ALVs, as well as the relevant expenditure level. The value of the Pseudo $R^2$ (55%), the log-likelihood (-719.978), and the LR Chisq (significant at the 1% level) indicate that the specifications of the two models provided a good fit to the data. In addition, the explanatory variables used in the models collectively explain consumers’ decision to purchase ALVs, as well as the expenditure level in the study area. The results show that ten factors influenced the purchasing decision, while eight influence the level of ALV expenditure. Factors that only influenced the purchasing decision but not the level of expenditure were AGE and DIST. Factors that influenced both the purchasing decision and the level of expenditure were the socio-economic factor (SOCG) and perception factors (RELI, TAST and AFOD).

The age variable (AGE) only affected the level of expenditure on ALVs but did not have any influence on the decision on whether or not to purchase ALVs.
purchase ALVs. The results imply that younger respondents were less likely to spend more on ALVs in comparison with older ones. Older people had local knowledge of ALVs having nutritional and health benefits (Oniang’o et al., 2004). Jansen van Rensburg et al. (2007) also noted that young people in South Africa had hardly consumed ALVs because they did not want to be described as old fashioned and poor. In this respect, only middle-aged and older people participated in the consumption of ALVs (Mayekiso, 2017). Regarding the gender variable (GEND), the decision to purchase ALVs was negatively significant. This implies that households headed by females were more likely to purchase ALVs in comparison with their male counterparts. Hart and Vorster (2006) also confirmed that ALVs were regarded as a food mainly consumed by females. The dummy variable, marital status (MARR), affected the decision to purchase ALVs significantly negative, but not that of the level of expenditure. This implies that married people were less likely to purchase ALVs and less likely to spend more on ALVs. The reason may be that men, who happened to be the husbands, were less likely to consume ALVs, therefore, there was no reason for married women to purchase and prepare ALV dishes.

Meanwhile, the respondents’ level of education (EDUC) affected the purchasing decision negatively, but not the level of expenditure. This implies that families headed by relatively educated people were less likely to purchase ALVs, thus, higher education levels reduced the acceptance of ALVs as a food choice. These results concur with Taruvinga and Nengovhela (2015) who reported that education had a negative impact on the consumption of ALVs in the Eastern Cape. This may be attributed to the fact that not much information regarding ALVs’ health and nutrition benefits had been made available and accessible to the consumers in
They were aware of the nutritional and cultural values of ALVs. These results concur with Agbelemoge (2014) in that consumer awareness/knowledge about ALVs had a positive impact on the consumption of ALVs. Interventions that would promote the transfer of information regarding ALVs to male and younger decision-makers may increase the likelihood to purchase and consume ALVs. Distance to ALV markets (DIST) determined consumer ease of accessing these products. In this study, this variable significantly and negatively influenced the level of households' ALV expenditure. These findings further reinforce the notion that ALV consumption moved more towards being market driven, suggesting that consumers were likely to consider ALV consumption if markets selling them were closer. Longer distances to markets constrained access to food commodities due to high transportation costs (Vorster et al., 2007).

The relish variable (RELI) significantly affected both the purchasing decision and the level of expenditure positively. This implies that the relish attribute increases the probability of purchasing ALVs and the level of expenditure. According to Vorster et al. (2002), the tender leaves and flowers of ALVs are normally boiled and consumed as a relish throughout sub-Saharan Africa. The cooked ALVs are then enjoyed with a stiff porridge. This is a nourishing dish for many poor households who cannot often afford meat. Respondents’ perception that ALVs were tasty (TAST) positively and significantly affected both the decision to purchase and the level of expenditure. The results concur with those of Vorster et al. (2007) that the taste of ALVs increased the probability of the purchase decision. Taruvinga and Nengovhela (2015) also found that households believed that ALVs were tasty and easy to cook, which made them a preferred daily dish in rural areas.

Consumers who thought that ALV prices were affordable (AFOD) were more likely to purchase and spend more on them. Price perception has several roles in the price-quality association, prestige sensitivity, price consciousness and value consciousness of consumers, but they may change over time based on how they influence consumers’ purchasing behaviour (Sternquist et al., 2004; Fatih, 2014). Like other...
agricultural products, market prices for ALVs fluctuate across seasons, making them less affordable among poor households, especially during dry seasons (Amaza, 2009). Consumers who are adequately informed about the importance of ALVs in a diet have a higher willingness to pay premium prices when purchasing these vegetables (Chelang’a et al., 2013).

The model results confirmed a significant positive association between the perception that ALVs are nutritious (NUTR) vegetables and the decision to purchase. This implies that consumers who perceived ALVs to be nutritious were more likely to purchase them. These findings, therefore, suggest that there may be sufficient evidence to claim that ALV production may be positively supported as long as rural households continue to share positive nutritional beliefs regarding these vegetables. In light of this finding, the observed association may be based on the assumption that production is driven by the desire to address nutritional deficiency. Tumwet et al. (2014), Acheampong et al. (2012) and Kimiywe et al. (2007) reported similar results.

CONCLUSIONS AND RECOMMENDATION

This study used a double-hurdle model to determine the impact of socio-economic and perception factors on consumers’ decision whether or not to purchase ALVs, and their level of expenditure on these foods. ALVs were found to be more commonly purchased and consumed by women. Interventions to raise awareness about their health and nutrition benefits may help to promote the consumption and purchasing of ALVs by educated, male, urban dwellers. Generally, ALVs were rather accepted by rural than by urban respondents. Strategies are required to enhance value addition and sensitisation of consumers to traditional knowledge regarding ALVs, as well as their nutritional importance to the human diet. There is a need to develop the food supply chain from rural to urban in order to meet the needs of a rapidly urbanising population.

ALVs were found to be consumed more by those who were aware of their benefits, but less consumed by the educated respondents. Hence, strategies offering awareness programmes to consumers who are unaware of ALVs and their benefits (such as the young, males and urban households) may increase the chances of consumption. Interestingly, the results showed that increasing levels of dependency on social grants was associated with decreasing level of expenditure on ALVs, suggesting that increasing income from social grants entrenches a culture of dependency and entitlement. The results of this study suggest that the influence of social grants on the purchasing decision and level of expenditure is not a question of whether or not a household is a social grant beneficiary but the level of household dependency on social grant income. In order to promote the consumption of ALVs in the Limpopo province, the study stresses the need to find strategies integrating awareness programmes on media (such as national and local radios, television stations, newspaper and social networks) where consumers are informed about the nutrition and health benefits of ALVs in languages they understand, may promote the consumption of ALVs by educated and urban consumers. Other strategies that could promote and increase urban households’ ALV consumption include value-adding activities such as canning, cutting, and quality packaging. These presentations will require traders and retailers to become involved by stocking them. Consumers who buy these products will need less time to prepare the ALVs before cooking. This will encourage poor households to consume ALVs and not to see them as a poor man’s food.

It is crucial to understand the changing perception factors of consumers that have an impact on their decision to purchase and expenditure level on ALVs. This understanding may assist policy makers to implement agricultural and food policies related to the ALV industry, thereby addressing the food security, nutrition and health nexus. Future breeding and value-adding activities to enhance taste is necessary to encourage the consumption of ALVs. All such initiatives will have another positive societal value of reducing dependence on a handful of crops for nutrition and food security. Furthermore, an increased consumption will contribute towards stabilising food commodity prices, as food product markets
will become more resilient as their product portfolio expands. The limitation of this study is that data from only one province in South Africa were analysed, which means that the data are not nationally representative. It is recommended that nationally representative studies be conducted to provide further understanding of ALV perceptions.

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A double hurdle analysis of consumers’ decisions to purchase African leafy vegetables in Limpopo province


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