

## ATTITUDES OF FARMERS, TRADERS AND URBAN CONSUMERS CONCERNING CONSUMPTION OF TRADITIONAL AFRICAN VEGETABLES IN TANZANIA

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### **Abstract**

Traditional African Vegetables (TAVs) form a significant source of food and nutritional security in rural areas of Sub-Saharan Africa. Consumption of TAVs in the region also plays a major role in providing dietary fiber and other important components in the prevention of chronic and lifestyle diseases. However, the consumption of vegetables per individual is still below the recommended level by WHO and FAO. This study determined the attitudes concerning consumption of TAVs in Tanzania. Descriptive statistics and principal components analysis were used to analyze data. Data was collected from randomly selected 63 farmers, purposively selected 65 traders and 262 consumers in Manyire, Embaseny and Bangata markets in Arumeru District, Tanzania. The results showed that of the eleven attitude statements presented to respondents, five scored over 90% and two over 80% on the positive end of the Likert Scale. Three of the remaining four statements scored over 80% and one over 50% on the negative end of the Likert Scale. These four statements carried negative attitudes and also received negative responses; essentially making them positive attitude statements. It was therefore concluded that farmers, traders and consumers have a positive attitude concerning consumption of TAVs. Factor analysis results showed that health, perception and taste factors were the prime movers of attitudes concerning TAVs consumption among farmers, traders and urban consumers. The health factor was the main prime mover for farmers and traders, and the second one for urban consumers. As consumption of TAVs moves away from the farm to urban markets, the importance of the taste factor shifts from the third position for farmers to the first position for urban consumers. Hence taste was the main driver of attitudes for TAVs consumption in urban areas. However, the importance of the perception factor diminishes from the second position for farmers to the fourth position for traders and consumers. It was therefore concluded that there is need to increase knowledge of health benefits for these crops to a larger population across the board. It is also important to train farmers, traders and consumers on innovative ways of mixing various TAVs varieties during preparation, and cooking techniques to enhance taste.

**Key word:** Attitudes, diet, nutrition, health, taste, perception, traditional African vegetables

## 1.0 Introduction

Traditional African Vegetables (TAVs) form a significant source of food and nutritional security in rural areas of Sub-Saharan Africa (SSA). Consumption of TAVs in the region also plays a major role in providing dietary fiber and other important components in the prevention of chronic and lifestyle diseases (Uusiku et al., 2010). However, low vegetable consumption is a major factor contributing to high prevalence of micronutrient deficiencies, and several other nutritional disorders including birth defects, weakened immune systems, mental and physical retardation (FAO, 2003). However, Kobe (2004) points out that vegetable and fruit consumption is still very low in the region (27–114 kg/capita per year), far below the WHO/FAO recommendation (146 kg/capita per year). Also, most SSA countries have not prioritized these TAVs in their policies, crop research, training and development programs ( Onyango & Onyango, 2005; Adebooye and Opabote, 2004, Ngugi et al., 2007). Ultimately, several studies have noted that the frequency of intake of TAVs has been declining over the years (Abukutsa-Onyango, 2007; Keller et al., 2006; Masayi & Netondo, 2012). Odhav et al. (2007) also observed that decline in use of TAVs by many rural communities has resulted into poor diets, increased incidence of nutritional deficiency disorders and diseases among the most vulnerable groups – women and children under five years. Low consumption of TAVs could also be due to the negative perception held by some consumers. Vorster et al. (2007) noted that, some people view TAVs as ‘poverty food’ or ‘food for the backward’, a notion that explains why some consumers are not positively inclined to them.

Various studies (Abukutsa-Onyango, 2007; Keller et al., 2006; Masayi & Netondo, 2012) have noted that the frequency of TAVs consumption has been low over the years. This outcome is as a result of the perception that TAVs are inferior in their taste and nutritional value compared to global vegetables such as cabbage and spinach. The general impression that traditional vegetables are ‘poverty foods’ or ‘backward’ describes why youth are not readily inclined to them (Vorster et al., 2007). Other factors such as gender and age also affect consumption of TAVs. Men, for instance prefer consuming less of vegetables as compared to women (Kimiye et al., 2007; Vorster et al., 2007). The youth show no interest in consuming traditional vegetables as they are viewed to be outdated. Limited recipes for cooking traditional vegetables have made them less appealing to the young. Furthermore, preference of traditional vegetables species varies depending on the geographical location and cultural background (Kimiye et al., 2007; Uusiku et al., 2010). Also, the consumption pattern and preferences for traditional vegetables vary among households within different countries (Uusiku et al., 2010). Occupation is one of the socio-economic factors that influence the choice and consumption of traditional vegetables. Kimiye *et al.* (2007) observed that casual consumption of traditional vegetables is high among laborers and/or unemployed people in comparison to full-time employees and business people. The authors noted that occupation determines the time one has for buying, preparing and cooking traditional

vegetables. Income level of household is another socio-economic factor that influences consumption of traditional vegetables. Vorster et al. (2007) observed that households at the lower income quintiles consume more traditional vegetables than their wealthier counterparts. Consumers derive a major portion of their diets from TAVs which play a significant role in human nutrition. These vegetables have high levels of minerals, especially calcium, iron and phosphorus, vitamins A and C and proteins (Nesamvuni *et al.*, 2001), that are important particularly to vulnerable groups such as pregnant and nursing mothers. Fresh leaves of most TAVs like vegetable amaranths, slenderleaf, spiderplant, vegetable cowpeas, pumpkin leaves and jute mallow contain more than 100% of the recommended daily allowances for vitamins and minerals and 40% proteins for growing children and lactating mothers (Chweya, 1985; Kokwaro, 1976). Despite these advantages, vegetable and fruit consumption per capita in Africa, has been reported (FAO, 2009) to be below the minimum recommended intake levels per capita.

Tanzania has made good progress in many health indicators over the past decade. However, the nutritional status of the population remains low (UNICEF, 2016). Currently, in Tanzania, malnutrition remains a problem with stunting affecting 42% of under-five-year old children; anemia affecting 53% of pregnant women, 60% of under-five children and 81% of 9-11-month-old infants (World Bank, 2010). Traditional African Vegetables have the potential to contribute in ameliorating this situation because they have high levels of minerals, especially calcium, iron and phosphorus, vitamins A and C and proteins (Nesamvuni *et al.*, 2001) which are particularly important to vulnerable groups. However, the problem is that vegetable consumption per capita in Tanzania is below the minimum recommended intake of 200 g per person per day (FAO, 2009). FAO (2003) observed that between 1993 and 2000, vegetable consumption grew from 107 to 113 g per capita per day. Nevertheless, the overall consumption is low and below the recommended level for low-income and medium consumers. Though some consumers are aware of the benefits of TAVs, literature suggests that some have negative attitudes towards these vegetables. Vorster et al. (2007) noted that positive perceptions of TAVs are more among older and rural consumers while negative perceptions are more common among younger and urban consumers. Hence the efforts of researchers and policy makers on TAVs tends to contrast sharply with the negative image of potential groups of consumers in the society (Vorster et al., 2002). It is only in the recent past that the importance of TAVs has been recognized by researchers (Vorster et al., 2007) while studies on consumers' attitude towards TAVs have generally been few (Yang & Keding, 2009).

The purpose of this study was to determine the attitudes concerning consumption of TAVs in Tanzania. The main objective was to establish the prime movers of TAVs consumer attitudes among farmers, traders and urban consumers. The study focused on the consumers along the TAVs value chain to determine whether there

are common factors influencing attitudes concerning TAVs consumption. A greater understanding of TAVs attitudes across the value chain is essential for developing strategies for marketing, trading and promotional campaigns among consumers.

## 2.0 Research Methodology

This study was carried out in Arumeru District of Arusha Region, Tanzania between July and November 2015. It was part of the project 'Improving Income and Nutrition in Eastern and Southern Africa by Enhancing Vegetable-based Farming and Food Systems in Peri-urban Corridors (VINESA)' led by AVRDC-The World Vegetable Center, Eastern and Southern Africa (AVRDC-ESA). Purposive sampling technique was used to sample study cases for consumers and traders because there were no records to develop a sampling frame. So, willing traders involved in selling TAVs and willing urban consumers involved in purchasing from these markets were interviewed. However, random sampling procedure was used to select study cases for farmers in the study area. The farmers were randomly selected from a list of those working with VINESA project. A sample of randomly selected 63 farmers, purposively selected 65 traders and 262 consumers was interviewed for the study. A structured questionnaire was developed and administered to the respondents by trained enumerators. The project area covered Manyire, Embaseny and Bangata markets. The data collected was on the socioeconomic characteristics of the three categories of consumers and their attitudes concerning consumption of TAVs. Respondents were asked to rate their agreement with 11 attitudinal statements on a five-point Likert-type scale labelled *strongly agree*, *agree*, *not sure*, *disagree* and *strongly disagree*. The scales were scored so that 1=strongly disagree to 5 = strongly agree. A total of 11 statements were chosen in order to be able to determine the attitudinal views of the participants on the various attributes of TAVs. The statements were developed from ideas generated earlier on during focus group discussions (FGD) and interviews with key informants, and were then put into the questionnaires. These statements were also developed in recognition of the local beliefs and attitudes of the people in relation to their consumption of TAVs. The methods used to analyze data were descriptive statistics and principal components analysis. Descriptive statistics were used to sum up the scores associated with each statement and were divided by the highest sum to obtain a score in percentage terms in a given Likert scale category (Shibia, 2010) or scale averages for the particular question responses (Dolisca et al., 2007; Rishi, 2007). Principal components analysis/ factor analysis (Leech et al., 2012) was used to identify latent dimensions underlying the different variables that measured attributes of the various consumer preference. Responses to five-point Likert-type scale items was subjected to a principal component factor analysis (PCA) with Varimax rotation. The objective was to obtain fewer dimensions that reflected the relationships among these inter-related variables. An Eigen-value greater than one rule was applied in identifying the number of factors. The factors were subjected to the Kaise-Meyer-Olkin and Bartlett's test (KMO and Bartlett's test) to determine the sampling

adequacy. According to Leech *et al.* (2012), KMO measure greater than 0.7 is satisfactory but it is inadequate if it falls below 0.5. The KMO test tells us whether or not enough items are predicted by each factor. The above procedures were adopted for this study.

### **3.0 Results and Discussions**

#### **3.1 Socio Economic Characteristics of TAVs Consumers**

Table 1 shows the demographic characteristics of TAVs consumers i.e. farmers, traders and urban consumers. The survey results demonstrated that the majority of farmers, traders and urban consumers interviewed were 57% males, 97% females and 74% females respectively. It was observed that there were more women involved in TAVs trading compared to men. The results of urban consumers reflect that women were mostly responsible for doing the household food shopping in keeping with most African customs. The respective marital status of the respondents were 92%, 85% and 82 % married. Most of the farmers (90%) and traders (89%) had attained primary school education whereas some of the consumer respondents had attained tertiary (2%), secondary (14%) and primary (76%) education. Thus, consumers seemed to have attained more higher education than farmers and traders, which influences purchase and consumption decisions of TAVs. The main occupation for most farmers is agriculture (75%) while others combine it with livestock (21%). The majority of traders (91%) are involved in business. Urban consumers are engaged in a number of occupations such as business (7%), formal employment (15%) and agriculture (63%). These results imply that more than half of consumer respondents in urban areas were also engaged in farm agricultural activities besides other occupations such as business (7%), formal employment (15%) and casual labor (3%). Table 2 shows the socio-economic characteristics of the respondents. The mean age of the farmer, trader and consumer respondents was 40.17, 38.15 and 39.65 years, respectively. The results imply that traders are younger than farmers and consumers; and that they are in the middle-age group. Their mean annual household income was Tshs. 1,263,651 (\$564.39); 1,634,692 (\$731.41) and 1,411,663 (\$631.62), respectively. It was observed that traders had a relatively higher annual income than farmers and consumers. The mean expenditure on the purchase of TAVs per week for consumption was Tshs 7,648(\$3.42); 9,143(\$4.09) and 6,328 (\$2.83) for farmers, traders and consumers, respectively. The results showed that traders had a higher expenditure on TAVs consumption than farmers and consumers. The level of knowledge in nutrition in relation to TAVs was high for farmers (2.854) compared to that of traders (2.769) and consumers (2.755). The frequency of TAVs consumption was high for traders (1.415) compared to that of farmers (1.06) and consumers (1.214). It is possible that traders use the advantage of trading in TAVs and the average level of knowledge they have about the importance of TAVs in nutrition to make them spend more money on consumption and hence high frequency of intake compared to farmers and consumers. It is also observed that expenditure on TAVs is higher for farmers than

that of urban consumers. Rural farm households are deemed to consume higher volumes of TAVs than urban households. Those households who do not produce TAVs purchase them from competitive markets with relatively high prices due to high demand from urban consumers. These two factors combined make TAVs expenditure for rural consumers higher than that of urban consumers, even when competitive market prices are used to impute value of TAVs produced and consumed at home.

*Table 1: Demographic Characteristics of the sample*

<b>Demographic properties</b>	<b>Farmers(63)</b>	<b>Traders(65)</b>	<b>Consumer(262)</b>
<b>Gender (%)</b>			
Female	42.86	96.92	73.66
Male	57.14	3.08	26.34
<b>Marital status of respondent (%)</b>			
Married	92.06	85.16	81.68
Single	6.35	10.23	13.36
Separated	1.59	3.08	0.76
Divorced	-	1.54	0.76
Widow or widower	-	-	3.44
<b>Ethnicity (%)</b>			
Meru	36.51	41.54	45.42
Maasai	3.17	-	3.05
Arusha	34.92	13.85	20.23
Chagga	15.87	21.54	20.61
Others (Sukuma, Nyakyusa, Iraqw, Pare)	9.52	23.07	10.69
<b>Main Occupation (%)</b>			
Agriculture	74.60	9.23	62.60
Casual labor	-	-	3.06
Formal employment	-	-	14.50
Business	4.76	90.77	7.25
Agriculture and livestock	20.63	-	12.60
<b>Highest Level of education (%)</b>			
None	1.59	3.08	8.78
Primary	90.48	89.23	75.57
Secondary	7.93	7.69	13.74
Middle-level college	-	-	0.76
University	-	-	1.15

Table 2: Socio-economic Characteristics of the Sample

Socio-economic properties	Farmers	Traders	Consumers
Age of respondent (mean)	40.17	38.15	39.65
Number of years of schooling (mean)-Head of household	7.13	7.14	6.95
Household size (count) mean	4.2	4.338	3.923
TAVs Farm size (acres) mean	0.61	-	-
Years in TAVs business (mean)	-	8.3	-
Household annual income (Tshs) (mean)	1,263,651	1,634,692	1,411,663
Amount spent to purchase TAVs per week (mean)	7,647.62	9,143.10	6,328.63
Distance to nearest market (minutes) Mean	52.403	51	28.393
Knowledge in Nutrition (count) mean	2.854	2.769	2.755
Frequency of intake (count) mean per week	1.06	1.415	1.214

### 3.2 Respondents' attitudes towards TAVs

Table 3 shows results of the eleven attitude statements presented to farmers, traders and consumers. It was observed that most of the attitude scores were high on the positive end (i.e., 'agree' and 'strongly agree') of the Likert Scale. Out of the eleven attitude statements, five of them had positive scores of over 90% (both strongly agree & agree) across the board. For example, the percentage responses for farmers, traders and consumers for the attitude statement: "consumption of TAVs is important to women, children and men" were 100%, 98.46% and 97.71% respectively. Two other attitude statements i.e. "Fresh TAVs contain more nutrients than dried ones" and "Intake of TAVs variety each day gives vitamins and minerals needed" had positive scores of 85.72%, 92.30% and 82.06, and 85.72%, 92.30% and 90.07, respectively. Thus, these two attitudes statements had scores of over 80% across the board. Four of the eleven attitudinal statements had high scores on the negative end (i.e. "Strongly Disagree" and "Disagree") of the Likert Scale. Three of them scored over 80% of the responses across the board. The first one was "TAVs are inferior foods; poverty food", with percentage scores 84.12%, 95.39% and 92.36% for farmers, traders and urban consumers, respectively. The other two attitude statements were "TAVs take more time to prepare" and "TAVs are not good to me". The fourth statement "TAVs are tasteless and bitter" scored 53.97%, 56.92% & 60.30% for farmers, traders and urban consumers, respectively. These four statements inherently carried negative attitudes. It is also observed that a good percentage of farmers, traders and urban consumers responded in the negative; ultimately making them positive attitude statements. For example 60.30% of the urban consumers disagreed with the statement that "TAVs are inferior foods; poverty food". Therefore it was concluded that they believed that "TAVs are normal foods". This study therefore concluded that farmers, traders and consumers have a positive attitude concerning TAVs consumption although the intensities might slightly be different.

Table 3: Farmers', Traders' and Consumers' Attitudes Concerning TAVs Consumption

Attitudinal views/Dimensions	Percent of Farmers' households within the response					Percent of Traders' households within the response					Percent of urban consumers' households within the response				
	SD	D	N	A	SA	SD	D	N	A	SA	SD	D	N	A	SA
Consumption of TAVs important to women, children and men	0	0	0	28.57	71.43	0	1.54	0	12.31	86.15	0.76	0.76	0.76	27.86	69.85
TAVs are inferior foods, poverty food	50.79	33.33	1.59	7.94	6.35	61.54	33.85	3.08	0	1.54	52.67	39.69	2.29	2.29	3.05
Fresh TAVs contain more nutrients than dried ones	1.59	1.58	11.11	42.86	42.86	1.54	1.54	4.62	36.92	55.38	1.53	4.58	11.83	41.98	40.08
Intake of TAVs variety each day gives vitamins and minerals needed	0	3.17	12.70	39.68	44.44	0	1.54	7.69	43.08	47.69	0.38	0.38	9.16	45.80	44.27
Important to choose daily diet with TAVs	0	0	1.59	57.14	41.27	3.08	1.54	3.08	43.08	49.23	0.76	0.38	2.29	51.91	44.66
Eating TAVs improve eyesight and boost immunity	0	0	7.94	33.33	58.73	0	1.54	4.62	24.62	69.23	0.38	1.15	3.44	24.43	70.61
TAVs are best consumed when fresh	0	1.59	4.76	41.27	52.38	0	0	1.54	35.38	63.08	0.76	1.15	0.38	45.04	52.67
TAVs takes more time to prepare	38.10	47.62	0	6.35	7.94	35.38	50.77	0	3.08	10.77	34.73	53.82	0	6.49	4.96
TAVs are not good to me	57.41	31.75	0	3.17	7.94	49.23	40	0	0	10.77	46.56	45.42	0	0.38	7.63
TAVs are tasteless and bitter	23.81	30.16	1.59	38.10	6.34	38.46	18.46	0	0	43.08	29.77	30.53	2.29	33.97	3.44
I am committed to preserve TAVs for next generation	0	0	3.17	47.62	49.21	0	0	0	36.92	63.08	0.38	1.15	0	40.23	58.24

Key: SD=Strongly Disagree, D=Disagree, N=Neutral, Agree=A and SA=Strongly Agree

### 3.3 Attitude Results of Farmers, Traders and Urban Consumers

#### 3.3.1 Farmers

The results of factor analysis for farmers were as shown in Figure 1 and Table 4. Leech *et al.* (2012) noted that a KMO measure greater than 0.7 is satisfactory but it is inadequate if it falls below 0.5. The KMO test measure of sampling adequacy obtained was 0.694 which suggests that the data is marginally appropriate for factor analysis. Figure 1 marked the usual cut off for retaining principal components and showed that components 4 through 11 were not important. The three factors retained accounted for 58.95% of the total explained variance as shown in Table 4. The results yielded seven attitude variables attached to the importance and conservation of TAVs and were clustered under Factor 1. These attributes (Table 4) had respective cross-correlation coefficients of 0.530, 0.574, 0.872, 0.753, 0.572, 0.733 and 0.716. These findings imply that rural households are persuaded that TAVs are important for human health and are best consumed when they are fresh. This factor accounted for 31.4% of the total variance. It was therefore labelled 'health benefits' since these attributes are mainly concerned with the importance of consumption as well as conservation by local farmers. These findings imply that farmers have a general understanding about the significance of consuming TAVs and are willing to safeguard these varieties for the next generation.

Only one attitude i.e. "TAVs are not good to me" concerning personal views on consumption of TAVs was loaded to Factor 2 with a cross-correlation coefficient of 0.633. It was then labelled 'personal perception'. Factor 2 accounted for 13.79% of the total variance explained. Also one- attitude concerning taste of TAVs was loaded to Factor 3. i.e. "TAVs are tasteless and bitter" with a cross-correlation coefficient of 0.895. It was therefore labelled 'personal taste'. Factor 3 accounted for 12.71% of the total variance. The percentage of the total variance explained by the three factors was 58.95%. Some of the high scores and positive responses observed in this factor implied that farmers strongly believe that TAVs contribute to their health.

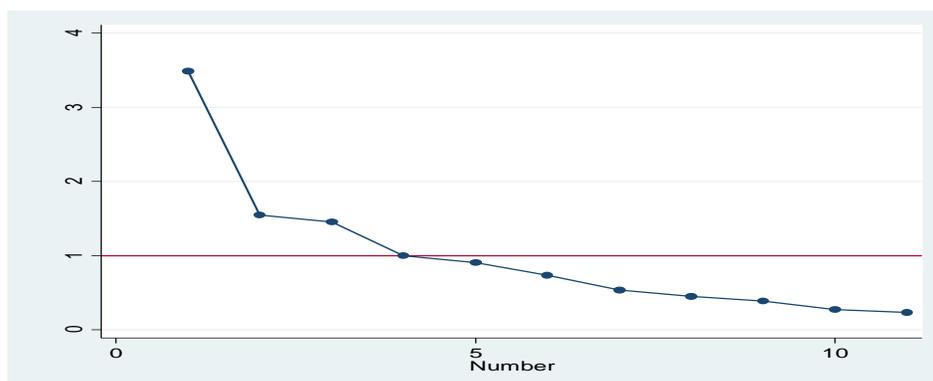


Figure 1: Farmers' Eigenvalues Versus Factor numbers

Table 4: Results of Exploratory factor analysis

Factor and item description	Factor loading	% Variance explained
<b>Factor 1: Health benefits</b>		31.44
	0.530	
Fresh TAVs contain more nutrients than dried ones	0.574	
Intake of TAVs variety each day guarantee vitamins and minerals required	0.872	
It is important to choose diet accompanied with TAVs	0.753	
Consumption of TAVs improve eyesight and boost body immunity	0.572	
TAVs are best consumed when fresh	0.733	
I am willing to preserve TAVs for the next generation	0.716	
		13.79
<b>Factor 2: Personal perception</b>		
TAVs are not good to me	0.633	
		13.72
<b>Factor 3: Personal taste</b>		
TAVs are tasteless and bitter	0.895	

3.3.2 Traders

The results of factor analysis for traders were as shown in Figure 2 and Table 5. The Kaiser's overall measure of sampling adequacy obtained was 0.695, which adequately borders on the recommended threshold of 0.7 (George & Mallery, 2003) suggesting that the data is appropriate for factor analysis. Figure 2 marked the usual cut-off for retaining principal components and showed that components 5 through 11 were not important. Only four factors were retained for further analysis.

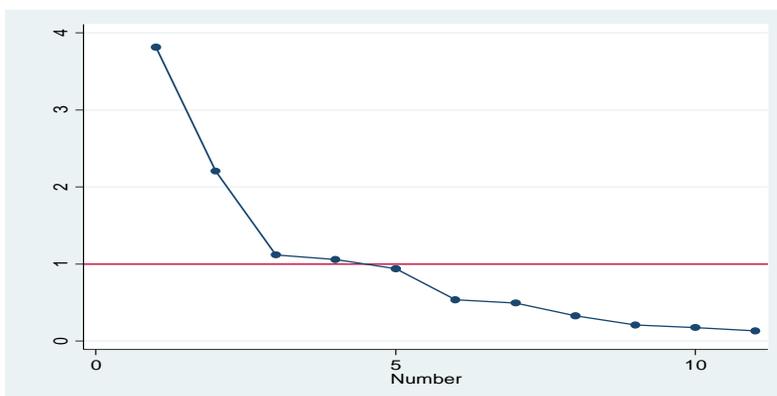


Figure 2: Traders' Eigenvalues Versus Factor numbers

Table 5: Results of exploratory factor analysis

Factor and item description	Factor loading	% variance explained
<b>Factor 1: Health Benefits</b>		32.38
Fresh TAVs contain more nutrients than dried ones	0.835	
Intake of TAVs variety each day guarantee vitamins and minerals required	0.915	
It is important to choose diet accompanied with TAVs	0.721	
Consumption of TAVs improve eyesight and boost body immunity	0.872	
TAVs are best consumed when fresh	0.838	
<b>Factor 2: Personal taste</b>		20.78
TAVs are inferior foods (poverty food)	0.664	
TAVs are tasteless and bitter	0.879	
<b>Factor 3: Time factor</b>		10.84
TAVs take more time in preparation	0.941	
<b>Factor 4: Personal perception</b>		10.48
TAVs are not good to me	0.956	

Factor loadings value of 0.50 and above is normally considered good and significant (George & Mallery, 2003).

The analysis produced a solution with five factors that accounted for 74.47% of the total explained variance as shown in Table 5. Five attitude variables concerning importance of consuming TAVs varieties were loaded on factor 1 with respective cross-correlation coefficients 0.835, 0.915, 0.721, 0.872 and 0.838. This factor accounted for 32.38% of the total variance and was termed 'Health benefits' because these variables focused mainly on the importance of consuming TAVs by local traders. Higher scores and positive responses on this factor revealed a general understanding of the import of TAVs consumption and frequency intake on health. Two attitudes concerning taste of TAVs varieties were loaded on Factor 2 with respective cross correlation coefficients of 0.664 and 0.879 (Table 5). This factor was therefore labeled 'personal taste' and accounted for 20.78% of the total variance. Higher scores and positive responses on this factor revealed a general opinion that it was important to consider how TAVs varieties taste. Only one attitude variable concerning time of preparing TAVs was loaded on Factor 3 with a cross-correlation coefficient of 0.941. Factor 3 was therefore labelled 'time factor'. Urban consumers normally have very limited time to prepare TAVs. Usually, traders

prepare, package and sell to the consumers ready for cooking. Factor 3 accounted for 10.84% of the total variance. One attitude variable concerning personal views was loaded to Factor 4 with a cross-correlation coefficient of 0.956. It was therefore labeled 'personal perception' and accounted for 10.48% of the total variance. There is a negative perception concerning TAVs that they are generally not good. This view has been in the communities for years. The cumulative percent of variance for all the factors explained was 74.47%.

### 3.3.3 Consumers

The results of factor analysis for consumers were as shown in Figure 3 and Table 6. The Kaiser's overall measure of sampling adequacy obtained was 0.667, which adequately borders on the recommended threshold of 0.7 (George & Mallery, 2003) suggesting that the data is adequate for factor analysis. Figure 3 marked the usual cut off for retaining principal components and showed that components 5 through 11 were not important. For consumers, only four factors were retained for further analysis. Factor loading value of 0.50 and above is normally considered good and significant (George & Mallery, 2003). The analysis produced a solution with four factors that accounted for 68.30% of the total explained variance as shown in Table 6. Four attitude variables concerning taste of TAVs varieties was loaded on Factor 1 with respective cross-correlation coefficients of 0.460, 0.514, 0.790 and 0.783 (Table 6). This factor was termed 'Taste' of TAVs varieties because these variables involved taste of TAVs by local consumers. Factor 1 account for 18.55% of the total variance explained. The higher scores on this factor revealed a general opinion that it was important to consider how TAVs varieties taste. Three attitude variables focusing on the importance of consuming TAVs for good health was loaded on Factor 2 with respective cross-correlation coefficients of 0.740, 0.722 and 0.410. This factor account for 15.31% of the total variance explained.

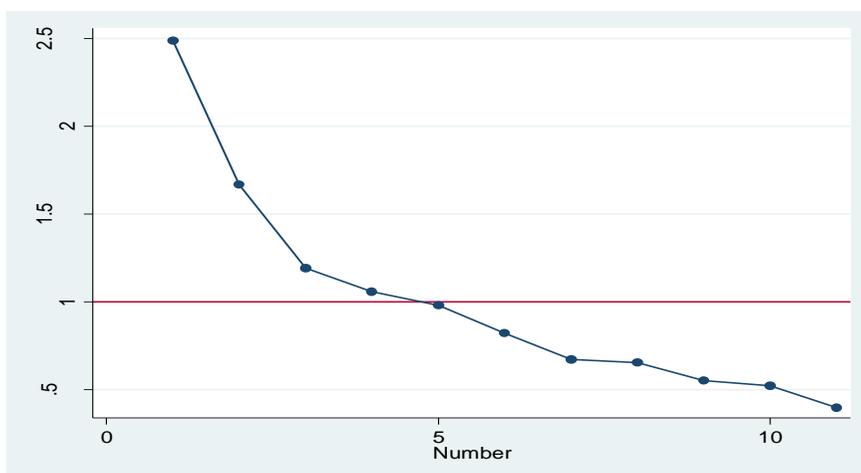


Figure 3: Consumers' Eigenvalues vs Factor Numbers

Table 6: Results of exploratory factor analysis

Factor and item description	Factor loading	% variance explained
<b>Factor 1: Personal Taste</b>		18.55
TAVs are inferior foods (poverty food)	0.460	
It is important to choose diet accompanied with TAVs	0.514	
TAVs are tasteless and bitter	0.790	
I am willing to preserve TAVs for the next generation	0.783	
<b>Factor 2: Health Benefits</b>		15.31
Consumption of TAVs is important to women, children and men	0.740	
Consumption of TAVs improves eyesight and boosts immunity	0.772	
TAVs takes more time to prepare	0.410	
<b>Factor 3: Freshness</b>		14.36
TAVs are best consumed when fresh	0.640	
Fresh TAVs contain more nutrients than dried ones	0.646	
Eating a variety of TAVs each day guarantee vitamins	0.450	
<b>Factor 4: Personal Perception</b>		10.00
TAVs are not good to me	0.899	

Source: Authors' Survey, 2016.

Three attributes focusing on the importance of consuming fresh TAVs were loaded on Factor 3 with respective cross-correlation coefficients of 0.646, 0.640 and 0.450. This factor was labelled 'Freshness' of TAVs. This factor accounted for 14.36% of the total variance explained. This finding implied that consumers prefer to consume TAVs when they are fresh. One attitude variable concerning personal views was loaded to Factor 4 with a cross-correlation coefficient of 0.899. It was therefore labelled 'personal perception' and accounted for 10.0% % of the total variance. There is a negative perception towards TAVs particularly associated with men and youth that these vegetables are not good for them. The cumulative percent of variance for all the four factors explained was 58.22%.

Table 7 shows the results of a cross tabulation of factors and the consumers. A cross-sectional observation of the factor analysis results showed that the "health" factor, the "perception" factor and the "taste" factor influenced the attitudes of farmers, traders and urban consumers though not in the same order. The "time" factor was in the third rank for traders whereas the "freshness" factor was also in the third rank for consumers. The health factor dominated the first position for

farmers & traders with a minimal decline to the second position for consumers. This implied that farmers, traders and consumers strongly associate consumption of TAVs with their health. Moreover, the three consumer groups do not consider TAVs as inferior or poverty food but as normal food (Table 3). Farmers, traders and urban consumers are persuaded that TAVs have medicinal properties and hence are important for human health. In the study area, African eggplant has been used as treatment for blood pressure, African nightshade for increasing blood and jute mallow was also used for stomach ulcers as well as cure for pains of the joints.

Table 7: A cross tabulation of factors and consumers

	Consumer Categories		
Factors	Farmers	Traders	Urban Consumers
Factor 1	Health	Health	Taste
Factor 2	Perception	Taste	Health
Factor 3	Taste	Time	Freshness
Factor 4	-	Perception	Perception

The “taste” factor had the lowest loading in the factor analysis for farmers. However, as consumption moved away from the farm to the urban areas, its importance ascended to the second and the first loading factor for traders and urban consumers respectively. Thus, “taste” was highly preferred by urban consumers compared to the other factors in keeping with consumer demand. The “freshness” factor was the third in rank among urban consumers. The urban consumers felt that TAVs are best consumed when fresh. They were also of the view that fresh TAVs contain more nutrients than dried ones. During the survey, “African nightshade and spider plants were said to be bitter and tasteless if not mixed with other TAV varieties during consumption. The results further showed that the perception factor diminished in importance from the second position for farmers to the fourth position for both traders and consumers.

#### 4.0 Conclusions and Recommendations

This study found out that five of the eleven attitudinal statements presented to farmers, traders and urban consumers had scores of over 90% and two of them had scores of over 80% on the positive end (i.e. “agree” and “strongly agree”) of the Likert Scale. Three of the remaining statements scored over 80% whereas one scored over 50% on the negative end (i.e. “Strongly Disagree” and “Disagree”) of the Likert Scale. It was observed that these last four statements inherently carried negative attitudes. Also, a good percentage of farmers, traders and urban consumers responded to them in the negative, ultimately making them positive attitude statements. It was therefore concluded that farmers, traders and urban consumers have a positive attitude concerning consumption of TAVs.

Factor analysis results showed that health, perception and taste were common factors influencing the attitudes of farmers, traders and urban consumers concerning TAVs consumption. In addition, time factor influenced the attitude of traders whereas freshness factor influenced the attitude of urban consumers. It was therefore concluded that health, perception and taste factors were the prime movers of consumer attitudes towards consumption of TAVs. The “health factor” had the highest rank among farmers and traders and the second rank among urban consumers. This finding implied that the health benefits in these TAVs influence their consumption positively. The study recommended an improvement in medicinal knowledge of these crops to a larger population. The findings also showed that the perception factor loading was the second highest for farmers. However, as one moves away from farm consumption to urban consumption, its importance diminishes. It was therefore concluded that there is low perception of TAVs consumption held by traders and urban consumers. The study therefore recommends incorporation of health attributes of TAVs in promotional campaigns to change trader and urban consumer attitudes. Various promotional approaches such as posters, road shows and cooking demonstrations can be used.

The results further found that the “taste” factor was the least preferred by farmers. However, as consumption moved away from the farm to the urban, its importance ascended to the second and the first preferred factor by traders and consumers respectively. It was therefore concluded that taste plays an important role in the attitudes of urban consumers concerning TAVs consumption. There is therefore need to improve processing and cooking of TAVs so as to maintain taste and nutrient content. For example, innovative ways of mixing various TAV’ varieties during preparation could improve taste. The study recommends that improved preparation, cooking and health attributes of TAVs to be incorporated in consumption promotional campaigns. There is also need to promote storage technologies which would preserve freshness as well as nutritional contents of TAVs.

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