

Full Length Research Paper

Consumers' beliefs on indigenous and traditional foods and acceptance of products made with cow pea leaves

Sarah T. P. Matenge, Daleen van der Merwe, Hanli De Beer, Magdalena J. C. Bosman and Annamarie Kruger*

Africa Unit for Transdisciplinary Health Research (AUTHeR), North-West University (Potchefstroom Campus), Private Bag X6001, Potchefstroom, 2520, South Africa.

Accepted 2 March, 2012

The study was conducted to obtain background information on consumers' beliefs on Indigenous and Traditional Foods (ITF) and to assess consumers' acceptance of, preference for and intended consumption of products made with cowpea leaves. Four focus groups investigated consumers' beliefs on ITF. Thematic analysis identified three major themes in relation to ITF consumption. These were benefits of ITF consumption, barriers of ITF consumption as well as suggestions on how to increase ITF consumption. Consumers' acceptance of, preference for and intended consumption of products made with cowpea leaves were assessed by 87 respondents. A 5-point hedonic scale and 7-point food action rating scale was used for sensory evaluation. Sample B (Cowpea leaves stewed with tomatoes, potatoes and onions with salt and vegetable oil added) was scored statistically higher for acceptance of general appearance, colour, smell, texture and taste with means ≥ 4 on a 5-point hedonic scale by respondents of the total study sample. The acceptability, preference and intended consumption of samples differed significantly between the communities, age groups and education levels. Overall, Sample B was the most acceptable, preferred and respondents' intended to eat it more often than the others except for acceptance by respondents from Tlaskgameng.

Key words: Consumers, consumers' beliefs, consumption intent, cow pea leaves, preference, product acceptance.

INTRODUCTION

Increasing consumption of fruits and vegetables has been one of the strategies to eliminate micro-nutrient deficiency in Sub-Saharan Africa (WHO/FAO, 2003). Approximately, 3 million deaths a year are attributed to diseases relating to inadequate fruit and vegetable intake (WHO/FAO, 2003). Fruit and vegetable intake in South Africa are lower than recommendations by the World Health Organization (WHO) (Maunder and Meaker, 2007), which contributes to inadequate nutrient intake and the overall burden of diseases (Labadarios et al., 1999). Dietary intake of traditional leafy vegetables (TLV) have been reported to have healing properties, serve as a source of micronutrients (Flyman and Afolayan, 2006;

Hassan and Umar, 2006; Frison, 2007) and reduce the risk of cardiovascular diseases and other degenerative diseases (Smith and Eyzaguirre, 2007). It also represents inexpensive but high quality nutrition sources for nutritionally vulnerable communities (Odhav et al., 2007). For the purpose of this study, traditional leafy vegetables (TLV) and indigenous and traditional foods (ITF) are vegetables/foods that are either native to a particular region, or were introduced to that region for a long period to evolve through natural processes or farmer selection, including both wild and traditionally cultivated vegetables/foods by the natives in a region. Previous studies have shown that TLV adapt well to harsh environments, are easy to grow, requiring simpler technology and low inputs (Van der Walt et al., 2005) and have the ability to resist pathogens, thus requiring fewer chemicals and pesticides (Abukutsa-Onyango, 2007). Despite the self reported contribution of TLV to health,

*Corresponding author. E-mail: annamarie.kruger@nwu.ac.za.
Tel: +27 18 299 2095. Fax: +27 18 299 2088.

nutrition and food security at household level in South Africa, several studies reported that the production and consumption of TLV has declined (Nesamvuni et al., 2001; Mbhenyane et al., 2005; Faber et al., 2007).

Some of the reasons mentioned are limited knowledge of the nutritional content of TLV (Modi et al., 2006), the lost of indigenous knowledge, the association of utilisation thereof with poverty and low esteem among rural communities (Modi et al., 2006). This decreased tendency in the utilization and cultivation of TLV necessitates the exploration of consumers' beliefs on these vegetables. A belief is an opinion or assumption about something that a consumer consider as the truth (Bareham, 1995; Hornby, 2005) that could be attained about a food such as TLV through exposure to, or remarks about the product, possibly influencing their attitudes and consequently guide their consumption behaviour (acceptance) (Bareham, 1995). Sensory characteristics of food such as appearance, smell, texture and taste, also play an important role in consumers' decision to consume a particular food. Although several studies concerning the acceptability of foods are reported (Davel et al., 2003; Khumalo, 2007; Mkanda, 2007; Simela et al., 2008), reports on acceptability of TLV in particular are limited. Research on the acceptability of food is needed to determine the impact of taste and preference on dietary intake patterns of consumers that can be used to improve the general acceptance of indigenous plant foods (Babu, 2000). For the purpose of this study, the leaves of Cowpeas (*Vigna unguiculata* L.) which are indigenous to Africa were investigated for acceptability. A variety of Cowpea species exists; making it one of the most widely grown, versatile and nutritious traditional legume. It provides consumable leaves, immature pods, and peas (with a long shelf life) providing protein, vitamins and minerals (Jansen van Rensburg et al., 2007; Vorster et al., 2007, 2008).

The objectives of this study were therefore: firstly, to obtain background information on consumers' beliefs of ITF in general using focus group discussions. Secondly, to assess the acceptance of, preference for, and intended consumption of products made with cowpea leaves with untrained consumer sensory panels.

MATERIALS AND METHODS

Study location

This study was a sub-study in a broader larger study. The main aim of the broader study is to provide empirical evidence of how the role of biodiversity can be translated into improved health status in contemporary poor rural and urban communities in the North West Province of South Africa. The focus of this sub-study was to explore ways of promoting the utilization of traditional and indigenous foods to urban and rural communities that could possibly lead to increased indigenous knowledge and dietary diversity. To reach the objectives of this sub-study, research was conducted in two phases, namely: i) a qualitative phase using focus group discussions and, ii) a quantitative phase, using sensory evaluation.

The selection of participants for this study was purposive and based on a defined set of criteria discussed in the next section.

Study design

It was a cross sectional population based study consisted of an explorative and experimental phase in urban and rural communities.

Qualitative research: Focus group discussions

Sampling

Four focus groups were conducted, two in rural (Ganyesa) and two in urban (Potchefstroom) communities over a period of two months to investigate consumers' beliefs about ITF. To recruit participants, specially arranged meetings by the local leaders were held at the Kgotla primarily to introduce the researcher to the communities, to inform them about the study, to elicit support and to invite participants to participate in the study. Participants were recruited according to inclusion criteria based on a specific purpose rather than randomly, in order to obtain insights into a phenomenon (Strydom and Delport, 2005) and to meet the objectives of this study. Criteria for selection were that prospective participants be male and female, aged older than 20, residing in the selected communities and be knowledgeable on the indigenous and traditional foods of the area. Specific questions were asked regarding availability, cultivation, preparation, consumption and general knowledge of ITF in the area to determine whether each participant complied with the inclusion criteria. Ten to twelve participants signed an informed consent form before participating in each session after which the qualitative standard of saturation was met (Guest et al., 2006).

Focus group questions

A semi structured questioning procedure was used to ensure consistency in questions asked across groups, yet allowing for some flexibility in accordance with topics raised and level of participation within the focus groups (Neumark-Sztainer et al., 1999). Questions were primarily aimed at investigating consumers' beliefs about ITF. The questions were first translated into Setswana and then reformulated into a conversational form to stimulate the discussion. Data saturation was met during the fourth focus group, since no new information or themes were observed and it represented an adequate sample size (Guest et al., 2006). The following are the five questions used:

- 1) Let's talk about indigenous and traditional foods. What comes to your mind when you hear the words indigenous and traditional?
- 2) Do you have concerns about the foods families eat?
- 3) Can you tell me positive things about indigenous and traditional foods?
- 4) Can you tell me negatives things about indigenous and traditional foods?
- 5) Of all the things we have discussed, what do you think can be done to motivate consumers to eat these foods?

Conducting the focus groups

At the commencement of the study, participants were introduced to the moderator (researcher) and assistant moderators who were responsible for making observations, operating the tape recorder, taking notes and handling the logistics. Ground rules as indicated

by Krueger and King (1998) were also presented regarding confidentiality, respect for the beliefs of the others and the importance of honesty to the participants. Verbal consent for the voice recording of the sessions was obtained. Participants were informed that the voice recordings will be transcribed without using their names and that the recordings will be discarded after data analysis. The use of local language, Setswana by the moderator maximized the group's cohesiveness and openness while maintaining cultural homogeneity and language use. Each group discussion lasted approximately 90 min, after which everyone enjoyed something to eat and drink. On completion of the focus group discussions, discussions of similar recurring and important themes were summarised and compared in context of the socio-demographics of the study population.

Data analysis

The focus groups transcripts were analysed using thematic content analysis (Creswell, 2009). The voice recordings were transcribed verbatim to contribute to the trustworthiness of the data. The written transcripts were then carefully translated from Setswana into English and compared with the field notes to ensure that the meaning of the data was represented correctly. Using the transcripts and field notes, the moderator reviewed the data for the purpose of determining trends and identifies major themes or patterns emerging (Krueger, 2000). Predominant themes and sub-themes were noted, outlined and coded (Rossman and Rallis, 1998).

Trustworthiness

This study relied on Guba's (Shenton, 2004) framework of trustworthiness. Credibility was achieved by gaining field experience during the pilot study, establishing participants' trust through prolonged engagement, allowing sufficient time for group discussions and conducting focus groups until data saturation. Triangulation was reached through debriefing sessions with moderators, verbatim transcription of focus group recordings and managing data parallel to field work. Transferability was applied during purposive sampling and using direct quotations when presenting findings. Dependability was reached through conducting multiple focus groups, using a detailed interview guide, encouraging participants to share their beliefs, verifying findings with participants and an in-depth description of the methodology. Finally, conformability was achieved by keeping all field notes and transcripts, providing a detailed audit trail of procedures and verifying the raw data.

Quantitative research: Sensory evaluation

Respondents

A total of 87 volunteers from Black communities aged 20 to 78 years participated at central locations (Stone and Sidel, 2004). A total of 29 respondents each from an urban township west of Potchefstroom in the southern Kenneth Kaunda district and two rural communities in the northern Bophirima district of the North West Province were recruited to participate in this phase of the study to test the acceptability of different dishes made from Cowpeas. Convenience sampling was used and the participants were untrained to act as taste panels. To reduce potential bias, selection inclusion criteria were: from both genders; aged older than 20; residing in the selected communities; have a primary education; be willing to taste the products and not be allergic to groundnuts

since one of the samples contained groundnuts as an ingredient. Before commencing the sample testing, respondents signed a written informed consent.

Food sample preparation and presentation

Three different dishes made from cowpea leaves harvested in the study area were tested for acceptability. Recipes were developed using the information gathered from the participants in phase one of this study and being standardised. Procedures regarding preparation, handling and serving were also standardised and pre-tested. Three different dishes of cowpea leaves were prepared: A) cowpea leaves cooked with salt and vegetable oil; B) cowpea leaves stewed with tomatoes, potatoes and onions with salt and vegetable oil added; and C) cowpea leaves cooked with groundnut powder, salt and vegetable oil. These recipes were selected to be representative of the main popular recipes to prepare relish and are regarded as highly important in the Setswana tradition in the study communities. Sufficient samples were prepared, transported to the testing sites and served steaming hot in preheated serving containers. Three different samples labelled with digit random numbers were presented to respondents on trays to be evaluated in random order. Respondents rinsed their mouths before and in-between samples.

The questionnaire

The questionnaire was pre-tested in English to ensure that it was well understood and to be completed within reasonable time. After the pilot study, questions were reformulated and translated into Setswana. The final version was back-translated into English to ensure the retaining of the original meaning. The questionnaire consisted of two sections, namely, demographic questions and the sensory score sheet. The score sheet included a 5-point hedonic scale to measure sample acceptance of each attribute and a 7-point food action rating scale (FACT) to score consumption intent of each sample. The hedonic scale ranged from 5 = extremely acceptable to 1 = extremely unacceptable. Response categories on the FACT scale were 1 = I will never eat it; 2 = I would eat this when no other food is available; 3 = I would eat this if available, but would not go out of my way; 4 = I would eat it now and then/occasionally (once a month); 5 = I would eat this frequently (once a week); 6 = I would eat this very often (twice a week) and 7 = I would eat it everyday.

Consumer acceptability and preference tests

The scales and the main sensory attributes were explained to the respondents and an example was provided to demonstrate the scale properties and its use. On each scale respondents were asked to mark the number that best describe the degree of acceptance of "appearance", "colour", "smell", "texture", "taste" and "overall acceptance" of each sample. Secondly, a question on preference of one sample above the other followed and finally, respondents' consumption intent regarding each sample was requested.

Statistical analysis

The sensory evaluation responses were analysed with Windows SAS system, version 9.1 (SAS Institute Inc, 2003) and the demographic data using FREQ procedure of SAS in consultation and with assistance of the statistical consultation services of the North-West University. Mixed models ANOVA ($P \leq 0.05$) were used

to determine significant differences in hedonic scores of each sample. The SAS® procedure PROC MIXED was used for mixed models. Significant differences between samples of various groups were examined with Post-hoc tests ($P \leq 0.05$). For the non-parametric variable “consumption intent” which did not have equal distances between the categories, significant differences in median within groups were determined using the Kruskal-Wallis and Mann-Whitney tests (Field, 2005). Partial least squares analysis was used to determine which attribute best predicted consumption intent and preference. Chi-square tests were performed to determine if there was a difference in the proportion of biographical groups’ preferences towards the samples ($P \leq 0.05$). Only statistically significant differences were discussed in the results.

Ethical consideration

A letter of information on the study was given to each participant and respondent. Before participation in the study, each participant signed an informed consent. Ethical approval for this study was obtained from the Ethics Committee of the North-West University, Potchefstroom Campus, No. 040M10.

RESULTS AND DISCUSSION

Focus groups (qualitative)

The recruitment procedure produced a gender balance across the communities with 23 male and 23 female. A total of 11 of the participants were employed, 11 were unemployed, 12 were pensioners, 6 were self employed and 6 had part time jobs. 9 participants were aged between 20 and 30, 8 were aged 31 to 40, 10 were aged 41 to 50 and 19 were aged older than 50. No participant had a tertiary education. Three major themes identified from the focus group discussions were: i) benefits of indigenous and traditional food consumption, ii) barriers of indigenous and traditional food consumption, and iii) suggestions as to increase indigenous and traditional food consumption. Under each major theme, sub themes were identified.

Theme 1: Benefits of indigenous and traditional food consumption

Health and nutrition

Health and nutrition was the most important reason for the consumption of indigenous foods by most participants from rural communities. Indigenous and traditional foods were believed to be of a higher quality, particularly in terms of freshness (as the cycle from harvesting to consumption is shorter), to be nutritious, natural, unrefined, produced locally and associated with health benefits [“They are nature’s foods and it’s that naturalness in them that makes them healthy and nutritious” (female, aged 50 to 59, urban)]. Older participants from the rural communities spontaneously mentioned the ability of ITF to prevent diseases [“Indigenous foods have health

healing properties; medicinal plants such as blue bush, Kalahari grewia, and devil’s claw were used both as beverages and as medicine” (male, aged 60+, rural)]. Participants often compared ITF with “modern foods” and considered “modern foods” as unhealthy. These findings confirmed the beliefs that TLVs are high quality nutrition sources for nutritionally vulnerable communities (Odhav et al., 2007) to prevent or reduce degenerative diseases (Smith and Eyzaguirre, 2007).

Food safety

Concerns regarding the safety of modern foods expressed were healthiness, food contamination, ethical issues, animal welfare and the environment. Similar concerns have been reported in a number of studies (Smith and Riethmuller, 2000; Brewer and Prestat, 2002; Renee, 2010). Concerns concerning the presence of preservatives, antibiotics and pesticide residues in modern food were considered unethical while it also motivated the consumption of ITF by some older participants from the rural community. Participants believed ITF to be safe, natural, and pure without processing or manipulation after production [“The food we eat nowadays is not safe; it is contaminated by fertilizers and chemicals that can harm the body especially if one does not wash or boil her/his vegetables thoroughly” (female, aged 50 to 59, urban)]. However, younger participants (aged 20 to 39) from both communities did not express any ethical issues [“...the taste of food is what matters to me; the modern food production and processing techniques make food tastier” (male, aged 20 to 29, urban)]. Participants older than 40 years considered food packaging as unnecessary and harmful to the environment [“...the selling of indigenous foods without packaging supports the Government initiative to prevent harm to the environment” (female, aged 40 to 49, rural)]. These findings suggest that the older participants are well aware of the utilization of fertilizers during production of modern foods and the dangers related to the use of pesticides, while food safety of modern foods seemed not be as important to younger participants.

Tradition and culture

Tradition and culture seemed to be important in relation to ITF consumption [“Indigenous foods are foods that have evolved from centuries, they form part of the tradition and we are content about them” (male, aged 50 to 59, rural)]. These participants also believed ITF to be transferred from one generation to another and that it has been consumed over a long period [“I still eat them the way I was taught at home by my parents in the past and continue eating according to those habits” (male, aged 50 to 59, rural)] and they continued to value their traditional food cultures. Extensive food preparation and a greater

variety of food consumed during special ceremonies and events were largely related to beliefs on tradition ["I remember Sundays were very special to us. My mum and sisters would prepare a very big meal and we will all gather and share the lunch/food together. A lot of times we had people coming over, relatives, friends of the family and my mum will just prepare a lot of food and we all share. You know, life was just too good" (male, aged 60+, rural)]. The term "indigenous" thus triggered nostalgic memories and emotions such as joy, warmth and sadness. Similarly, Guerrero et al. (2009) and Chambers et al. (2007) found that ITF were consumed for cultural, traditional and heritage reasons. Participants however considered ITF to be diminishing regarding production and consumption because of socio-economic changes and modern foods.

Theme 2: Barriers of indigenous and traditional food consumption

Lack of knowledge and skills on food preparation and nutrition information

The majority of younger (aged 20 to 40) participants in both communities mentioned the need for knowledge and skills to prepare ITF which was believed to be time consuming as compared to "modern foods" ["...indigenous foods takes time to process and prepare and are therefore not suitable for a busy lifestyle like mine" (male, aged 30 to 39, rural)]. Consistent with research by Chambers et al. (2007) and Guerrero et al. (2009) participants found it more difficult to consume ITF due to barriers such as a lack of knowledge and skills on preparation of ITF. Limited nutritional information on ITF products were also considered a barrier ["...how does one know that they are healthy because there is a lack of information to prove this" (female, aged 30 to 39, rural)] leaving participants sceptical since the nutritional value is not proven. Similarly, research has indicated a lack of information as a barrier to make consistently healthy choices (McGee et al., 2008) and information about nutritional qualities can increase the acceptability of food (Kähkönen et al., 1996) and thus consumption. Participants from both communities believed that they were insufficiently informed about ITF by their parents ["I do not know how to cook them. It will be nice if they could show us how to prepare them" (female aged 20 to 29, urban)]; "If my mother has raised me eating indigenous foods, I would have learnt to prepare and eat them" (male, aged 30 to 39, rural)]. However, some elderly who were knowledgeable about the preparation of ITF blamed this on urbanization, modernization and a lack of the interest regarding indigenous knowledge by the youth ["Modernisation and urbanisation has brought a lot of changes in terms of the eating habits of our children; changes in terms of the eating habits of our children; they now refuse to eat traditional foods" (female, aged 60+,

rural)]. The early introduction of ITF into the meals of young children, might teach them to prepare and consume it thereby increasing indigenous knowledge (Smith, 1995).

Older participants were knowledgeable about cooking of ITF and tend to blame the lack of preparation skills of younger participants on urbanization and changing lifestyles. Smith (1995) recommended that early introduction of ITF into the meals of young children, might teach consumers to prepare and eat it which also implies increased knowledge. Familiar food increase consumer acceptance as compared to those unfamiliar (Bech-Larsen et al., 2001) although repeated exposure to the taste of unfamiliar food could also significantly increased consumer acceptance and hence consumption (Wardle et al., 2003).

Negative image and unfamiliarity

The younger participants associated ITF with "a lifestyle that was too traditional and old fashioned". Younger participants (aged 20 to 29) from both communities did not identify with ITF and took pride in their preference and consumption of "modern foods" associating ITF with "poor people's food", "traditional" lifestyle and "food of the older generation". This could be due to a lack of exposure, unfamiliarity with ITF and believing that older generations have the time, knowledge and skills to prepare ITF. Younger participants found ITF rather revolting and undesirable. Examples of some of the undesirable themes emerge from quotes from urban and rural youngsters are: "The thought of indigenous foods makes me sick. ...they forced us to eat the sorghum porridge and the vegetables everyday.....the taste, smell and even the texture of these foods was awful." These younger consumers' beliefs regarding ITF were thus negative which plays a significant role in determining product acceptance and consumption (Damman et al., 2007; Frison, 2007). Their strongly negative beliefs might be explained as a type of rejection caused by unfamiliarity (Rozin and Fallon, 1987). Older participants blamed a lack of knowledge transfer between generations for younger generation's beliefs and pickiness ["as parents we should also take the blame for not passing on the knowledge about traditional foods to our children" (male, aged 50 to 59, urban)].

Different beliefs on ITF with regard to sub-themes "sensory acceptability", "cost and availability" and "convenience" could not be fitted under either the category of benefits or barriers of ITF consumption as the statements made were contradictory. However, these differences were critical and determined whether a person was likely to consume ITF or not.

Sensory acceptability

Major differences in participants' beliefs regarding the

sensory attributes of ITF were found. As indicated in the previous section too, older participants (≥ 40 years) were more positive considering ITF tastier and more appealing than “modern foods” with unique attributes [“Indigenous foods taste better than exotic foods and the cooking is easier, need no condiments to enhance the flavour” (female, age 40 to 49, rural); “indigenous foods are made with natural ingredients, processed naturally and grown naturally and therefore taste really good” (male, aged 60+, rural)]. On the contrary, younger participants put more emphasis on the importance of taste, smell and texture as reasons for not consuming ITF. The unacceptable taste of ITF was more important than their health benefits [“Indigenous foods may be healthy, but the taste of food is more important” (male, aged 20 to 29, urban); “the taste, smell and even the texture of these foods is awful ... and ... amaranths and spider plant have a bitter taste that makes it unacceptable” (female, aged 20 to 29, urban); “the taste, appearance and quality of indigenous foods are not as good as that of modern foods” (male, aged 20 to 29, rural)].

Cost and availability

Older participants (≥ 40 years) residing in the rural communities believed ITF to be highly available and therefore cheaper as compared to “modern foods” [“They are locally grown and thus make them plentiful and inexpensive” (male, aged 60+, rural); “they are inexpensive compared to modern foods and they are naturally grown, cheap to produce and maintain” (male, aged 40 to 49, rural)]. However, most participants from urban communities identified “cost and availability” as a barrier to ITF acquisition. Indigenous and traditional foods were believed as being more expensive than “modern foods” [“Indigenous vegetables have become more expensive than conventional ones due to limited availability and seasonality” (female, aged 40 to 49, urban)]. A lack of diversity and choice was evident for urban participants due to the absence of ITF in supermarkets and restaurants [“There is no variety of ITF in the market place and so we end up buying modern foods” (male, aged 50-59, urban)].

Convenience

There were differences in the beliefs of participants' from both communities regarding “convenience”. Some older participants believed that ITF were more convenient than “modern foods” in terms of food preparation [“Indigenous foods make life easier in the sense that they are easy to prepare” (male, aged 60+, rural)]. An older participant from the urban community however indicated ITF is less convenient, due to its absence in supermarkets [“I prefer convenience foods over indigenous foods because

they make my life easier as they are quick to prepare” (female, aged 60+, urban)]. Overall, issues of convenience were most often raised by women who were more concerned about food preparation [“Preparing an indigenous meal can be a daunting task and time consuming especially when you have a busy lifestyle like mine; we need foods that are easy to prepare” (female, aged 40 to 49, urban)].

Theme 3: Suggestions to motivate consumers to consume indigenous and traditional foods

Participants made a number of important suggestions to motivate consumers to eat ITF, namely:

- i) Promotional education to create awareness on health benefits and preparation of ITF using different media [“...the use of media like TV, magazines, radio and newspaper could help spread the message about the importance of consuming indigenous foods” (female, aged 20 to 29, urban)].
- ii) Increase the availability of ITF in formal and informal markets through commercialization of ITF [“Commercializing indigenous crops will make them more accessible ...” (female, aged 20 to 29, rural); “If we can have them available in supermarkets ... we would consume them” (female, aged 30 to 39, urban)]. Older participants also recommended using home gardens to produce ITF to increase availability and to alleviate hunger and food insecurities in poor households, contributing to self reliance and indigenous knowledge.
- iii) Marketing of ITF on television and using acceptability studies to promote ITF product development [“Marketing indigenous foods on TV especially on children’s programmes will be the best way to advertise these foods” (female, aged 20 to 29, urban)].
- iv) Providing in-store samples of ITF was highly recommended by younger participants to taste the food before consumers consider buying it (“Food fairs especially in towns can also help create awareness where food demonstrators can showcase their skills and allow people to taste indigenous foods” (female, aged 30 to 39, urban)].
- v) Gradual transition and introduction of ITF in family meals to familiarise young children with these foods [“As parents we should introduce these foods gradually in our diets so that our children can eat or get to like them” (male, aged 50 to 59, urban)].

Sensory evaluation (quantitative)

A total of 87 respondents (46 male and 41 female) completed the sensory evaluation questionnaire. The majority had a primary education ($n = 60$), of which 27 were from the rural area while only two respondents attained a tertiary education and both were rurally based.

Table 1. Acceptability of attributes and consumption intent (median) of cowpea leaves samples of consumers in the total study sample (n = 87).

Food sample	* Mean scores and standard errors for sensory attributes						#Consumption intent [‡]
	General appearance	Colour	Smell	Texture	Taste	Overall acceptance	
A	3.32±0.12 ^b	3.83±0.11 ^b	3.66±0.13 ^b	2.98±0.13 ^c	2.97±0.13 ^c	3.33±1.20 ^b	5 (2; 6) ^b
B	4.66±0.12 ^a	4.69±0.12 ^a	4.56±0.13 ^a	-	4.59±0.13 ^a	4.57±0.53 ^a	6 (5; 7) ^a
C	3.57±0.12 ^b	3.29±0.11 ^c	3.46±0.13 ^b	4.38±0.13 ^a	3.55±0.13 ^b	3.45±1.01 ^b	5 (4; 7) ^b
P values	0.0001	0.0001	0.0001	3.56±0.13 ^b	0.0001	0.0001	0.0001

Samples with different superscripts differed statistically significant ($p < 0.05$). *Hedonic scores: 1 = extremely unacceptable; 2 = unacceptable; 3 = neither acceptable nor unacceptable; 4 = acceptable; and 5 = extremely acceptable. [‡]Consumption intent is reported as median (lower quartile; upper quartile); Kruskal-Wallis was performed because the data was non-parametric. [‡]Food action rating scale: 1 = I will never eat it, 2 = I would eat this when no other food is available, 3 = I would eat this if available but would not go out of my way, 4 = I would eat it now and then/occasionally (once a month), 5 = I would eat it frequently (once a week), 6 = I would eat this very often (twice a week), and 7 = I would eat it everyday.

Acceptance, overall acceptance and consumption intent of total study sample

The mean sensory acceptance scores for the “general appearance”, “colour”, “smell”, “texture”, “taste”, “overall acceptance” and “consumption intent” for the pooled data of the total study population are presented in Table 1. Statistically significant differences were found between the means for acceptability of all attributes, overall acceptance of the samples and the consumption intent of the total study population.

Sample B (Cowpea leaves stewed with tomatoes, potatoes, onions, salt and vegetable oil) scored significantly more acceptable (means ≥ 4.4 on a 5-point hedonic scale) than sample A (means ≥ 3.0) and C (means ≥ 3.3) from all attributes and is therefore the most acceptable overall. Acceptance of colour, texture and taste of the three samples differed significantly from one another with sample B in all cases being the most acceptable.

For acceptance of colour, sample A scored higher than sample C, while for texture and taste, sample C was scored higher than sample A. There is however no significant differences ($P > 0.05$) between sample A and C regarding acceptance of general appearance and smell as well as overall acceptance, while sample B had a significant higher score than both samples. Sample A the least acceptable for texture and taste and sample C for colour.

Consistent with research by Bosman et al. (1997) and Scholtz and Bosman (2005), the high acceptance scores for the individual attributes for sample B can be interpreted as a true reflection of product acceptance by the respondents.

Consumption intent also high for sample B with a median food action rating of 6 (5; 7), which denoted that consumers would eat sample B very often (twice a week), while they would consume samples A and C only frequently (once a week). This supports previous research that has demonstrated a positive relationship between acceptance and consumption intent of food products (Scholtz and Bosman, 2005).

Acceptance testing for different demographic groups

According to the results differences in acceptability of food sample attributes and overall acceptability were observed between the communities (Table 2). No significant differences in acceptance of all attributes and overall acceptability ($P = 0.0001$) were however found between communities for sample B which indicated as being the most acceptable sample. Although, significantly different from sample B, acceptance of samples A and C did however not differ from each other for most attributes between the communities. These results indicate a general tendency towards sample A (cowpea leaves cooked with salt and vegetable oil) and sample C (cowpea leaves cooked with groundnut powder, salt and vegetable oil) fell within an unacceptable to acceptable range (2.3 to 3.6) as compared to sample B ranging from acceptable to highly acceptable (4.0 to 4.8) from respondents from the urban and semi-rural areas. Respondents from Tlaskgameng (a deep rural area) scored significantly higher on acceptance for most attributes of samples A and C than respondents from Ganyesa (rural) and Potchefstroom (urban). This may be explained by preference differences and the method of food sample preparation or other personal and cultural factors (Thompson et al., 1999) such as sample B being currently more familiar. This corresponds with the findings from the focus group discussions which indicated that rural (specifically deep rural) participants are more familiar with these vegetables. With regard to age, respondents 20 to 30, 41 to 50 and 50+ years scored the acceptability of sample B significantly higher (means = 3.8 to 4.5; 4.6 to 4.8 and 4.4 to 4.9, respectively) for all attributes than samples A (means = 2.3 to 3.2; 3.3 to 4.0 and 3.0 to 4.0, respectively) and C (means = 2.8 to 3.3; 2.9 to 3.3 and 3.6 to 4.0, respectively). The age group 20 to 30 years found no difference in acceptance of samples A and C for most attributes (means = 2.3 to 3.3), which also true for the 41 to 50 years age group. In the case of age group 31 to 40 years, respondents also scored the acceptance of sample B (means = 4.3 to 4.8) higher than the other samples while no differences were found

Table 2. Acceptability of attributes and consumption intent (median) for cowpea leaves samples of respondents in Potchefstroom, Ganyesa and Tlaskgameng (n = 87).

Food sample	*Mean scores and standard errors for sensory attributes												°P-value
	Potchefstroom n = 29				Ganyesa n = 29				Tlaskgameng n = 29				
	A	B	C	*P-value	A	B	C	*P-value	A	B	C	*P-value	
Acceptance*													
General appearance	3.16±0.13 ^c	4.68±0.14 ^a	2.94±0.13 ^c	0.0001	2.56±0.24 ^c	4.79±0.24 ^a	3.61±0.24 ^b	0.0001	4.32±0.18 ^{ab}	4.57±0.19 ^a	4.15±0.17 ^{ab}	0.2323	0.0001
Colour	3.60±0.12 ^c	4.72±0.13 ^a	2.83±0.13 ^{cd}	0.0001	3.19±0.26 ^c	4.59±0.27 ^a	3.32±0.23 ^c	0.0005	4.67±0.16 ^a	4.64±0.17 ^a	3.86±1.56 ^b	0.0018	0.0001
Smell	3.37±0.18 ^b	4.67±0.19 ^a	3.01±0.15 ^c	0.0001	3.15±0.26 ^c	4.20±0.27 ^a	3.19±0.26 ^c	0.0120	4.50±0.16 ^a	4.72±0.16 ^a	4.28±0.14 ^a	0.0950	0.0001
Texture	2.59±0.14 ^c	4.59±0.15 ^a	3.10±0.15 ^{bc}	0.0001	2.32±0.30 ^c	4.03±0.30 ^a	2.96±0.30 ^c	0.0008	3.94±0.18 ^b	4.51±0.18 ^a	4.42±0.17 ^a	0.0477	0.0001
Taste	2.79±0.18 ^c	4.74±0.19 ^a	3.34±0.18 ^{bc}	0.0001	2.51±0.26 ^c	4.52±0.26 ^a	3.22±0.28 ^c	0.0001	3.81±0.19 ^{ab}	4.42±0.19 ^a	4.10±0.18 ^a	0.0624	0.0001
Overall acceptability	3.06±0.20 ^{bc}	4.70±0.07 ^a	3.05±0.09 ^{bc}	0.0001	2.76±0.24 ^c	4.45±0.12 ^a	3.23±0.22 ^b	0.0001	4.25±0.09 ^a	4.59±0.09 ^a	4.09±0.17 ^a	0.0193	0.0001
#Consumption intent [‡]	5 (3; 6) ^b	6 (5; 7) ^a	4 (3; 5) ^b	0.0005	3 (1; 7) ^b	6 (4; 7) ^a	4 (3; 6) ^b	0.0140	5 (4; 6) ^b	5 (5; 7) ^{ab}	7 (5; 7) ^a	0.0629	0.0029

Samples with different superscripts differed statistically significant ($p < 0.05$) within each community and over different communities. *P-value between food samples within different communities. °P-values between food samples and communities. †Hedonic scores: 1 = extremely unacceptable; 2 = unacceptable; 3 = neither acceptable nor unacceptable; 4 = acceptable; and 5 = extremely acceptable. ‡Consumption intent is reported as median (lower quartile; upper quartile); Kruskal-Wallis was performed because the data was non-parametric. *Food action rating scale: 1 = I will never eat it, 2 = I would eat this when no other food is available, 3 = I would eat this if available but would not go out of my way. 4 = I would eat it now and then/occasionally (once a month), 5 = I would eat it frequently (once a week), 6 = I would eat this very often (twice a week) and 7 = I would eat it every day.

between samples A (means = 2.8 to 4.0) and C (means = 3.7 to 4.0) for most attributes. Similarly, the age group 50+ years also found no difference in acceptance of samples A and C for most attributes.

According to these results indicating the main effect of age, younger respondents (20 to 30 years) scored samples' acceptability of general appearance (means = 3.5; $p = 0.0171$), colour (means = 3.6; $p = 0.0036$), smell (means = 3.6; $p = 0.0462$) and overall acceptability (means = 3.5; $p = 0.0077$) significantly lower than the respondents in the 50+ age groups. Although significantly lower, the younger respondents mean scores however still indicated the samples to be acceptable. Both the 20 to 30 and 50+ age groups' acceptance scores for all attributes did not differ from those of the 31 to 40 and 41 to 50 age categories. No differences were found between all age groups for the acceptance of texture and taste. The influence of age on food acceptability

and consumption is well documented (Niva and Mäkelä, 2007; Guàrdia et al., 2008). Despite differences for acceptability of food samples between respondents of the age categories 20 to 30 and 50+ years in the present study, these differences as well as overall acceptability showed that sample B was considered highly acceptable by respondents of all age groups. Among genders, there were no differences between males' and females' acceptance of food samples for colour ($p = 0.7522$), smell ($p = 0.5522$), texture ($p = 0.4292$), taste ($p = 0.9078$) and overall acceptability ($p = 0.4014$), while general appearance had a borderline p -value ($p = 0.0439$). Male and female respondents scored the acceptability of sample B (4.25 to 4.78; acceptable to highly acceptable) higher than samples A (2.89 to 3.89; neutral to acceptable) and C (3.26 to 3.62; neutral to acceptable). Acceptance of general appearance, smell and overall acceptability of samples A and C was also

not scored differently by both genders, while both scored texture and taste of sample C higher than A.

Evidence from literature suggests that gender differences exist in relation to food consumption (Bogue et al., 2005). A study by Vorster (2007) revealed that men insisted on eating meat, leaving TLV for women and children. Consequently, indigenous vegetables are regarded women's crops. Findings from the present study showed that there were no positive association between acceptability of food samples and gender, a tendency which was also observed in consumption intent. However, within gender, male and female respondents scored the acceptability and consumption intent of sample B higher than those of samples A and C. Significant differences in acceptance of samples were observed between respondents with a primary and secondary education ($p = 0.001$) and between the samples within the education groups (Table 2).

Respondents with a primary education scored

Table 3. Percentage of respondents preferring food samples (A, B and C) for: i) communities, ii) gender, iii) age, and iv) educational levels.

Respondent	Frequency of preference of food samples (%)		
	A	B	C
Community			
Potchefstroom	17.2	72.4	10.3
Ganyesa	3.45	89.7	6.9
Tlakgameng	13.8	51.7	34.5
Gender			
Male	8.5	72.3	19.2
Female	14.3	71.4	14.3
Age groups			
20-30	8.7	82.6	8.7
31-40	0.0	85.0	15.0
41-50	26.1	65.2	8.70
50+	8.7	56.5	34.8
Educational level			
Primary	16.1	64.5	19.4
Secondary	0	88.0	12.0

the acceptability of sample B (4.57 to 4.76; highly acceptable) significantly higher for all attributes than sample A and C. No significant differences were found in acceptance of sample A and C for all attributes (3.30 to 3.86; neutral) except for colour. However, respondents with a secondary education only scored the acceptance of sample B higher with regard to general appearance, taste and overall acceptability.

These respondents scored the acceptance of sample C higher than sample A for general appearance and taste while they did not differ regarding acceptance of smell, texture and overall acceptability of sample A and C.

Education is also recognised as an important factor influencing food acceptance (Simela et al., 2008; Corredor et al., 2010).

Consumer preference testing

Respondent's preference for each food sample within the total study population, all the communities, genders, age groups and educational levels showed that sample B was the most preferred food sample (Table 3). Preference for the samples differed between respondents from the different communities (chi square: 13.13; $p = 0.01$). More respondents from Ganyesa showed a preference for sample B (89.7%) than Tlakgameng (51.7%) where a higher percentage of respondents preferred sample C (34.5%) than from other communities. No significant differences were found between genders (chi square:

0.97; $p = 0.62$) (Table 3). A higher percentage of respondents of the age group 50+ preferred (chi square: 15.01, $p = 0.02$) sample C (35%) than the other age groups. The preference of the 50+ group can be associated with a greater sense of tradition, product familiarity and knowledge of traditional food, as supported previously by research showing a high correlation between food choice and local tradition (Laureati et al., 2006). Significant differences existed (chi square: 5.97; $p = 0.05$) between preferences of respondents with different educational levels. A higher percentage of respondents (88%) with secondary education preferred sample B than those with primary education. According to Partial least squares analysis, acceptance of texture of the food samples was more important than other attributes to drive preference. Texture and mouth feel of food and beverages were previously found to play a dominant role in food acceptance and preference (Guinard and Mazzucheli, 1996; Bosman et al., 1997) and identification of food (Rolls et al., 2003). However, texture is often taken for granted by consumers unless it is definitely inappropriate or expectations are violated (Szczeniak, 2002).

In the present study, the comparative acceptance for texture could have been attributed to the combination of different ingredients used in the preparation of the food samples such as the tomato and onion in sample B, that might have masked the natural colour and the texture of the dried Cowpea leaves that could be less acceptable in samples A and C, since a combination of different

ingredients could make formerly disliked foods more acceptable (De Moura, 2007).

Intended consumption of food samples

Significant differences ($p = 0.0029$) in consumption intent were found between the communities, indicating that respondents from deep rural Tlaskgameng differed from those from urban Potchefstroom and rural Ganyesa. Respondents from the deep rural intended to consume all three food samples ($p > 0.05$) as frequently as between once a week and every day, while those from Potchefstroom and Ganyesa intended to consume sample B more frequent (twice a week to every day) than samples A (once a month to twice a week) and C (once a week to everyday). No differences were found for respondents' intended consumption (once to twice a week) of sample B between the three different communities. There were no significant differences reported in consumption intent of the samples between age categories ($p = 0.1328$) and genders ($p = 0.6183$). Significant differences in consumption intent however existed between the food samples within different age and gender groups. For samples A and C consumption intent increased with age with respondents in the age category 20 to 30 years intending to eat sample A only when no other food is available and sample C occasionally (once a month), while those from the 50+ year category intended to eat sample A frequently (once a week) and sample C very often (twice a week). On the contrary, the respondents from the age group 20 to 30 years intended to eat sample B more frequently (twice a week) than the age group 50+ (once a week). Thus, intention to eat food samples A and C increased with age, since the better intended consumption of sample A and C by older respondents could be explained in relation to their acceptance of the sensory attributes and familiarity with these samples.

Product familiarity has been shown to influence traditional food consumption which indicates that consumers' who attached more importance to a familiar product are more likely to consume a traditional food product (Laureati et al., 2006; Pieniak et al., 2009). Both male and female respondents intended to consume sample B more frequently (twice a week) than sample A (once a week). Male respondents intended to eat both samples A and C once a week, while female respondents intended to eat sample A once a week and sample C only once a month. As far as the level of education is concerned, significant differences were reported for consumption intent of respondents between the two educational groups ($p = 0.0035$) and between samples within the primary ($p = 0.0150$) and secondary education groups ($p = 0.0057$). Respondents of both education levels intended to consume sample B twice a week while those with a primary education intended to consume

sample A more frequently (once a week) than those with a secondary education (I would eat this if no other food is available but would not go out of my way). Surprisingly, consumption intent of sample B did not differ from sample C by respondents from both education groups. According to Partial least squares analysis, acceptance of taste of the food samples was more important than other attributes to drive consumption intent. Numerous studies have confirmed that taste is the single largest determinant of food consumption (Verbeke, 2001) confirming the findings of Bosman et al. (1997) also reporting flavour as the most determining factor in food consumption.

CONCLUSION AND RECOMMENDATIONS

This study indicated that health and nutrition; tradition and culture; and food safety act as drivers for ITF consumption, whereas a lack of knowledge and skills on food preparation; negative beliefs and image; and unfamiliarity of ITF acted as barriers for the consumption of ITF in these studied communities. Participants emphasized the need for information that aims to increase awareness on the health and nutritional benefits of ITF, as well as the skills to prepare it, especially among younger consumers that might lead to increased consumption. Cowpea leaves stewed with tomatoes, potatoes, onions, salt and vegetable oil was the most acceptable and preferred dish and respondents indicate an intention to consume it more often than the other samples. However, the older participants preferred the more traditional way of cooking (samples A and C). That comply with the findings of the focus group discussions that the older participants indicated that ITF are natural, fresh, less complex and healthy as compared to "modern" foods. Younger participants' negative beliefs and dislike of ITF determined their lower product acceptance and intended consumption of the less modernized dishes (samples A and C). The differences in the beliefs and acceptance of the different age generations indicate that childhood exposure to ITF might have influenced the positive beliefs of older respondents that were formed and expressed as nostalgic memories and other emotions. On the contrary to the lack of exposure of younger respondents to TLV, precipitated in negative beliefs and low acceptance of ITF due to unfamiliarity and a lack of knowledge with these products. These younger participants were thus unlikely to increase ITF consumption regardless of older participants' beliefs that it is natural and healthy due to their preference for familiarity with modern foods.

A positive experience regarding the image and sensory attributes of "new" products from ITF by especially younger consumers might result in changing their negative beliefs and thus their acceptance, preference and consumption behaviour. Simultaneously, the older consumer market might also be reached with these more

modernized ITF using affective marketing strategies that might positively change their beliefs about “modern” foods. These findings can also be used as a strategy to promote the production and consumption of ITF resulting in better health related to ITF. Overall, the need to understand consumer behaviour is important in the acceptance of and preference for ITF taking into consideration cultural and traditional values, consumers’ beliefs and childhood exposure to products that guide consumer decision making about food selection and intended use.

RECOMMENDATIONS

- i) It is evident that traditional ITF should be modernized (as in the case of sample B) to improve the image of TLV in order to improve acceptability, preference and consumption by younger consumers, thereby presenting food product developers and marketers with the opportunity to make more acceptable ITF product available.
- ii) Furthermore, younger respondents’ complaints about the lack of commercial availability of convenient ITF highlight that these new products should be sold in retail outlets in a packaged convenience food format that would attract the attention of all consumers.
- iii) Marketing messages such as “old-fashioned but new” or “traditional but more convenient” might reach both younger and older consumer markets by triggering nostalgic memories by older consumers while addressing younger consumers’ needs for convenient, tasty and fashionable food products.
- iv) The need for education is crucial in order to preserve and extend the knowledge of ITF. Childhood exposure and education on TLV could be initiated at primary school level by incorporating these products into school feeding programmes in a tasty way, while consumer studies classes can teach children to cook healthy, but tasty TLV dishes, while motivating to prepare it at home.
- v) Information on evidence based nutrition and health claims are needed and promoted as such. ITF and in particular TLV can play a substantial role in sustainable food production especially in poverty stricken areas. From the broader study we identified gaps in knowledge on the nutritive values of ITF especially on the bio-availability of nutrients from TLV. This knowledge is crucial for future recipe and dish development to mobilise the use of ITF/TLV’s in the counteracting of malnutrition in Africa.

ACKNOWLEDGEMENTS

The authors wish to thank Bioversity International and African Unit for Transdisciplinary Health Research (AUTHeR) for funding the project and the community members for kindly participating in the study.

REFERENCES

- Abukutsa-Onyango MO (2007). The diversity of cultivated African leafy vegetables in three communities in Western Kenya. *Afr. J. Food Agr. Dev.*, 7(3): 1-15.
- Babu SC (2000). Rural nutrition interventions with indigenous plant foods - a case study of vitamin A deficiency in Malawi. *Biotech. Agron. Soc. Environ.*, 4(3): 169-179.
- Bareham J (1995). Consumer behaviour in the food industry: A European Perspective, Stoneham: Butterworth Heinemann.
- Bech-Larsen T, Grunet KG, Poulsen JB (2001). The acceptance of functional foods in Denmark, Finland and the United States. MAPP working paper no. 73. The Aarhus School on Business.
- Bogue J, Coleman T, Sorenson D (2005). Determinants of consumers’ dietary behaviour for health-enhancing foods. *Br. Food J.*, 107: 4-16.
- Bosman MJC, Van Aardt AM, Vorster HH, Drewnowski A (1997). Dietitians’ attitude towards fat substitutes and the acceptability of high-fibre muffins containing Simplesse®. *S. Afr. J. Food Sci. Nutr.*, 9(2): 61-68.
- Brewer MS, Prestat CJ (2002). Consumer attitudes towards food safety issue. *J. Food Saf.*, 22(2): 67-83.
- Chambers S, Lobb A, Butler L, Harvey K, Traill B (2007). Local, national and imported foods: a qualitative study. *Appetite* 49: 208-213.
- Corredor, JAH, Prinyawiwatkul W, No HK, Chompreeda P, Garcia K, Saidu JEP, Kachatryan A (2010). Influence of education/profession of Mexican consumers on acceptance and purchase intent of corn tortilla. *J. Sens. Stud.*, 25(1): 108-126.
- Creswell JW (2009) *Research design: qualitative, quantitative, and mixed methods approaches*. 3rd ed. Thousand Oaks, CA: Sage.
- Damman S, Elde WB, Kuhnlein HV (2007). Indigenous peoples’ nutrition transition in a right to food perspective. *Food Pol.*, 33(2008): 135-155.
- Davel M, Bosman, MJC, Webb, EC (2003). Effect of electrical stimulation on consumer acceptance of mutton from class- AB sheep carcasses. *S. Afr. J. Anim. Sci.*, 33(3): 206-212.
- De Moura SL. (2007). Determinants of food rejection amongst school children. *Appetite* 49: 716-719.
- Faber M, van Jaarsveld PJ, Laubscher R (2007). The contribution of dark-green leafy vegetables to total micronutrient intake of two- to five-year old children in rural setting. *Water SA*. 33(3): 407-412.
- Field A (2005). *Discovering statistics using SPSS*, London: Sage.
- Flyman MV, Afolayan AJ (2006). The suitability of wild vegetables for alleviating human dietary deficiencies. *S. Afr. J. Bot.*, 72: 492-497.
- Frison E (2007). Biodiversity, nutrition and health. In *Ecosystems and people for development – the road to 2010 and beyond: Papers read at Fifth Trondheim Conference on Biodiversity held in Norway, Trondheim*. pp 113-116.
- Guàrdia MD, Guerrero L, Gelabert J, Gou P, Arnau J (2008). Sensory characterisation and consumer acceptability of small calibre fermented sausages with 50% substitution of NaCl by mixtures of KCL and potassium lactate. *Meat Sci.*, 80: 1225-1230.
- Guerrero L, Guàrdia MD, Xicola J, Verbeke W, Vanhonnacker F, Zakowska S (2009). Consumer-driven definition of traditional food products and innovation in traditional food. A qualitative cross-cultural study. *Appetite* 52(2): 345-352.
- Guest G, Brunce A, Johnson L (2006). How many interbeliefs are enough: an experiment with data saturation and variability? *Field Methods* 18(1): 59-82.
- Guinard J, Mazzucchelli R (1996). The sensory perception of texture and mouth feel. *Trends Food Sci. Technol.*, 7(7): 213-219.
- Hassan LG, Umar KJ (2006). Nutritional value of Balsam Apple (*Momordica balsamia* L.) leaves. *Pak. J. Nutr.*, 5(6): 522-529.
- Hornby AS (2005). *Oxford advanced learners dictionary*. 7th ed. Oxford: Oxford University Press.
- Jansen van Rensburg WS, van Averbeke W, Slabbert R, Faber M, van Jaarsveld P, Van Heerden I, Wenhold F, Oelofse A (2007). African leafy vegetables in South Africa. *Water SA*. 33(3): 317-326.
- Kähkönen P, Tuorila H, Rita H (1996). How information enhances acceptability of a low-fat spread. *Food Qual. Pref.*, 7: 87-94.
- Khumalo TP (2007). Consumer acceptability and perception of maize meal in Giyani, South Africa. M.Sc. dissertation, University of Pretoria, South Africa.

- Krueger RA (2000). A practical guide for applied research. 3rd ed. Thousand Oaks, CA: Sage.
- Krueger RA, King JA (1998). Involving community members in focus group. Thousand Oaks, CA: Sage.
- Labadarios D, Steyn N, Maunder E, Macintyre U, Swart R, Gericke G, Huskisson J, Dannhauser A, Vorster HH, Nesamvuni EA (1999). The national food consumption survey (NFSC): children aged 1-9 years, South Africa, 2000. Department of health: directorate of nutrition, Pretoria.
- Larson NI, Perry CL, Story M, Neumark-Sztainer D (2006). Food preparation by young adults is associated with better diet quality. *J. Am. Diet Assoc.*, 106(12): 2001-2007.
- Laureati M, Pagliarini, E, Calcinoni O, Bidoglio M (2006). Sensory acceptability of traditional food preparations by elderly people. *Food Qual. Pref.*, 17: 43-52.
- Maunder EMW, Meaker JL (2007). The current and potential contribution of home-grown vegetables to diets in South Africa. *Water SA*. 33(3): 404-406.
- Mbhenyane XG, Venter CS, Vorster HH, Steyn HS (2005). Nutrient intake and consumption of indigenous foods among college students in Limpopo Province. *S. Afr. J. Clin. Nutr.*, 18: 32-38.
- McGee BB, Richardson V, Johnson GS, Thorntin A, Johnson C, Yadrick K, Ndirangu M, Goolsby S, Watkins D, Simpson PM, Hyman E, Stigger F, Bogle ML, Kramer TR, Strickland E, McCabe-Sellers B (2008). Perceptions of factors influencing healthful food consumption behaviour in the lower Mississippi Delta: focus group findings. *Nutri. Edu. Behav.*, 40: 102-109.
- Mkanda AV (2007). Relating consumer preferences to sensory and physiochemical properties of dry Cowpeas. M.Sc. dissertation, University of Pretoria, South Africa.
- Modi M, Modi AT, Hendriks S (2006). Potential role for wild vegetables in household food security: a preliminary case study in Kwazulu-Natal, South Africa. *Afr. J. Food Agr. Nutri. Dev.*, 6: 1-13.
- Nesamvuni C, Steyn NP, Potgieter MJ (2001). Nutritional value of wild, leafy plants consumed by Vhavenda. *S. Afr. J. Sci.*, 97: 51-54.
- Neumark-Sztainer D, Story M, Perry C, Cassey MA (1999). Factors influencing food choices of adolescents: findings from the focus-group discussions with adolescents. *J. Am. Diet. Assoc.*, 8: 929-937.
- Niva M, Mäkelä J (2007). Finns and functional foods: socio-demographics, health efforts, notions of technology and the acceptability of health-promoting foods. *Int. J. Cons. Stud.*, 31: 34-45.
- Odhav B, Beekrum S, Akula S, Baijnath H (2007). Preliminary assessment of nutritive value of traditional leafy vegetables in KwaZulu-Natal, South Africa. *J. Food. Comp. Anal.*, 20: 430-435.
- Pieniak Z, Verberk W, Vanhonacker F, Guerrero, L, Hersleth M (2009). Association between traditional food consumption and motives for food choice in six European countries. *Appetite* 53: 101-108.
- Renee BK (2010). Meeting consumer concerns for food safety in South Korea: the importance of food safety and ethics in a globalizing market. *J. Agr. Environ. Ethic* 22(2): 141-152.
- Rolls ET, Verhagen JV, Kadahisa M. (2003). Representations of the texture of food in the primate orbit frontal cortex neurons responding to viscosity, grittiness and capsaicin. *J. Neurol. Physio.*, 90: 3711-3724.
- Rossmann GB, Rallis SF (1998). Learning in the field. An introduction to qualitative Research. Thousand Oaks, CA: Sage.
- Rozin A, Fallon EA (1987). A perspective on disgust. *Psychol. Rev.*, 94: 23-41.
- SAS Institute inc (2003). The SAS system for windows release 9.1 TS level 1MB. Copyright© by SAS institute inc., Cary, NC, USA.
- Scholtz SC, Bosman MJC (2005). Consumer acceptance of high-fibre muffins and rusks baked with red palm olein. *Inter. J. Food Sci. Tech.*, 40: 857-866.
- Shenton AK (2004). Strategies for ensuring trustworthiness in qualitative research projects. *Educ. Inf.*, 22: 63-75.
- Simela L, Webb EC, Bosman MJC (2008). Acceptability of chevron from kids, yearling goats mature does of indigenous South African goats: A case study. *S. Afr. J. Anim. Sci.*, 38(3): 247-259.
- Smith IF, Eyzaguirre P (2007). African leafy vegetables: their role in the world health organization's global fruit and vegetable initiative. *Afr. J. Food Agr. Dev.*, 6: 1-13.
- Smith D, Riethmuller P (2000). Consumer concerns about food safety in Australia and Japan. *Br. food J.*, 102(11): 838-855.
- Smith IF (1995). The case for indigenous West African food culture. Breda series n 9, Dakar.
- Stone H, Sidel JL (2004). Sensory evaluation practices. 3rd ed. Amsterdam: Elsevier.
- Strydom H, Delpont CSL (2005). Sampling and pilot study in qualitative research. In *Research at grass roots*, 3rd ed (ed. by AS De Vos). Pretoria: Van Schaik.
- Szczesniak AS (2002). Texture is a sensory property. *Food Qual. Pref.*, 13: 215-225.
- Thompson B, Demark-Wahnefried W, Taylor G, McClelland J, Stables G, Feng Z, Topor M, Heimendinger J, Reynolds K, Cohen N (1999). Baseline fruit and vegetable intake among adults in seven 5 a day study centers located in diverse geographic areas. *J. Ame. Diet. Assoc.*, 99: 1241-1248.
- Van Der Walt AM, Mossanda AM, Jivan KSA, Swart SD, Bezuidenhout CC (2005). Indigenous African food plants: vehicles of diseases or source of protection. *Indilinga* 4: 279-279.
- Verbeke W (2001). Beliefs, attitude and behaviour towards fresh meat revisited after the Belgian dioxin crisis. *Food Qual. Pref.*, 12: 489-498.
- Vorster HJ (2007). The role and production of traditional leafy vegetables in three communities in South Africa. M.Sc. dissertation, University of Pretoria, South Africa.
- Vorster HJ, Jansen Van Rensburg WS, Van Zijl JJB, Venter SL (2007). The importance of traditional leafy vegetables in South Africa. *Afr. J. Food Agr. Dev.*, 7(4): 1-13.
- Vorster HJ, Stevens V, Steyn GJ (2008). Production systems of traditional leafy vegetables: challenges for research and extension. *S. Afr. J. Agr. Ext.*, 37: 85-96.
- Wardle J, Herrera M-L, Cooke LJ, Gibson EL. (2003). Modifying children's food preferences: the effects of exposure and reward acceptance of an unfamiliar food. *Eur. J. Clin. Nutri.*, 57: 341-348.
- WHO/FAO (World Health Organization/Food and Agricultural Organization) (2003). Diet, nutrition and the prevention of chronic diseases. WHO technical report series, p. 916. Geneva.