



Factors Influencing Consumer Preference for Sweat Potato in Namibia, Case Study from Windhoek

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Authors' contributions

This work was carried out in collaboration between both authors. Author GMM designed the study and conducts literature searches and wrote the first draft of the manuscript. Author MYT managed to write the protocol and analyses of the study performed. Both authors read and approved the final manuscript.

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ABSTRACT

The aim of this study was to analyse factors affecting consumers' preferences. The study was conducted in Windhoek; multiple stage sampling was employed to collect data. That is first stage was cluster sampling methods (to characterise the population to lower, middle and higher income); then followed to random sampling. In total 353 individual face to face interviews was conducted. Data was analysed using Logistic regression, key finding of the study finding age of the household and employment status being negatively linked and bigger weight implying that increase in these two parameters will lead to small consumption. On the other hand the positive sign for family size stay in the house was found as hypothesised. Shows the responsibility and creativity increases with different option of preference. This makes it necessary for the family to diversify the source of diet, further look for healthy food. The gender of the farmer was found to be positive and significant, whereas age was found to be negative and significant. This implies that female consumers trying to avoid any risk health related. The study recommended that demographic shifts create the need for marketers to keep pace with change and identify with and predict future demand.

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1. INTRODUCTION

Namibia is located in south-western Africa, covers a land area of 825,418 km², and has a 1,500 km coastline along the South Atlantic Ocean [1]. It has a population of 2.1 million people [2,3].

The Namibian economy is highly influenced by the South African economy, explained by two major reasons. Firstly, Namibia is a member of the Common Monetary Area (CMA) arrangement, that is, South African currency is legal tender along with the Namibian dollar currency, at a one-to-one ratio, as a result over 80% of Namibia's imports are sourced from South Africa [4]. Secondly, Namibia receives an annual share of import tax benefit collected through Southern Africa Custom Union (SACU). However, these two issues create volatility and complicate government budget planning. Moreover, the Namibian economy remains volatile and vulnerable to any economic and political risk emanating from South Africa, which renders commodity prices unstable as South Africa becomes a net importer of foodstuff [5].

When it comes to sweet potato, *Ipomoea batatas* is multipurpose root crop grown in tropical and sub-tropical, and it is rich source of flavonoid anti-oxidants, vitamins, minerals, and dietary fiber, which essential for human health [6]. As a plant sweet potato reduce risk of heart diseases, diabetes, obesity, and cancer [6]. Furthermore, it is good source of income and nutrition [7].

Apart from the health benefit, the crop can resist drought better than any other crops and it require less inputs and can be produced within four months of establishment [7]. Despite these values, sweet potato has not been gained much popularity in Namibia and not integrated into the daily diets of the household consumption. Due to lack of awareness and falling to diversify in production side and consumptions accounted for low consumption in Namibia [7].

In 2011 and 2012 a total of 367.37 tonnes and 317.58 tonnes was imported respectively, and this represent about 59.70% and 44.23% local demand requirements respectively. On the other hand local production increased from 247.98 to 400.38 tonnes between 2011 and 2012 that represent an increment of 23.49%. The increase in domestic demand and imports was due to

variation in market prices and seasonality of sweet potatoes [5,8].

In comparison with other staple crops, sweet potato provides less calories and protein per unit weight than grain cereals and rice, but offset by its higher nutrient densities for vitamins and minerals [6]. Sweet potato provide on average about 90 calories per 100 kg compared to 70 calories/100 g to Irish potato [9]. The tuber, however, contains no saturated fats or cholesterol and it is rich source of dietary fiber, anti-oxidants, vitamins, and minerals. Its calorie content mainly comes from starch, a complex carbohydrate [6].

On the other hand, consumers seek food safety and are Willing to Pay (WTP) higher prices for "healthy or nutritive products" since they increase their utility level, reducing, at the same time, health risks [10]. However, they are unable to ascertain food safety before purchase, being this the most important constraint to economic efficiency in the production and marketing of food safety. Since some of these health risks benefits are hard to assess, a method commonly applied to determine food safety benefits is estimating consumers' willingness to pay for safer and better quality food [11].

The preference and WTP for a particular product can be divided into two categories; i.e. product related factors and consumers related factors. The product related factors that influences consumers' preferences, and product price, then the question comes what their WTP, product quality, product type (perishable or non-perishable) and origin of production, knowledge of the product, labelling and regularity in supply [12]. Consumer related factors are income, age, education, gender, occupation, family size and type of the consumers [10]. Additionally, consumers' preferences and WTP and is also affected by peers opinion, awareness (i.e. awareness about the harmful effects of consuming traditionally produced food products), habits and socio-cultural factors [13].

Consumer needs and preferences are changing, given the change factors like demographics and lifestyles. These changes can become great business opportunities for alert marketers and threats for marketers who fail to adapt. It is very essential to know how buyers behave in modern

marketing field and what factors affect their preferences and WTP for a product.

Therefore, this study examined factors related to the demand side, which included consumers' related factors or general household characteristic and their influence on consumer preferences WTP sweet potatoes. This research was conducted in Namibia, in Windhoek district, mainly in Okuryangava, Khomasdal and Pionierspark suburbs.

2. LITERATURE REVIEW

[14] studied social economic factors affecting consumption of sweet potato value added products. The study was conducted in Shanyanga rural and Mwanza urban of Tanzania. Using cross sectional design, the study employed individual interviews, focused group discussion; review of relevant practical documents and discussion in data collected from a total of 200 surveyed households. The analysis of the factors hypothesized that influence the consumption of sweet potatoes value added was carried out using multiple regression analysis. The results showed that different economic and social demographic characteristics of respondents, such as gender, age, education level, household size and income were found to influence consumers' preference for sweet potato value added products were found significant to influence and followed by factors such as price, quality, and availability.

[15] carried out a consumer research for sweet potatoes, in Australia. This research evaluated the behaviours and purchasing drivers of key sweet potato consumers. This research was qualitative in nature. Methods used included focus group, depth interviews and shop-a-longs in Brisbane, Sydney and Melbourne, and data was analysed based on Grounded Theory approach. The research found that preferences for sweet potato were varied amongst the groups. In general smaller torpedo shaped vegetable was valued for ease of preparation and the convenience of being of sufficient size for a meal for two. Satisfaction with sweet potato was high with negative comments on quality exceedingly rare within discussions. However, shop-a-longs revealed that some quality issues were apparent at retail such as withered product, pitting and occasionally damage. A display with stock resting in any amount of water was a barrier to purchase for consumers and this was apparent on two out of 15 occasions. A high quality

sweet potato was of a deep orange/red colour, had a smooth skin and was extremely dense and hard. An inferior sweet potato was wrinkly, spongy, pitted and damaged.

[16] assessed consumers preference for strawberry products in California in areas of Louisiana. The objective of this study was to identify preference for selected strawberries attributes by consumers' demographics and by purchasing behaviour. The study also included the analysis of demographic and lifestyle factors that influence the decision about sources of and preference for strawberries. Conjoint analysis to examine consumer preference for selected product attributes of fresh strawberries. The results of the study showed that consumers put highest relative importance on brand, origin and to a lesser degree price.

[17] studied Factors Affecting the frequency of fresh potatoes' purchasing in Argentina. The aim of this research was to examine consumers' preferences for fresh potatoes quality attributes and also to identify those factors associated to purchases of potato of better quality. A representative sample of the population included 500 randomly selected households. Related to potato nutrients, 50% of the sample mentioned at least one nutrient (carbohydrates 83%, vitamins 24%, potassium 16%, and fibre 12%). Households with many members had a higher probability to consume fresh potato more frequently than smaller households, and older respondents consume fresh potato more frequently than younger individuals. Households who considered potato as a relevant component of a balanced diet consumed fresh potatoes more frequently than households that did not emphasized the role of this product in their meals. Consumer perception about the relationship between price and quality showed that the higher educational level, the lower the number of respondents who declared that the price is a trustful sign of quality. Finally, when asked about willingness-to-pay for fresh potatoes of better quality, 34% of households were willing to pay a premium of 0.13 US\$/kg and 19% were willing to pay a price premium of 0.26 US\$/kg.

Furthermore, [18], studied factors Affecting Consumers' Willingness to Pay for Certified Organic Food Products in United Arab Emirates. The objective of this paper is to examine consumers' Willingness to Pay (WTP) for the organic food in UAE. Data was collected in UAE from 300 respondents. Regression model was

used to identify major determinants of consumers WTP for the organic food. The results showed that majority of consumers responded positively when asked if they are willing to pay more for the organic food products. The age, nationality, education; household size and income were deciding factors for consumers to pay higher price for the organic food. These results will provide key information to organic food industry that will help to promote organic food markets in the UAE [19].

In literature review the theoretical framework foundation factors influencing consumers' preference categorized into six components that includes cultural, social, personal, psychological and product related factors [20]. For example, [14] studied social economic factors affecting consumption of sweet potato value added products. Which was conducted in the urban of Tanzania of Shanyanga and Mwanza rural areas; using cross sectional design, the study employed individual interviews, focused group discussion; review of relevant practical documents and discussion in data collected from a total of 200 surveyed households. The results showed that different economic and social demographic characteristics of respondents, such as gender, age, education level, household size and income were found to influence consumers' preference for sweet potato value added products were found significant to influence and followed by factors such as price, quality, and availability.

Therefore, this study was examined to conduct factors affecting for consuming sweet potato that included consumers' related factors or general household characteristic and their influence on consumer preferences. This research was conducted in Namibia, in Windhoek district, mainly in Okuryangava, Khomasdal and Pionierspark suburbs.

3. METHODOLOGICAL FRAMEWORK

3.1 Study Area

The study was conducted in Windhoek district, specifically in the suburbs of Okuryangava, Khomasdal and Pionierspark. Windhoek is the capital city of the republic of Namibia and it's located at 22°34'12"S and 17°5'1"E coordinates. It is situated in central Namibia in the Khomas highland plateau area, around 1700 meters above sea level. Windhoek is situated in a semi-arid climatic region. Days are mostly warm with very hot days during the summer months, while

nights are generally cool. The average annual; temperature is 19.47°C (67.05°F). The mean annual rainfall is around 360 millimetres [21].

The population of Windhoek during the year 2012 was estimated to be 325 858 and the city grows continually due to influx from all over the country [2,3]. Windhoek is the social, economic, and cultural center of the country. The Northern part of Windhoek housing the old township Katutura, Goreagab, Wanaheda, and the Northwestern suburbs is the historical area of most black people with low income it is in the section of Windhoek that so called informal settlement, characterised by informal structures are found. In contrast, the central and southern parts of Windhoek are areas of people earning middle to high incomes [2].

3.2 Data Collection

In this study applied multiple stage-wise sampling technique; the first stage was cluster sampling into the three categories of the group LOW, MIDDLE & HIGH income suburbs represent properly cluster sampling, which possibly exclude other target grouping for the purpose of convenience. However, clustering does not guarantee the exact category of those classifications; the researcher is aware of the existence of mixed population group in any classifications of clustering. After this clustering, the second stage systematic sampling technique was applied, to select every third household to be interviewed, and every third household was interviewed.

The interviews were face-to-face basis, based on a structured questionnaire that was designed and pretested. The structured questionnaire covered general household characteristics, different consumer for sweet potato. Variables were selected based various literatures that address common factors affecting consumer preferences.

Due to the large size of population cover for Windhoek district, financial limitation and time consideration, this research focused on two suburbs selected based on income classification. Multiple stage sampling technique was applied; the first was cluster sampling method was used, in which the target population was divided into three subgroups or clusters based on income classification stated above, assuming that:

1. Low income suburbs was represented by Okuryangava.

2. Middle income suburbs was represented by Khomasdal.
3. High income suburbs was represented by Pionierspark.

According to [2,3], there are 69 393 households in 32 suburbs in the district of Windhoek. The distribution of the households are as follows 13,749 Households in Okuryangava (Low income), in Khomasdal (Middle income), there are about 5852 Households and in Pionierspark (High income) there are about 2559 households. For the purpose of this study randomly, proportion ratio was applied that is 57% of the total sample (about 200 sample) from low income households, 29% of the total sample from middle income households (about 100 sample size) and proportion of 14% of the total sample (thus represent about 53 sample size) from High income. Due to limitations of available resources, budget, time, reachability (to the targeted population) and to allow computation of required statistical analysis, about 0.7% that is 353 sample size was considered to be sufficient to represent the case of this project.

3.3 Data Analysis

In achieving research objective logistic regression model was found to be suitable to use for the factors affecting consumers 'preference for sweet potatoes. Logistic regression measures the relationship between a categorical dependent variable and one or more independent variables, which are usually (but not necessarily) continuous, by using probability scores as the predicted values of the dependent variable [22].

Using the logistic regression coefficients are the coefficients $B_0, B_1, B_2 \dots B_k$ of the regression equation.

3.3.1 Dependent variable

Where: $Y = P$, sweet potato preference = is the probability that consumers prefer sweet potatoes, thus those who consume sweet potato take one; otherwise zero.

3.3.2 Independent variables

- HHEsp = Household Size stays and consume sweet potatoes.
- GDHH = Gender of the head of the household.
- AGHH = Age of the head of the household.

- HHS = Household size (members stay constantly in the house).
- EDUL = Educational qualification of the head of the household.
- EMPS = Employment status of the head of the household.
- MHINC = Household Monthly Income.

Logistic regression model is the easiest modification of log p which has an unbounded range is the logistic (or logit) transformation, $\log \frac{p}{1-p}$. We can make this a linear function of x without fear of nonsensical results (of course the results could still happen to be wrong or non-representational, but still valid to give insight). The following mode the last alternative is logistic regression. The model logistic regression followed the following model [14]:

Model:

$$\log \frac{P(x)}{1 - P(x)} = \beta_0 + X \cdot \beta$$

Solving for P, this gives

$$\frac{e^{\beta_0 + X \cdot \beta}}{1 + e^{\beta_0 + X \cdot \beta}} = \frac{1}{1 + e^{-(\beta_0 + X \cdot \beta)}}$$

Assumptions:

- The data Y_1, Y_2, \dots, Y_n are independently distributed, i.e., cases are independent.
- Distribution of Y_i is *Bin* (n_i, π_i), i.e., binary logistic regression model assumes binomial distribution of the response. The dependent variable does not need to be normally distributed, but it typically assumes a distribution from an exponential family (e.g. binomial, poisson, multinomial, normal...)
- Does not assume a linear relationship between the dependent variable and the independent variables, but it does assume linear relationship between the logit of the response and the explanatory variables; *logit* (π) = $\beta_0 + \beta X$.
- Independent (explanatory) variables can be even the power terms or some other nonlinear transformations of the original independent variables.
- The homogeneity of variance does not need to be satisfied. In fact, it is not even possible in many cases given the model structure.

- Errors need to be independent but not normally distributed.
- It uses maximum likelihood estimation (MLE) rather than ordinary least squares (OLS) to estimate the parameters, and thus relies on large-sample approximations.
- Goodness-of-fit measures rely on sufficiently large samples, where a heuristic rule is that not more than 20% of the expected cells counts are less than 5.

4. RESULTS AND DISCUSSION

Gender distribution in this study found to be 61.8% of the respondents were female compared to 38.2% were male (out of 353), even though this might necessarily indicating female prefer more sweet potato. However, gender has been recognised as an essential variable for analysing the roles, responsibilities, constraints, opportunities, incentives, costs and benefits on the specific preference [23].

Family size, as one demission of factor influencing for sweet potato; in this study found to be between 1 and maximum of 2 persons (39.2%), 2-3 persons in the house (33.3%), 4- 5 (7.4%) and more than five people in the house (8.8%); this implying that the lower the family size, could be linked to better education attainment and level of awareness for type and variety of preference.

In terms of education Level of the respondents, in this research the majority of the sampled respondents attended high school (36.3%), graduated high school (16.2%), graduated college (20.6%) and only 12.7% are post graduate. With this regards, for example [4,24] found that consumption of fresh potatoes was positively related to educational attainments in Argentina. [19], indicates that higher education is associated with the regular and balanced diet consumption. Furthermore, this implying that high school graduate has better awareness with regards to sweet potato; as they might have exposure to different source of information. Similar study by [25] found that consumption of fresh potatoes was positively related to educational attainments.

In terms of employment status, the majority of the sampled respondents were employed, representing 57.4%, and only 22.5% of the sampled respondents were unemployed, while

the remaining 20.1% were self-employed. The occupation of a person has significant impact on his purchasing behavior, for example [7] in South Africa proven this empirical evidence; [16] in another study shows consumer preference for strawberries, consumer preferences for strawberries was found to be positive with those consumers engaged in full time professional occupation.

The regression model explained between 35.5% (Cox and Snell R-square) and 38% (Nagelkerke R-square) of variance in whether participants preferred sweat potato, and classified 67% of cases between YES and NO (see Table 1).

Independent variables, out of seven variables four of them found to be significant at one percent [those variables are HHEsp, AGHH, HHS and EMPS], and the remaining found to be insignificant. Moreover, HHEsp and HHS found to be positive related; whereas AGHH and EMPS found to be related to be negatively; the significant estimated variables coefficients parameters were 0.055, - 0.39, 0.56 and -0.5 for HHEsp, AGHH, HHS and EMPS respectively. The odd ratio or probability; (exp (B) 1.005, 0.68, 1.75, and 0.611 respectively. Before interpretation, it is important to take note that the following about odd ratios:

- Odds ratio = 1 same as probability of event occurring between two situations.
- Odds ratio > 1 probability of event occurring with unit increase in higher the case by the same point.
- Odds ratio < 1, probability of event occurring with unit increase eventually will lead to lower than the original.

This implying that one percent increase/decrease in household count would lead to (1.005-1.000 = 0.5%) increase/decrease by 0.5%; in the same explanation goes to Age of Household (0.611 – 1 = 0.39); one percent increase/decrease in AGHH will lead to decrease/increase by 39%. The two variables will have similar explanation.

Household whose preferring frequently to consume sweat potato (HHEsp) found to be bigger weight to influence the sweet potato consumption; that is (1.753 – 1.00 = 0.753 = 75%); thus indicating that increase/decrease one percent in their consumption will eventually lead to increase/decrease by about 75%. Whereas; employment status tend to have the opposite relationship that is increase one present in

number of employed people, tend to reduce the consumption of sweat potato by 49%; this shows that with increase income in the society people shift to other food items.

In this model Chi-square test was used to test the equality of the standard deviation of a population to a specified value. This test can be either a two-sided test or a one-sided test. The two-sided version tests against the alternative, namely that the true standard deviation is either less than or greater than the specified value. The one-sided version only tests in one direction. Choosing to use a two-sided or one-sided test is determined by the problem [26].

The Chi-square, which tests the joint significance of the explanatory variables in this study, is statistically significant at the level of 5% (Table 1). The estimated model correctly classified 93% of the respondents. The success rate for predicting between those prefers and none preferred for sweat potato 67% and 78%, respectively.

Along this analysis it is very important to take note that as indicated in [26], customer service is an influential factor in consumer decision making in selecting the fast food products. No matter the size of the business, excellent customer service needs be at the heart of the business model. Therefore, it is important to provide good customer service to all types of customers, including potential, new and existing customers. Secondly, Consumers are expecting that size, colour, texture, availability, price, origin and nutritional value might be considered by fresh sweet potatoes suppliers in the domestic market. Quality judgements are largely influenced by

product itself [26]. For example, consumers may ascertain product quality by screening product appearance. Some consumers will assume that the product is of high quality if the package is of high quality. Vice versa, if the consumers have negative information on the product package, then they will transfer low quality perception to the product itself.

On the basis of results obtained and shown in Table 1, the techniques described in the methodology section were applied. Variables HHEsp, HHS, AGHH, and EMPS are found to be significant (see Table 1). The two former lists are the positive estimated coefficient sign; whereas the latter two variables estimated to be negative coefficients.

The positive estimated coefficient indicates that the greater the values of these variables, the higher the tendency for consumers tend to consume sweat potato. The negative sign for AGHH and EMPS indicates that the greater the value of these variables, the lower the probability of not consuming.

The positive sign of the HHEsp (family size) was as hypothesised. Shows the responsibility and creativity increases with different option of preference. This makes it necessary for the family to diversify the source of diet, further look for healthy food.

The gender of the farmer was found to be positive and significant at a 5% level, whereas age was found to be negative and significant. This implies that female consumers trying to avoid any risk health related.

Table 1. Factors influencing sweet potato preference: Logistic regression approach

		B	S.E.	Wald	df	Sig.	Exp (B)
Step 1 ^a	HHEsp	0.005	0.002	10.662	1	0.001	1.005
	GDHH	0.349	0.247	1.994	1	0.158	1.418
	AGHH	-0.389	0.152	6.577	1	0.010	.678
	HHS	0.561	0.126	19.702	1	0.000	1.753
	EDUL	0.016	0.072	0.047	1	0.829	1.016
	EMPS	-0.492	0.180	7.466	1	0.006	.611
	MHINC	-0.094	0.082	1.313	1	0.252	.910
	Constant	-0.046	0.690	0.004	1	0.947	.956
Classification of cases							0.67
Cox & Snell R square							35.5%
Nagelkerke R square							38%

a. Variable(s) entered on step 1: HHEsp, GDHH, AGHH, HHS, EDUL, EMPS, and MHINC

The formal education level (EDU) expected to be significant; however, the puzzling result of the estimated coefficients on EDU shows not significant levels, and positively influences. Perhaps between preferred and none preferred category data was not found for this study. This might jeopardise the result of this variable, or might suggest that a specific study is needed.

In line with the existing literature review theoretical framework foundation [20] six categories of factors influencing in this study household characters (social factors that is age and family size) and also economic factor (income) amplified significantly.

[14] in Tanzania factors influence specifically for sweet potatoes social and economic factors found to influence preference; [15] in Australia quality sweet potato found to be drivers for sweet potato consumption; [16] in California found to be brand and origin of product; [4] studied in Argentina compared among household size for pattern of sweet potato consumption the study finding shows that households with many members had a higher probability to consume fresh potato more frequently than smaller households [4,24]. Furthermore, older respondents consume fresh potato more frequently than younger individuals. Consumer perception about the relationship between price and quality showed that the higher educational level, the lower the number of respondents who declared that the price is a trustful sign of quality [4,24]. Including this study implying that in lower income countries such as Namibia sweet potato more influenced by income and household size; but in higher income countries sweet potato more influenced by sweet potato product attributes.

5. CONCLUSIONS AND RECOMMENDATIONS

In this study concluded that the negative sign for age of the household (AGHH) and employment status (EMPLS) indicates that the greater the value of these variables, the lower the probability of not consuming.

The positive sign for family size stay consistently in the house (HHesp) was as hypothesised. Shows the responsibility and creativity increases with different option of preference. This makes it necessary for the family to diversify the source of diet, further look for healthy food.

The gender of the farmer was found to be positive and significant, whereas age was found

to be negative and significant. This implies that female consumers trying to avoid any risk health related.

The study shows that the demographic shifts create the need for marketers to keep pace with change and identify with and predict future demand. It is also further recommended that the current agricultural marketing policy should incorporate the component of market related type of research that are aimed at informing policy makers on different demographic and product/market factors that affect consumer preferences for different key food crops such as sweet potatoes that has the potential of addressing the current food shortage experienced in Namibia, since the crop can do better under dry land, with minimum input cost.

COMPETING INTERESTS

Authors have declared that no competing interests exist.

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