*International Journal of Agricultural Management and Development (IJAMAD)*
*Available online on: www.ijamad.iaurasht.ac.ir*
*ISSN: 2159-5852 (Print)*
*ISSN:2159-5860 (Online)*

# Management Strategies of Perceived Risk Associated with Moringa Products by Consumers in Ilorin Metropolis, Kwara State, Nigeria

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*Received: 26 July 2014,*
*Accepted: 22 March 2015*

**Abstract**

This study focused on examining the management strategies of perceived risk associated with Moringa products by consumers in Ilorin metropolis with view to rank the perceived risk associated with Moringa product; assess the different strategies employed by consumers to manage or cope with the risk and to examine socio-economic determinants of consumers' consumption behaviour in relation to the perceived risk. Primary data were collected with the aid of a well structured questionnaire from 116 sampled respondents in the study area. The data were analysed using descriptive statistics and the Tobit regression model. The result shows that majority of the consumers consume Moringa powder while none of them consume Moringa oil. It was also discovered that most of the respondents do nothing about the risk associated with Moringa consumption, while some of them reduce the quantity consumed per dose or frequency consumption. Awareness of risk and consumption of Moringa powder were found to have significant effect on consumer attitude towards the perceived risk at ($p<0.1$). The study therefore recommends the need for more clinical trials that will ascertain the long term health implication of Moringa products consumption and the need for marketing agencies to take advantage of the relative ambivalence to Moringa consumption for more advertorial and promotional campaigns.

*Keywords:*
*Management strategies, Perceived risk, Moringa consumption, Consumer behaviour*

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## INTRODUCTION

Moringa is a small, fast growing tree found in all tropical regions. Its leaves are considered among the world's richest vegetables. It is a plant food of high nutritional value, ecologically and economically beneficial and readily available in the countries hardest hit by food crisis. Moringa is considered to have its origin in the northwest region of India, south of the Himalaya Mountains. Moringa is cultivated in the tropics for various purposes such as food crop, medicinal and industrial uses and many African countries use Moringa leaf powder as a food supplement to fight malnutrition and to assist people suffering from micronutrient deficiency (Animashaun *et al.,* 2013a). The leaf powder is rich in proteins and micronutrients such as vitamins, minerals and all essential amino acids and for centuries, these nutritional and therapeutic properties have been utilized in the traditional treatment of several health disorders in various cultures (Animashaun *et al*., 2013b; Azeez *et al*., 2013; Fahey, 2005; Saint Sauveur, 2001). It is considered to have the highest protein ratio of any plant so far studied on earth. A wide variety of nutritional and medicinal virtues have been attributed to its roots, bark, leaves, flowers, fruits and seeds (Anwar *et al.*, 2007; Farinola *et al*., 2014; Kumar *et al.*, 2010).

Despite the wide use of Moringa for nutriceutical and therapeutic purposes, there are documented studies of its toxicity profile at certain level or doses of use in experimental animal studies (Adedapo *et al.,* 2009; Kasolo *et al.*, 2011). This could be a source of concern for potential consumers as it may be perceived as a source of risk among human users. Risk analysis provides the framework for any programme and production that is to result to successful effort (Ayinde *et al.,* 2012); Risk perception is the subjective assessment of the probability of a specified type of accident happening and how concerned we are with the consequences (Sjorberg *et al.*, 2004). Perception about the safety risk of Moringa use are what the individual believes would be the amount of health risk, if any, they would face from consuming a food product.

Processed Moringa is a relatively new product and is not yet widely accepted. This might be as a result of consumer perceived risk associated with the consumption of the product. Acceptance of a product is largely determined by what is known as subjective knowledge with regards to the perceived risk and benefit associated with its consumption. Consumers' knowledge on moringa product mainly depends on their trust in the information received, which is directly associated with the sources from which information is transmitted (Huffman *et al.*, 2004; Koivisto-Hursti and Magnusson, 2003; Siegrist *et al.*, 2000). According to Hilson and Murray-Webster (2005), risk attitude is a chosen response to an uncertainty that matters while under the influence of perception. Risk attitude refer to how willing a person is to accept risk. Risk averse people place a high premium on ventures that are assured safe,risk neutral people are indifferent regarding choices with different levels of risk and risk seeking individuals pursue risky situations.

In the light of these concerns, this study examined the management strategies used by Moringa consumers in the light of perceived risk which may be associated with its consumption among consumers in Ilorin Metropolis. The specific objectives are to:

1- rank the perceived risk associated with Moringa product;

2- assess the different strategies employed by consumers to manage or cope with the risk associated with Moringa consumption; and

3- examine socio-economic determinants of consumers' consumption behaviour in relation to the perceived risk.

## MATERIALS AND METHODS

### Area of Study

The study was conducted in Ilorin metropolis Kwara State, Nigeria. The state is made up of 16 local government areas namely Asa, Baruten, Edu, Ekiti, Ifelodun, Ilorin-west, Ilorin-east, Irepodun, Isin, Moro, Kaima, Offa, Oke-ero, Oyun and Patigi (Kwara State diary, 2004). The survey used in this study was carried out in Ilorin metropolis. A snowball-technique was

used to select Moringa consumers because of the difficulty and cost of sampling which would be involved in composing a sampling frame for Moringa users with specific attributes in terms of its perceived risk of use. The seminal works of both Becker (1966) and Lindesmith (1968) in their studies of deviant behaviours agreed that where the subjects of studies were sparse, the snowball sampling technique is most appropriate to use. In addition, this study observed that users who have knowledge of the perceived risk of Moringa are likely to know others who share the characteristics that make them eligible for inclusion in the study. At the end of the sampling, a total of one hundred and twenty Moringa consumers were randomly sampled in the study area with only one hundred and sixteen used.

The main source of data for this study wss the primary data that was collected with the aid of a well structured questionnaire. Data collected was on socio-economic characteristics of the respondents and data on perceived risks associated with Moringa users and the management strategies used. Moringa consumption was measured by recording the number of teaspoon of dried Moringa leaves consumed per day. A teaspoon of Moringa dried leaf is approximately 8g. Data was subjected to analysis using descriptive statistics and the Tobit regression model.

**Tobit Regression Model**

Tobit model is a statistical model which describes the relationship between a non-negative dependent variable and an independent variable. The model supposes that there is a latent (unobservable) variable. This variable linearly depends on the independent variable via a parameter which determines the relationship between the independent variable and the latent variable. In addition, there is a normally distributed error term to capture random influences on this relationship. The observable variable is defined to be equal to the latent variable whenever the latent variable is above zero and zero otherwise.

The implicit form of the Tobit regression model is as follows,

$Y^* = \beta xi + ei$

$Y = Y^*$ if $Y^* > 0$

$Y = 0$ if $Y^* < 0$

The explicit form of the model is as follows,

$Y^* = \beta x_1 + \beta x_2 + \beta x_3 + \beta x_4 + \beta x_5 + \beta x_6 + \beta x_7 + \beta x_8 + \beta x_9 + \beta d_1 + \beta d_2 + \beta d_3 + \beta d_4$

Where Y = index of the difference in the quantity of Moringa consumed before and after risk perception.

$\beta$ = Coefficients to be estimated

$X_1$ = Sex

$X_2$ = Age of respondents

$X_3$ = Single (Yes=1, No=0)

$X_4$ = Married (Yes=1, No=0)

$X_5$ = Widowed (Yes=1, No=0)

$X_6$ = Tertiary (Yes=1, No=0)

$X_7$ = Income (Naira)

$X_8$ = Public sector (Yes=1, No=0)

$X_9$ = Private sector (Yes=1, No=0)

$d_1$ = Awareness of risk associated with moringa consumption (Yes=1, No=0)

$d_2$ = consume moringa powder form (Yes=1, No=0)

$d_3$ = Consume moringa Seed (Yes=1, No=0)

$d_4$ = Consume moringa fresh leaf (Yes=1, No=0)

## RESULTS

**Socio-economic characteristics of respondents**

This section presents the socio-economic characteristics of the respondent. It describes the household socio-economic features. The study revealed that 42.2% of the respondents were male and 57.7% female. This implies that females are more involved in the use of Moringa when compared to males in the study area. The marital status distribution of the respondents shows that greater percentages of the respondents were married and they depend on numerous benefits of Moringa by which they sustain their family. This is in support with findings of Kola-Oladiji et al., 2014 research. Unlike Kola-Oladiji et al., 2014 findings, only 5.2% of the respondents are within the age of 16-18, 50.9% were between 19-29, 22.4% were between 30-40, 14.7% were between 41-51 and 6.8% were above 51. The modal class of level of education is Tertiary education. Majority (75.7%) of the respondents attended tertiary institution, 16.3% have secondary

Table 1: Moringa product consumed

| Moringa products available | Frequency | % |
|---|---|---|
| Fresh leaf | 58.0 | 50.0 |
| Seed | 35.0 | 31.0 |
| Powder | 69.0 | 60.3 |
| Oil | 0 | 0 |

Table 2: Products perceived to have highest risk

| Product | Frequency | % |
|---|---|---|
| Nil | 71.0 | 61.2 |
| Moringa leaf | 24.0 | 20.7 |
| Moringa flower | 3.0 | 2.6 |
| Moringa seed | 13.0 | 11.2 |
| Moringa bark | 5.0 | 4.3 |

Table 3: Management Strategies to risk

| Strategy | Percentage (%) |
|---|---|
| Do nothing | 43.3 |
| Reduce quantity/dose | 22.4 |
| Reduce frequency of consumption | 21.0 |
| Take supplement | 10.4 |
| Stop consumption | 2.9 |

education, 5.2% have primary education, 0.8% has adult education and 4.3% have no formal education. It was observed that 31.9% of the respondents work in the public sector, 22.4% private sector, 37.1% were students, 8.6% artisans and 0.8% farmers. It was also observed that 13.8% of the respondents earn ₦5000[1] and below monthly, 31.9% earned between N6,000-25,000 monthly, 16.4% earned between N26,000-45,000 monthly, 16.4% earned between N46,000-65,000 and 21.5% earned over N66,000 monthly.

As revealed in Table 1, 60.3% of the respondents consume moringa powder, 50% consume moringa fresh leaf, 31% consume the seed and non of the respondents consume moringa oil. This implies that majority of the respondents consume moringa powder. This is probably due to the fact that moringa powder is readily available in the study area.

It was observed that 20.7% of the respondents perceive moringa leaf consumption to be associated with some risks, 11.2% perceive that the consumption of the seed carried some risk, 4.3% perceive the consumption of the bark of the plant have risk and 2.5% of the respondents perceive moringa flower consumption to bear some risk (Table 2). Moringa leaf is perceived to have the highest risk. Some of the respondents believe that while processing Moringa leaf into powder, there may be contamination with microbes and loss of nutrition.

**Consumers' management strategies to risk associated with Moringa Consumption**

As shown in Table 3, about 43% of the respondents do nothing about the risk, that is, majority of the respondents do nothing about the risk associated with moringa consumption, 22.4% of the respondents reduce the quantity they consume per dose, 21% of the respondents reduce their frequency of consumption, 10.4% of the respondents take other drugs to supplement the effect of moringa while 2.9% of the respondents stop moringa consumption after perceiving the risk.





[1] *US dollar is equivalent to ₦230*

**Socio-economic determinants of consumers' consumption behaviour in relation to the perceived risk**

The result of socio-economic determinant that influences consumers attitude to Moringa consumption before and after the perception of risk associated with Moringa is presented in Table 4. The Tobit regression model was used to analyse respondents' behaviour. It is assumed that respondents' attitude to the perceived risk was in the form of either reduction in quantity of Moringa consumed or reduction in the number of times of consumption. The Tobit model was used to determine consumers' behaviour in terms of quantity consumed.

The Tobit model as shown by the significance of the ($p<0.01$) indicated that the model with the variables is significantly different from the model without the variables. As shown in Table 4, awareness of risk significantly explains the difference in the quantity of Moringa consumed before and after risk perception at ($p<0.01$).

Furthermore, in the Tobit regression model, consumption of Moringa powder was also found to have significant effect on consumer attitude at ($p<0.01$).

## CONCLUSION AND RECOMMENDATIONS

Findings from the study show that respondents' management strategies to the perceived risk associated with Moringa consumption ranges from doing nothing to reduction in doses and frequency of consumption. This is consistent with findings of Farinola *et al.*, 2014 and Kola Oladiji *et al.,* 2014. And that very little of the respondents (2.9%) actually stop Moringa consumption based on the perceived risk. Tobit regression model indicates that variations in Moringa consumption by respondents as a result of perceived risk are significantly explained by the model and they are attributed to knowledge of risk attributed to Moringa consumption and consumption of Moringa in powder form. The study implies that apart from the Moringa powder, respondents are ambivalent about the risk associated with the consumption of Moringa product.

In view of this, the study makes the following recommendations; There is need for more clinical trials that will ascertain the long term health implications of Moringa products consumption; improved processing of the Moringa powder with a view to reducing the antinutrients and tannin contents; and marketing agencies should take advantage of the relatively ambivalent attitude of consumers to the perceived risk of

Table 4: Tobit Analysis Result

| Predictor variables | Coefficient | SE | t | p- value |
|---|---|---|---|---|
| Male | -3.74 | 3.46 | -1.08 | 0.283 |
| Age | -0.02 | 0.30 | -0.08 | 0.938 |
| Single | 5.67 | 12.47 | 0.45 | 0.650 |
| Married | -2.88 | 11.58 | -0.25 | 0.804 |
| Widowed | 7.46 | 12.20 | 0.61 | 0.542 |
| Tertiary | 5.83 | 6.10 | 0.96 | 0.341 |
| Public sector | 4.77 | 5.50 | 0.87 | 0.388 |
| Private sector | 5.33 | 5.76 | 0.93 | 0.356 |
| Income | -5.58e-06 | 0.00 | -0.10 | 0.917 |
| Aware of risk (Yes) | 16.86 | 5.17 | 3.26 | 0.002** |
| Powder (Yes) | 13.22 | 5.20 | 2.54 | 0.013** |
| Seed | 2.37 | 4.03 | 0.59 | 0.559 |
| Fresh leaf(consume) | 2.77 | 3.25 | 0.85 | 0.396 |
| Constant | -39.48 | 19.49 | -2.03 | 0.046 |
| Sigma | 8.3 | 1.72 | | |
| Log likelihood = -72.05 | | | | |
| LR $chi^2$ (17) =44.32 | | | | |
| Prob > $chi^2$ = 0.0003 | | | | |

**p<0.01

Moringa consumption and intensify on advertisement and promotional campaign strategies.

## ACKNOWLEDGEMENT

The authors are grateful to Atanda Omolala in the collection of Data for this work and every part of this research.

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