

Socio-economic factors influencing adoption of *Moringa oleifera* water purification by farmers in Kaduna state, Nigeria

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ABSTRACT

This study investigated those factors which influenced the adoption of *Moringa oleifera* as water purifier by the farmers in Kaduna state. Data were collected with the use of structured questionnaire from 30 respondents. The data were analyzed using descriptive statistics and logit regression model. The results showed that the respondents had no formal education or the other. About 90 percent were married average household size of 10 persons per household. About 73 percent adopted *Moringa oleifera* water purification. Socio-economic factors influencing adoption of *Moringa oleifera* water purification were age, education, extension contact and membership of cooperative. The study therefore recommends that farmers should form themselves into association because such association will aid in collective soliciting for government assistance, NGOs and other funding agencies. Also, more awareness should be created by extension agents on the importance of *Moringa oleifera* seed powder in rural development.

Keywords: *Moringa oleifera*; adoption; water purifier; socio-economic factors; extension agents

1. INTRODUCTION

Moringa oleifera (Family Moringaceae) is cultivated across the tropics and used for a variety of purposes (Jahn 1986). Its seed powder is a good water purifier; and contains polyelectrolyte, which constitute active ingredients in water treatment. Aqueous extract of mature seeds from trees and shrubs of Moringaceae family are effective in clarifying turbid and waste water in tropical countries (Jahn, 1986), especially during rainy season. Muyibi and Ewun (1995) noted that *M. oleifera* seeds have been used in the treatment of hard water, and proved that hardness removal efficiency of *M. oleifera* increased with increasing dosage. *Moringa* seed powder is a natural alternative to imported alum (aluminum sulphate, the conventional synthetic coagulant) used in purifying turbid water in fish culture enclosures (earthen ponds, farm dams and irrigation canals). It is obtainable locally at a fraction of the cost of alum in many countries, simple to use and cheap to maintain (Jahn, 1986; Ndabigengesere and Nasarasiah, 1998).

2. METHODOLOGY

2. 1. Study area

The study was carried out in Bomo village, Sabon gari local government area, located between latitude 118 11° north and longitude 070 38° East at 675 meters. The hottest months are March-April, while the coldest months are December-January. Rainfall is heaviest in the south and decreases northwards with an annual mean rainfall varying between 942mm and 1000mm which last for six months (May-October) (NARERLS, 2002). Soil of the area is characterised by ferrogenous tropical soils formed on drift material (Klinkenberg and Haggins, 1968).

The surface soil is fine sandy loam, prone to capping and poor structure. Its physical structure has been described by Kowal (1972). In this area trees like sea butter, locust bean predominate, while in the north and northwest, Baobab, silk cotton and date palm are predominant. The people in this area engage in agricultural production activities. The main crops which are grown include maize, millet, rice, groundnut, yam and sugarcane.

Primary data were used for this study. These were collected with the aid of structured questionnaire. The data were collected from 30 respondents in the study area.

2. 2. Analytical techniques

Descriptive statistics: this was used to describe socio-economic characteristics of the farmers and level of adoption. It includes frequency count and percentages.

Logit regression: this was used to identify socio-economic and institutional factors influencing adoption of *Moringa oleifera* water purification. The probability of a respondents adopting *Moringa oleifera* purification is determined by an underlying response variable that captures the true socio-economic status of the respondents. The underlying response variable y^* in the case of binary choice is defined by the multivariate logit regression relation:

$$y^* = (\sum X_i \beta_j) + \mu$$

where: $\beta_j = \beta_1, \beta_2, \beta_3, \beta_4, \beta_5, \beta_6, \beta_7, \beta_8,$ and $X_i = X_{i1}, X_{i2}, X_{i3}, X_{i4}, X_{i5}, X_{i6}, X_{i7}, X_{i8}$

The relevant logistic expressions are given as:

$$Prob (y^* = 1) = 1 - F * (\sum X_i \beta_j) = \frac{e^{\sum X_i \beta_j}}{1 + e^{\sum X_i \beta_j}}$$

$$Prob (y^* = 0) = F * (\sum X_i \beta_j) = \frac{e^{\sum X_i \beta_j}}{1 + e^{\sum X_i \beta_j}}$$

where: F = The cumulative distribution function for μ_i, \dots

$$Prob \left(Y_i = \frac{0}{\beta_j} X_i \right) = F(-\sum X_i \beta_j), \quad Prob \left(Y_i = \frac{1}{\beta_j} X_i \right) = 1 - F(-\sum X_i \beta_j)$$

where;

Y = adoption (1 = adopter, 0 = non-adopter)

μ_i = a logistic cumulative distribution in F

X_i = characteristics of households

X_1 = Age

X_2 = Education (years of formal schooling)

X_3 = Household size (number of persons in the household)

X_4 = Amount of credit received (Naira)

X_5 = Membership of cooperative (years)

X_6 = Income (Naira)

X_7 = Extension contact (Number of contacts)

β_i = The coefficients for the respective variables in the logit function

3. RESULTS AND DISCUSSION

Results in Table 1 shows that *Moringa oleifera* activities are predominated by male; this may be due to religious belief, that men are more involved in agriculture than the women in the area. Table 1 further reveals household size between 12-17 has percentage of (36.7), this implies that household have positive significant role in farming activities. Therefore, adoption of *Moringa oleifera* as water purifier is higher among the large household than the small-sized household. This may be due to the fact that farmers with large household have many families to cater for. Ninety percent of the respondents were married men while 10 % were single. This shows the business as that of settled minds and that it contributes to household economic stability in one way or the other, Amiechi (2000). Most of the respondents (43.3 %) had Arabic education, 26.7 % had secondary education, 13.3 % had primary education, 10 % had tertiary education while 6.7 % only had no formal education. 95 % of them are literates and had one form of education or the other. Education may not prerequisite to enter into *Moringa* business, but their productivity could be enhanced by some level of educational attainment. Seventy three percent of the respondents adopted the innovation, while 26.6 % did not adopt the technology. The reason for relatively greater adoption of the practice may be that this innovation is by no means completely new to these farmers. Studies (Roger, 1965; and Vonberger, 1962) have also shown that are compatible with local practices are known to be acceptable to farmers.

Table 1. Socio-economic characteristics of *Moringa* farmers.

Variables	Frequency	Percentage (%)
Gender		
Male	30	100
Female	0	0
Household size		
1-5	7	23.3
6-11	6	20.0
12-17	11	36.7
None	6	20.0
Marital status		
Married	27	90
Single	3	10

Educational level		
Primary	4	13.3
Secondary	8	26.7
Tertiary	3	10
Arabic	13	43.3
Other	2	6.7

3. 1. Adoption of *Moringa oleifera* seed powder

One of the objectives of the study was to determine the extent to which farmers have adopted the technology. Table 2 showed that, 73.4 percent adopted the technology and 26.6 did not adopt the new technology. The reason for greater adoption of the technology is because; this practice is economical and environmental friendly to these farmers. Studies (Rogers, 1965; and Lionberger, 1962)

Table 2. Adoption level of the technology

Variables	Frequency	Percentage
Adopters	22	73.4
Non-adopters	8	26.6
Total	30	100

3. 2. Factors influencing adoption of *Moringa oleifera* seed powder

Results presented in Table 3 show the factors that influence the adoption of *Moringa oleifera* in the study area. It was revealed that four out of the seven variables included in the model were significant. These variables were age, education, extension contact and membership of cooperative. Age was positive and significantly influential to the adoption of *Moringa oleifera* water purification. This implied that as farmers increase in age the probability of adopting this method would also increase. The importance of age lies in its effect on the adoption of innovations and the processing of information. This is evident that there is a positive relationship between age and adoption behaviour of farmers. Older farmers are more likely to adopt innovation than younger farmers. The coefficient obtained for education is positive and significant at 5 percent level. This implies that the higher the educational level, the more the probability that respondents would adopt this method of water purification and vice versa, this is because education enhances the level of understanding. Also, the more educated a farmer, the more the chances that he/she would utilize available opportunity and adopt innovation.

The coefficient obtained for extension contact was positive and significant at 1 percent. The implication of this is that if farmers have more contact with the extension agent. There is probability that adoption would increase. This implied that availability of extension services and information about *Moringa* production as well as its utilization as water purification play important role in determining level of adoption. The coefficient (0.447) for membership of

associations was positive and significant at 5 % level of probability. Membership of association can provide means of interaction with other farmers and this can also provide avenue or forum through which innovation can be diffused among farmers. Membership of association affords the farmers the opportunity of sharing information on modern farming practices by interacting with other farmers.

Table 3. Factors influencing adoption of *Moringa oleifera* seed powder.

Variable	Coefficient	Standard error	b/S.E
Age	0.063	0.028	2.25**
Education	0.432	0.142	3.04***
Household size	-0.251	0.523	-0.480
Amount of credit received	0.472	0.743	0.635
Membership of cooperative	0.573	0.149	3.846***
Income	0.015	0.063	0.238
Extension contact	0.171	0.023	7.434***

*** = P < 0.01 ** = P < 0.05 * = P < 0.10

4. CONCLUSION

The result of this finding reveals that, organising the Moringa farmers into association is an essential task as it makes the work easier. Also, such an association will aid in collective bargaining, soliciting government assistance, Non Governmental Organisations and other funding agencies. Generally *Moringa oleifera* seed powder can fit in rural development if modernize, as it is a source of income and nutrition and is not detrimental to the environment. Also, adequate attention should be paid to farmers' socio-economic characteristics as these would be significant facilitators for adoption of *Moringa oleifera* water purification. Extension agents should be trained to understand the socio-economic characteristics of farmers which influence their level of adoption.

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(Received 13 June 2014; accepted July 2014)

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