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Awareness, Utilization, and Income Potential of *Moringa oleifera* Among Residents of Umuahia, Nigeria

[1]Olowoyo, F. B., [2]Udoh, E.D., [3]Obadimu, O.O., [1]Owese, T., [1]Ugwu, R.A. and [1]Adepoju, R.B.

[1] Federal College of Forest Resources Management, Ishiagu, Ebonyi State
[2] High Forest Research Station, Awi
[3] Forestry Research Institute of Nigeria, P.M.B 5054, Jericho, Ibadan
Corresponding author's email: felixolowoyo65@gmail.com

Abstract
This study assessed the various uses of Moringa in meeting domestic needs. It also highlighted the potential of Moringa for an additional source of household income in the Umuahia North and South Local Government Areas (L.G.A.) of Abia State, Nigeria. The study specifically examined the socioeconomic characteristics of respondents in the study area, ascertained awareness of Moringa, and examined various uses and factors affecting the level of income realized from Moringa production. A total of ninety-eight (98) respondents were sampled using a simple random sampling procedure. Data collection was facilitated by the use of a structured questionnaire designed and validated for the purpose. Data analysis utilized descriptive statistics such as means, percentages, frequency distributions, regression analysis, and Pearson product-moment correlation analysis. Results showed that the majority (50.0%) of the respondents were within their active and innovative years, between 31 and 50 years. Only a minority of the respondents (4.1%) had no formal education. The majority of the respondents (90.8%) were engaged in farming and trading as their primary occupation and income generation activities. About 66.3% were married. Results of the regression analysis indicate that planting pattern or method, attendance at training on Moringa by either an extension agent or at a workshop/conference, farm size, and level of education were significant and positively related to the level of income generated from Moringa production, while age was significant but negatively related to the level of income generated from Moringa production. The result of the Pearson moment of correlation analysis shows that there is a significant and positive relationship between the proportions of land allotted to Moringa production and the level of income realized at the 0.01 level of significance. The correlation coefficient of 0.336 signifies that there is a 33.6% strength of relationship between the proportion of land allotted for Moringa and the level of income realized. It was recommended that an area of special and specific planting for the Moringa farm and scientific publications be made available at the study area with enough extensive services in the form of workshops, training talks, and extension seminar which will increase the respondents' agricultural production capacities.
Keywords: Moringa oleifera, household income, Umuahia

Introduction

Moringa oleifera, often referred to as the "miracle tree," is a fast-growing, drought-resistant plant native to South Asia but now widely cultivated across tropical and subtropical regions of Africa, including Nigeria. Its leaves, seeds, pods, bark, and roots are known for their exceptional nutritional, medicinal, and industrial value, making it one of the most versatile plants for rural livelihoods and sustainable development (Okoro and Danlami, 2023). In many parts of Nigeria, particularly in rural communities. *Moringa* is gaining increasing attention not just as a health supplement but also as a potential driver of economic and environmental resilience (Eze and Ibrahim, 2022).

In Umuahia, the capital of Abia State, where agriculture forms a backbone of household livelihoods, the adoption and integration of multipurpose crops like *Moringa oleifera* present a valuable opportunity. Yet, despite its proven benefits, awareness and utilization of *Moringa* remain inconsistent across different segments of the population. While some residents cultivate or consume it regularly, many others remain unaware of its full potential for income generation, nutrition, and environmental sustainability (Nwankwo and Oluchi, 2024). Understanding the level of awareness, socioeconomic characteristics of users, and the uses of *Moringa oleifera* is therefore essential for informing local agricultural development policies.

Moringa has demonstrated strong potential as a supplementary income source for rural and peri-urban households. The plant requires minimal input to grow and thrives even in marginal soils, making it accessible to low-income farmers. Its leaves can be harvested multiple times a year, processed into powder, and sold in local and regional markets, while seeds can be used for oil extraction and water purification. These multiple income streams make it an attractive option for household economic diversification (Adebanjo and Yusuf, 2023).

Beyond economics, *Moringa* also offers significant environmental benefits. Its deep-rooted system and rapid growth make it ideal for soil conservation, particularly in areas prone to erosion and land degradation—a concern increasingly relevant to Umuahia due to shifting rainfall patterns and poor land management. Additionally, its ability to restore soil nutrients and act as a natural windbreak positions it as a strategic agroforestry crop for climate-smart agriculture (Chinedu and Obasi, 2022).

However, for *Moringa*'s full potential to be realized in Umuahia, there is a need to assess both the level of public awareness and the socio-economic context in which it is grown and used. Only by understanding who grows it, how it is used, and what barriers exist to its wider adoption can policymakers and extension services promote it effectively for both economic empowerment and environmental restoration.

This study, therefore, explores the economic importance and awareness level of *Moringa oleifera* among the populace of Umuahia, Abia State. By examining its uses, income-generating potential, and environmental functions—especially in relation to erosion control—the research seeks to provide evidence that can guide local planning and agricultural innovation efforts.

Methodology

The study was carried out in Umuahia metropolis, Abia State, and it is located in the Eastern part of Nigeria, lying between latitude 05^0 29^1N of the equator and longitude 07^0 33^1 E Greenwich meridian. It comprises two local government areas, namely, Umuahia North and south with a total population of approximately 359, 230 (NPC, 2006).

A simple random sampling was used in selecting 120 respondents, with only 98 valid for analysis during data collection. A structured questionnaire, which was developed and validated for the purpose, was used to collect data from the respondents. Data analysis employed included descriptive statistical tools such as means, percentages, and frequency distributions, while the regression procedure was used to analyse the factors affecting the level of income generated from *Moringa production*. The implicit form of the regression model used was specific as follows:

$Y = F (X_1 X_2 X_3 X_4 X_5 X_6 X_7 X_8 X_9) + e$

Where;

Y=level of income realized from *Moringa* production measured in naira

X_1 = Health status of the respondents (healthy = 1, non – healthy = 0)

X_2 = primary occupation (farming = 1, non-farming =0)

X_3 = Planting pattern (sole = 0. Mixed = 1)

X_4 = Training on *Moringa* (Training = 1, non-training = 0)

X_5 = marital status (married = 1, single = 0)

X_6 = farm size (proportion of farmland allocated for *Moringa* in %) otherwise use the conventional one = ha)

X_7 = Household size (number of persons staying under the same roof).

X_8 = Age (years)

X_9 = Level of education (years)

While Pearson moment correlation was employed to analyse the relationship between farm size and level of income.

The Pearson moment correlation is stated as follows.

$$rxy = \sqrt{\frac{\sum XY}{(\sum X)2\ (\sum Y)2}}$$

Where;

r = correlation coefficient

x = farm size (ha)

y = level of income (Naira)

The exponential functional form was chosen as the lead equation $logY = bo + b1X1 + b2X2 + b3X3 + \cdots . + e)$ for explaining the factors affecting the level of income realized from *Moringa production* in the study area, because it provided the best fit.

Results and Discussion

Table 1 shows that 35.7% of the respondents were males, while 64.3% were females. This indicates that women were more involved in the farming of *Moringa* than men. Also, the result showed that 25.5% of the respondents sampled for this study were in the age group of more than 50years while 28.6% and 23.5% were between the age groups 31-40 and 20-30 years, respectively. This implies that the majority of the farmers were in their productive age group, which is expected to reflect on their agricultural production efficiency. This finding concurs with the study by Battese & Coelli (1995) and Oladosu (2010), where it was reported that older farmers were less efficient and aware than the younger ones. Though 95% of respondents were literate with different educational levels, this may affect farmers' adoption in agricultural production, which in turn have effect on their household food security status. This finding is in line with the study by Seyoum *et al.* (1998) and Uchechi (2010), who found that farmers with more years of school tend to be more technically

efficient than farmers with no education because they would be able to source information from various media, which could boost their agricultural production endeavours. The result also indicates that 66.3% of the respondents were married, while 29.6% were single. This means that the majority of the respondents were married; being married could mean that the majority of the respondents were financially and non-financially responsible to their family members and to the communities where they reside, which may encourage more available labour for farm work. This result corroborates the findings of Aphunu & Otoikhian (2008). A good percentage of the respondents (55.1%) were engaged in farming as their primary occupation, while 35.7% were engaged as traders. Also, the result showed that 53.1% of the respondents had 6-10, while 44.9% had 1-5. The mean household size was 5.53. This means that the majority of the households had between 6 and 10 members, which could be referred to as a large household size. A large household size could mean an abundant, cheap, and available source of family labour that could be used in *Moringa* production. The result also shows that 54.1%, 29.6%, and 16.3% of the respondents generated income 1000-20000, 21000-40000, and 41,000 – 60,000, respectively, from *Moringa oleifera*. However, the majority of the respondents generated between 1000 and 20000 naira. This means that the majority of *Moringa* producers are operating on a small scale or are small-scale farmers.

Table 2 shows the awareness of the farmers about *Moringa oleifera*. This implies that almost all the respondents (93.9%) are aware of *Moringa*. Almost 65.3% of the respondents come about *Moringa* through family and friends, while 23.5% know *Moringa* through the non-governmental organizations (NGO's). All the respondents (100.0%) agreed that they planted *Moringa*. Also, 65.3% of the respondents plant *Moringa* in the homestead gardens, while 34.7% plant it in farmlands. About 33.7% of the respondents said 50% of their farms have *Moringa,* while 56.1% said 25% of their farms have *Moringa*. 38.8% of the respondent's plant *Moringa* solely, while 61.2% inter-planted with their food crops. 37.8% of the respondents planted *Moringa* with yams and maize, while 67.2% planted *Moringa* with cassava and melon. Almost all the respondents (96.9%) agreed that they preserved *Moringa* either as dried leaf (41.8%) or ground (58.2%).

Table 3 shows the responses of the respondents about the various uses of *Moringa*; 80.6% of the respondents used *Moringa oleifera* for tea, while 12.2% and 7.1% of the respondents made use of *Moringa* as a vegetable for stew and soup, respectively, and eaten boiled with spices, respectively. This indicates that the majority of the respondents made use of *Moringa* as tea. This could be due to the medicinal composition of the leaves and seeds of *Moringa oleifera*. However, the use of *Moringa* in creating environmental benefits, protection of crops, or a hedge for erosion control is still at the lowest level. This is shown by the low % of respondents who made use of *Moringa* for fencing (17.3%) and wind breakers (17.3%). The low use of *Moringa* for environmental purposes could be because other tree crops used in place of *Moringa* have low shade cover. The majority of the respondents (58.2%) claimed that they have been using *Moringa* for up to 3years. Also, 36.7% and 28.6% of the respondents asserted that they use *Moringa* both daily and weekly, respectively. 78.6% of the respondents used *Moringa* for all members of their family, while 80.6% noticed gradual improvements with the

usage. The respondents, 41.8% and 22.4%, affirmed that they use *Moringa* either in a powdered form or raw, like that respectively. About 82.7% of the respondents said they can recommend *Moringa* to people, and the recommendations will be either for medicinal use (86.7%) or good for health (10.2%). About 95.9% of the respondents said that if they are given seedlings of *Moringa,* they will plant them. While 68.4% respondents said they have not attended a workshop or training talk on *Moringa,* and almost all, about 92.9%, agreed that if they are invited to seminars or conference they will gladly attend.

Table 4 indicates that the four functional forms were tried, and the lead equation, being the Exponential model, was chosen. This was due to the value of R^2 (coefficient of multiple determination), F-ratio, and the conformity of the signs of the regression coefficient with a priori expectations. The value of $R^{2,}$ which was 0.572, means that 57.2% of the total variation observed in the use of *Moringa* (dependent variable) could be accounted for by the independent variables included in the model. The F-value of 5.473 signifies that the model is statistically significant. The table indicates that planting /method, attendance at training on *Moringa* by either extension agent or at workshop /conference, farm size, and level of education were significant and positively related to the level of income generated from *Moringa* production, while age was significant but negatively related to the level of income generated from *Moringa* production. The planting pattern/method adopted by *Moringa* farmers/producers was significant at 5% and positively related to the level of income generated from *Moringa* production. This means that as the planting pattern/method adopted in planting/growing *Moringa* is compatible, as it provides aid to the growth of *Moringa*, the greater the harvest/yield. The greater the yield/harvest, the greater the volume of sales. The increase in growth could be due to the adoption of a mixed planting method, which could have improved the level of soil fertility, and the greater the volume of sales, the greater the level of income generated from *Moringa* production. Farm size proportion allotted to *Moringa* was significant at 1% and positively related to the level of income realized from *Moringa* production. This means that as the proportion allotted to *Moringa* production increased, the level of income also increased. The increased level of income realized from *Moringa* production could be due to increased yield as a result of economies of scale. The greater the yield/harvest as a result of economies of scale, the greater the sales, and the greater the level of income generated from *Moringa* production. Training on *Moringa* (respondents) received by *Moringa* producers either through the extension agents, Conference or workshop was significant at 5% and positively related to the level of income realized by the respondents on *Moringa* production. This means that the greater the training received on *Moringa,* the greater the level of knowledge and expertise on *Moringa* production, which consequently influences the level of income. Age was significant at 1% and was negatively related to the level of income realized by the respondents. This means that as the age of the respondents increased, the income generated/realized decreased, vice versa. Decreased income could be because, as respondents get older, he lacks the necessary physical and mental energy to execute a task or adopt innovation. The more the respondents are not able to execute a task or adopt an innovation, the less his productivity and consequently their level of income.

Education was significant at 1% and positively related to the level of income realized. This

means that as the level of education increased, the level of income realized increased. Education is a tool that increases or enhances the level of imposture and skill acquisition; the greater the level of imposture and skill acquisition, the higher the level of income realized from *Moringa* production.

The level of significance of different alpha levels (1%,5%,10%) shows the mean levels of chance or sampling error. In addition, the level of significance helps to show how different alpha levels associate variables together. The result of the relationship between the proportion of land allotted to *Moringa* and the level of income realized from *Moringa* production was determined using Pearson's moment correlation. It shows that there is a significant at 1% and positive relationship between the proportion of land allotted to *Moringa* production and the level of income realized. The correlation coefficient of 0.336 signifies that there is 33.6% strength of the relationship between the proportion of land allotted for *Moringa* and the level of income realized

Conclusion

This study has shown that the majority of the respondents were literate, although with different educational levels, which enables them to source information from various media to boost their farming activities. The respondents also engage in diverse non-farm livelihood activities such as trading, science, teaching, etc. The factors influencing the usage of *Moringa* were identified as health status, farm size, training on *Moringa,* and planting pattern of the respondents. It is recommended that a special and specific plot be dedicated to the planting of *Moringa* and adequate scientific publications be made available. Extension service in the form of workshops, training talks, and extension seminars is recommended as a means of encouraging the respondents in farming and utilizing *Moringa oleifera* in Abia State. The government can set the stage to achieve this laudable goal.

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Table 1: Socio-economic characteristics of respondents (n=98)

Characteristics	Indicator	Frequency	Percentage %
Sex	Male	35	35.70
	Female	63	64.30
Age	20-30	23	23.5%
	31-40	28	28.6%
	41-50	22	21.4%
	> 50	25	25.5%
Education	N.F.E	4	4.10
	Primary	16	16.30
	Secondary	53	54.10
	Tertiary	25	25.50
Marital status	Single	27	27.60
	Married	65	66.30
	Widow	5	5.10
	Single parents	1	1.00
	Total	98	100
Religion	Christianity	97	99.00
	Traditional Worshipper	1	1.00
Annual Income	1000-20000	53	54.10
	21000-40000	29	29.60
	41000-60000	16	16.30
Household Size	0-5	44	44.90
	6-10	52	53.10
	16-15	2	2.00
Health status	Arthritis	22	22.40
	None	76	77.60
	Total	98	100
Profession	Farmer	54	55.10
	Scientist	3	3.10
	Civil servant	3	3.10
	Teacher	3	3.10
	Trader	35	35.70

Table 2: Awareness of *Moringa* by the respondents (n=98)

Characteristics	Indicator	Frequency	Percentage %
Are you aware of *Moringa oleifera*	Yes	92	93.90
	No	6	6.10
How do you come about it	Through family and friends	64	65.30
	Through NGO's	23	23.50
	Through seminar	11	11.20
Do you plant *Moringa*	Yes	98	100.0
If yes, where do you plant it	Homestead gardens	64	64.30
	Farmlands	34	34.70
What percentage of your farm has *Moringa*	100%	3	3.10
	75%	7	7.10
	50%	33	33.70
	25%	55	56.10
Farm proportion	0.00	55	56.10
	1.00	43	43.90
How do you plant			
	Sole	38	38.80
	Interplanted with other food crops	60	61.20
Interplanted with which food crop			
	Yam and maize	37	37.80
	Cassava and melon	60	61.20
	Cowpea	1	1.00
How do you get *Moringa* if it's not planted			
	Market	52	53.10
	Bush	14	14.30
	Friend –farm	32	32.70
From the market, what quantity do you buy			
	1 – 4gms	19	19.40
	5-8gms	57	58.20
	10 above	22	22.40
How much do you spend on buying *Moringa* at a time			
	50-100	19	19.40
	150-200	19	19.40
	300-350	28	28.60
	500 above	32	32.70
Do you preserve it			
	Yes	95	96.90
	No	3	3.10
If yes, what method			
	Dried leaf	41	41.80
	Grinded	57	58.20

Table 3: Usefulness of *Moringa* to the respondents

Characteristics	Indicators	Frequency	Percentage %
How long have you been using *Moringa*			
	1 year	23	23.50
	3 years	57	58.20
	5 years and above	18	18.40
What do you use it for			
	Tea	79	80.60
	Vegetable for stew and soup	12	12.20
	Eaten boiled with spices	7	7.10
How do you use it			
	Weekly	28	28.60
	Daily	36	36.70
	Fortnight	11	11.20
	Monthly	23	23.50
Do you use it for all members of your family			
	Yes	77	78.60
	No	21	21.40
Which improvement have you seen with the usage			
	Instant	19	19.40
	Gradual	79	80.60
What other uses do you put this plant into			
	Fencing	17	17.30
	Medicinal	27	27.60
	Water purification	12	12.20
	Wind breaker	17	17.30
	Food nutrition supplement	17	17.30
	Oil use	8	8.20
In what form do you use it			
	Raw	22	22.40
	Powdered	41	41.80
	Boiled	35	35.70
Can you recommend *Moringa* to people			
	Yes	81	82.70
	No	17	17.30
What recommendations can you make			
	For medicinal use	85	86.70
	Good for health	10	10.20
	Fever /diabetes	2	2.00
	Toothache relief	1	1.00
If you are given seedlings of *Moringa,* will you plant			
	Yes	94	95.90
	No	4	4.10
Have you attended any workshop/training talk extension			
	Yes	31	31.60
	No	67	68.40

Table 4: Regression results on factors affecting the level of income realized from *Moringa* production

Variables	Linear	Exponential	Semi-log	Double log
Constant	159426.72	11.680	326440.77	12.339
	(1.7757) *	(22.034) ***	(1.596) *	(10.410) ***
Health	20542.091	0.140	21270.353	0.147
Status	(0.712)	(0.819)	(0.713)	(0.848)
Occupation	6155.861	0.061	8005.247	0.074
	(0.243)	(0.405)	(0.301)	(0.476)
Planting	20155.553	0.360	28100.214	0.200
Pattern	(0.740)	(2.236) **	(0.974)	(1.666) *
Training on	47317.496	0.330	51.434.690	0.395
Moringa	(1.729) *	(2.044) *	(1.742) *	(2.307) **
Marital	13895.873	0.077	14638.831	0.092
Status	(0.528)	(0.495)	(0.534)	(0.580)
Farm size	65803.487	0.442	70805.110	0.474
	(2.471) **	(2.811) ***	(2.562) **	(2.959) *
Household size	7268.610	0.043	48375.449	0.249
	(1.063)	(1.076)	(1.117)	(0.994)
Age	-2491.519	-0.017	-90030.949	-0.543
	(2.816) ***	(-3.191) ***	(-2.241) **	(-2.332) ***
Education	4479.332	0.028	56556.116	0.383
	(2.924) ***	(3.044) ***	(2.041) **	(2.383) **
R^2	0.505	0.572	0.371	0.526
R^{-2}	0.381	0.404	0.280	0.401
F-ratio	4.434***	5.473***	3.730 ***	4.960 ***

Note: *** Significant at 1%, **5%, *-10%; Values in parentheses. The T-values and values not in parentheses are the coefficients of the different variables