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Factors Associated with Adoption and Utilization of Moringa among Rural Women in Osun State, Nigeria

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Abstract. The study focused on factors associated with adoption and utilization of Moringa among rural women in Osun State, Nigeria. Data were gathered through structured interview schedule from 120 rural women that participated in DelPHE Project 643. Data collected were analyzed using descriptive statistical tools while inferential statistics such as Chi Square and Pearson Product Moment Correlation were used to test the hypothesis set. The results of the study showed that the mean age of women interviewed in the study area was 43.5 ± 2.9 years and had spent an average of 4.4 ± 4.2 years in formal school, while vast majority (81.7%) of them belongs to one association or the other. The result also indicated that few (15.7%) of the women were not involved in any occupation. There were significant association between respondents' level of Moringa's adoption and their main occupation ($\chi 2$= 33.48; $\rho \leq$ 0.01); organization membership ($\chi 2$= 29.50; $\rho \leq$ 0.01); and marital status ($\chi 2$= 32.85; $\rho \leq$ 0.05), also there was negative and significant relationship between respondents' adoption of Moringa and their age (r=-0.414; $\rho \leq$ 0.01); and the relationship with their years of formal education (r=0.434; $\rho \leq$ 0.01) was positive. The study also identified four crucial factors associated with adoption and utilization of Moringa among rural women in the study area which were socio economic factor (λ= 1.8202); extension agents' related factor (λ= 1.6744); Moringa related factor (λ= 2.6458); and community related factor (λ= 0.7792). The factors identified explained 83.50 percent of the variance in adoption and utilization of Moringa among rural women in Osun State.

Key words: Adoption, Moringa, Utilization, Rural women

Introduction

Moringa is a farmer friendly plant and is useful from top to bottom. It is strongly recommended for Agro-forestry and range land areas in tropics. Being a deciduous plant, it does not have any negative effect on crops; it is deep rooted and does not compete with crops for nutritional concerns; it does not have any direct competition with food crops as it is an edible source of fuel; and it helps to improve organic matter in soil and ultimately the soil fertility. Moringa is also just like an Agro-Based Cottage Industry at farmer's field and also helps to maintain clean environment in general and at specific niche in particular (Johnson, 2005; Manzoor *et al*., 2007; Sreelatha and Padma, 2009; Tree of Life, 2005).

Its production creates employment, requires little financial investment and can be cultivated without using chemicals. The keys to a successful farm are pruning the trees to obtain bushy leaf-growth and regular but limited amount of water and organic manure. By following these recommendations, a Moringa plantation can produce leaves in abundance all year-round. Processing is also an accessible activity that generates income for food processing businesses and rural farmers' associations. Sun drying is an inexpensive, efficient method used to obtain quality results. Milling does not require specific equipment; the mills widely used in Africa are perfectly adapted. Packaging has to be air tight and light proof. The fundamental aspects of processing are hygiene and humidity control to ensure that the leaf powder stays perfectly dry until packaging (Foidle *et al*., 2001; Moringa News, 2008; Fahey, 2005 Ashfaq *et al*., 2011).

Despite the usefulness of Moringa its relevance is quite low in most of the rural areas in Nigeria like Osun State where rural women face a lot challenges daily such as empowerment, poverty, malnutrition, low quality of life, unemployment, and other societal issues associated with underdevelopment that Moringa can help minimize or stop if effectively adopted and utilized.

Due to the situation above, African Women and Rural Environment (AWARE) tagged DelPHE Project 643, a collaborative intervention project between Obafemi Awolowo University (under the auspices of Isoya Rural Development Project), Ile-Ife,

Nigeria; Institute of Agricultural Research and Training (IAR&T), Moor Plantation, Ibadan; and University of Newcastle upon Tyne, Newcastle, United Kingdom introduced Moringa to rural women in Osun State. The project was worn through a proposal written in 2008 in a keenly contested competition under the Development for Partnership in Higher Education for Africa sponsored by the British Council of United Kingdom and coordinated by the Department for International Development (DFID). The project started in September 2009 spanning three years of implementation from 2009-2012. DelPHE Project 643 directly and indirectly focused on meeting three Millennium Development Goals (MDGs): Gender equity and women empowerment; reduction of extreme poverty and hunger; and food security.
The project seeks to exploit and harness the inherent entrepreneurial capability of African women by motivating them to be aware of the immense possibilities open to them to start-off thriving rural enterprises in natural resource utilization and on- and off-farm wealth generation activities, including crop processing, handling, storage, preservation and marketing. Through Isoya Rural Development Project of Obafemi Awolowo University, Ile-Ife, DelPHE Project 643 introduced Moringa to some of its outreach communities in Osun State. The foregoing necessitated this study which investigated the factors associated with adoption and utilization of Moringa among rural women in the study area.

Purpose of the study

The main objective of the study was to examine factors associated with adoption and utilization of Moringa among rural women in Osun State, Nigeria. The specific objectives were to

i. describe the socio-economic characteristics of the rural women that participated in AWARE in the study area;
ii. examine the perception of AWARE's participants towards Moringa;
iii. examine factors associated with adoption and utilization of Moringa among AWARE's participants.

Hypotheses of the study

i. There is no significant relationship between the selected socio-economic characteristics of rural women and level of adoption of Moringa.

ii. There is no significant relationship between respondents' perception towards Moringa and its level of adoption

Methodology for the study

The study was conducted in Osun State, Nigeria. The population for the study consists of all rural women that participated in African Women and Rural Environment (AWARE) programme under the auspices of Isoya Rural Development Project of Obafemi Awolowo University, Ile-Ife, Nigeria. The three major zones considered for the programme were: Iyanfoworogi, Esa-Oke and Ojo zone. For sample selection, two communities were randomly selected from each of the 3 major zones making a total of 6. These communities and their participating women were Olode (40) and Iyanfoworogi (44) from Iyanfoworogi zone; Aafin (45) and Afon (38) from Esa-Oke zone; Awo (46) and Ojo (32) from Ojo zone. Finally, a systematic random sampling technique with a random start at an interval of two using participants' register as sampling frame was used to select fifty percent of women from each selected community. A total of 120 respondents were interviewed for the study. Validated and pre-tested interview schedule was used to elicit information on socio-economic characteristics of the respondents, perception towards Moringa and factors associated with adoption and utilization of Moringa. The data were summarized using descriptive statistics; factor analysis was used to identify the crucial factors associated with adoption and utilization of Moringa; while Chi-Square and Correlation analyses were used to make inferences from the hypotheses.

Measurement of variables

The dependent variable was conceptualized as level of adoption of Moringa by the rural women as a result of participation in AWARE. There were seven areas of Moringa emphasized in the project. The dependent variable was measured by

calculating total adoption score of each respondent form indicators arising from areas of Moringa emphasized in the project. The reaction was against a 4-point scale of adoption ranging from Large Extent (4 points), Some Extent (3 points), Little Extent (2 points), and No Extent (1 point) as used by Adeloye (2011). The total score per respondent was further classified into three categories of improvement as follows: low, moderate and high level of adoption using mean of total improvement score plus/minus standard deviation.

The respondents' perception towards adoption of Moringa was determined by asking the respondents to indicate their view using 12 declarative sentences consisting of both positive and negative items on a 5-point scale of; Strongly Agreed (5), Agreed (4), Undecided (3), Disagree (2) and Strongly Disagree (1) for positive and vice versa for the negative statements.

Results and discussion

Socio economic characteristics of rural women that participated in AWARE

Result in Table 1 revealed that the average age of rural women interviewed for this study was 43.5 with standard deviation of 2.9. This implied that the many (58.0%) of the respondents were middle aged, active and need to be empowered for gainful employment. Vast majority (81.7%) of the respondents were married, this suggested that they were responsible to their family. Majority of the women interviewed had little formal education as the average years spent in formal schooling was 4.4 with standard deviation of 4.2, this could harped their level of adoption and utilization of Moringa. Majority (74.2%) of the women interviewed were Yoruba with very few as Igbo and Igede. It was observed that the main occupation of the respondents was in this order farming (31.7%), trading (35.0%), artisanship (17.5%) and few (15.8%) were doing nothing. Furthermore, vast majority (81.7 %) of the respondents interviewed were members of one or more social groups, this could enhance their level of adoption and utilization of Moringa. It was also revealed that vast majority

of the respondents (80.8%) were not aware of Moringa before participation in AWARE.

Table 1: Distribution of rural women by selected personal characteristics

n= 120

Variables	Frequency	Percentage	Mean	Standard deviation
Age (years)				
<30	18	15.0		
30-50	58	48.3	43.5	2.9
>50	44	36.7		
Marital status				
Married	98	81.7		
Widowed	22	18.3		
Years of formal education				
No formal education	70	58.3		
1-6	26	21.7	4.4	4.2
>6	24	20.0		
Main occupation				
Farming	38	31.7		
Trading	42	35.0		
Artisanship	21	17.5		
None	19	15.8		
Ethnicity				
Yoruba	89	74.2		
Igbo	11	9.2		
Igede	20	16.6		
Membership of social group				
Yes	98	81.7		
No	22	38.3		
Awareness of Moringa before participation in AWARE				
Aware	23	19.2		
Not aware	97	80.8		

Source: Field survey, 2012

Perception towards Moringa

Result in Table 2 revealed that majority (60.0%) of the respondents had favourable disposition toward Moringa as a mean of empowerment, this might be connected with the hope of empowering them and compatibility of Moringa activities to women's nature. This result is in contrast with that of Odeyinka *et. al.,* (2007) which reported that many farmers were indifferent toward Moringa in Southwestern Nigeria.

Table 2: Distribution of the respondents according to attitude towards Moringa

n= 120

	Statements	SA	A	U	D	SD
1	Moringa cultivation is a waste of time and resources	15 (12.5)	13(10.8)	10(8.3)	50 (41.7)	32 (26.7)
2	Moringa is a mysterious crop	24 (20.0)	62 (51.7)	-	20 (16.7)	14 (11.6)
3	Moringa is of great economic importance	63 (52.5)	45 (37.5)	-	12 (10.0)	-
4	Moringa is not expensive to cultivate	45 (37.5)	13 (10.8)	25 (20.8)	35 (29.2)	2 (1.7)
5	Moringa cultivation has no impact on poverty alleviation	48 (40.0)	22 (18.3)	-	30 (25.0)	20 (16.7)
6	Moringa has medicinal value	61 (50.8)	32 (26.7)	-	12 (10.0)	15 (12.5)
7	Farmers in my community will never cultivate Moringa	9 (7.5)	14 (11.6)	32 (26.7)	53 (44.2)	32 (26.7)
8	There is nothing special about Moringa	28 (23.3)	20 (16.7)	21 (17.5)	31 (25.8)	20 (16.7)
9	Moringa has no value at all.	31(25.8)	22 (18.3)	-	33 (27.5)	30 (25.0)
10	Farmers in my community will cultivate it if they know its importance	53 (44.2)	41 (34.2)	-	11 (9.2)	15 (12.5)

Strongly Agree= SA, Agree= A, Undecided= U, Disagree, Strongly Disagree= SD

Mean = 72.7

Standard deviation = 1.8

Adoption of Moringa

Result in Table 3 revealed that the highest adoption level among the respondents was marketing of Moringa (4.02), followed by packaging of Moringa (4.00),

processing of Moringa (3.98), preservation of Moringa (3.96), storage of Moringa (3.94), handling of Moringa (3.91) in that order. This finding implied that these (marketing, packaging, processing and handling of Moringa) were the aspect of Moringa activities adopted most. This result could be due to less strength exertion of the activities which suit women nature. This was in agreement with that of Thurber and Fahey (2009) which reported that there was high level of adoption of Moringa to combat under-nutrition.

Table 3: Distribution of respondents by adoption of Moringa

n=120

Variables	NE F(%)	LitE F(%)	SE F(%)	LagE F(%)	Mean	Rank
Marketing of Moringa	0(0.0)	0 (0.0)	31(25.8)	89(74.2)	4.02	1st
Packaging of Moringa	0 (0.0)	14(11.7)	40 (33.3)	66(55.0)	4.00	2nd
Processing of Moringa	0 (0.0)	20(16.6)	38(31.7)	62(51.7)	3.98	3rd
Preservation of Moringa	0 (0.0)	32 (26.7)	30(25.0)	58(48.3)	3.96	4th
Storage of Moringa	0 (0.0)	40 (33.4)	28(23.3)	52(43.3)	3.94	5th
Handling of Moringa	25(20.8)	35(29.2)	20(16.6)	40(33.4)	3.91	6th
Harvesting of Moringa	29(24.2)	32(26.7)	18(15.0)	41(34.1)	3.86	7th
Pruning of Moringa	34(28.3)	30(25.0)	16(13.3)	40(33.4)	3.83	8th
Planting of Moringa	34 (28.3)	30(25.0)	18(15.0)	38(31.7)	3.74	9th

Source: Field survey 2012

Large Extent= LagE, Some Extent = SE, Little Extent= LitE, No Extent= NE

Factors associated with adoption of Moringa

In order to decide which factor to exclude, Kaiser's criterion was employed which according to Koutsoyannis (1979) was to select those factors which have Eigen value of greater than 0.3. the factor analysis carried out as revealed in Table 4 indicated that factors associated with adoption of Moringa among rural women in Osun State were socio economic (λ= 2.6458); extension agents'(λ= 1.6744); Moringa related(λ= 1.8202); and community related(λ= 0.7792) among others. The results in Table 5

revealed that the factors loaded explained 83.50 percent of variance, while unknown factors explained the remaining 16.50 percent of variance.

Table 4: Factor analysis showing variables associated with adoption of Moringa

Factors and contributing variables	L	L^2	λ
1. Socio economic factor			
Participants' age	0.545	0.2970	
Participants' sex	0.561	0.3147	1.8202
Marital status	0.621	0.3654	
Social group membership	0.723	0.5227	
External orientation	0.566	0.3204	
2. Extension agents' factor			
Integrity	0.582	0.3387	
Commitment	0.393	0.1544	
Desired technical skills	0.602	0.3624	
Communication skills	0.440	0.1936	1.6744
Facilitation skills	0.543	0.2947	
Organization skills	0.575	0.3306	
3. Moringa related factor			
Relative advantage	0.440	0.1936	
Compatibility	0.618	0.3819	
Complexity	0.637	0.4058	2.6458
Observability	0.417	0.1739	
Triability	0.711	0.5055	
4. Community related factor			
Community perception towards Moringa	0.551	0.3036	
Community psychological characteristics	0.550	0.3025	0.7792
Presence/ absence of conflict	0.416	0.1731	

Source: Field survey, 2012

Significantly contributing at 0.05 percent

L= Loading for factor,

L^2= The square of loading factor

λ= Latent root for the factor (ΣL^2)

Table 5: Factor names and percentage variation accounted for by each factor associated with adoption of Moringa

Factors	Name	% variance	Cumm.% var.
1	Socio economic	21.80	21.80
2	Extension agents'	19.20	41.00
3	Moringa related	32.20	73.20
4	Community related	10.30	83.50
5	Others	16.50	100.00

Source: Field survey, 2012

Hypothesis testing

Result in Table 6 revealed that at 0.01 level of significance, main occupation (χ^2=33.483); and organization membership (χ^2=29.502) of the respondents had significant association with level of Moringa's adoption. Furthermore, at 0.05 level of significance, the respondents' marital status (χ^2=32.851) also has significant association with the respondents' level of Moringa's adoption. Whereas ethnicity (χ^2 =4.370) has no significant association with the respondents' level of Moringa's adoption. Thus ethnicity of the respondent has nothing to do with respondents' level of Moringa's adoption.

Table 6: Results of Chi-Square analysis of the relationship between socio economic characteristics of respondents and level of Moringa's adoption

n=120

Variables	χ^2 -value	Df	P-Value	decision
Main occupation	33.483	14	0.847**	S
Marital status	32.851	28	0.741*	S
Ethnicity	4.370	7	0.021	NS
Organisation membership	29.502	7	0.635**	S

Source: Field survey, 2012

*** Significant at 0.05 level of significant S- Significant**

NS- Not significant

**** Significant at 0.01 level of significant**

Result in Table 7 revealed that at 0.01 level of significance, respondents' age (r=-0.414) and years of formal education (r=0.434) had significant relationship with level of Moringa's adoption. While that of years of formal education was positive, that of age was negative. Thus, increase in respondents' years of formal education would increase their level of Moringa's adoption and increase in respondents' age would decrease their level of Moringa's adoption.

Table 7: Correlation analysis showing relationship between socio-economic characteristics of the respondents and their level of Moringa's adoption

n=120

Variables	Correlation coefficient (r)	Coefficient of determination (r^2)	Decision
Age	-0.414**	0.099	S
Years of formal education	0.434**	0.111	S

Source: Field survey 2012.

****Significant at 0.01 level S- Significant**

Result in Table 8 show that there was positive and significant relationship (r= 0.578; P≤ 0.01) between level of respondents's Moringa's adoption and their perception towards Moringa. The contribution of respondents' perception towards level of Moringa's adoption was 33.4 per cent (r^2=0.3341). This implies that the more favourable the respondents' perception towards Moringa, the higher the level of Moringa adoption.

Table 8: Correlation analysis showing the relationship between perception of respondents towards Moringa and their level of Moringa's adoption.

n=120

Variables	Correlation coefficient (r)	Coefficient of determination (r^2)
Perception	0.578**	0.3341

Source: Field survey, 2012

****Significant at the 0.01 level**

Conclusion and recommendations

Based on the findings of the study, it was concluded that Moringa cultivation is usefulness and relevant in minimizing or stopping lot of challenges rural women face if effectively adopted and utilized. It was established that the factors that are associated with adoption and utilization of Moringa in Osun State were socio economic factor, extension agents' related factor, Moringa related factor and community related factors among others.

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