KNOWLEDGE EXCHANGE AND COMMUNICATION OF AGROFORESTRY RESEARCH FOR RURAL LIVELIHOODS IMPROVEMENT IN NIGERIA.

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ABSTRACT
This study evaluated forest research communication in Nigeria with major reference to diverse channels with which results of research are disseminated to farmers and utilized among selected farmers in Ibadan/Ibarapa zone of Agricultural Development Programme of Oyo state (OYSADEP) situated in the tropical rainforest ecological zone of Nigeria based on a survey amongst 200 farmers. Forty (40) farmers each from five LGAs were sampled through a multi-stage sampling technique. Information collected includes socio-demographic characteristics, results of research at their disposal, assessment of the indigenous knowledge; and methodologies used in communicating the results of the forest research in the area were also evaluated. T-test, Chi-square test of statistics and analysis of variance (ANOVA) were all used for the analysis. Results revealed lack of feed-back from the farmers to the researcher as about 21.5% of the farmers do not respond to feedback while 60.5% of farmers do not respond back always. The result of chi-square test of statistics revealed positive and significant effects of farmers' demographic characteristics on exchange of communication between the farmers and the researchers except for age and marital status variables that were not significant at $\alpha_{0.05}$. 39% of the total farmers obtained between N20,000 and N40,000 as their average monthly income generated from their farming activities. However, this amount does not put the farmers above the internationally acceptable poverty line of $1.9 per day. In the medium of communication, about 21% of the farmers obtained their information from researchers through group discussion. Effective exchange of information between the farmers and the researchers is very critical and important for improving farmers' productivity. Proper and adequate information transfer and dissemination are important processes to facilitate the flow of agricultural knowledge among farmers to ensure their livelihood improvement.
Keywords: Agroforestry research, Communication, dissemination of knowledge, rural development

INTRODUCTION
Eradication of extreme poverty, hunger and improving the economy is one of the main mandates of this current administration in Nigeria. Livelihood survival in the rural areas typically depends on agricultural activities. And as the environment is being eroded, it is greatly affecting the rural agricultural output and income. Also, as climate changes, floods and other environmental hazards are contributing to crop failures, thereby affecting the rural livelihoods. However, one major activity that can arrest the situation is an adequate knowledge exchange mechanism between the farmers (end users of information) and the researchers (source of information). Knowledge exchange becomes effective when stakeholders creating, disseminating, sharing and using knowledge are effectively linked together. Farmers, forest researchers and the forest extensionists and advisory system must be linked together to enhance exchange of knowledge. The linkage is important in enhancing access to and usage of knowledge in a knowledge system.

Agroforestry research has been going on for more than a decade in Nigeria, and some promising technologies have been developed. Research has moved from the stations out into farmers' fields, and efforts are intensifying to disseminate the technologies on a large-scale to small-scale farmers in the region. Adoption, or adaptation, of technologies by farmers to improve their livelihoods is the ultimate objective of most agricultural and forest research. However, it also poses the biggest challenge in the research – development – adoption continuum (CTA 2001).

Extension education is a voluntary non-formal education design for farmers (Onumadu et al., 2001). Extension services are important to improve food security situation by improving crop production (Amir et al., 2013). Forestry extension programs are designed to meet the needs of small scale farmers in forested area through agroforestry techniques. Nigeria has a forest research institute and many related agricultural research institutes with key roles of generating current and adequate scientific information for farmers' uses. However, research has shown that access to forestry information among the agroforestry farmers in Nigeria is still at infant stage despite the government of the day's effort in assuring dissemination of information to rural farmers. Agbogidi and Ofuoku, (2009) asserted that many research organisations, whose sole purpose is to develop new farming technologies (i.e., generate new

information) and communicate them to farmers, relegate the communication part to the dustbin. Instead of creating wealth, research findings gather dust (Wesseler and Brinkman, 2002; Raheel and Satoshi, 2014). Research institutions sometimes seem more concerned with self-advancement than with providing information to the end users (farmers). The potential of media (such as radio, market traders, churches and mosques) that do reach people in remote rural areas is ignored (Wesseler and Brinkman, 2002). However, following the notions that forest research publications end up on shelves, this study examined the ''forest researchers-farmers'' linkage and the means of accessing research information through communication.

Factors influencing the flow of knowledge

There are several factors influencing the flow of information between the farmers and the research stations. They are grouped into Individual, Organizational and Technological factors (Haque et al, 2015)

- Individual factors may include the willingness to share/disseminate/exchange knowledge, ability to verbalize and codify knowledge and the willingness of the receiving party to accept new knowledge (Holdschlag and Ratter, 2016).
- Organizational factors are related to organizational culture, organizational processes, trust, reward system, leadership and organizational structures (Yang and Chen, 2007).
- Technological factors may include communication infrastructure, communication channels and usage of social media may influence the flow of knowledge too (Noor et al, 2012).
- One of the main factors hindering the spread of technologies is lack of information
- Agricultural extension agencies are being downsized and closed
- Effective training
- Bossy nature of extension agents
- Language barrier
- Affordability of tariffs for communication
- Access to a reliable power source
- Efficient feedback mechanism

METHODOLOGY

Study Areas

This study was carried out at Ibadan/Ibarapa zone of OYSADEP in Oyo State, Nigeria. The target populations are household heads that engage in farming activities Ibadan/Ibarapa LGA is dominated by the people with low socio-economic status. The land area is about 986 km^2 and population of 153, 261 (NPC, 2016). Ibadan/Ibarapa LGA contains a few patches of forests and most of the inhabitants are subsistence farmers, artisans, and civil servants. Figure 1 shows a maize farmland incorporated with *Parkia biglobosa* tree.

Sampling technique and data collection

For this study, a 3 stage random sampling design was employed to select the farmers. Since local government areas (LGAs) represent an agricultural extension block of OYSADEP, the first stage involved random selection of all the eight (8) local government areas from Ibadan/Ibarapa zone. They are Lagelu, Ido, Akinyele, Egbeda, Ona Ara, Ibarapa North, Ibarapa Central and Ibarapa East LGAs. The second stage involved purposive selection of five (5) LGAs based on their extensive involvement in Agroforestry and Fadama activities in the LGA. They are Akinyele, Egbeda, Ona Ara, Ibarapa North and Ido LGAs as shown in figure 2. It was from these LGAs two hundred (200) farmers were systematically interviewed, representing forty (40) questionnaires per LGA. The distribution of the questionnaire to farmers was done during their fortnightly meetings with extension agents of the OYSADEP at their respective LGA.

Data analysis

All questionnaires were completed and retrieved on site because majority of the farmers had no formal education. Data obtained were analyzed using descriptive statistics that include the use of frequency distributions, means and percentages. Chi-square ($\chi 2$) was used to test for the presence of associations in the variables obtained. Also, one-way analysis of variance (ANOVA) was employed to test for the presence of significant difference in respondents' ages, family sizes, major occupations etc. Where significant differences occurred, means separation was carried out with Fisher's Least Significant Difference (LSD). Student t-test was used to verify the presence of significant differences between respondents' gender.

RESULTS AND DISCUSSION

In the table 1 above, the gender, marital status, age, family size, and educational level of the farmers were presented. It can be seen that in Akinyele, Ido, Ona-ara, Egbeda and Ibadan North LGAs 70%, 82.5%, 72.5%, 77.5% and 62.5% were male respectively, with a total percentage of 73% out of all the respondents, leaving only 27% of women out of the total respondents. The results of the t-test show a significant difference ($P<0.05$, $df = 4$) in gender distribution among the respondents. The proportion of males is significantly higher than that of females. The majority of respondents are married (69%) with only 6.5% being single, while divorcees and widows/widowers showed results of 11.5% and 13% respectively out of the total respondents. The chi square ($\chi 2$) and Analysis of variance (ANOVA) results confirmed that the exchange of

communication between the farmers and the researchers does not depend on marital status and age of farmers respectively in the study locations. The results of this study show that the percentage of men in the study locations was found to be significantly ($p<0.05$) higher than their female counterpart and the difference is highly significant. This is due to the fact that farming is one of the major occupations of the local habitant of this study area, and, in general is usually labour-intensive and requires a lot of energy. It is widely assumed to be, and so is usually regarded as a man's job. Women can only participate in activities that are less strenuous while men are working on the farm. However, this result is similar to the result of Onilude (2018).

The highest age category of the farmers was found in the age group 41 – 50 years (48.5%) whereas the least-represented age group was above 60 years with 4.5% of the total respondents. The highest proportion of respondents as regard family size has a family size of between 5 and 7 with a total percentage of 45% of the total respondents. As for education status, a total percentage of 40.5% have no formal education in the study locations, primary, secondary and tertiary educations were 32.5%, 19.5%, 7.5% respectively. The level of education will directly affect one's ability (farmers) to adapt to change and to accept new ideas and information. The $\chi 2$ test results (significant at P=0.05) revealed that the educational level of the respondents correlated highly with exchange of communication between the farmers and the researchers (table 1). The results of the one-way analysis of variance indicate the presence of significant differences ($p<0.05$) family size distribution (household size) of the respondents. This shows that there is a wide variation in distribution of farmers over different family sizes.

Most of the respondents were mature adults and were married with only 6.5% across locations were single. The highest percent of the total number of respondents are aged between 41 and 50 years, followed by 31 and 40 years. At this age ranges, people are most active and with large families are duty-bound to increase their level of income to be able to provide more for their household. Younger people, especially those younger than 30 years, are usually not found in rural areas. Their level of education notwithstanding, they normally migrate to urban centers such as Lagos, Abuja (Federal Capital Territory), Port Harcourt or Kano in search of a white-collar job. Some leave for urban centers to take part in politics. The absence of infrastructure and social amenities such as good roads, access to healthcare facilities, safe water, schools and electricity have made rural areas (where most these farms are located) less appealing for young people to stay and earn their living. Rural-urban migration has its peculiar problems. These problems include overpopulation, social vices, congestion and poor environmental conditions. It is very common to have a big family in Africa, especially Nigeria with an estimation of about 200 million population (Onilude, 2018). A large family is usually desirable in order to supply needed assistance to the family in terms of farm labour or any other work the household heads might assigned.

Across the study areas, 39% of the total farmers sampled in the study earned between N20,000 and N40,000 (Table 2). While 3% earned above N100,000. The class of those that earned above the N100,000 were engaged in farm mechanization. Also, result revealed that majority of the farmers monthly income is below the recently approved 30,000 naira minimum wage in Nigeria. This result is not unexpected since majority of the farmers are poor. it is also an indication that some of the farmers of the area do not meet up with the living standard and therefore could be considered as being poor. Though, insignificant number of farmers earn above the minimum wage. These are those that have the resources and financial muscle to invest in mechanization on their farm

Farmers were asked to mention how information were obtained and gathered. It was found that there were different ways through which information and knowledge flowed between the farmers and the research stations. Figure 3 showed the means by which researchers extend useful information to farmers about their research. It was revealed that 21% of the communication medium was through group discussion, 18% through television, 16% through forest extension programs while 14%, 12%, 9%, 6%, 4% were through radio jingles, Journal publication, conference seminars, newspaper and internet respectively. However, the highest medium was observed in group discussion, this was mostly done through the management of the Oyo State Agricultural Development Programme (OYSADEP) in the state and this was usually done fortnightly. Though, some of the farmers were pensioners who were able to read and write and as such newspapers and internet were useful in disseminating information to them.

In addition, in the effort to understand and find out if there was a feedback from farmers to the research stations showed that majority of the farmers (60.5%) do not always feed the station back on the what they observed on the field. About 21.5% of the sampled farmers do not at all respond back to research extension agents on the information given to them to use on their field. However, 15.5% of the farmers reacted that they do report and discussed with the researchers on the output from their farm activities (Fig. 4).

The result of the parameters estimates in chi-square test of statistics was presented in table 3. The chi-square test of statistics was conducted to test for association between farmers' demographic characteristics and exchange of communication

between the farmers and the researchers. The farmers' demographic characteristics was used as observed variables (e.g. gender, age, marital status, educational level, household size and income) while exchange of communications between the farmers and the researchers was used as expected variables.

All of the tested variables that linked knowledge exchange and communication to the socio-characteristics of the farmers had positive chi-square value. This indicated that all variables were positively linked to the exchange of communication. However, gender, household size, level of education and income variables were significant at 0.05 probability level ($P<0.05$, $\alpha_{0.05}$). The positive coefficient indicated that the variables have effects on the exchange of communication between the farmers and the researchers (Table 3) whereas age and marital status variables were not significant (Table 3). However, any increase in the value of such variables would lead to an increase in the level of exchange of communication between the farmers and the researchers and the better for the system. This was also reported by Okwu and Daudu, 2011 and Huyer, 2016.

CONCLUSION AND RECOMMENDATION

An effective exchange of information between the farmers and the researchers is very critical and important for improving agricultural productivity. Agricultural information sharing, exchange, transfer and dissemination are important processes to facilitate the flow of agricultural knowledge among farmers. For these processes to be effective, suitable communication channels should be made available to enhance the flow of agric. information from the source (researchers) to the recipient (Farmers). Some of the medium identified in the study included group discussion, newspapers, radio. The study is innovative as it revealed to the researchers how research findings are being explored among the users. It also showed different channels of communicating forest research results among the selected group of farmers in the study area.

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APPENDIX

Fig. 1: A maize farm incorporated with *Parkia biglobosa* tree in the study area

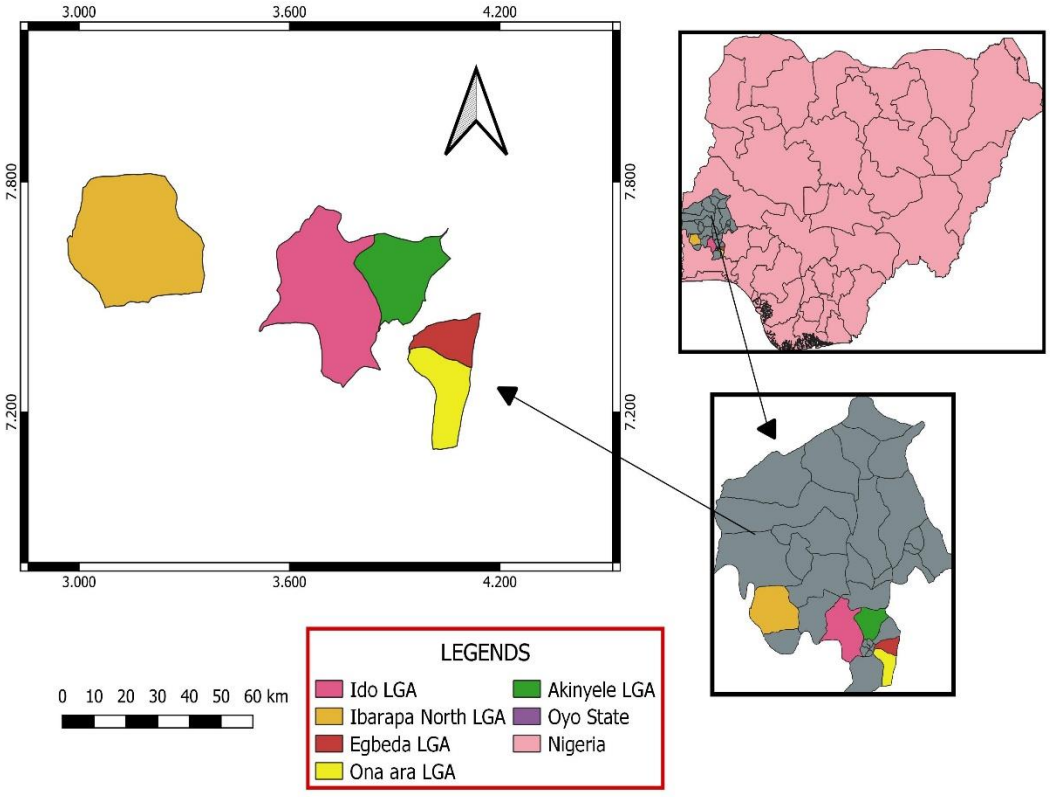

Figure 2: The map of the study area

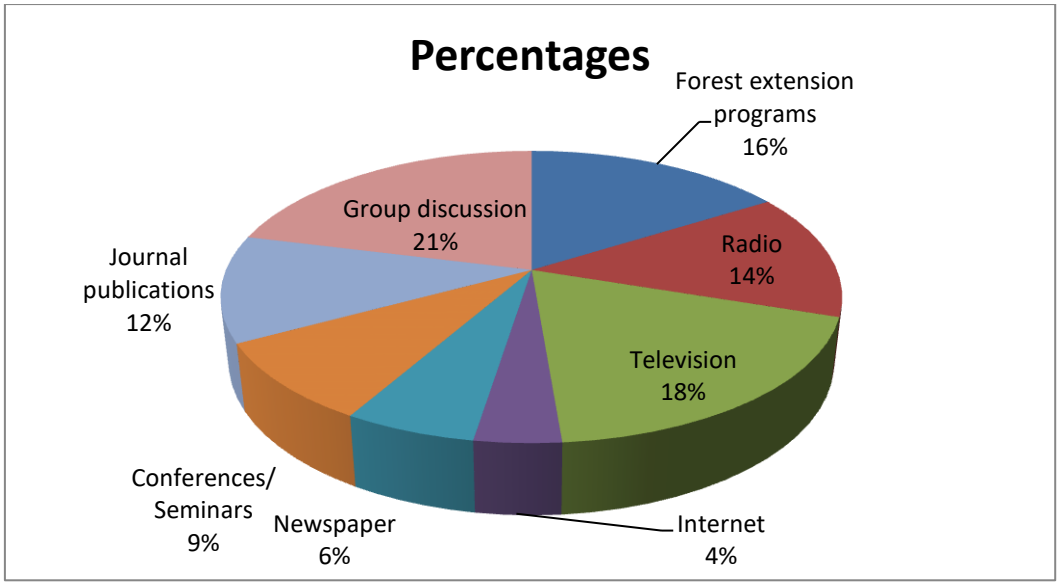

Figure 3: Medium of research communication among the farmers

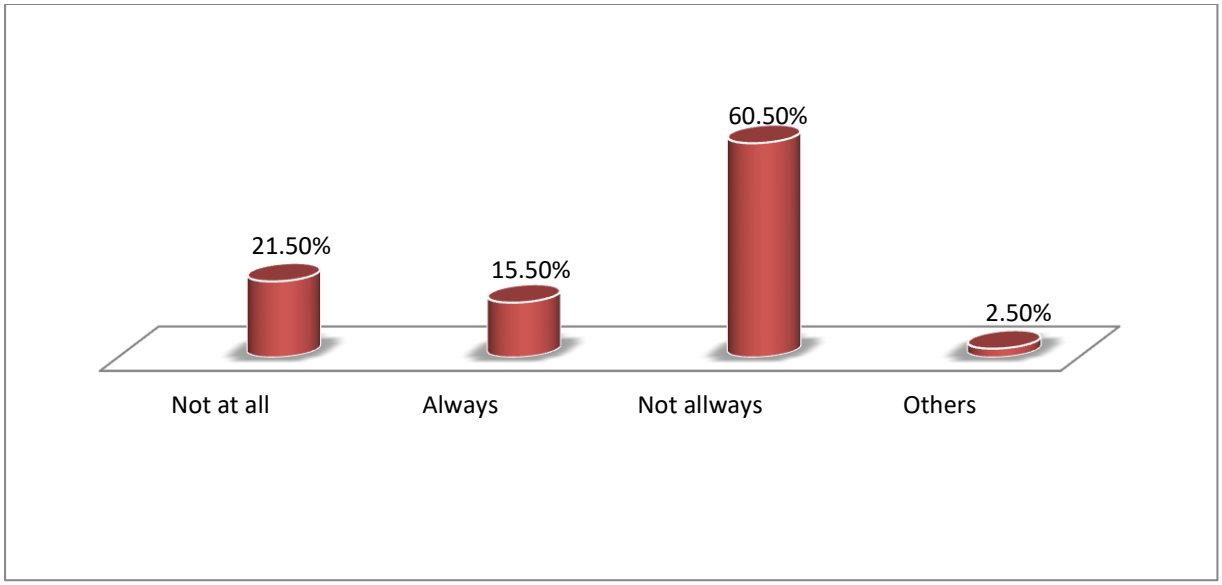

Figure 4: Feedbacks from the Farmers to the Researchers

Table 1: Demographic characteristics of the Respondents

VARIABLE	IBADAN/IBARAPA ZONE					
	Akinyele	**Ido**	**Ona-ara**	**Egbeda**	**Ibarapa North**	**Total**
Gender respondents						
Male	28 (70%)	33 (82.5%)	29 (72.5%)	31 (77.5%)	25 (62.5%)	**146 (73%)**
Female	12 (30%)	7 (17.5%)	11 (27.5%)	9 (22.5%)	15 (37.5%)	**54 (27%)**
t-test results	t-calculated = 12.24, t-tabulated = 2.78, P = 0.001, (P<0.05) *					
Marital status						
Married	26 (65%)	29 (72.5%)	22 (55%)	31 (77.5%)	30 (75%)	**138 (69%)**
Single	3 (7.5%)	2 (5%)	4 (10%)	1 (2.5%)	3 (7.5%)	**13 (6.5%)**
Divorced	6 (15%)	4 (10%)	7 (17.5%)	3 (7.5%)	3 (7.5%)	**23 (11.5%)**
widow	5 (12.5%)	5 (12.5%)	7 (17.5%)	5(12.5%)	4 (10%)	**26 (13%)**
X^2 results	$\chi 2$ calculated = 10.23, $\chi 2$ tabulated = 12.59, (P>0.05) **					
Age of respondents						
Less than 30 yrs	2 (5%)	4 (10%)	2 (5%)	5 (12.5%)	4 (10%)	**17 (8.5%)**
31 - 40	10 (25%)	12 (30%)	8 (20%)	8 (20%)	10 (25%)	**48 (24%)**
41 - 50	20 (50%)	17 (42.5%)	20 (50%)	18 (45%)	22 (55%)	**97 (48.5%)**
51 - 60	7 (17.5%)	5 (12.5%)	7 (17.5%)	6 (15%)	4 (10%)	**29 (14.5%)**
Above 60	1 (2.5%)	2 (5%)	3 (7.5%)	3 (7.5%)	0 (0%)	**9 (4.5%)**
ANOVA results	F- calculated = 5.61, F- tabulated = 16.26, (P<0.05) **					
Family size						
1 - 4	11 (27.5%)	12 (30%)	13 (32.5%)	9 (22.5%)	11 (27.5%)	**56 (28%)[a]**
5 - 7	17 (42.5%)	16 (40%)	18 (45%)	21 (52.5%)	18 (45%)	**90 (45%)[b]**
8- 10	9 (22.5%)	4 (10%)	2 (5%)	8 (20%)	9 (22.5%)	**32 (16%)[c]**
Above 10	3 (7.5%)	8 (20%)	7 (17.5%)	2 (5%)	2 (5%)	**22 (11%)[d]**
ANOVA results	F- calculated = 26.71, F- tabulated = 3.26, (P<0.05) *					
Educational status						
No formal Edu.	19 (47.5%)	17 (42.5%)	10 (25%)	14 (35%)	21 (52.5%)	**81 (40.5%)**
Primary Edu.	11 (27.5%)	15 (37.5%)	15 (37.5%)	15 (37.5%)	9 (22.5%)	**65 (32.5%)**
Secondary Edu.	8 (20%)	3 (7.5%)	11 (27.5%)	9 (22.5%)	8 (20%)	**39 (19.5%)**
Tertiary Edu.	2 (5%)	5 (12.5%)	4 (10%)	2 (5%)	2 (5%)	**15 (7.5%)**
X^2 result	$\chi 2$ calculated = 12.48, $\chi 2$ tabulated = 2.59, (P<0.05)*					

Note: *=significant; **=non-significant

Table 2: average monthly income of the respondents

Variables	**IBADAN/IBARAPA ZONE**					
Av.Mnt. Income	**Akinyele**	**Ido**	**Ona-ara**	**Egbeda**	**Ib. North**	**Total**
< 20,000	10 (25%)	5 (12.5%)	6 (15%)	8 (20%)	11 (27.5%)	40 (20%)
N20K -N40K	13 (32.5%)	18 (45%)	16 (40%)	14 (35%)	17 (42.5%)	78 (39%)
N40K – N60K	10 (25%)	8 (20%)	11 (27.5%)	8 (20%)	6 (15%)	43 (21.5%)
N60K – N80K	5 (12.5%)	4 (10%)	3 (7.5%)	4 (10%)	3 (7.5%)	19 (9.5%)
N80K – N100K	2 (5%)	3 (7.5%)	2 (5%)	5 (12.5%)	2 (5%)	14 (7%)
> N100,000	0 (0%)	2 (5%)	2 (5%)	1 (2.5%)	1(2.5%)	6 (3%)
TOTAL	**40**	**40**	**40**	**40**	**40**	**200**

Note: Av.Mnt. Income =Average Monthly Income; Ib. North= Ibarapa North

Table 3: Test of Statistics (Chi-Square)

Variables	Chi-square Value	Degree of freedom	Asymptotic Sig
Gender	48.210	1	0.000*
Age	106.100	4	0.123ns
Marital Status	178.000	3	0.213ns
Level of Education	51.439	4	0.000*
Household size	50.510	2	0.001*
Income	44.621	4	0.000*

*= significant, ns= not significant