ISSN:
Print - 2277 - 0755
Online - 2315 - 7453

Journal of Agricultural Science and Environment

SOCIO ECONOMIC FACTORS INFLUENCING FARMERS' KNOWLEDGE IN INTEGRATED AND NON - INTEGRATED FISH FARMING IN OGUN STATE, NIGERIA

ABIONA[1]*, B. G., FAKOYA[2], E. O., SODIYA[2], C. I., BOLARINWA[1], K. K. AROWOLO[3], K. AND IYANDA[3], I. F.

[1]Department of Agricultural Administration,
[2]Department of Agricultural Extension and Rural Development,
Federal University of Agriculture, P.M.B. 2240, Abeokuta, Ogun State. Postcode 110001. Nigeria.
[3]College of Fresh Water Fishery Technology, P. M. B. 1500, Niger State.
***Corresponding author**: dolace6ng@yahoo.com.

ABSTRACT

The study examined socio economic factors influencing farmer's knowledge of Integrated and Non – integrated fish farming in Ogun Sate, Nigeria. Multistage simple random sampling techniques was used to select 133 non - integrated fish farmers (NIFF) and 216 integrated fish farmers (IFF) making a total of n = 349. Data were analysed using chi-square, and Pearson Product Moment Correlation. Results showed that 92.5% of NIFF were males compared with 90.7% IFF. Also, 96.8% of IFF and 79.7% of NIFF were married. The mean ages of sampled farmers were 44 years (NIFF) and 46 years (IFF) while the mean fish farming experiences were 4 years (NIFF) and 5 years (IFF). Also, 41.2%of the respondents had moderate level of knowledge. knowledge of fish farming had significant association with respondents sex ($\chi^2 = 9.44$, df = 2, $p < 0.05$), marital status ($\chi^2 = 23.2$, df = 4, $p < 0.05$), occupation ($\chi^2 = 25.5$, df = 8, $p < 0.05$), mode of involvement ($\chi^2 = 17.1$, df = 2, $p < 0.05$), interaction with friend and relatives ($\chi^2 = 14.0$, df = 2, $p < 0.05$), radio/ television ($\chi^2 = 21.7$, df = 2, $p < 0.05$) and internet usage ($\chi^2 = 6.40$, df = 2, $p < 0.05$). Correlation analyses showed significant relationship between farmers knowledge and age ($r = 0.20$, $p < 0.05$), fish farming experience ($r = 0.17$, $p < 0.05$), level of cosmopoliteness ($r = 0.16$, $p < 0.05$), livestock population capacity ($r = 0.21$, $p < 0.05$), fish production capacity ($r = 0.36$, $p < 0.05$), area of land cultivated ($r = 0.55$, $p < 0.05$) and production constraints ($r = -0.00$, $p < 0.05$).

Keywords: Socio economic factors, knowledge, integrated and fish farming

INTRODUCTION

Agriculture is known for its multi-functionalities of providing employment, livelihood and ecological securities (Diver, 2006). The extent of these advantages is greatly determined by categories of farmers that are involved in production. Fish culture in combination with crops or livestock is a unique and lucrative venture which provides a higher farm income, makes available a cheap source of protein improves productivity on small land holdings and provides the supply of feed ingredients for farm livestock (Kerala Agricultural University, 2007). From the socio economic perspective, this system of farming augment farm income which serves as an instrument against any short coming or disaster. It also increase the standard of living among resource poor farmer in developing countries especially Africa. Despite the importance of integrated and non – integrated fish farming to the wellbeing of the farmers. Abiona, (2010) reported that small units of animal crops and

fish culture can remove some bottlenecks in agricultural production. However, in Ogun state most large scale farmers are into integration of fish cum poultry farming and it had been confirmed that fish and livestock produced by the farmers in the state were] inadequate to meet the local demand resulting into mass importation of fish, turkey/ chicken from other countries.

In view of the above, it is important to know the factors that influence farmers knowledge in integrated and non integrated fish farming in Ogun State, Nigeria.

Objectives of the study

Specifically this study was designed to:

1. describe the socio-economic characteristics of integrated and non - integrated fish farmers in Ogun State.
2. ascertain farmer's sources of information on non - integrated fish farming and integrated fish farming in the study area.
3. assess farmers' knowledge of fish farming technologies in the study area.

Hypotheses

HO1: There is no significant relationship between socio economic characteristics of the respondents and their knowledge of fish farming.

HO_2: There is no significant association between farmers' sources of information and their knowledge of fish farming.

MATERIALS AND METHODS

The study was conducted in Ogun State, Nigeria It lies within latitudes 7°01N and 7°18N and longitudes 2°45E and 5°55E (Oyesiku, 1992). The State is situated within the tropics covering 16,409.29 square kilometres with a population of about 4,054,272 (National Population Commission 2006). The State has twenty (20) Local Government Areas (LGAs). It is divided into four (4) major Agricultural Zones (Abeokuta, Ijebu-ode, Ilaro and Ikenne) for ease of extension administration by Ogun State Agricultural Development Programme (OGADEP) which is the agency responsible for agricultural extension activities in the State.

The study area has a bimodal rainfall pattern which reaches its peak in July and September (Aderibigbe, 1994) multistage random sampling (SRS) technique was used in this study. At the first stage involved selection of all Ogun State Agricultural Development Programme (ADP) operational zones (Abeokuta, Ilaro, Ijebu-ode and Ikenne). Fifty per cent (50%) of the blocks were selected which is equivalent to two (Ikenne and Ilaro zones) and three (Abeokuta and Ijebu-Ode zone) blocks respectively from each of the zone. Furthermore, sixty percent (60%) of the cells in each of the selected blocks were also selected which amounted to 13, 9, 9 and 8 making a total of 39 extension cells. Thereafter, 56% of registered fish farmers were selected from the chosen cells. Thus 349 respondents were interviewed for the study. Primary data were collected from the respondents using a well structured interview guide. Descriptive and inferential statistical tools such as Chi-square and Pearson Product Moment Correlation were used in analysing the data.

Measurement of variables

Age: The actual age of the respondents was obtained in years.

Sex: Respondents indicated whether they are male = 1 female = 2. Frequency counts and percentages were then used to interpret the data generated.

Educational attainment: Respondents indicated their level of educational attainment from the list of eight options provided as:

a) No formal education, b) Primary,
c) JSS/Modern III, d) Secondary
e) Technical/Grade II, f) OND/NCE,
g) HND/B.Sc., h) Postgraduates

Marital status: Respondents were categorized into married (1), single (2) and others (3).

Religion: Respondents were asked to indicate their religious affiliation from listed options. The various religious practices provided in the list were:

a) Christianity, b) Islam,
c) Others

Main occupation: Respondents were asked to indicate their main occupation.

Mode of involvement in fish farming: This was measured by asking the respondents to indicate whether they are full time (1) part time (2)

Number of years of involvement in fish farming: Respondents were asked to state the number of years they have been involved in fish farming and this was measured at interval level.

Nativity: This was measured as native (1) and non native (2)

Cosmopoliteness: This has to do with information on respondent's visits to other communities/cities with the following options:

a) Ever visited: Yes =1; No =2,
b) Durations after last visits (months)
c) Total number of visits in the last one year,
d) Average number of days spent per visit

Sources of information: This was measured by asking the respondents the sources of their knowledge in integrated and non - integrated fish farming.

Knowledge of fish farming: This was measured using 19 adoptable technologies. The extent of knowledge was measured using 4 point rating scale of "Very well" which attracted 3points, "fairly well" 2points, "have ideas" 1 point and not at all zero point. This gave a maximum score of 57 and minimum score of 19points and this was used to categorise farmers' knowledge into different levels.

Integrated fish farming: This was operationalized based on the respondents who combined fish farming with other agricultural farming such as livestock and crop production.

Non -integrated fish farming: this was based solely on farmers who culture fish farming only.

Data analysis

The generated data for the study were analysed using frequency counts, percentages, chi square and Pearson product moment Correlation

RESULTS AND DISCUSSION

Table 1 shows the mean age of the respondents between the two categories of fish farming (Non - integrated fish farming and integrated fish farming) to be 44, and 46 years, indicating that majority of the respondents were within the economically active age category (FAO, 1997; Yunusa, 1999). In support of this result, Fakoya and Daramola (2005) observed that respondents within this

age bracket are more innovative, motivated and adaptable individuals who can with wisdom cope with farming challenges. Respondents in the age bracket 40 – 50 years were more involved in integrated fish farming (38.0 %) while non - integrated fish farming (NIFF) recorded 36.1 %. The percentage range between the two categories under study is a pointer to the fact that much commitment either in terms of finances or experience is needed to cope with farm operations especially with integrated fish farming (IFF) with multiple enterprises which recorded the highest value (38.0 %). The age bracket 30-40 years is another important age category with strength for mobility to tackle some of the tasks on the farm. In this age bracket, integrated fish farmers (IFF) dominated with 27.8% compared to non - integrated fish farmers (NIFF) (19.5 %). It could be recalled that, the above age category are youths who have the capacity to explore and withstand farm stress. However, this may be one of the reasons why those who are into integrated fish farming dominated this age category. Financial requirements of the farm operations in all categories may also be the reason for lower values recorded for other age groups (< 30, 30-40, 50-60 and >60 years) as compared to age 40-50 group.

Sex is an important factor to consider in farming activities or any other energy demanding exercise. Out of all the respondents sampled, 91.4 % (IFF and NIFF) were males while 8.6 % were females. This result can be justified by the assertion of Brummett *et al*. (2010) that fisheries activities are mostly dominated by men. However, the observation is contrary to the report of Worby (2001) who reported that women are often motivated than men to adopt new technologies that provide nutritional benefits such as fish culture. Based on the technologies involved which may be energy demanding, farming occupation is largely controlled by men and this may be due to the general belief that men are more energetic than women. The finding can be further supported by the assertion of Ekong (2003) that women play minimal roles in farming among Yorubas.

Considering the educational level of sampled farmers in the study area, it was revealed that majority (83.1 %) of the respondents had secondary and tertiary education. For the purpose of comparison, majority of integrated fish farmers had secondary school certificate (47.7 %) compared to non - integrated fish farmers (38.3%). For the category of farmers that had tertiary certificate, non - integrated fish farmers had higher percentage (47.4 %) compared to integrated fish farmers (33.5 %). The high level of education recorded in this study might be due to the metropolitan nature of the study area and its implication is that the respondents according to Olagunju *et al*. (2007) may be very receptive to new innovations. This result shows that at least more than half of the respondents had the capacity to access innovation within a short period of time based on their level of education.

Table 1 also shows that 96.8 % of integrated fish farmers were married compared to 79.7 % of non - integrated fish farmers. This finding agrees with those of Ekong (2003), Fakoya (2000) and Oladoja *et al.* (2008) who asserted that marriage confers some level of responsibility and commitment on individuals who are married. Comparing the occupational status of the respondents, majority (58.3 %) of IFF engaged more in farming activities compared to NIFF (46.6 %). It was also found out that 60.7 % of IFF were full

time farmers compared to NIFF (46.6 %), The study further confirmed that respondents in this category have much engagement with several farm enterprises which take most of their time unless they delegate their responsibility to do other farm activities/enterprises.

Experience played prominent role in any farming enterprise. From the findings of this study, 77.4 % of non integrated fish farmers had 1-5 years experience compared to their counterparts with 60.2 % (integrated fish farmers) This implies that this aspect of farming is still very new compared to other farming practices like mixed farming or rotational farming which had been in existence for over 100 years . As a result, there is need for more subject matter specialists in this area of farming to assist rapid dissemination of information to practicing and intending farmers in the nearest future. Also 67.9 % were Christians while 32.1 % practiced Islamic religion. This result further showed the dichotomy in religious spread across Nigeria, thus supporting the fact that the northern part of the country is predominantly Muslim while the southern part has relatively more Christians (World Health Organisation, 2001). Based on the nativity of the respondents, it was also revealed that, majority (87.1%) were natives of Ogun State while 12.9 % were non-natives. This observation may be attributed to the geographical and occupational distributions as well as infrastructural provision of the respondents' household which favour these two types of farming (Fapojuwo, 2007).

Technologies used

Table 2 presents sampled respondents as regard technologies used in integrated and Non - integrated fish farming. The technologies range from pond selection to adding value to harvested fish by processing. 99.1 % of integrated fish farmers identified pond site selection as one of the key technologies used in integrated fish farming while non - integrated farmers also supported it (95.5 %). Similarly, 99.5 % of integrated fish farmers identified pond construction as another technology used in integrated fish farming, which was also supported by non - integrated fish farming (99.2 %). Another technology identified was application of lime and fertilizer by which 100 percent of both integrated and non - integrated fish farmers featured significantly.

Furthermore, considering feed formulation as another key technology used, 100 percent of non - integrated fish farmers were aware of this technology as compared to 99.1 % of integrated fish farmers. Another technology identified was artificial production of fingerling. This technology identified by 95.4 % of integrated fish farmers compared to 93.2 % of non - integrated fish farmers. Also, 80.1% of integrated fish farmers identified production of maggot from livestock waste as another technology in integrated fish farming system while 54.1 % of non - integrated fish farmers also did.

Based on this, 95.8 % of integrated fish farmers were aware of this technology as against 84.2 % recorded for non - integrated fish farmers. It is worthy of note that majority of the respondents were aware of this technology. Water could serve as a problem to some farmers especially during dry season. The study explored further on the use of pond water for crop irrigation. It was discovered that 96.8 % of integrated fish farmers were aware of this technology compared to non - integrated fish farmers (80.5 %). Also, the technology that involved the production

Table 1: Distribution of respondents by their socio economic characteristics

Variables	Non integrated fish farmers n=133		Integrated fish farmers n = 216		Total response n = 349	
Age(years)	Freq	%	Freq	%	Freq	%
Below 30 years	15	11.3	4	1.9	19	5.4
30 - <40	26	19.5	60	27.8	86	24.6
40 - <50	48	36.1	82	38.0	130	37.2
50 - <60	32	24.1	52	24.1	84	24.1
60 and above	12	9.0	18	8.3	30	8.6
Mean age	44		46			
Sex						
Male	123	92.5	196	90.7	319	91.4
Female	10	7.5	20	9.2	30	8.6
Educational status						
No formal education	4	3.0	12	5.6	16	4.6
Primary education	15	11.3	28	13.0	43	12.3
Secondary education	51	38.3	103	47.7	154	44.1
Tertiary education	63	47.4	73	33.8	136	39.0
Marital status						
Single	16	12.0	4	1.9	20	5.7
Married	106	79.7	209	96.8	315	90.3
Others	11	8.3	3	1.4	14	4.0
Occupation						
Artsianship and craft	15	11.3	9	4.2	24	6.9
Farming	62	46.6	126	58.3	188	53.9
Paid employment	29	26.4	57	21.8	86	24.6
Trading	12	9.0	20	9.3	32	9.2
Others	15	11.3	4	1.9	19	5.4
Mode of involvement						
Full time	62	46.6	128	59.3	190	54.4
Part time	71	53.4	88	40.7	159	45.6
Fish farming experience (years)						
1 -5	103	77.4	130	60.2	233	66.8
6 – 10	20	15.0	62	28.7	82	23.5
Above 10	10	7.5	24	11.1	34	9.7
Religion						
Christianity	92	69.2	145	67.1	237	67.9
Islam	41	30.8	71	32.9	112	32.1
Nativity						
Native	114	85.7	190	88.0	304	87.1
Non native	19	14.3	36	12.0	45	12.9

Source: Field survey, 2009

of fish meal from fish waste was also explored and 94.4% of the integrated fish farmers were aware of this technology, compared to non - integrated fish farmers with 81.2 %. Apart from the aforementioned technologies, processing of poultry dropping into manure was identified and 96.8 % of integrated fish farmers were aware of this technology as compared to 93.2% of non - integrated fish farmers. Other technologies identified among the respondents were fish feed production, pelleting and adding value to harvested fish by processing.

Sound understanding and effective manipulation strategy of these identified technologies can reduce the overall average cost of fish at the end of a cropping season. Haryana (2006) asserted that culture technologies and economics of production are key factors in fish farming.

Table 2: Distribution of respondents by various technologies in integrated and Non – integrated fish farming (n = 349)

Variables	Non-Integrated		Integrated		Total response	
Technologies	Yes	No	Yes	No	Yes	No
Pond site selection	127(95.5)	6(4.5)	214(99.1)	2(.09)	341(97.7)	8(2.3)
Pond construction	132(99.2)	1(0.8)	215(99.5)	1(0.5)	347(99.4)	2(0.6)
Application of lime	132(99.2)	1(0.8)	216(100.0)	0(0.00)	348(99.7)	1(0.3)
Fertilizer application	131(98.5)	2(1.5)	216(100.0)	0(0.00)	347(99.4)	2(0.6)
Fish pond netting to control predators	132(99.2)	1(0.8)	214(99.1)	2(0.9)	346(99.1)	3(0.9)
Fish feed formulation	133(100.0)	0(0.00)	214(99.1)	2(0.9)	347(99.4)	2(0.6)
Test and control of acidity of pond water	131(98.5)	2(1.5)	214(99.1)	2(0.9)	345(98.9)	4(1.1)
Test and control of pond water fertility	132(99.2)	1(0.8)	214(99.1)	2(0.9)	346(99.1)	3(0.9)
Test and control of oxygen level in pond water	128(96.2)	5(3.8)	216(100.0)	0(0.00)	344(98.6)	5(1.4)
Artificial production of fingerling	124(93.2)	9(6.8)	206(95.4)	10(4.6)	330(94.6)	19(5.4)
Production of maggot from livestock waste	72(54.1)	61(45.9)	173(80.1)	43(19.9)	245(70.2)	104 (29.8
Harvesting of insect to feed fish	23(17.3)	110(82.7)	61(28.2)	155 (71.8)	84(24.1)	265 (75.9)

Table 2: (cont.) Distribution of respondents by various technologies in integrated fish farming (n = 349)

Variables	Non integrated		Integrated		Total response	
Technologies	**Yes**	**No**	**Yes**	**No**	**Yes**	**No**
Uses of pond water to irrigate	107(80.5)	26(19.5)	209(96.8)	7(3.2)	316(90.5)	33(9.5)
Uses of pond silt for cultivation	128(96.2)	5(3.8)	216(100.0)	0(0.00)	344(98.6)	5(1.4)
Production of fish meal from fish waste	108(81.2)	25(18.8)	204(94.4)	12(5.6)	312(89.4)	37(10.6)
Processing of poultry dropping into manure	124(93.2)	9(6.8)	209(96.8)	7(3.2)	333(95.4)	16(4.6)
Fish feed production and pelleting	128(96.2)	5(3.8)	208(96.3)	8(3.7)	336(96.3)	13(3.7)
Post harvest preservation and storage	31(23.3)	102(76.7)	40(18.5)	176(81.5)	71(20.3)	278(79.7)
Adding value to harvested fish by processing	65(48.9)	68(51.1)	89(41.2)	127(58.8)	154(44.1)	195(55.9)

Source: Field survey, 2009

Sources of information

Table 3 identified various sources of information available to respondents in the study area. Result of the analysis shows that, 96.3 % of integrated fish farmers, and 90.2 % of non - integrated fish farmers used this source. This finding corroborates the assertion of Nwabude (1995), who said that farmers mainly source for information from fellow farmers and neighbours.. This was closely followed by extension agents as information source. It is worthy of note that integrated fish farmers identified better with this source (91.2%) compared to non - integrated fish farmers (72.2%).

Another source which featured significantly is radio and television programmes. It could be recalled from Table 3 that integrated fish farmers (84.3 %) had the highest percentages as against non - integrated fish farmers which accounted for 60.2%. This finding is in agreement with the report of Ajayi (2003) who pointed it out that the use of radio was the most popular among farmers in South West Nigeria.

Test of hypotheses

Relationship between socio-economic characteristics of respondents and knowledge of fish farming" was tested with the used of chi -square (χ^2) and PPMC. Table 4 shows that, there was a significant relationship between knowledge of the farmers (integrated and non -integrated fish farming) and age ($r = 0.20$, $p<0.02$) and fish farming experience ($r = 0.17$, $p < 0.00$). This result is in agreement with the report of Adeniji (2005) who reported a similar significant relationship between age and knowledge among farmers. The implication of this result is that, the prominent age category of the respondents

between the two different types of farming categories may be responsible for the trend of this result. In other words, as age of the respondents increases, their knowledge in fish farming also increases which further shows their interest in fish farming. Furthermore, there was significant relationship between knowledge and cosmopoliteness, ($r = -0.16$, $p<0.01$).

Table3: Respondents sources of information used on integrated fish farming (n = 349)

Variables	Non integrated fish farming		Integrated fish farming		Total response	
Sources of information	Freq	%	Freq	%	Freq	%
Formal training in school						
Yes	25	18.8	35	16.2	60	17.2
No	108	81.2	181	83.8	289	82.8
Short courses, seminars and workshops						
Yes	87	65.4	164	75.9	251	71.9
No	46	34.6	52	24.1	98	28.1
Extension agent						
Yes	96	72.2	197	91.2	293	84.0
No	37	27.8	19	8.8	56	16.0
Interaction with friends and relatives						
Yes	120	90.2	208	96.3	328	94.0
No	13	9.8	8	3.7	21	6.0
Apprenticeship/work experience on other farms						
Yes	23	17.3	21	9.7	44	12.6
No	110	82.7	195	90.3	305	87.4
Radio/TV programme						
Yes	80	60.2	182	84.3	262	75.1
No	53	39.8	34	15.7	87	24.9
Internet						
Yes	16	12.0	28	13.0	44	12.6
No	117	88.0	188	87.0	305	87.4
Newspaper, magazine and fliers						
Yes	23	17.3	38	17.6	61	17.5
No	110	82.7	178	82.4	288	82.5

Source: Field survey, 2009

Table 4: Correlation analysis of the respondents socio-economic characteristics and their knowledge of integrated fish farming

Variable	r-value	p-value	Decision
Age	0.20	0.00	S
Fish farming experience	0.17	0.00	S
Level of cosmopoliteness	0.16	0.01	S

Source: Field survey, 2009
Note: S = Significant at 0.05 level
NS = Not Significant at 0.05 level

Table 5: Chi –square analysis of respondents socio economic characteristics and their knowledge of integrated fish farming.

Variables	$\chi 2$	Df	CC	Decision
Sex	9.44	2	0.00	S
Educational status	10.79	6	0.09	NS
Marital status	23.2	4	0.00	S
Occupation	25.5	8	0.01	S
Mode of involvement	17.1	2	0.00	S
Religion	1.20	2	0.54	NS
Nativity	2.51	2	0.28	Ns
Extent of group participation	12.5	4	0.01	S

Source: Field survey, 2009
Note: S = Significant at 0.05 level
NS = Not Significant at 0.05 level

Table 5 also shows the result of chi-square analysis between framers knowledge and some socio-economic variables measured at nominal level. Significant association was found between knowledge of fish farming and marital status ($\chi^2 = 23.2$, $p < 0.05$), occupation ($\chi^2 = 25.5$, $p < 0.05$), mode of involvement ($\chi^2 = 17.1$, $p < 0.05$) land acquisition ($\chi^2 = 26.4$, $p < 0.05$)) and extent of group participation ($\chi^2 = 12.5$, $p < 0.05$), while no significant relationship was recorded between educational level ($\chi^2 = 10.79$, $p > 0.05$), religion ($\chi^2 = 1.20$, $p > 0.05$), nativity ($\chi^2 = 2.51$, $p > 0.05$) and knowledge of fish farming.

The significant relationship observed between farmer's educational status and their knowledge of integrated fish farming is a clear attestation to the fact that education is important to the success of any innovation. This finding is supported by assertion of Islam and Dewan (1987), that education is an important factor in changing attitude, adoption of new technologies and ability of the respondents to handle different technologies.

ACKNOWLEDGEMENTS

The corresponding author appreciates the support of the Science and Technology Education Post Basic (Step-B) Project for their financial support during the conduct of this research work.

CONCLUSION AND RECOMMENDATIONS

From the study, education played a prominent role in the adoption of integrated fish farming, that is, farmers with higher level of education were able to integrate more enterprises with fish farming compared to their counterparts with lower education. The age of most of the farmers was equally within the economically active age. In this study, result obtained from gender was so sensitive that males dominated compared to their female counterpart. The study therefore recommends as follows:

1. This system of farming must be gender sensitive in such a way that will favor women.
2. Group networking must be intensifying among the respondents and this will serve as avenue for getting loan from private sectors.
3. Programmes should be developed to aid farmers who are willing to practice integration with increase access to extension services and training at local levels.
4. Fish culture should be incorporated in the informal education system of extension service delivery with a view to educating the farmers on potential role of fish culture for agricultural production and serving as income generating activities.

REFERENCES

Abiona, B. G. 2010. Comparative analysis of Integrated and Non- Integrated fish farming in Ogun State, Nigeria. Ph.D. Thesis Department of Agricultural Extension and Rural Development, University of Agriculture, Abeokuta. Ogun State, Nigeria.

Adeniji, G. B. 2005. Training Need of Extension Agents in Agricultural Development Programmes of selected states of South Western Nigeria. *Journal of Agricultural Extension*. 9: 31 – 37.

Aderibigbe, A. F. O. 1994. An assessment of the linkage between extension services of OGADEP and inputs supply system. B. Agric. Project Report, Department of Agricultural Extension and Rural Development, University of Agriculture, Abeokuta, Nigeria.

Ashley, C., Carney. D. 1999. *Sustainable Livelihoods: Lessons From Early Experience.* London: Department for International Development.

Brummett, R. E., Youaleu, J. L. N., Tiani, A. M., Kenmegne. 2010. Women's traditional fishery and alternative aquatic resource livelihood strategies in the Southern Cameroonian Rainforest. *Fisheries Management and Ecology* 17: 221–230

Diver Steve, 2006. Aquaponics-Integration of Hydroponics with Aquaculture, ATTRA Publication #1P163.

Ekong, E. E. 2003. An Introduction to Rural Sociology (2nd ed.) Dove Educational Publishers, Uyo, Nigeria. P. 167.

Ellis, F. 1999. "Rural Livelihood Diversity in Developing Countries: Evidence and Policy.

Fakoya, E. O. 2000. Farmers Use of Sustainable Land Management Practices in

Ondo State, Nigeria. Ph.D. Thesis, Department of Agricultural Extension and Rural Development, University of Ibadan. P. 160.

Fakoya, E. O., Daramola, B. G. 2005. Socio Economic Factors Influencing Farmers Participation In Integrated Fish Farming. Published *Rural Sociology Journal*. P. 2.

FAO, 1997. Review of the state of World Aquaculture. FAO Fisheries Cir. 886 (Rev.1)

Fapojuwo, O. E. 2007. Cassava processing techniques and household food security of women processing in Ogun State, Nigeria. Ph.D. Thesis , Department of Agricultural Extension and Rural Development, University of Ibadan, Pp. 111 – 175.

Islam, M. S., Uddin, M. E., Rashid, M. U. 2007. Use of Knowledge System in the Rural Community in Improving Livelihood Status of the Farmers under RDRS. *Journal of Agriculture and Rural Dev.elopment5(1&2), 167-17.*

KAU (Kerala Agricultural University), 2007. Integrated fish farming. A project of the Department of Agriculture, Government of Karela. IITM, India. www.integrated info.htm.

National Population Commission (NPC) 2006: www.onlinenigeria.com Accessed on 4th February 2009.

Oladoja, M. A., Adedoyin, S. E., Adeokun, O. A., 2008. Training needs of fisherfolks on fishing technologies. *Journal of Food Agriculture and Environment Science and Technology*. 6: (1) . WFL publisher, Helsinki, Finland www.world-food.net

Olagunju, F. I., Adesiyan, I. O., Ezekiel, A. A. 2007. Economic viability of cat fish production in Oyo – State. *Nigeria Journal of Human Ecology* 21 (2): 121-124.

Oyesiku, O. O. 1992. *Ogun State in maps*. Rex Charles Publication.

Rodda, A. 1993. *Women and Environment* forum Enterprises, Kuala Lumpur. P.24

Toulmin, C. R., Leonard, K. Brock, N. Coulibaly, G. Carswell, D. Dea. 2000. "Diversification of Livelihoods: Evidence from Mali and Ethiopia." Research Report 47, University of Sussex, Institute of Development Studies, Brighton, U.K.

Tuleum, C. D. 1992. The utilization of heat treated poultry manure in chicks diets. *Paper presented at the 17th annual conference of the Nig. Society for Animal Production. Abuja 23 – 27 March, 1992*. Pp. 8.

Worby, E. 2001. Socio-cultural considerations when introducing a new integrated agriculture-aquaculture technology. In: FAO Fisheries Technical Paper. FAO, Rome. Pp. 3-8

World Health Organisation 2001. WHO Country Cooperation Strategy: Federal Republic of Nigeria (2002 - 2007).WHO Regional office for Africa, Brazzaville.

Yunusa, M. B 1999. Not farms alone: study of rural livelihood in the middle belt of Nigeria. DAREASC Working Paper 38.

(Manuscript received: 2nd January, 2013; accepted: 16th December, 2013).