



Assessment of Extension Service Delivery on Improved Fishing Technologies among Artisanal Fishermen in Baga Area of Lake Basin, Nigeria

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ABSTRACT

The study assessed the extension service delivery on improving artisanal fishing technologies among artisanal fishermen in the Baga Area of Lake Chad, Nigeria. Data were obtained from 210 fishermen using multi-stage sampling techniques through the structured interview schedule. Data were analysed with the use of descriptive statistics such as frequency, percentages and means. The results of the socioeconomic characteristics revealed that majority (78.1%) of the respondents' age were between 31 and 50 years, which indicated that economically active respondents were involved in artisanal fishing in the study area. The result, however, showed that the majority (63.8%) of the respondents had low levels of education, who could not have access credit (67.1%), with 11 and above years of fishing experience (66.7%). The Adopted Village Programme of the Agricultural Research Council of Nigeria through the Federal College of Freshwater Fisheries Technology Baga was acknowledged as the source of extension service to all (100%) the respondents. The study indicated that improved fishing technologies were available in the study area. However, not all the improved fishing technologies were adopted by the respondents. The result revealed constraints of high cost (87.6%), lack of capital (85.7%), lack of infrastructures (82.9%), lack of government incentives (70%) and fear and anxiety due to insurgency (46.2%). Based on the findings, recommendations made include the need to design a special programme through the adopted villages programme to enable the fishermen link up with Nigerian Agricultural Cooperative and Rural Development Bank. This could ensure timely accessibility of credit facilities for improved adoption of the fishing technologies in the study area.

Key words: Artisanal, Baga Area, Extension service delivery, Fishing technologies, Lake Chad

INTRODUCTION

Fish play an important role in improving the nutrition of millions of people in the world. Not only are they a source of protein, but they also provide vitamins, minerals, fatty acids and other micronutrients essential to a healthy diet (Ovi and Raji, 2006). Fish from inland waters can be extremely important to local food security as compared with other sources of animal protein. It was estimated that more than 56 million people were directly involved in inland fisheries in the developing world in 2009 (Ayotunde and Oniah, 2012).

Fisheries are crucial to the Nigerian economy, contributing 5.4% of the Gross Domestic Product in 2002 (Federal Department of Fisheries (FDF), 2005). Fish is the commonest and cheapest source of protein for the teeming Nigeria's poor estimated to be between 65-70% of the entire population (Ovie and Raji, 2006). Nigeria has fish demand of 1.5 million metric tons and a per capital consumption of 7.5-8.5kg annually (FDF, 2005). The FDF added that current national production stands at 511,000 metric tons per annum, thereby, producing a demand-supply gap of about a million metric tons. The poorly equipped artisanal fishermen (inland and coastal) have consistently produced about 85% of the nation's total domestic supply (460,000 Mt.) (FDF, 2005). Out of this, coastal accounts for about 260,000 Mt, while, inland waters contribute about 200,000 Mt. with remaining 511,000mt annual production comes from industrial fisheries.

Lake Chad is inland water rich in fish biodiversity and it is an active fishing site for fishermen in Nigeria (Agbelege, 2007; Ahmed, 2013). The Lake Chad fisheries have been described as one of the most productive inland water fisheries in the World with an annual production figure of about 100,000 t in

“normal state” and it provides employment to over 200,000 people (Agbelege, 2007). The main type of fisheries practiced in the Lake Chad Basin is the artisanal fisheries. Artisanal fishery is the harvesting of fish from rivers, streams, lakes and ponds by small scale fishermen using both traditional and modern fishing gears. It is the most important of fishery production in Nigeria and accounts for over 90% of her fishery production (Ogunbadejo *et al.*, 2007).

According to Adefila (2012), funding in artisanal fish production is one of the major constraints in Nigeria. The rise of fishing technologies with other constraining factors in artisanal fishing has made an initiative worthwhile to fishers. Goswami *et al.* (2010) defined technology as the systematic application of scientific and other organized knowledge to practical purposes and it include new ideas, inventions, innovations, techniques, methods and materials. He further stated that fishing technologies, therefore include all the materials, techniques, practices and innovations used to maximize fish production.

Artisanal Fisheries have activities that are challenged by several factors despite its high potentials to improve the living standard of the communities. Most of the studies (Adeokun *et al.*, 2006; Inoni *et al.*, 2007; Sule *et al.*, 2009) conducted on the adoption of fishing technology, did not focus on the artisanal fishing, thus leaving a research gap to be filled. Therefore, an empirical study that assesses the extension service delivery of improved artisanal fishing technologies is a necessary step in filling this gap in a bid to improve artisanal fisheries. The specific objectives were to:

- i. identify the sources of information of the artisanal fishermen in the study area;
- ii. identify the extension agencies available in the study area;
- iii. examine the extension approaches used by the agencies in the study area;
- iv. identify the fishing technologies available to the artisanal fishermen;
- v. ascertain the effects of extension services in the study area; and
- vi. identify the constraints in acquiring improved fishing technologies by the artisanal fishermen.

MATERIALS AND METHODS

The study area

The study location was the fishing communities in Baga area of Lake Chad, Nigeria. These include Baga, Doro, Dumba and Kwata- Yobe. It is located in the semi- arid plain between latitudes 12° 18' – 13° 48' N and longitudes 13° 18' – 14° 48' East of the G.M.T. (Sule *et al.*, 2009). The study area has a population of about 56,130 (National Population Commission, 2006). The ethnic groups include: Kanuri, Buduma, Hausa, Kanembu, Kotoko, Kuri, Fulani and Manga (Chad Basin Wikipedia free encyclopaedia, 2014). Fishing is their major occupation consisting of fisheries activities including processing, preservation, transportation and marketing. Other economic activities are farming, cattle herding and trading.

Sampling procedure

Multi-stage sampling technique was employed for selecting the respondents. At the first stage, Agricultural Research Council of Nigeria (ARC/N) adopted villages (Baga, Doro, Dumba, Monguno, Kwata Yobe and Sabon Daba) for programmes on fisheries in Baga area of Lake Chad was selected. At the second stage, four adopted villages as a result of predominantly large numbers of fishermen were purposively selected. An adopted villages list of the registered fishermen's groups obtained from the Federal College of Freshwater Fisheries Technology (FCFFT) office in Baga forms the sampling frame for the study. The third stage involved random selection of 20 percent of the respondents from each group of fishermen from the various communities as indicated in Table 1.

Data for this study were obtained from both primary and secondary sources. The primary data were obtained through the structured interview schedules that elicited information from the respondents. Secondary information was obtained from journal papers, past projects, textbooks, records of FCFFT

Baga ARC and other agencies. The analytical technique used in this study was descriptive statistics such as percentages and frequency distribution to analyse the specific objectives.

Table 1: List of selected adopted villages and sample size selected for the study

Name of Adopted Villages	Membership strength	Sample size (20%)
Baga	200	40
Doro	250	50
Dumba	300	60
Kwata Yobe	300	60
Total	1,050	210

Source: Field survey data, 2015, Sources of Data and Analytical Technique

RESULTS AND DISCUSSION

Sources of information of the fishermen

The fishermen's sources of information on fishing technologies in artisanal fisheries were presented in Table 2. The study revealed FCFFT Baga (100%), implying that the adopted village programme of the Agricultural Research Council of Nigeria (ARC) using West Africa Agricultural Productivity Programme (WAAPP) -Nigeria was proactive and gets across the fishermen. Borno State Fisheries ADPs had majority (91.4%). This implies that, extension services had spread to rural areas and that extension services in most part of the country solely rest on ADPs which operates the Training and Visit (T&V) system to reach rural small scale farmers. Relatives and friends (50%), Radio (41.9%), United Nation's Development Programme (UNDP) artisanal fisheries (33.3%), Cooperative Union and Non-Governmental organizations (26.7%) each. Federal Ministry of Agriculture (21.4%); while 14.3% received their contact through television, implying that the use of Television as source of information was not encouraged in the study area.

Table 2: Sources of information available to the respondents in the study area (n=210)

Information sources	*Frequency	*Percentage
Federal College of Fisheries Baga	210	100
Borno State Fisheries Dept.	192	91.4
Relatives and friends	105	50.0
Radio	88	41.9
UNDP (artisanal fisheries)	70	33.3
NGOs	56	26.7
Cooperative Union	56	26.7
Ministry of Agriculture	45	21.4
Television	30	14.3

*Results indicate multiple responses, Source; field survey Data, 2015.

UNDP = United Nations Development Programmes, NGOs = Non-Governmental Organisations

Extension agencies available to the fishermen

Table 3 revealed the extension agencies involved in disseminating information for improved fishing technologies in the study area. The Federal College of Freshwater Fisheries Technology Baga (Adopted Village Programme) (100%) and Borno State ADP (Fisheries) (91.4%) play leading roles in reaching the fishermen with information. However, other regular extension agency includes United Nations Development Programmes (66.7%). The result indicated that the presence of international, national and state agencies on the ground, emphasizing extension activities. The result is in agreement with the earlier study by Idrisa and Ogunbameru (2008) who reported that the use of new technology include extension workers' knowledge, ways of organization and management of extension programmes and physical condition of the area. He noted that most effective ways of influencing the fishermen to adopt the technologies in their fishing routine is by establishing a demonstration centre. Extension programs aimed at increasing knowledge have potential to increase adoption of technology (Raji and Omoyemi,

2001; Sule *et al.*, 2009), and increased frequency of extension visits to impart information could result in increased productivity and income generation (Ackello-Ogutu, 2011). In addition, education and extension training are essential for farmers to adopt new technologies (Oladimeji *et al.*, 2013). Idrisa and Ogunbameru (2008) also opined that exposing farmers to extension services has great effect on reducing food insecurity through the adoption of improved farming practices by farmers and hence, increased yields.

Table 3: Extension agencies available in the study area (n=210)

Agencies	*Frequency	*Percentages*
Borno State Fisheries Dept.	192	91.4
Federal College of Fisheries Baga (Adopted Village Programme)	210	100
Ministry of Agriculture	46	21.9
UNDP on Artisanal fisheries	140	66.7
NGOs	56	26.7

Source; field survey Data, 2015, *Results indicate multiple responses

Extension approaches used by the agencies among the respondents

Table 4 revealed that extension approaches to the respondents were; method demonstration (57.1%), result demonstration (52.9%), field days (44.3%) and face to face method (37.6%). Extension approach was used to enhance farmers' skill in the gradual adoption stage or convince farmers in the long term benefits of a technology. Most of the approaches used were methodical and result demonstrations in the study area.

Table 4: Extension approaches used by the agencies reaching the fishermen (n=210)

Extension approaches	*Frequency	*Percentage
Method demonstration	120	57.1
Result demonstration	111	52.9
Field day method	93	44.3
Face to face method	79	37.6

Source; field survey Data, 2015, *Results indicate multiple responses

Fishing technologies available to the fishermen

The fishing technologies available to the fishermen in the study area as shown in Table 5 were as follows: water bailing, hooks and line, boat, nets, Ndurutu, Calabash, Dumba (barrier fishing) and Malian traps were available as attested to by 100% of the respondents' 100% awareness. Appropriate hanging ratio (80.5%), craft and gear maintenance (86.7%), use of outboard engine and its maintenance (41.0%), fishing gear storage (66.7%), appropriate mesh sizes (90.5%), preservation equipment such as cold box and refrigerator (00%), and fish farming (14.8%). Appropriate hanging ratio enhances easy removal of fish from nets and better fish harvest. The study revealed that the majority of the improved fishing technologies was available, implying that, the availability could aid the adoption of those technologies.

Effect of extension services among respondents

Table 6 revealed that the majority (80.95%) of the respondents developed confidence in extension through increased adoption of other improved technologies, 76.19% had increased with income from adopting improved artisanal fisheries technology, 40.95% had changed in quality of food consumed, while 48.57% of respondents had changes in their fishing patterns. The result implies that the aims and objectives of agricultural extension which is to improve the efficiency of the human capital in an effort to rapidly increase the rate of agricultural production were achieved. That is the extension services had imparted the necessary skills to the artisanal fish farmers for understanding the improved fishing operations made available and created in them a favourable attitude for innovation and change by the

agencies. This is consistent with the earlier study by Bolong *et al.* (2012) that agricultural extension activities definite goal and objectives are increased levels of income, productivity, enhancement of farmer's skills and efficient use of resources

Table 5: Distribution of available fishing technologies of the respondents (n=210)

Fishing Technologies	*Frequency	*Percentage
Water Bailing	210	100
Hooks and line	210	100
Boat	210	100
Nets (fixed net, gill net and cast net)	210	100
Nduruitu	210	100
Calabash	210	100
Dumba	210	100
Malian Traps	210	100
Appropriate hanging ratio	169	80.5
Craft and gear maintenance	182	86.7
Outboard engine and maintenance	86	41.0
Fishing gear storage (shading)	140	66.7
Appropriate mesh size	190	90.5

Source; field survey Data, 2015, *Result indicates multiple responses

Table 6: Effect of extension services by respondents (n=210)

Effect indicators	*Frequency	*Percentage
Enhanced adoption of improved technologies	170	80.95
Increased income from fishing	160	76.19
Changes in quality of food consumed	86	40.95
Changes in fishing pattern	102	48.57

Source; field survey Data, 2015, *Results indicate multiple responses

Constraints acquisition of improved fishing technologies by respondents

The constraints faced by the fishermen in acquiring improved fishing technologies are presented in Table 7. These include high cost of fishing input (95.2%); lack of electricity (57.1%); lack of preservation equipment (56.2%); Inadequate credit facilities (55.7%); fear and anxiety due to insurgency (46.2%), poor inaccessible roads (31.4%); menace on fishing gears (27.6%) and poor media exposure (23.8%).

Table 7: Distribution of constraints faced by the respondents in acquisition of improved fishing technologies (n=210)

Constraints	*Frequency	*Percentage
High cost of technologies	200	95.2
Lack of electricity in the villages	120	57.1
Lack of preservative technologies	118	56.2
Inadequate credit	117	55.7
Fear and anxiety due to insurgency	97	46.2
Poor inaccessible road	66	31.4
Menace on fishing gears	58	27.6
Poor media exposure	50	23.8

Source; field survey Data, 2015, *Result indicates multiple responses

The result is consistent with the earlier study by Nwabeze and Erie (2013) that Small farmers/fishermen generally have low incomes and lack capital, and their operations are adversely affected by poor infrastructure and communication. High cost of technologies was the major constraint in the acquisition

of improved fishing technologies. However, all the constraints from the respondents for obvious reasons stand as a barrier to adoption of their improved fishing technologies. The implication could be that the level of acquisition was negatively affected.

Conclusion and recommendations

The study showed that fishing technologies (both traditional and the improved ones) were available in the study area. The study concluded that the extension services had a positive effect on the dissemination of information on improved fishing technologies as well as making the technologies available in the study area. The major constraint to acquisition of improved fishing technologies was the high cost of technology. Based on the findings of the study, the following recommendations were made:

- (i) Special programmes to improve access of artisanal fishermen to credit facilities should be put in place. This is to enable the fishermen link up with Nigerian Agricultural Cooperative and Rural Development Bank (NACRDB) and other agencies for timely provision of credit.
- (ii) The price of improved fishing technologies should be subsidized by the Research Institutions and other agencies in the study area. This could improve the level of acquisition of improved fishing technologies in the study area.
- (iii) Government, Fishermen Cooperatives and NGOs should establish fish processing industry in the fishing settlements. Besides, the industry will generate more revenue for the state and the living standard will be raised and hence there will be improvement in the national economy.

REFERENCES

- Ackello-Ogutu, C. (2011). Managing food security implications of food price shocks in Africa. *Journal of African Economics*, 20:100-141.
- Adefila, J. O. (2012). Spatial assessment of farmer's cooperative organization in agricultural development in Gurara area of Niger State, Nigeria. *Journal of Ecology and the Natural Environment*, 4(2):51-57.
- Adeokun, O. A., Adereti, F. O., and Opele, A. I. (2006). Factors influencing adoption of Fisheries Innovation by Artisanal Fishermen in Coastal Area of Ogun State, Nigeria. *Journal of Applied Sciences Research*, 2(11):966-971.
- Agbelege, O. O. (2007). Constraints Associated with Fishing Activities in Lake Chad. *Proceedings of 27th Annual Conference of Fisheries Society of Nigeria (FISON). 12th – 16th.November, 2007*, 165-171.
- Ahmed, Y. B. (2013). Socio-economic Status of the Fisher Folk of Yuna Adopted Village in BorguLocal Government Area of Niger State. *Journal of Fisheries and Aquatic Sciences*, 81: 136 – 141.
- Ayotunde, E. O. and Oniah, M. O. (2012). The Socio-Economic Status of Artisanal Fishers in Cross River, Cross River State, Nigeria. *World Journal of Fish and Marine Sciences*, 4(6):672-678.
- Bolong, J., Omar, S. Z., Shaffril, H. A. M., D'Silva, J. L. and Abu, H. M. (2012). Communication technologies and fishermen: lesson learned from Langkawi Island and Kuala Besut. *Science Series Data Report*, 4(5):2-12.
- Chad Basin Wikipedia free encyclopedia 2014.
- FDF (2005). *Report of Presidential Committee on Fisheries and Aquaculture Development. Volume one: Consolidated Report*. Federal Department of Fisheries, Federal Ministry of Agriculture and rural Development, 17Pp.
- Goswami, B. Ziauddin, G., and Dutta, S. N. (2010). Adoption behaviour of Fish Farmers in relation to scientific cultural practices in West Bengal. *Indian Research Journal of Extension Education*, 10(1):24-28.
- Idrisa, Y.L. and Ogunbameru, B. O. (2008). Farmers' assessment of the Unified Agricultural Extension Service in Borno State, Nigeria. *Journal of Agricultural Extension*, 11:106-114.
- Inoni, O. E. and Oyaide, W. J. (2007). Socio-economic Analysis of Artisanal Fishing in the South

- Agro-ecological Zone of Delta State, Nigeria. *Agricultura Tropica et Sub-tropics*, 40(4):135-149.
- National Population Commission of Nigeria, Census (2006).
- Nwabeze, G. O. and Erie, A.P. (2013). Artisanal Fisher's Use of Sustainable Fisheries Management Practices in the Jebba lake basin, Nigeria. *Journal of Agricultural Extension*, 17(1):123-134.
- Ogunbadejo, H.K., Alhaji, T. and Otubusin, S. (2007). Productivity of Labor in Artisanal fish farming in Nigeria. *Afr. J. Appl. Zool. Environ. Biol.*, 9:74-77.
- Oladimeji, Y. U., Abdulsalam, Z. and Damisa, M. A. (2013). Socio-economic Characteristics and Return of Rural Artisanal Fishery Household in Asa and Patigi Local Government Areas of Kwara State, Nigeria. *International Journal of Science and Nature*, 4(3):445 – 455.
- Ovie, and Raji, A. (2006). Food Security and Poverty Alleviation through Improved Valuation and Governance of River Fisheries in Africa. Fisheries Co-management in Nigeria: An Analysis of the underling policy process. National Institute for Freshwater Fisheries Research New Bussa, Niger State, Nigeria. 5Pp.
- Raji, A. and Omoyeni, B. (2001). An Assessment of the Socio-economic Problems and Potentials of the Artisanal Fishermen of the Lake Chad Basin against the Background of the National Fisheries Policies. *Journal of Arid Zone Fisheries*, 99-116.
- Sule, A. M., Sanni, A.O., Olowosegun, T., Agbelege, O.O., and Olabanji, M. (2009). Socio-economic factors influencing the adoption of "Gura" fish trap technology in Nigeria. *Continental Journal Fisheries and Aquatic Science*, 3:12-19.