Existing Fisheries Technologies and Approaches for Dissemination in Two Maritime States of Nigeria: Effectiveness and Constraints

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Abstract: A study was carried out to document available traditional practices and improved technologies in the fisheries sub-sector of two maritime states in Nigeria (Lagos and Rivers states) and the effectiveness of approaches used in information dissemination of such technologies. Structured questionnaire was used through interview schedules to obtain information from respondents in two fishing villages in a local government area of each state. The respondents (consisting of fisher-folks, fish processors and fish farmers) were randomly selected. Secondary information on available improved fisheries technologies and means of dissemination was collected from the Agricultural Development Project (ADP) in each state. Data collected were analyzed using descriptive statistics of frequencies, percentages, means and cross-tabulation. Results obtained showed that subsistence practices characterized the fisheries sub-sector in the two states. Whereas over 70% of fish farmers had less than 0.01 ha land holding in Rivers State, about 53% of fish farmers in Lagos state have holdings of pond sizes above 0.5 ha. Poly-culture of different fish species under semi-intensive feeding was common in both states. Hook and line; and use of nets were the major fishing gears used. Dry smoking (by use of kilns and ovens) was the popular method of curing fish products by over 77% of respondents in the two states. Awareness and adoption levels of improved fisheries technologies were generally low among all the respondents. Group contact method was mostly used by the ADPs in information dissemination to 70.6% of respondents in Lagos and 62.5% of respondents in Rivers. While field day was rated as the most popular and most effective (41.2%) strategy used in Lagos, result and method demonstrations were the two major effective strategies (with 62.5 and 55.0% effectiveness ratings) used in Rivers. In the two states, the ADPs were rated by 95.6% of farmers as the foremost agencies in information dissemination and their extension agents as the foremost channels. Constraints to effective dissemination of information on improved technologies include lack of vehicles for field work by extension agencies, high cost of adoption inputs, dilapidating demonstration infrastructures and non release of on-shelf technologies by research institutes. However, prompt release of on-shelf fisheries technologies by Research Institutes, development of sustainable and farmer friendly technologies, empowerment of extension agencies and resuscitation of dilapidated training structures and sites were recommendations proffered to enhance technology adoption by fisher-folks.

Key words: Fisheries technologies · extension approaches · fish farmers · maritime states · Nigeria

INTRODUCTION

Subsistence in the level of operation characterizes most agricultural enterprises in developing countries. This has led to marginal output in all the component sub-sectors. Fisheries as a sub sector of agriculture, is basically operated as a small-scale enterprise by most fisher folks in sub-Saharan Africa. However; this sub sector has the potential of enhanced generation of income and thereby transforming the productivity and output of operators in the sub sector. Indigenous fishermen and processors have their practices in fishing and post-harvest handlings that have been acquired either through tradition or developed by the circumstances of their environment. In most cases; as efficient, as these practices might be, a lot of limitations and shortcomings inherent in the, prevent the realization of maximum benefits for, the level of efforts put into it. Fish protein

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contributes significantly to the protein intake of an average Nigerian (25 kg caput/day) [1]. Government has been making efforts in funding research institutions to improve on the efficiency of existing fisheries technologies and also develop new technologies and innovations that can be disseminated by extension agencies to the technologies must be adoptable by fisher-folks and sustainable; leading to enhanced productivity; more availability of fish protein to the populace and better income to fisher-folks. Innovations and recommendations that would be readily adopted by farmers must be cheap to acquire (low cost); simple to handle, operate and maintain; available (in terms of input and spare parts); portable; durable; labour saving; energy efficient and gender friendly [2-4]. The success or likely acceptability of technologies in fisheries by fisher-folks depends on the extent to which the benefit of recommendation is high; the cost of recommendation is low; the benefit is immediate and the recommended practice is simple [5].

Lagos and Rivers States are situated in the Nigerian coastline and the Peasant natives are mostly fisher-folks characterized with subsistence production. The gears and vessels used in fishing; the traditional kilns used in processing and the indigenous packaging materials for marketing the fish products all combine to place limitations on the efficiency of the sub-sector. Notable projects that have been promoted by various administrations in Nigeria to transform the sub sector in times past include the Coastal Artisanal Fisheries Canoe Mechanization Scheme in 1962, Improved Fish Smoking Project in 1963 and the Coastal Artisanal Fisheries Development Project in 1995 [6].

Specifically; various projects have been implanted by the authorities in charge of fisheries development in the two states-Lagos and Rivers. More over the grass root extension agencies in the two states (Rivers State Agricultural Development Programme and Lagos State Agricultural Development Authority) have fisheries as their main focus in agricultural technology transfer to the rural populace in their project areas. This is understandable since fishing is the main occupation among artisans in each. There is therefore a need to document the existing traditional practices improved technologies available in the two states. It is therefore necessary to conduct a study to enable a proper establishment of data bank for fisheries technologies and evaluation of the present approaches for the dissemination of the technologies with possible improvement and re-designing.

The general objective for this work was to document the existing fisher-folks' practices and improved technologies available in the fisheries sub sector of the two states and approaches used by extension agencies in their dissemination. The specific objectives were:

- Identify improved fisheries technologies in the study areas,
- Identify sources of information of the technologies to fisher-folks,
- Assess the effectiveness of approaches used for dissemination of the technologies and
- Identify constraints to effective dissemination by research and extension agencies.

MATERIALS AND METHODS

Lagos and Rivers states were purposively selected for the study in 2003. Rivers state, located in the South-South agro-ecological zone is a maritime state, just like Lagos, which is situated in the Southwest zone of Nigeria. Both states are located within the mandate area of the Nigerian Institute for Oceanography and Marine Research (NIOMR). While Lagos hosts the NIOMR headquarters, Rivers state host an outstation of NIOMR and the African Regional Aquaculture Center (ARAC). This obviously makes the states advantageous in directly benefiting from improved technologies developed by the Institute and other Institutions (especially the Universities around the zones).

Selection of these states was based on their significance in artisanal fisheries production. One fishing village was purposively selected from a Local Government Area known for fishing activities in each state. Forty (40) fisher-folks were randomly selected for interview in each of the chosen villages. Data on available improved technologies and the approaches used for their dissemination were sourced from the records of Agricultural Development Projects (ADP) in the two states. The ADPs assisted in identification of the selected villages and the fisher-folks interviewed for the study.

Secondary data were collected from universities, research institutes and extension agencies in the two states. Data was analyzed using descriptive statistics such as frequencies, percentages and means. Cross tabulation statistics was used to measure the effectiveness of extension approaches.

RESULTS AND DISCUSSION

Socio-economic characteristics of respondents: The socio-economic characteristics of fisher-folks in the two states are presented in Fig. 1-5. The economically active age groups consist of 31-50 years with 57.5% in Lagos and 57.5% in Rivers, with the mean age being 38.0 and 30.0years respectively in the two states (Fig. 1).

Studies have shown that middle age farmers are more inclined to adoption of innovations [7, 8]. Males dominated the fisher-folks population in both states with a proportion of 70% (Fig. 2).

The remaining 30% of the fisher-folks population in both states were women, indicating that fishing and fish farming are not exclusively male occupation. Dominant household sizes in both states were 6-10 members per household (55.0% of respondents in Lagos and 47.5% in Rivers state) (Fig. 3).

Most of the fisher-folks were literate with primary, secondary or tertiary educational attainment (Fig. 4). The implication of this is that adoption of modern technologies can be accelerated, since level of education is known to be influential in the adoption decision of farmers [9]. About 67.5% of the fisher-folks in Lagos state had between 1-10 years fishing business experience, while, only 35% of respondents in Rivers state had same (Fig. 5). On the average, 51.3% of respondents in both states had between 1-10 years fishing business experience. It was also discovered, that even though
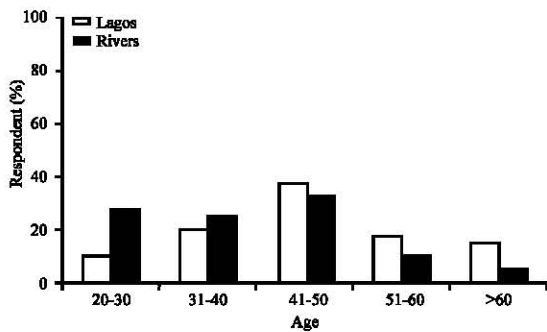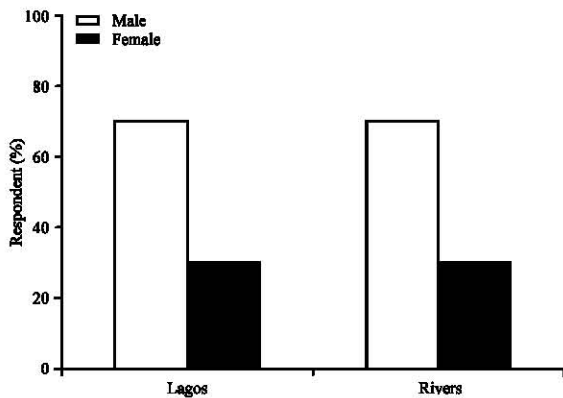

Fig. 1: Age of respondents
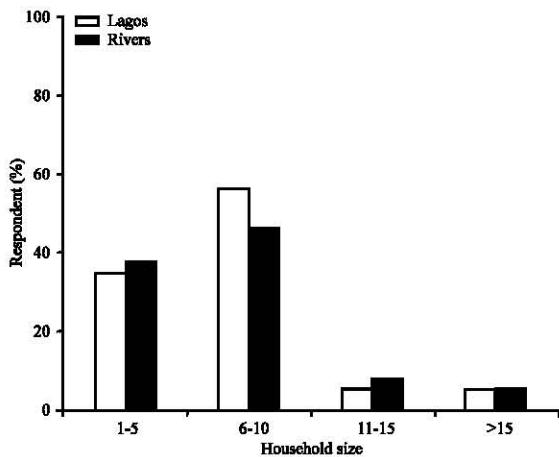

Fig. 2: Sex of respondents
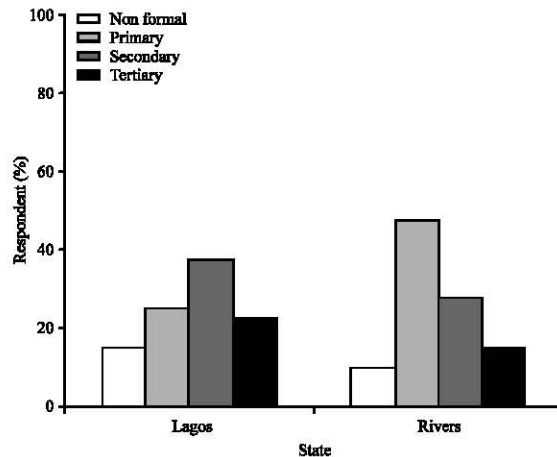

Fig. 3: Household size of respondents

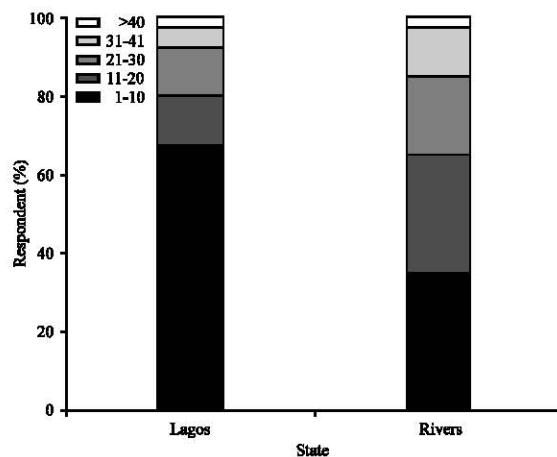Fig. 4: Highest Education of respondents

Fig. 5: Years of experience of respondents

57.5 and 62.5% of the fisher-folks in Lagos and Rivers states respectively belong to cooperative societies (with an average of 60% in both states) (Table 1), personal savings (i.e. internally generated fund) was the source of finance for business for majority of them (81.3% of respondents) (Fig. 6). The

Table 1: Membership of cooperative societies

| Membership of coop. | Lagos States | | Rivers States | | |
	Freq.	%	Freq.	%	Average (%)
Yes	23	57.5	25	62.5	60.0
No	17	42.5	15	37.5	40.0

Source: Survey, 2003

Table 2: Fish feeding practices of respondents

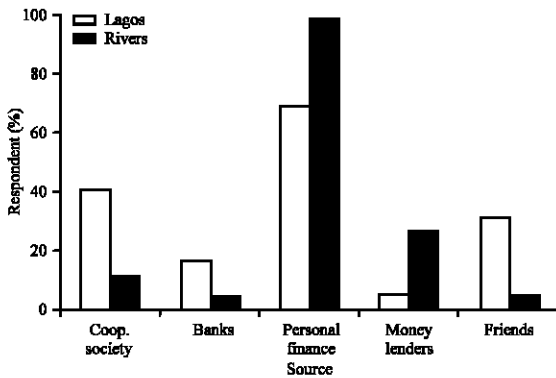| Feeding practices | Lagos States | | Rivers States | | |
	Freq.	%	Freq.	%	Average (%)
Extensive	5	14.7	3	30.0	22.4
Semi-intensive	15	44.1	7	70.0	57.1
Intensive	14	41.2	-	-	20.6

Source: Survey, 2003

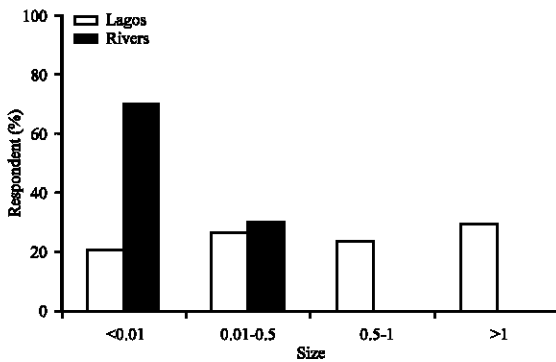Fig. 6: Sources of credit for Business

Fig. 7: Size of ponds in Aquaculture practice in Lagos and Rivers states

implication of this is that the fisher-folks would continue to operate at mere subsistence level without adequate credit sources.

Traditional practices in aquaculture: Subsistence practices characterized the level of operation of the fish culture of farmers in Rivers state, with small-size fish ponds (<0.01ha) dominating the holdings of 70% (Fig. 7). Poly-culture of different species of fish was common (70%) in the two states (Fig. 8) with semi-intensive system of feeding being the common practice in Rivers state (70%) and to a lesser extent (44% of respondents) in Lagos (Table 2).

The commonly cultured fish species were *Clarias gariepinus, Heterotis niloticus, Oreochromis niloticus* and to some extent, *Gymnarchus niloticus* in Lagos State with a stocking duration, in most cases 2-3 years. *Clarias* fingerling were stocked at densities ranging from 3000-5000fish per hectare and *Heterotis* at 1000-2500 ha^{-1}. *Gymnarchus* attracted the highest price of 700-800 naira N kg^{-1}, while Tilapia was the least priced (100-180 N kg^{-1} depending on the sizes ($1.00 is approximately N140.00- Nigerian Naira).
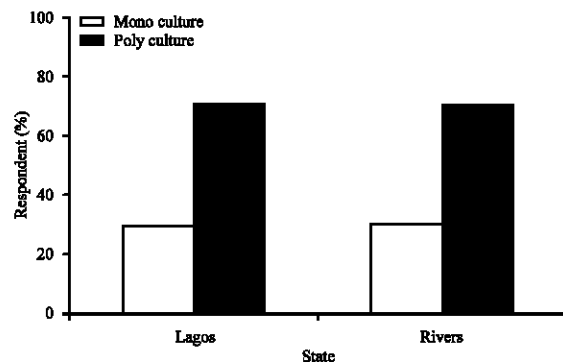

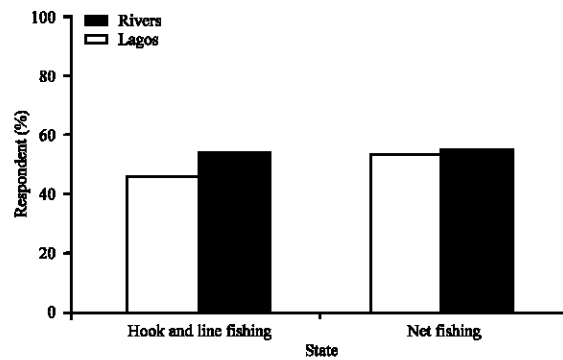Fig. 8: Culture systems in practice in Lagos and Rivers states

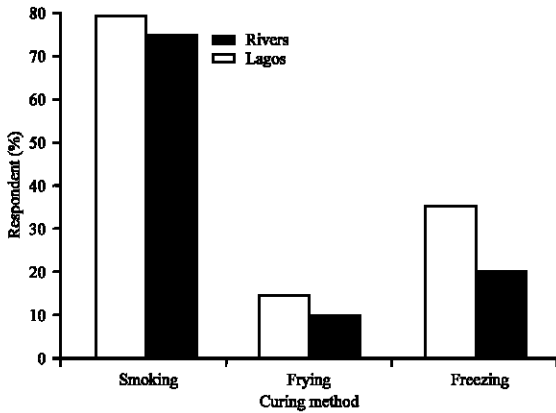Fig. 9: Respondents distribution by type of Fishing gears
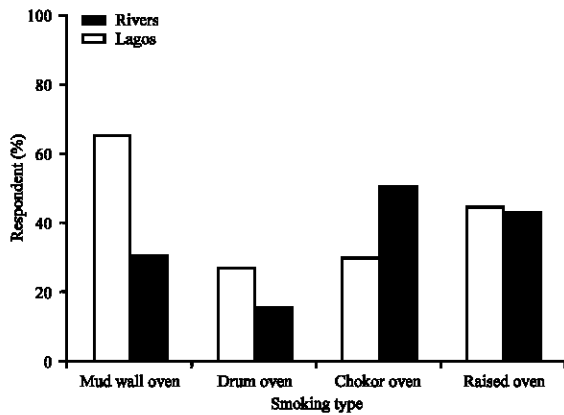
Fig. 10: Post-Havest Curing practices

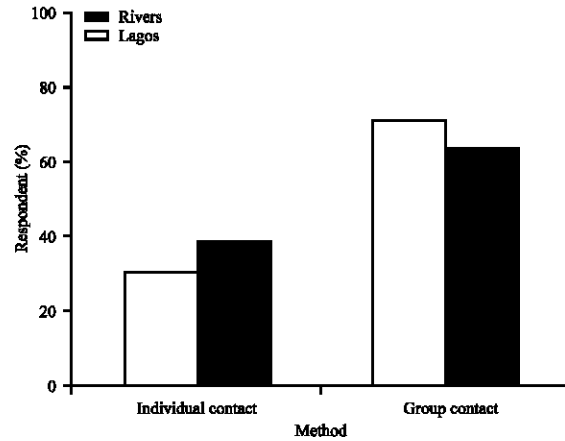Fig. 11: Smoking methods practiced in the States

Fig. 12: Extension method used to disseminate information from respondent view point
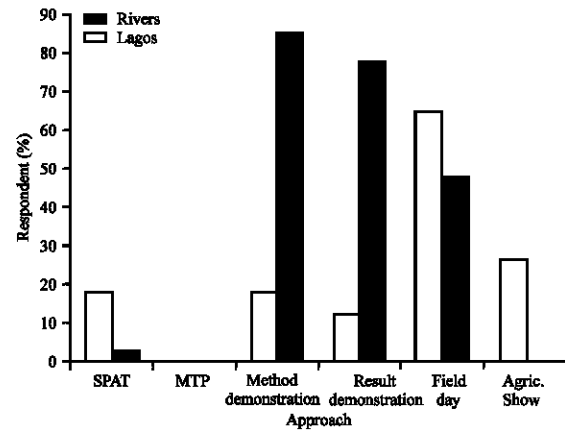
Fig. 13: Extension approaches used to disseminate information from respondent view point

Traditional fishing methods and post-harvest practices:
The locations of Lagos and Rivers states in the marine environment restrict the fisher-folks to use of nets in fishing and to some extent, hook and line. Nets commonly used include gill nets, cast net, beach seining and drift net. Respondents distribution in the two states by type of fishing gears used are shown in Fig. 9.

Smoking of fish was the most preferred curing method employed by an average of 77.5% of the respondents in the two states surveyed compared to frying and freezing as shown in Fig. 10. The most popular smoking methods include the use of Mud wall oven in Lagos and Chokor oven in Rivers state, while the use of Raised Altar ranked second with an average of 43.3% for both states (Fig. 11).

Methods and approaches for information dissemination:
Extension methods used for information dissemination from the respondents view point on production recommendations by extension agencies are through individual contact and group contact methods (Fig. 12).

The survey revealed that group contact method was mostly used to disseminate information to fisher-folks in the two states, i.e. 70.6% for Lagos and 62.5% of the respondents in Rivers state, as shown on Fig. 12. Extension approaches/strategies used to enhance farmer's skill in the gradual adoption stage or convince them on the long-term benefits of a technology include the use of Small Plot Adoption Techniques (SPAT), Management Training Plot (MTP), method demonstration, result demonstration, field days and agricultural shows (Fig. 13). According to Adams [10], the choice of extension method will depend on the number of clienteles to be reached, the nature of practices to be taught, characteristics of the method to be used, the stage of adoption of a technology, the competence of extension agents in the use of the method and the cost of procurement (of the method).
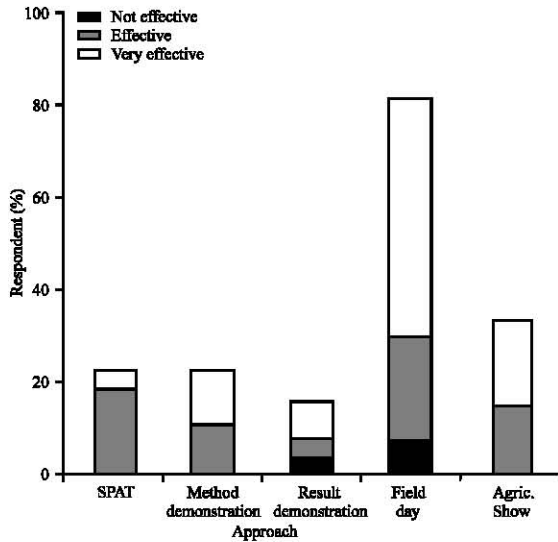
Fig. 14: Percieved effectiveness Assessment of extension approaches by respondent in Lagos state
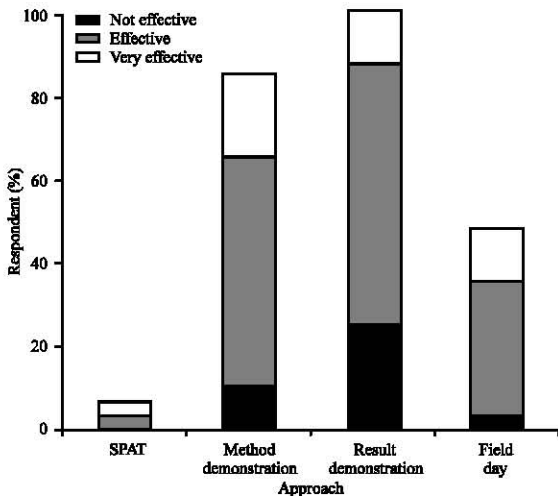

Fig. 15: Percieved effectiveness Assessment of extension approaches by respondent in Rivers state

For strategies used to further create awareness and promote adoption, field day was acclaimed by fisher-folks to be the most popular with 64.7% in Lagos and 47.5% in Rivers state. However, result and method demonstrations were popularly used in Rivers sate with 77.5% and 85% respectively. SPAT application seems to be limited to EAs' contact farmers with only 17.6% in Lagos and 2.5% in Rivers. MTP was completely unknown by fisher-folks in the 2 states. This calls for the availability of fisheries technologies demonstration centers in the two states. Agricultural show seems not to be in popular use in Rivers state perhaps due to costs and logistics.
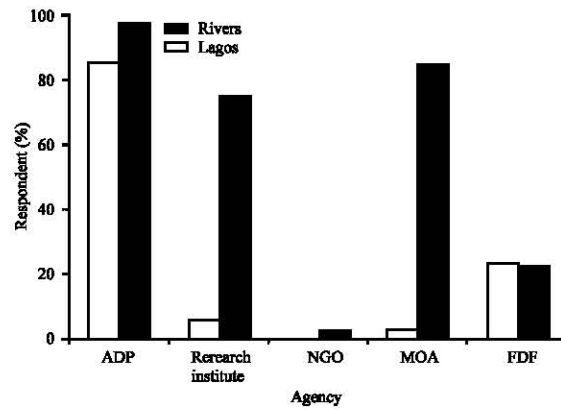

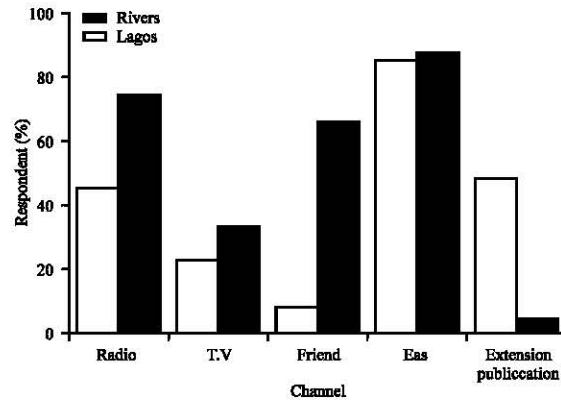Fig. 16: Agencies of information dissemination on fisheries

Fig. 17: Channels of information dissemination on fisheries technologies

Effectiveness of extension approaches: The effectiveness of an extension approach as perceived by fisher-folks would determine to a great extent the adoption of production recommendations. The criteria for rating the perceived effectiveness of the approaches were subjective. These were 'not effective', 'effective', or 'very effective'. For SPAT, 14.7% of respondents in Lagos state believed it is effective while the only respondent familiar with it in Rivers state claims it is also effective (Fig. 14 and 15).

Method demonstration had 55% effectiveness rating and 20% very effective rating in Rivers, whereas 62.5% rated result demonstration as effective in the same State. In Lagos, both extension approaches had low ratings. Field day was rated by 17.6% as effective and 41.2% as very effective in Lagos state with 32.5% effective and 12.5% very effective rating in Rivers state. 11.8% and14.7% of respondents in Lagos state considered agricultural show as effective and very effective respectively (Fig. 14 and 15).
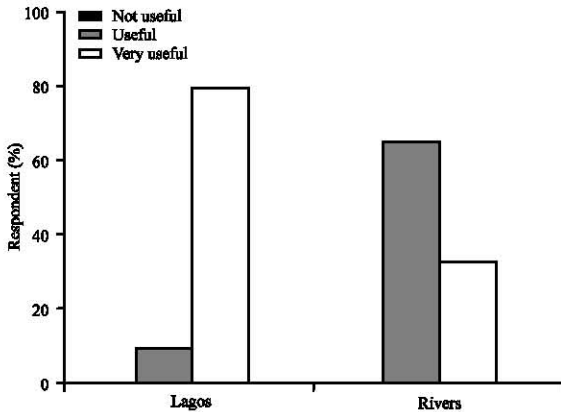
Fig. 18: Assessment of VEAs recommendations by respondents

Table 3: Assessment of VEAs Recommendation and Fisher-folk Interaction with VEAs and contact farmers

| Assessment of rec. | States | | | | |
| | Lagos | | Rivers | | |
	Freq.	%	Freq.	%	Average (%)
Not useful	-	-	-	-	
Useful	3	8.8	26	65.0	36.9
Very useful	27	79.4	13	32.5	56.0
Interactions					
Aware of VEAs	30	88.2	38	95.0	91.6
Aware of contact farmers	16	47.1	17	42.5	44.8
Contact farmers	11	32.4	16	40.0	36.2
Receive advance from	14	41.2	16	40.0	40.6

Source: Survey, 2003

Agencies and channels for information dissemination:
The Agricultural Development Project (ADP) is the major agency for information dissemination in Lagos state as attested to by 85.3% respondents while in Rivers state, the ADP, Research Institute and the Ministry of Agriculture (MOA) were classified as major agencies by 97.5, 75.0 and 85.0% of the respondents respectively (Fig. 16). The extension agents (EAs) were also known by fisher-folks in the two states as their foremost channel of information dissemination, with 91.2% in Lagos and 100% in Rivers state. As well, radio broadcast (82.5%) and information through fellow fisher-folks (75.0%) were also important channels in Rivers state while, Extension publication (52.9%) and radio broadcast (47.1%) were also regarded as additional important channels by respondents in Lagos state (Fig. 17).

The 'contact farmers' approach in the training and visit extension (T & V) is a system of passing recommendations through Village Extension Agents (VEAs) to contact farmers, with the hope that when such farmers adopt the technologies with foreseeable benefits, other farmers will be encouraged to adopt same. In Lagos, 32.4% of the fisher-folks are contact farmers, while Rivers has 40% contact farmers among respondents. Those percentages were considered adequate for effective spread of recommendations among non-contact farmers. Reasonable percentages of non-contact farmers were aware and received production advices from contact farmers in the two states (Table 3).

Majority of the respondent interviewed in Lagos state (79.4%) assessed the recommendations given by the VEAs as very useful while it was rated by majority (65.0%) in Rivers state as just useful (Fig. 18). However, there was evidence of close interaction between the fisher-folks and
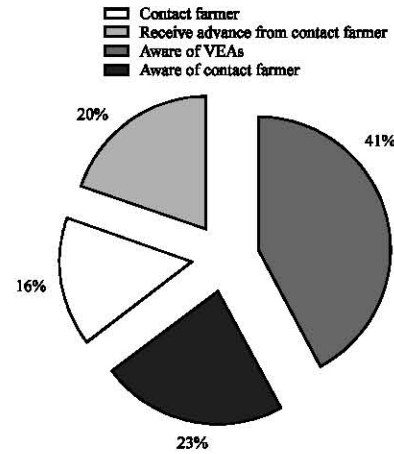

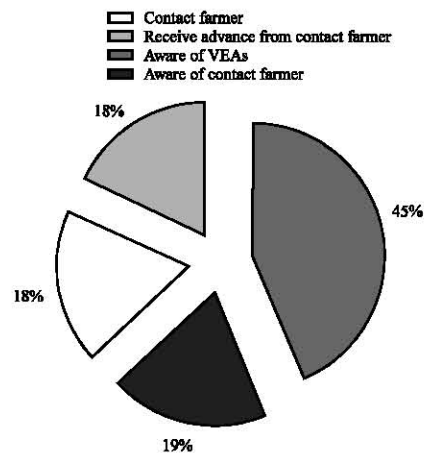Fig. 19a: Fisher folk interaction with VEAs and contact farmers in Logos

Fig. 19b: Fisher folk interaction with VEAs and contact farmers in Rivers

the VEAs on one hand and the contact farmers on the other, in both states (Fig. 19a and b).

Constraints to effective dissemination of fisheries technologies: From the records of Lagos (11) and Rivers (12) states ADP, the following were major factors affecting efforts at disseminating fisheries technologies.

- Non-availability of relevant research results on fisheries from research institutes.
- Cold attitude of fisher-folks towards disseminated technologies especially due to cost of the technologies and lack of inputs to back up adoption.
- Inadequate research work on extension delivery methods to know lapses and areas needing improvement.
- Lack of reliable field vehicles.
- Lack of field equipments to promote awareness creation like mobile cinema vans
- Lack of technology demonstration centers to serve as venue for MTPs.

CONCLUSION AND RECOMMENDATIONS

The fisheries extension situation in Nigeria is that of a commodity that is gradually being integrated into the farming systems of the farmers. This is particularly the case with Aquaculture. The study has shown that only very few technologies were available on fisheries in the two maritime states studied. This is a reflection of the entire Nigerian scenario. The constraints to effective dissemination of available technologies and recommendations on fisheries need to be given serious attention by policy makers and existing agencies in order to harness the potentials of the fisheries sub-sector as the major source of animal protein for the Nigerian populace. In view of the findings, the following recommended measures would go a long way in promoting the development of the fisheries sub-sector of the Nigerian economy.

Research institutions should be mandated to release most research results on fisheries that are on-shelf. This should pass through the technology release process of on-station trials and farmer's field trials in order to validate such as proven and relevant to the fisher-folks field situation.

Technologies and recommendations meant for fisher-folks consideration and adoption should be sustainable and user friendly. This is in terms of cost of acquisition, ease of maintenance, technical efficiency (especially of ovens), durability, portability and profitability.

Extension agencies should be equipped with functional vehicles and audio-visual materials to aid their dissemination efforts.

Practical technology demonstration plots that have dilapidated in the ADP zones should be resuscitated as this will enhance fisher-folks adoption considerations.

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