PRELIMINARY SURVEY ON CONSUMER PREFERENCE FOR SHRIMPS AND PRAWNS IN CROSS RIVER STATE, NIGERIA

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ABSTRACT
Consumer preferences for freshwater prawns and marine shrimps in Cross River State, Nigeria were examined. This was a baseline study to gather information for the development of shrimp and prawn farming in the State. Data were collected with the use of structured questionnaires. Seventy seven percent (77%) of the respondents were within the age bracket of 21—50 years, while ten percent (10%) of the respondents were above 60 years. The respondents were highly literate with 40% having tertiary education, 28.5% secondary education while 11.4% had primary school education. Data from the survey revealed that 71% of the respondents had a high consumer preference for shrimp and prawns than all other fish species with the motivating factor for consumption being taste and as a source of animal protein. However, they preferred fish as a major source of animal protein (80%) followed by shrimps (65%) and prawns (52%). Majority of the consumers (65.7%) preferred to purchase the shrimps or prawns whole without processing or value addition. The survey showed that the people of Cross River State had high consumer acceptability for shrimps and prawns, an indication that if shrimp or prawn farming is developed in the State, there will be market for the products.
Keywords: *Penaeus*, *Macrobrachium*, Niger Delta

INTRODUCTION
New (2002), proposed terminologies for decapod crustaceans to harmonize issues of nomenclature that have been different in different countries, so the term 'shrimp' refers to marine species and 'prawn' to freshwater species. Both are highly priced products in local and international markets. The marine shrimp industry is a huge global sea food industry valued at over $20 billion and growing at the rate of 10% annually (Chemonics, 2002, Islam *et al.*, 2003; FAO, 2009). The world's shrimp catch is largely due in part to industrial fishing operations, but some of the largest shrimp fisheries are based on small-scale fishing including non motorized operations (Palha de Sousa *et al*., 2006). Freshwater prawns also are contenders in the global fishery trade contributing their portion in the build-up of human protein needs (El-Sherif, *et al.*, 2009 and Lin, 2009). The economic growth of the shrimp industry according to Soundarapandian *et al.* (2008) continues to enjoy an upward geometric assent in recent times.

In Nigeria, the bulk of shrimp or prawn activities are capture based and this has formed the bulk of the trading platform among local and international trading partners (FDF, 2007). The culture of shrimps and prawns however is presently at a very low level, although there are great potentials for commercial aquaculture of the species (Anyanwu *et al*., 2011). Many Nigerians especially in the southern part of the country consume small shrimps and prawns (erroneously termed '*crayfish'*) and other fishery products but large shrimps and prawns are mostly used in preparation of dishes in big hotels, restaurants or during special ceremonies. Nigeria is poised to develop shrimp and prawn aquaculture and consequently consumer acceptability and preference for the species need to be ascertained. This will provide baseline information on marketing of the products and pricing as well as consumption levels.
Cross River State is a coastal state in Nigeria with a lot of shrimp and prawn fishing activities (Dublin-Green and Tobor, 1992). This study was carried out to assess the consumer acceptability and preference for shrimps and prawns which are expected to form a basis for the development of aquaculture of these species in the State.

MATERIALS AND METHODS
Study Area
Cross River State is a maritime State with a land mass of 23,074 km^2. The State is located in the south-south geo-political zone of Nigeria with its capital at Calabar. It is bounded on the East by Cameroon, West by Ebonyi and Abia State, in the North by Benue and South by Akwa Ibom State and the Gulf of Guinea. The State as at 2006 had a population of 2.89 million people and the main economic activities were transportation, subsistence agriculture, urban commerce and tourism (Ingwe *et*

al., 2010). The major language is Efik while other languages spoken include Ekoi, Boki and Becheve.

The State is endowed with enormous water resources with the Atlantic Ocean as well as numerous tributaries of the Cross River. It has one of the largest lakes in Southern Nigeria called the Reforme Lake which supports a fishing festival held between March and May every year. Two-thirds of Cross River State is covered by the second largest tropical rain forest reserve in Africa making the State one of the world's biodiversity hot spots. Mineral resources like oil, gas, clay, salt, limestone, kaolin, barite and quartzite also abound. The State has 18 Local Government Areas namely: Abi, Akamkpa, Akpabuyo, Bakassi, Bekwara, Biase, Boki, Calabar municipality, Calabar south, Etung, Ikom, Obanliku, Obubra, Obudu, Odukpani, Ogoja, Yakurr and Yalla.

Survey Methodology

Global Positioning System (GPS) was used to locate the sites where data were collected through administration of structured questionnaires. Stratified Random Sampling Technique was employed in the administration of the structured questionnaires and a total of seventy (70) questionnaires were administered. Researchers from Nigerian Institute for Oceanography and Marine Research (NIOMR) and other personnel from the State Department of Fisheries and Agricultural Development Programme (ADP) administered the questionnaires to the respondents. The questionnaires were administered face to face through a guided oral interview.

Four Local Government areas were chosen and visited because of high level of shrimp and prawn fishing activities in the area. These were Calabar South, Calabar Municipality, Akpabuyo and Bakassi. Nine sites were chosen and their geo-reference points are presented in Table 1. Landing sites and sales outlets of shrimp and prawn were inspected. The survey was conducted in March, 2011.

The survey was conducted using a three pronged approach which included planning, logistics and status overview; field visits and interviews and report writing. Pre-survey meetings were held with different stakeholders in the State to determine areas for visitation, survey plan, logistics and peculiar issues in shrimp and prawn exploitation. Species of fin and shellfish at the selected landing sites were identified during the survey.

Table 1: Survey sites and GPS location

SAMPLING SITES	LOCATION (GPS)
Watt market (Calabar South)	N04° 57′ 26.3′′ , E08° 19′ 21.1′′
Lagos street market (Calabar South)	N04° 57′ 22.9′′ E08° 19′ 8′′
Esuk Abitu (Calabar South)	N04° 54′ 57′′ , E08° 19′ 0.2′′
Esuk Jebs (Calabar South)	N04° 54′ 59′′ , E08° 18′ 54.8′′
Esuk Nsidung (Calabar South)	N04° 57′ 05.6′′ ,E08° 18′ 35.3′′
Esuk Atansiyak (Calabar south)	N04° 56′ 59.5′′ ,E08° 18′ 30.3′′
Esuk Atu (Great Qua River) (Calabar municipality)	N04° 56′ 58.8′′ , E08° 21′ 31.0′′
Esuk Mba (Akpabuyo LGA)	N04° 61′ 55.0′′ , E08° 23′ 44.4′′
Esuk Ikang (Bakasi)	N04° 47′ 18.0′′ , E08° 31′ 58.3′′

RESULTS

Fisheries Activities

A lot of fishing activities was observed around the Great Kwa River, Cross River and their tributaries. A visit to Lagos Street market in Calabar municipality, showed the presence of prawns and other fish species. Majority of the cosmopolitan city dwellers purchase their shrimp and prawns and other fish species from this market. Other hot spots included Watt Market (Plate 1), Nsidung beach (Plate 2), and Esuk Atansiyak (Plate 3) among others.

Fish species landed at the sites visited were, *Chrysichthys nigrodigitatus* (silver catfish), *Sphyraena* sp. (Barracuda), *Cynoglossus* sp. (sole), *Lutjanus* sp. (red snapper) and *Galeoides decadactylus* (shiny nose). Other species included *Oreochromis niloticus* (Tilapia) *Clarias gariepinus* (mud-catfish), *Pseudotolithus* sp. (croaker), *Thunnus* sp. (tuna), *Liza* and *Mugil* spp. (grey mullet), *Gymnarchus niloticus* (trunk fish), *Carcharhinus altimus* (shark), *Raja miraletus* (ray), *Ethmalosa fimbriata* (bonga), *Synodontis* sp. (catfish), *Momyrus rume* (trunk nose), *Scomber* sp. (mackerel) and *Sardinella* sp. (sardine).

Shellfish species seen included, *Callinectes* sp. (crab), *Sebia elobyana*, (squid), *Tympanotonus* sp. (periwinkle), *Crassostrea gasar* (mangrove oyster) and *Octopus macropus* (octopus). Shrimp and prawns

encountered were, *Macrobrachium vollenhovenii* (African river prawn), *Penaeus monodon* (black tiger shrimp), *Penaeus notialis* (pink shrimp), *Nematopalaemon hastasus* (estuarine shrimp), *Penaeus kerathurus* (caramote shrimp), *Parapenaeopsis atlantica* (Guinea shrimp) *Parapenaeopsis longirostris* (deep-water rose shrimp) and ghost shrimp. The tiger shrimp *P. monodon*, the largest shrimp species globally is not indigenous to Nigeria but has been established in the coastal waters since 1999.

Sex ratio and age of respondents

The number of male respondents (50%) that participated in this survey was equal to the number of female respondents (50%) while the age group with the highest percentage (32.8%) was group 40-49 years, followed by age group 30-39 years (24.2%). The least age group was 60-70 years constituting only 1.4%. Details of the age of the respondents are presented in Fig. 1.

Educational background

Forty percent (40%) of the respondents had tertiary education while 28.5% completed secondary education. However, 7.1% of the respondents did not complete secondary education. Those that completed their primary education were 12.3%, while 5.7 % of the respondents had college of education and technical training.

Motivational factor for consumption of shrimp and prawn

Majority of the respondents (44.8% for shrimp and 49.3% for prawns) indicated that taste and source of animal protein were the main motivational factors for the consumption of the products. The cost of preparation of the product for consumption was not a motivational factor. Details are presented in Table 2.

Ranking of shrimps and prawns with other preferred fish species

Consumption of shrimps was ranked highest (71.1%) in Cross River State when compared with other fish species. This was closely followed by prawns (64%). Silver catfish, marine catfish and shiny nose were ranked 48.5%, 40% and 38.5% respectively. The species ranked low were *Lates niloticus* (1.4%), *Momyrus* (1.4%) and squid (1.4%) while none of the respondent had preference for octopus (0%). Details of the result are presented in Table 3.

Table 2: Motivational factors for shrimp and prawn consumption in Cross River State

MOTIVATIONAL FACTOR	NUMBER OF RESPONDENTS		PERCENTAGE OF RESPONDENTS (%)	
	SHRIMP	PRAWN	SHRIMP	PRAWN
Price	1	2	1.5	2.9
Taste alone	28	26	41.8	37.7
Price of other animal protein	2	2	3	2.9
Cost of preparing it to final consumption	0	0	0	0
Medicinal importance	1	1	1.5	1.4
No religious bias	0	1	0	1.4
Only source of protein available	3	1	4.5	1.4
Other derivable advantages	2	2	3	2.9
Taste and animal source of protein	30	34	44.8	49.3

Table 3: Ranking of consumer preference for shrimps and prawns with other preferred fish species

Fish species	Scientific name	% Frequency
Shrimp	*Penaeus* sp	71.1
Prawn	*Macrobrachium* sp	64.2
Silver catfish	*Chrysichthys nigrodigitatus*	48.5
Sea catfish	*Arius* sp	40.0
Shiny nose	*Galeoides tetradactilus*	38.5
Tilapia	*Oreochromis niloticus*	38.5
Periwinkle	*Tympanotonus*	34.2
Oyster	*Crassostrea* sp	34.2
Croaker	*Pseudolithus* sp	34.2
Crab	*Callinectes* sp	30.0
Mackerel	*Scomber* sp	20.0
Bonga	*Ethmalosa fimbriata*	18.5
Sardine	*Sardinella* sp	18.5
Mud catfish	*Clarias gariepinus*	18.5
Sole	*Cynoglossus* sp	17.1
Barracuda	*Sphyraena* sp	14.2
Grey mullet	*Mugil* and *Liza* spp	10.0
Red snapper	*Lutjanus* sp	7.1
Shark	*Carcharinus altimus*	5.7
Catfish	*Synodontis*	5.7
Ray fish	*Raja miraletus*	5.7
Tarpon	*Tarpon atlanticus*	5.7
Tuna	*Thunnus* sp	4.2
Trunk fish	*Gymnarchus niloticus*	2.8
Squid	*Sebia elobyana*	1.4
Trunk nose	*Momyrus rume*	1.4
Nile Perch	*Lates niloticus*	1.4
Octopus	*Octopus macropus*	0.0

Preference of shrimps and prawns with other preferred animal products

Majority of the respondents had a high preference (80%) for fin fish as a source of animal protein than shrimps (65%). This was followed by prawns with 52%, snail 40% and meat 38%. Details are shown in Fig. 2.

Sales outlets for shrimps and prawns

Many of the respondents (57%) preferred to purchase their shrimps and prawns from market stalls and landing sites while only 24.2% preferred the market stalls alone. Some of the respondents (28%) preferred to purchase from the road side while none of the respondents purchased from shops, super market, farmers and trawlers.

Presentation of shrimp and prawn products

Forty-six respondents representing 65.7% preferred to purchase their shrimps and prawns whole without processing or value addition while 12.8% were not particular about the manner of presentation. None of the respondents preferred the shrimp and prawn frozen or requested for dressing after purchase while 12.8% were not particular on the manner of presentation. Details of the preferences for product presentations are shown in Table 4.

Table 4: Consumer preferences and presentation of shrimp and prawn products

PRODUCT PRESENTATION	NUMBER OF RESPONDENTS	PERCENTAGE OF RESPONDENTS
Whole without value addition	46	65.7
Whole in ice block	2	2.8
Frozen plates in 2kg boxes	0	0
Frozen plates in 1kg boxes	1	1.4
Frozen	0	0
Visual measurement	4	5.7
Finished product - head and tail cut off	3	4.2
Buy and request for dressing	0	0
Smoked	1	1.4
Others (not particular on the manner of presentation)	9	12.8

Sources of information for consumption of shrimps and prawns

Majority of the respondents (72.8%) obtained information on the consumption and preference for shrimps and prawns from their families followed by women fish marketers (8.5%). None of the respondents obtained information from extension workers, government agencies or religious organizations.

Preparation of shrimps and prawns

The respondents preferred to eat their shrimps and prawns cooked (68.5%) while 4.2% liked them fried fresh. Few of the respondents preferred them fried in batter (1.4%) or smoked (1.4%) while none of the respondents liked them sun dried or eaten raw. However, some of the respondents (24.2%) did not respond.

Combination of shrimps and prawns with other foods

The respondents preferred to consume the shrimps and prawns with rice and soup (42%) while 31% preferred them in soups alone. Some of the respondents (14.2%) preferred to eat them with rice alone ("Jollof or fried rice") but no respondent preferred them as snacks.

Market price for shrimp and prawns

In the open market, shrimps and prawns were sold in plates measured by "hand pinching". The approximate weight for the plate was 60g and was sold at ₦200.00 (1 US $ = ₦158.00). The prices for the frozen plates ranged from ₦1450.00 to ₦1650.00 for 450 g and 500 g respectively. Baskets of shrimp or prawn weighing up to 900 g were sold for ₦3000.00 while bags of 1kg were sold for ₦4000.00

The marketing of shrimps and prices offered by the fishing trawler companies were different from that of the open market. Codes were used for the different sizes of shrimps. For example code U5 was sold for ₦6,000.00/kg while U15 was sold ₦4,500.00. Other codes were sold as follows - U10(₦5,000),U5(₦5,500), T1(₦4,500), T2(₦3,500), T3(₦3,000), T4(₦2,500), T5(₦2,000), SHL(₦3,500), MHL(₦4,000) and LHL(₦4,500).

Income profile of respondents

The income profile was classified into three categories namely high income (≥₦250,000/month), middle income (>₦50,000 to <=₦250,000) and low income (≤ ₦50,000). Majority of the respondents (65.7%) were in the low income category while 27.1% were in the middle income category. Only one respondent (1.4%) was in the high income category.

Plate 1: A research scientist administering questionnaires at Watt Market in Calabar

Plate 2: A basin of Prawn, *Macrobrachium vollenhovenii* at Nsidung Beach, Cross River State

Plate 3: Fish landing site at Esuk Atansiyak , Cross River State

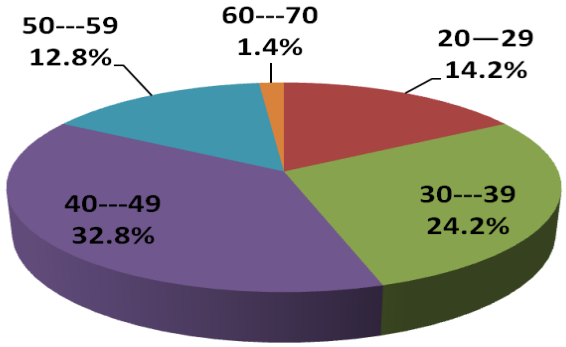

Fig 1: Age group of respondents

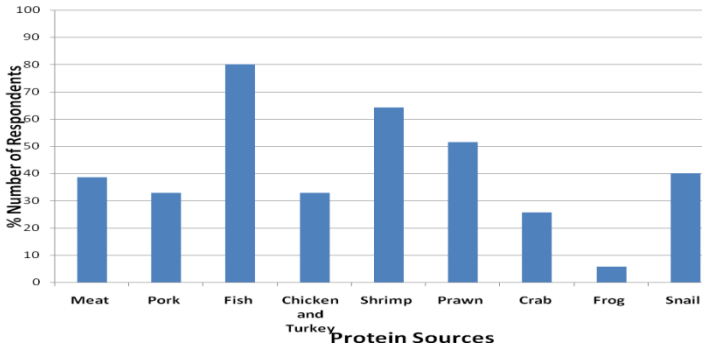

Fig. 2: Percentage number of respondents and major sources of animal protein

DISCUSSION

The level of production of any product is highly related to the level of acceptance of the product by the consumer or users. To mass produce a product, it is important to first carry out a survey of consumer acceptability or preference for the product. Ballenger and Blaylock (2003) stated that successful producers know that consumers are key factors towards economic viability and growth and their preferences drive the evolution of any industry. The people of Cross River State had high consumer acceptability of shrimps and prawns.

Consumer preferences for any product have been known to vary significantly from one region to the other with knowledge of the product playing an important role in consumer's choice (Frewer *et al*., 2005, Dasgupta *et al.,* 2010). Most of the respondents in Cross River State were highly literate (40% had tertiary education and 28.5% had secondary education) and hence had good knowledge of the nutritional values of shrimp and prawns. However, in Niger State, educational background of the respondents was low and the prawns were considered to be of little value and rarely consumed (Ebonwu, personal communication).

The demand for shrimp and prawns once regarded as a luxury food by most people, is steadily rising in the major consuming markets of Japan, North, America and Europe. It has grown into a significant global seafood industry of nearly four million tonnes worth about $18 billion annually (Chemonics 2002). Majority of the consumers are high income earners or live around major cities, ocean resort areas and tourist centres (Hanson *et al.,* 2005 and Dasgupta *et al.,* 2010). However, in Cross River State, consumption of shrimps and prawn was found to be an old family tradition for both middle and low income earners and passed from one generation to other. Consequently, there may not be a problem with marketing the product if shrimp and prawn farming is developed in the State.

Purchase decisions depend mostly on the consumer's knowledge of the species and sometimes on previously established preferences like taste, ease of preparation, nutritional value instead of price (Steine *et al.*, 2005 and Kelling *et al.*, 2011). The survey revealed that although the shrimps and prawns were expensive, the respondents did not bother about the prices but purchased even small quantities just to add taste or flavour to their meals. The main motivational factor for shrimp and prawn consumption was taste and animal protein source. This observation is similar to the consumer preference of stockfish by the Igbo people where small quantities are purchased just to add flavor to the soup. Taste and animal source of protein played an important role in the purchase decision and were major motivational factors for consumption of the species.

CONCLUSION

The study examined the consumer preference of shrimps and prawns in Cross River State. Data obtained showed that the people had high consumer acceptability for shrimps and prawns. There were no shrimp or prawn farms in the State at the time of visit but 87% of the respondents were interested in going into shrimp and prawn farming if the culture technology is disseminated to them. The survey showed that there will be a ready market for shrimp and prawn products if the culture system is developed due to the high consumer acceptability. This will create employment opportunities and impact positively on the socio-economic status of the people.

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