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An assessment of the fishery of the Saint Bartholomew River, Akuku-Toru Local Government Area, Rivers State, Nigeria

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ABSTRACT
The fishery of Saint Bartholomew River in Rivers State was studied, in order to provide information for sustainable management and development of the River's fishery. A four-week survey in six randomly selected sample stations along the River assessed Fishers' demographic and non-demographic information, using a questionnaire. Results revealed fishing as the predominant occupation in stations A to E (70-95%), farming (4-20%), others (1 – 5%), whereas in station F it was, fishing (60%), farming (30%) and others (10%). In all the stations, 70-95% of fishers fished full time and 5-30% engaged in fishing on part-time. Both males and females fished actively with less number of females (20% - 35%), and more males (65% - 80%) involved in stations A - E, while more females (45%) were involved in station F. Age distribution for male and female fishers recorded 18 and 50 years in A - E, whereas F station recorded 18-40 years. In all the stations, the sole fishing crafts were canoes. In station F, 30% were motorized without-board engines, while in Stations A to E, 70% used paddles for movement. Fishing gears used by male fishers were nets (such as cast nets, seine nets), and hook bearing gears (long lines and hook and line), while female fishers used only light gears (basket and non-return valve traps). Daily income generated revealed Station A fishers realized lower daily incomes (70% realized ₦100-₦5, 000 daily), whereas Station F fishers recorded the highest daily income (60% of fishers realized above ₦50,000 daily).

Keywords: Fishers, fishery, females, males, Saint Bartholomew River.

INTRODUCTION
A Fishery is said to be "an entity engaged in raising or harvesting fish which is determined by some authority to be a fishery (Wikipedia, 2018). Fishing is the primary occupation of people living along riverine areas (Gwary *et al.*, 2014; Ahmad *et al.*, 2018). Fishery is important in sourcing, extracting and bringing to man, the very important, and cheap protein source, fish. In Nigeria, Fisheries is known to play a very vital role in the nation's economy, as it is a sub-sector known for its capacity to earn high foreign exchange (Sikoki and Otobotekere, 1999), and it is a high income source for the local fishers (demand far outstrips the supply), hence an important source of livelihood. Abowei and Hart (2008) reported that, fisheries generates about 20 million dollars annually through the export of shrimps alone. They added that, fisheries also provided primary and secondary employment to more than one million Nigerians.

The Saint Bartholomew River is a brackish water system, in the Akuku-Toru local government area, in Rivers State, in Southern tip of the Niger Delta Area of Nigeria. It is a major river in the Niger Delta Area, one of the largest and most important wetlands in the world, supporting a wide variety of life forms and providing ecosystem services. It is a tidal estuarine

water system, (Igwe *et al*., 2016), and empties into the Atlantic Ocean. It is flanked on both sides by a series of islands making up the Soku communities with a population of nearly 20,000 persons (Ezekwe *et al*., 2015; Igwe *et al*., 2016). According to Ezekwe *et al*.(2015), the area is among the swampiest of the ecological zones, under tidal influence. They added that the vegetation around the river is made up of mangrove ecosystem (intermingled with other rain forest and raffia palm species; dominated by *Rhizophora racemosa, Rhizophora mangle, Rhizophora harrisonic,* and *Avicenia africana* (Abere and Ekeke 2011).

The climate of this area is tropical hot climate characterised by sustained high temperatures and rainfall and all year long precipitation, with a reduction in the month of August and between the months of December and February, each year (Ezekwe and Edoghotu, 2015)

The river is economically important to Rivers State and Nigeria at large, as it hosts the Soku Oil and Gas Fields (IUCN Niger–Delta Panel, 2013; Ezekwe *et al*., 2015; Igwe *et al.,* 2016), and hosts three flow stations providing 100% of total gas feedstock to the Nigerian government owned Bonny LNG terminal (Ezekwe *et al*., 2015). It is also very vital to the communities around it as the residents are predominantly fishers. However, this river has been severely impacted by oil pollution, leading to the degradation of forests, depletion of aquatic fauna and destruction of biodiversity (IUCN Niger–Delta Panel, 2013; Ezekwe *et al*., 2015; and Igwe *et al.,* 2016) which will in no small way impact the fishery of the river.

Despite these issues and the importance of the river to all stakeholders, there is paucity of information on the fishery activities of this river. Few works on the fishery of the area by IUCN Niger–Delta Panel (2013), and Igwe *et al.* (2016) reported that, the predominant and primary economic activity in the River /area is fishing followed by petty trading. They added that the fishery is artisanal, as the gears and vessels used are traditional; requiring huge effort that yields a low catch per unit effort. The IUCN Niger–Delta Panel (2013) further reported that the fishing is carried out at both commercial and subsistence levels. Detailed studies on aspects of the fishery such as; the fishers' gender, age-class, among others, are not available.

The key objective of this study therefore is to assess the status of the fishery of the St. Bartholomew River, and its influence on the socio-economic livelihoods of the fishers. The information generated from this study is expected to be of great importance in developing and managing sustainably the fishery of the St. Bartholomew River, in a way that will eventually enhance the socio-economic livelihoods of the Soku communities dependent on the river. This will go a long way in mitigating /eradicating restiveness and conflicts associated with this area.

MATERIALS AND METHODS

Study Area and Sampling Site Selection

The study area is the Saint Bartholomew River commonly referred to as San Barth River, Figure 1. It is located in the Southern tip of the Niger Delta Basin, in the Akuku-Toru local government area, Rivers State, Nigeria. Ezekwe *et al*. (2015) reported this river to be located within latitudes 4o 38' 50''N and 4o 42' 05''N and longitudes 6o 35' 45''E and 6o 41' 03"E.

The study used multistage sampling techniques. The first stage involved random selection of fishing villages as sample points along the course of the St. Bartholomew River. Six (6) villages/communities along the San Bartholomew River were selected and titled as follows; Station A- Oru-Sangama; B - Elem Sangama; C - Ekine ama (Bush bar); D – "Russia" Community; E – Soku; and F- Ben-Ama. The second stage was the random selection of a total of 90 respondents with Fifteen (15) from each

community to form a sampling frame from the six (6) sample stations.

The respondents were gathered together and engaged for a Focus Group Discussion (FGD) in each community, where the structured questionnaires were administered.

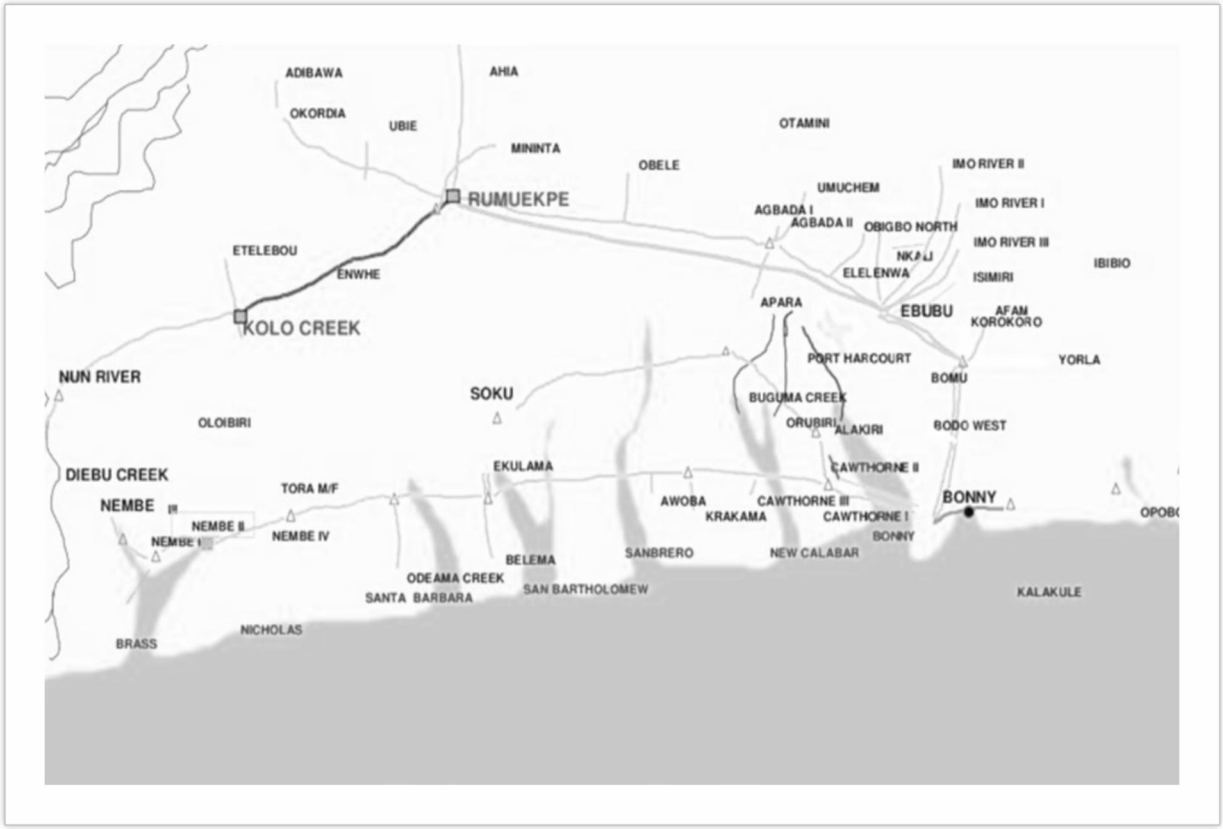

Fig. 1. St. (San) Bartholomew River and Soku Community (Google maps).
Source: https://groups.google.com/forum/#!topic/usaafricadialogue/Ixs2z2vrrpk

Sources of Data and Data Collection

The data for this study was collected from the questionnaires. A total of 90 structured questionnaires were prepared and 15 administered for each sample station to solicit information from the respondents. In a situation where the respondents could not read or write, personal interviews were carried out and the responses entered into the questionnaires.

The categories of data for the study were as follows;

i. Occupational activities of natives
ii. Fishing Activities (Fishing type, fishing vessels, fishing gears)
iii. Fishers' Information (fishers' sex, proportion fishing among sexes, age distribution of fishers)
iv. Fishers' Catch Assessment (daily catch, catch sizes, quantity, daily income).

Method of Data Analysis

The data collected from the respondents was subjected to analysis using descriptive statistics.

RESULTS

Occupation/Economic activities of Respondents

The occupation/economic activities of the natives at all sample stations (A to F) of the study area (Figure 2), revealed fishing as the predominant economic activity as a majority (70-95%) of the respondents were fishers, few were farmers (4-20%) and a very insignificant number did other jobs (1-5%).

However, in the F station, farming (20%) was a fairly prominent economic activity.

Engagements in Fishing

Distribution of respondents based on engagements in fishing (Figure 3) showed that, full time fishers (70-95%) predominate in all the communities while a lower percentage (5-30%) engaged in part-time fishing.

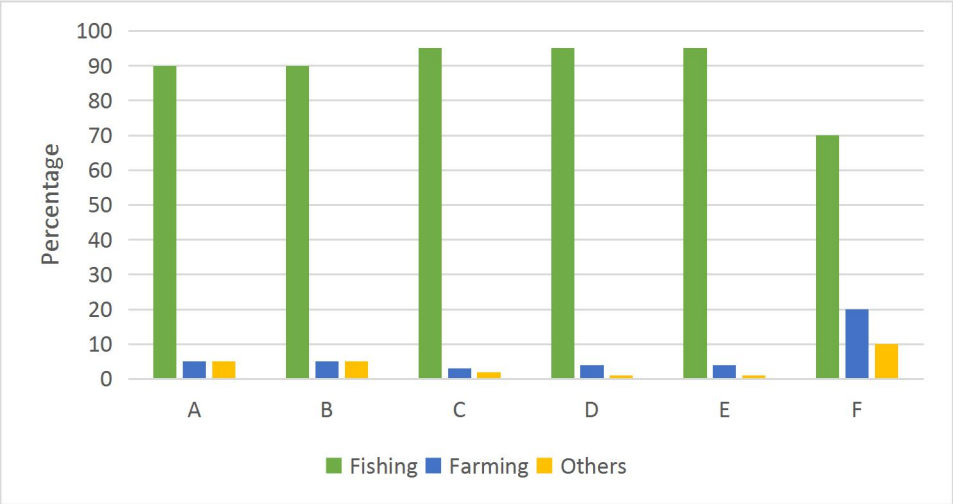

Fig. 2. Distribution of Respondent on Main Economic Activities

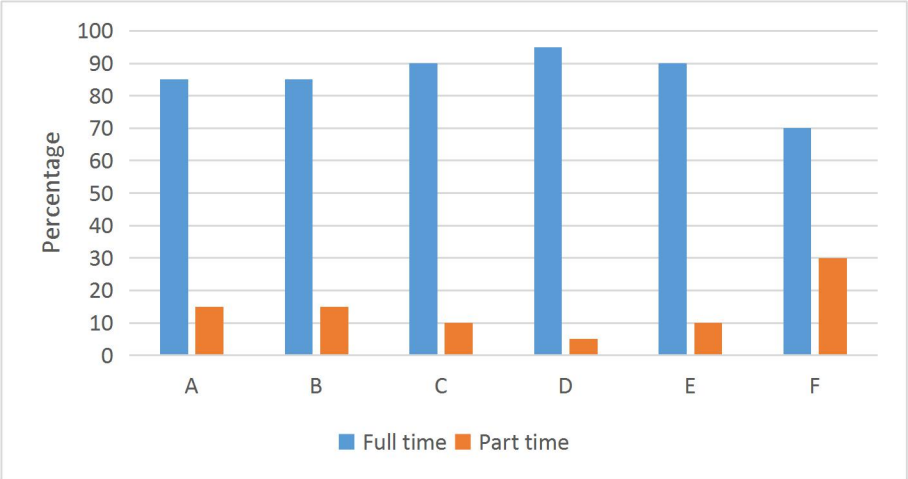

Fig. 3. Distribution of Respondents Based on Engagements in Fishing

Fishers' Information

Fishers' gender and Proportion fishing among genders

Considering the gender of fishers in the sampling stations (Figure 4) both males and females were actively involved in fishing in all the stations. However, in station F, majority of the fishers were males while few were females. The overall percentage of male to female fishers (as shown in bar G) revealed that, 20% of the respondents engaged in fishing were females, while 80% were males. However, the F station recorded a higher (45%) female involvement than other stations.

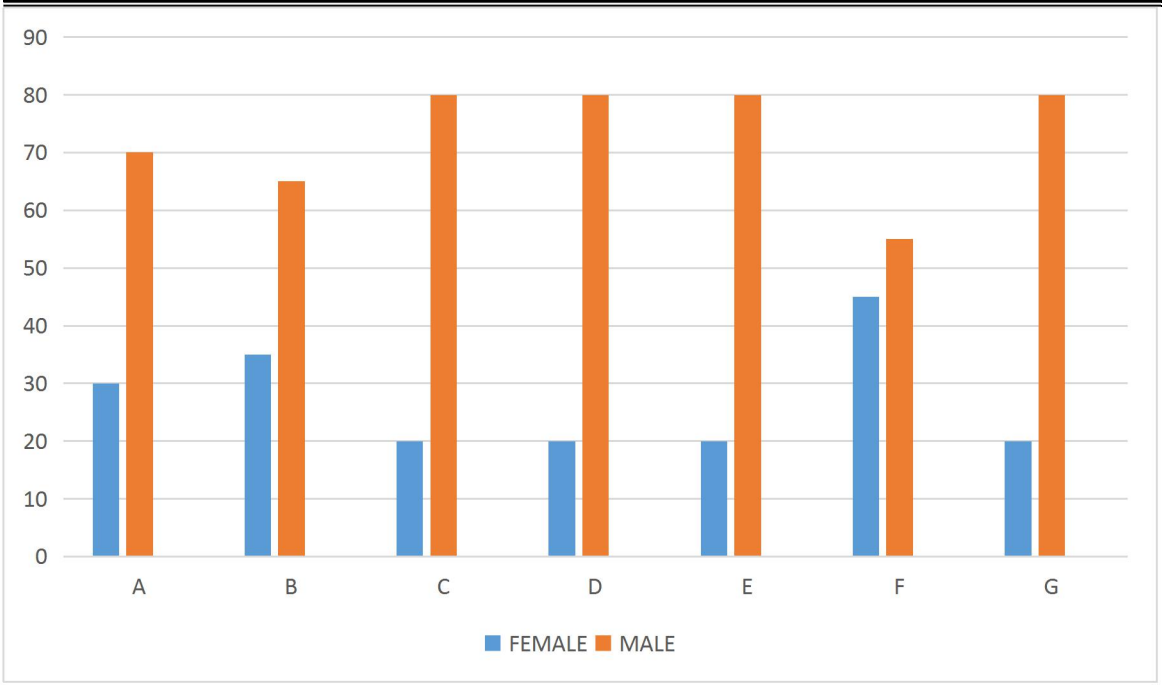

Fig.4. Distribution of Respondents based on Gender.

Age distribution of fishers

The age distribution of fishers (Figure 5) revealed that, stations A – F have majority of their fishing population, both males and females between the ages of 18 and 50. However, in station F, age of fishers was within two categories: 18- 30 and 31 – 40, regardless of gender.

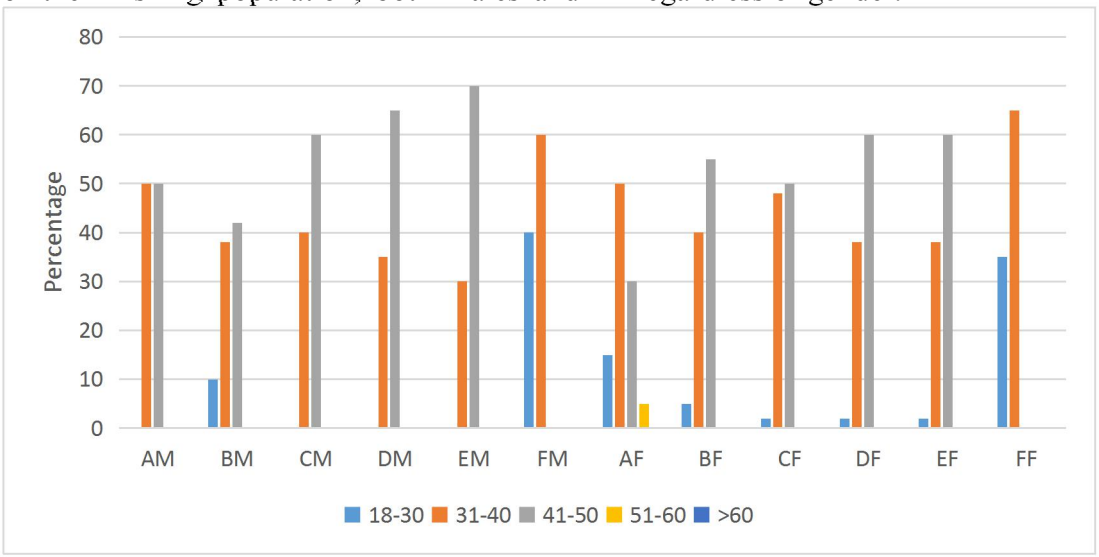

Fig. 5. Age Distribution of Male and Female Fishers. (Note: AM-FM represents male fishers while AF-FF represents the female fishers).

Fishing Type/Fishing Vessels

In all sample stations, the fishing activities revealed the use of Canoes as the sole fishing crafts. The Canoes were dugout wooden boats that are of different sizes. Some were motorized with outboard engines while others used paddles. Other forms of fishing vessels were not employed. Majority (70-95%) of the fishers (Figure 6) used paddles to move their canoe, whereas only a few (5-30%) use outboard engines to power their canoes. In station F unlike Stations A to E, 30% of the fishers used out-board engines to power their Canoes.

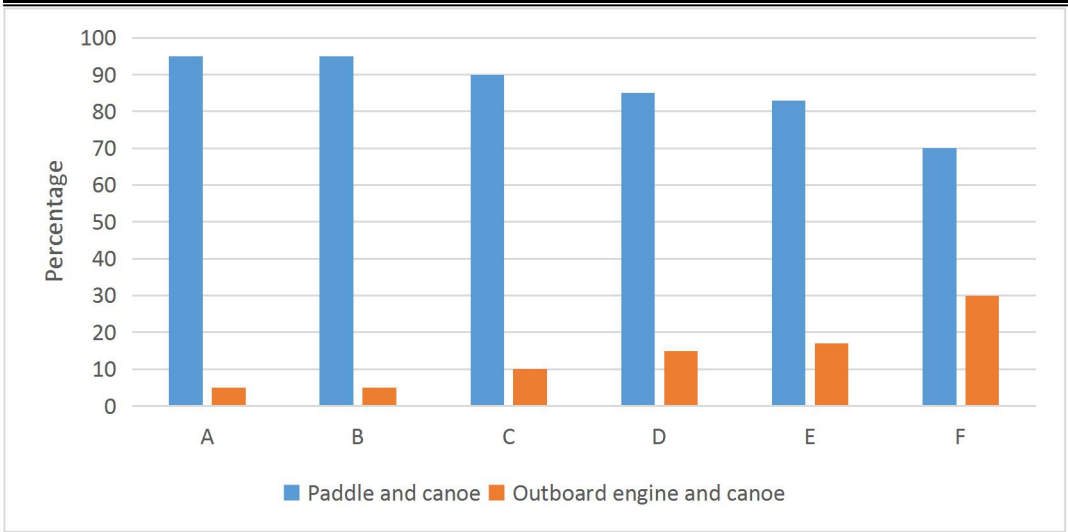

Fig. 6. Frequency distribution of respondents based on fishing craft type.

Fishing Gears and their uses

Fishing gears of the St. Bartholomew River Fishery, varied in types, shapes and sizes. The mesh sizes of the nets also varied from ½", 1", 1½", 2", 2½" to 3".

The female fishers used the light fishing gears (basket and non-return valve traps) as shown in Figure 7, while the male fishers were observed to use mainly the heavy fishing gear; nets (cast nets, seine nets, gill nets, circling nets), and hook bearing gears (the long lines and hook and line), as shown in Figure 8.

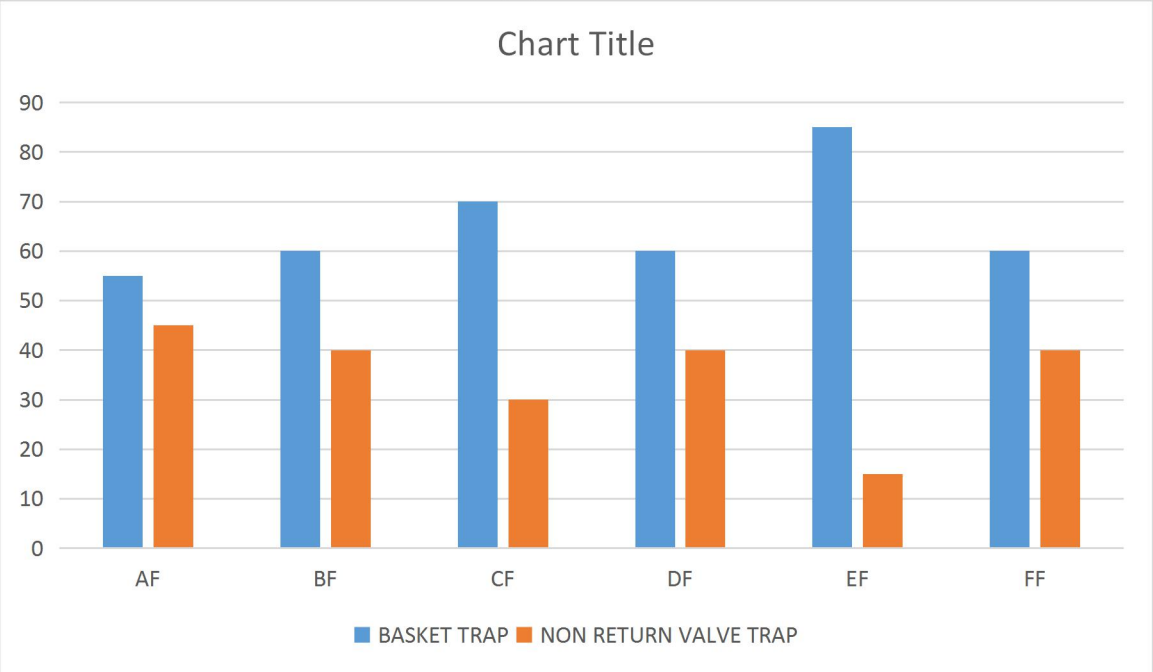

Fig.7. Distribution of female respondents based on type of fishing gears

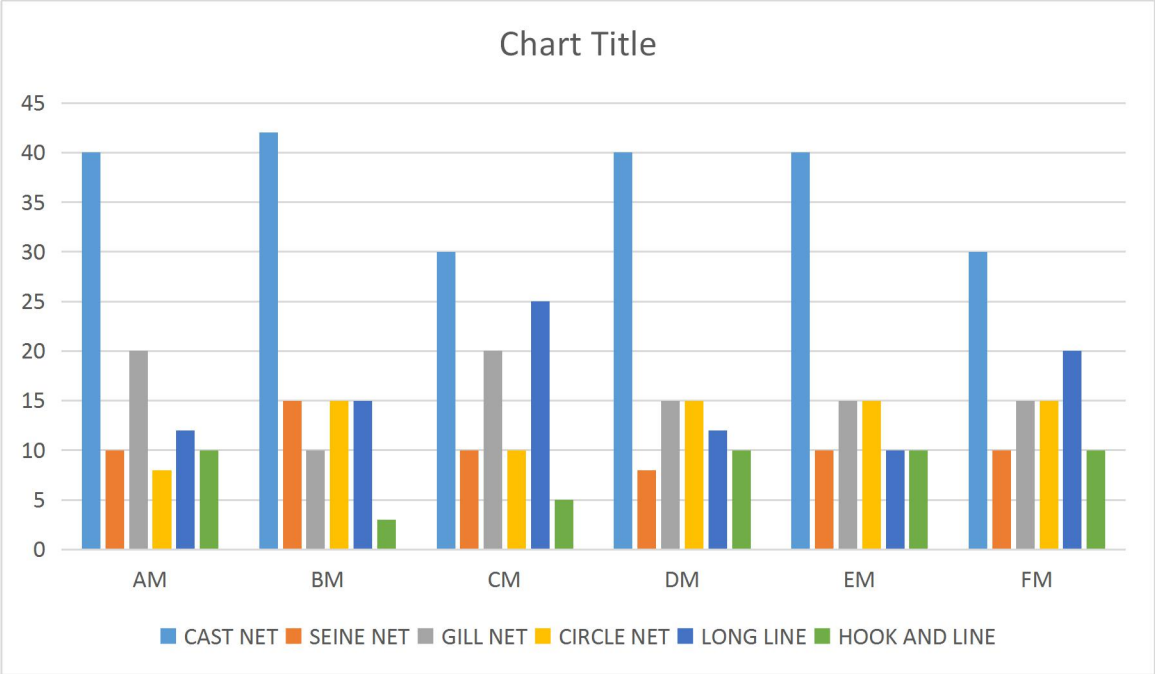

Fig. 8. Distribution of male respondents based on type of fishing gears

Fish Catch Composition

The fish catch in the study area (Figure 9),comprised of 10% of small(0 – 20cm) and medium sized fish (21-40cm), and 50% of larger fishes (51cm and above) in station F, whereas in station A – E stations fishers caught more(80%) of small sized (0-20cm) fishes.

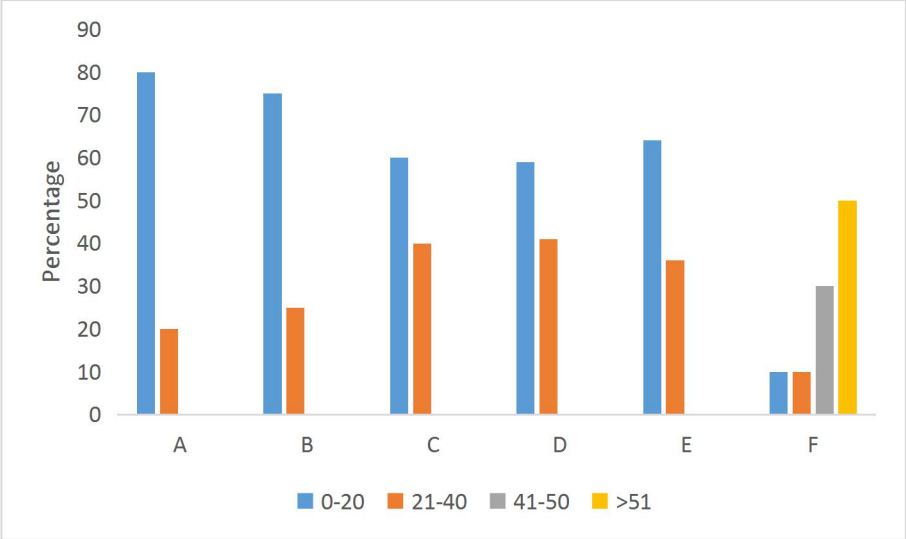

Fig. 9. Fish Catch Composition of Respondent

Daily income

The data on the income generated per day (Figure 10) revealed that, fishers in Station A made lower incomes as 70% realized between ₦100 - ₦5,000 daily, whereas in Station F fishers make the highest daily income as 60% of fishers realized above ₦50,000 daily.

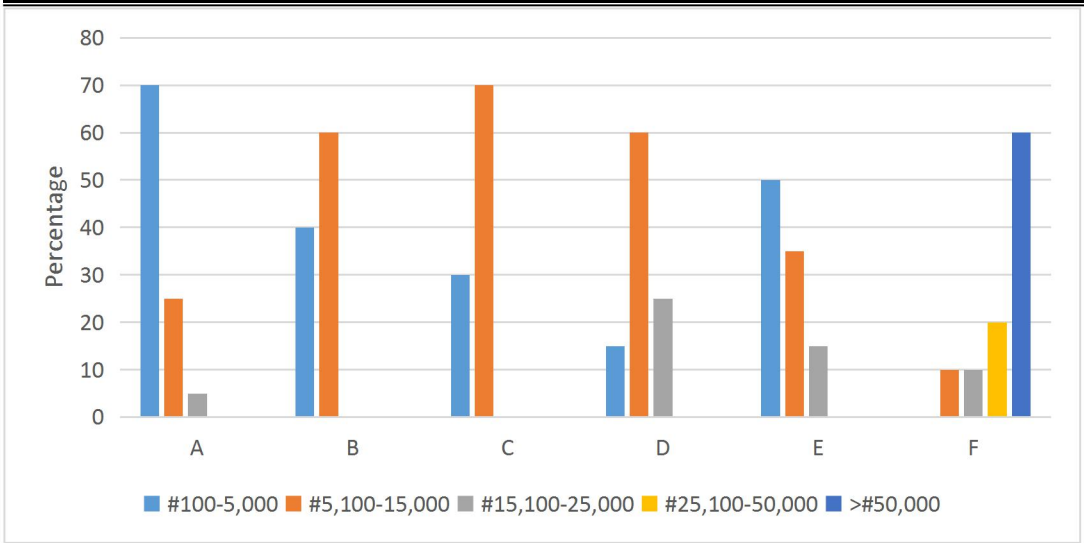

Fig.10. Distribution of Respondents on Daily Income Generated.

DISCUSSION

The study confirmed that, fishing is the predominant economic activity of the natives of all the communities along the St. Bartholomew River, even though a few other economic activities were observed. This is in agreement with previous report by the IUCN Niger–Delta Panel Report (2013), and Igwe *et al.* (2016). The IUCN Niger–Delta Panel Report (2013) added that the fishing is carried out at both commercial and subsistence levels and farming is another prominent economic activity. Fishing as a means of livelihood to most people inhabiting areas where water bodies are found especially in rural areas (Ahmad *et al.,* 2018). According to Igwe *et al.* (2016), one of the minor economic activity of the inhabitants along the St. Bartholomew River was petty trading in goods. Fishing being the primary economic activity is synonymous with many riverine communities around the world. Gwary *et al.* (2014), reported that communities around Lake Alau near Maiduguri and other surrounding local government areas utilize the lake for fishing activities.

In St. Bartholomew River, fishing was reported to be either full time or part time but mainly full time. This is in agreement with many fishing communities. Gwary *et al.* (2014) stated that, fishing is an essential full or part time occupation in areas where riverine or coastal offshore resources are more abundantly available. Arowolo and Awotunde (2004) reported that fishing is often a part-time job for supplementary household income by those engaged in other activities

The fishery of the river revealed that the fishers in all the sample stations used wooden dug-out canoes operated with engines or paddles, as their fishing vessels, with the station F (Ben –Ama) having more fishers using out-board engines to power their canoes. Also, the various fishing gears reported to be operated in the study area were simple traditional gears. This confirms that, the fishery in the area is artisanal. This is in agreement with the IUCN Niger–Delta Panel Report (2013) and Igwe *et al.*(2016) who reported that, the fishers observed in communities sampled in the Soku area were all artisanal or small scale fishers operating dug-out wooden canoes of which some were motorized and others were not. Artisanal fishery is said to be an economic activity which is characterized by the use of dug-out, wooden canoes that are often not motorized, operated by individual or small groups using labour intensive gears of relatively low level of productivity (Fregene *et al.*,2003; Gwary

*et al.,*2014). This artisanal fishery is a level of economic activity common with fishers in rural fishing communities, as observed in Lagos and Rivers States (Adesehinwa and Bolorunduro (2007); Suleiman and Fregene, 2011). Igwe *et al.* (2016) also reported this to be the popular mode of fishing prevalent in the riverine communities of the Niger Delta. Fregene *et al*. (2003) reported that, artisanal capture fisheries characterize fishing activities in Nigeria. Furthermore, FAO (2008) reported that, 6.9% of the world fishermen are engaged in artisanal fisheries, and it is the dominant fishing activity in Africa.

The traditional gear types observed in this study were similar to those reported in the IUCN Niger–Delta Panel Report (2013) in some Soku communities. They reported various simple traditional fishing gears that were not complex or modern, and is synonymous with artisanal fisheries of other water bodies in the Niger Delta and its flood plains (Otobo, 1995; Udolisa, 1994; Fregene *et al*., 2003). Artisanal fisheries are characterized by the use of labour intensive gears with relatively low level of productivity, a situation that has been aggravated by the inability of the rural fisher folks to acquire formal education and in turn adopt modern gear technology (Gwary *et al.,* 2014)

Small sized fish predominated the catch from all the stations, with the exception of Station F (Ben-Ama community) which recorded larger fish in the catch. This observed catch was in agreement with IUCN Niger–Delta Panel report (2013), which also recorded similar catch in the Soku area. Similarly, following a survey of Soku committees, Igwe *et al.* (2016) reported the prevalence of small-sized catches by the fishers. However, catch is dependent on the time/season of fishing, type of gear, status of exploitation, and most of all environmental degradation from Hydrocarbon pollution. Seasons play a key role in catch status in the fisheries of any river. Other factors could be responsible for the small sizes of catch experienced. The IUCN Niger–Delta Panel Report (2013) revealed that, total hydrocarbon concentration (THC) in the form of the oil and grease concentrations recorded for the surface water samples in the Soku area was in the range of 1.15 – 9.15mg/l, which indicated high levels of hydrocarbon contamination, higher than previous records in polluted sites elsewhere in the Niger Delta. This level of pollution is capable of drastic fish kills or even repel fishes to other rivers far away. Igwe *et al.* (2016) reported prevalent poor (small- sized) catches in the study area, driven by increased demand for fish by increasing population, worsened by over exploitation and unethical fishing methods such as blast fishing. These unwholesome practices they reported, killed fishes indiscriminately and none selectively, and fishes of all ages were killed leaving none to reproduce and replenish the river except seasonal migratory species. NEDECO (1980) reported declining fish catch in the Niger Delta, as in many other parts of the country, due to fishing pressure, and this has been a major problem in the world affecting fish populations. Abowei and Hart (2008), in their study in the Nun River reported that, as fishing in the river is intensified, the catch per unit effort gets lower. Also, Gwary *et al.* (2014) reported that, traditional gears have their limitations for fish catch .

The daily income of fishers operating in the study area revealed that, the capital accruing from sales of fish varied with sizes fished from community to community. Most of the communities along the St. Bartholomew River recorded low daily income, with exception of Ben Ama fishers. This low daily income will naturally translate into low standard of living of the fishers in the study area. On the contrary, station F (Ben Ama community) which had more larger fish in their catches, earned more than others from sales of fish and thus would have better livelihoods. The low daily income of fishers in some communities is in agreement with

the findings of Igwe *et al.* (2016), in the Saint Bartholomew Soku area. According to Abowei and Hart (2008), in the Nun River, Niger Delta basin, the variation in the average income per fisher was attributed to the productivity of the area, and the low estimated income per fisher translated to low living standard of people in the area. One major issue affecting the livelihoods of fishers according to Alam *et al*. (2012) is that, at the primary markets fishermen lack bargaining power and market information. Meanwhile, price is determined by direct bargaining between the sellers and buyers. The lack of bargaining power is mostly due to the highly perishable nature of fish as a commodity and the gluts experienced at certain periods. This is the experience of many developing countries where artisanal fishermen operate (Suleiman and Fregene, 2011).

Livelihoods and food security of millions of people across the world are supported by small-scale fisheries", and this has been known to be capable of contributing tremendously to socio-economic development of fishing communities (Suleiman and Fregene, 2011). Ahmad *et al*. (2018) thus stated that, if artisanal fisheries are managed appropriately, it can make tremendous contributions to socio-economic development of fishing communities.

In the fishery of the St. Bartholomew River, fishers consisted of males and females. Although the ratio of male to female fishers varied with the males being more dominant in the activity from community to community, there was generally an active involvement of both gender. In station F (Ben-Ama) the females and males were equally active fishing in fishing. This dominance in fishing is natural with fishing communities. In agreement, IUCN Niger–Delta Panel (2013), and Igwe *et al.* (2016) in the Soku area reported that, while the men folk engaged in fishing actively, the women were known to pick/fish seafoods such as periwinkles, shrimps, African Scallop, Oysters, Clams, Mussel, and Cockles. This is in agreement with IUCN Niger–Delta Panel Report (2013), where the artisanal shell fishery of the women fishers was reported to be a very active, age long engagement, which cannot be underestimated as an important component of the fishery in the area. They added that Shrimps, one of the leading highly priced sea foods, is harvested by fishers in Soku creeks by small scale fishers. They added that, male fishers fish around the larger water bodies and nearshore areas, while the women and children and men who lack boats pick/ harvest Oysters. Similarly, in a survey of Soku area. Igwe *et al.* (2016) reported that, the men and the women folk are engaged in fishing, though the women were known to pick several seafoods including periwinkles. This Periwinkle (Isam) fishing they added, is a type of fishing not common in the Niger Delta, practiced almost exclusively community by the Soku people, sparingly by Obonoma a community near the neighbouring town of Abonnema North of Soku.

In agreement with the situation in station F (Ben-Ama) where the females and males were equally actively fishing, women have been reported to be as active as men in the fisheries within the Kainji Lake area, with some cases of even greater activities by the women (Olowosegun *et al*., 2004). Contrarily, Wokoma (1991), Shallesha and Stanley (2000), Ibim and Francis (2014) reported that, in most fishing settlements, women are mainly involved in fish processing while the men fish.

The age distribution of the fishers in this study revealed that the respondents in all the communities belonged to the active segment of the population, as they were mostly young energetic and vibrant people, and even those of station F (Ben-Ama community) were even younger. This is in agreement with the findings of Olowosegun *et al*. (2004) who reported similar young population (age-class) fishing in the Kainji

Lake. They added that this age-class can have positive effect on the business aggressiveness of the respondents. Also the artisanal fishing industry in Kebbi State is dominated solely by fishers who are within the productive age bracket, and are mainly small scale but full time operators, with varying degree of experience in the art of fishing. Hence the art of fishing could be sustained in the state (Suleiman and Fregene, 2011).

CONCLUSION AND RECOMMENDATION

It is therefore concluded that, 5 out of the 6 communities involved in the Saint Bartholomew River fishery are poor artisanal male and female fishers, while the sixth - Ben –Ama community fishers were doing well and thus had a better standard of living. The improved livelihoods of the station F (Ben Ama) can be attributed to involvement of young active persons in the fishery, equal gender participation as well as, adoption of improved fishing technology. In addition, the catching of large size fish and value of catch, resulting in better income would have greatly enhanced the livelihoods of the Ben-Ama community.

It is therefore recommended that stakeholders engage, educate and empower the other poorer communities (Stations A-E), in order to stimulate the development of the fishery, for sustainable socio-economic livelihoods in these communities.

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