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## LIVELIHOOD CHARACTERISTICS OF COMMUNITIES OF STUBBS CREEK FOREST RESERVE IN AKWA IBOM STATE

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### **Abstract**

*This study examined the livelihoods conditions of rural communities in Stubbs Creek Forest Reserve in Akwa Ibom State of Nigeria. A total of 400 heads of households randomly sampled from eight communities in the three local government areas of Mbo, Ibeno and Esit Eket were utilized for the study. A structured questionnaire was used to elicit responses from each of the household heads. It is recommended that government at various levels should address the neglected socio-economic services to the people in the study area in exchange for the forestland taken away from the people in order to reduce their level of poverty and improve their standard of living. The result revealed lots of very strong positive correlation coefficients between the forest reserve livelihood variables and socio-economic activities. The livelihood activities of the people are tied to the forest and as such the communities should be made stakeholders in the management of the reserve. The reserve has a lot of potentials ranging from tourism, beekeeping, grass cutter farming to mushroom and snail farming to promote the socio-economic activities of the people and the communities. It is recommended that the forestry Department in charge of the management of the stubb creek forest reserve should come up with skill acquisition programmes aimed at imparting entrepreneurial skills to the forest communities so as to help improve their socio-economic activities and livelihoods.*

**Keywords:** *Stubbs Creek, Forest reserve, livelihoods, Akwa Ibom State*

### **Introduction**

Rural livelihood is considerably connected to natural resource base and particularly arable land; and the dominant livelihood strategies include crop cultivation, livestock keeping, bee keeping, fishing, collection of forest products (timber and non timber) and tourism activities. According to Adekunle, Oloruntobe, Ajibola and Agbaje (2011) the rural economy is highly dependent on forest resources to generate income, provide food, medicine and religious activities. The rural inhabitants depend on forest resources such as edible leaves, wild animal products, edible fruits, wrapping leaves, mushrooms, snails, aquatic fish, palm wine and honey. Aruwajoye and Ajibefun (2013) opined that forest communities rely heavily on forest resources as a source of livelihoods. These include collection of edible fruits, flowers, tubers, roots and leaves for food and medicines, firewood for cooking, materials for agricultural implements, house construction and fencing, fodder for livestock and the collection of a range of marketable non-timber forest products.

According to Mmom and Mbee (2013), the history of man's dependence on natural forest resources for survival is as old as the origin of man. Thus, since ages, man has harvested forest resources for food,

shelter and as means of survival. However, increasing demand for forest resources leads to the destruction of biodiversity and loss of their values in the survival of mankind. Against this background, forest reserves are created as a strategy for conserving biodiversity from net loss. These reserves are ideally protected against unauthorised access. The British Colonial Government could be credited for spearheading the establishment of forest reserves in Nigeria, though, with the interest of ensuring a continuous supply of timber and other forest resources to its home industries.

Nadkarni (2006) wrote that the economic benefits of the forest are usually measured in monetary terms and may include income from employment in the sector, the value of the production of goods and services from forest, and the contribution of the sector to the national economy, energy supplies and international trade; and further asserted that the social functions of forest are often more difficult to measure and can vary considerably among countries, depending on their level of development and traditions. In developed post-industrial societies the benefits of forests for recreation and amenity values or the maintenance of a rural way of life may be most important while in developing countries, the area of forests available for subsistence activities or the number of people employed in the sector may be a better indication of their social values. This implies that a wide variety of variables could be measured to ascertain the benefits of forest, such as production and consumption, recreation and tourism, funding and investment in the forest sector; cultural, social, spiritual needs, values, forestry employment, health, safety and community needs.

Socio-economic activities are the various activities people can get involved in to improve their livelihood in the forest reserve. Majority of the rural populace in Nigeria either depend entirely on farming and farming activities for survival and generation of income, or depend on these activities to supplement their main source of income (Olawepo, 2010). According to Etim and Edet (2014) the predominant occupation of most rural communities in Akwa Ibom State is farming. The World Bank (1995) described rural farmers in Nigeria as small scale operators, tenants or landless characterised by low income, high nutritional deficiency, large family size, high dependency and limited assets. One can agree with Nchukuwe and Adejuwon (2012) that farming which is a subset of agriculture also has a higher multiplier effect, which means that investment in farming, can generate high economic and social returns and enhanced diversification as well as social development. The significance of rural farming cannot be over emphasised as rural areas form the food basket of the nation and a major source of export materials.

According to Akpan-Ebe (2001), the Stubbs Creek Forest Reserve (Amendment) Order, 1955 clearly spelt some rights left for the natives, which include among others the right of way, right to fish, to collect palm produce and of the palm wine and the right to royalties. However, the principal rights of the land were forfeited by the original owners of the land to government following the change in status of the forestland. Olawuyi and Rahji (2012) observed that a total restriction on the reserve to the communities has been on for some decades. This shows that the concern of government is majorly on the conservation of biodiversity without recognising the plight of the natives who believe that the forestland and what goes with it are their inheritance and sustenance.

According to Adekunle *et al.*, (2011) the rural socio economy is highly dependent on forest resources to generate income, provide food, medicine and religious needs. The people depend on forest resources such as edible leaves, wild animal products, edible fruits, wrapping leaves, mushrooms, snails, aquatic fish, palm wine and honey. The major challenge facing forest resources management is the inability to manage the forests and its resources to meet with the social, economic and ecological needs of the people. The present system of forest reserve management denies the indigenous communities their traditional rights and responsibilities for the care and stewardship of those resources, thus increasing the level of poverty and hardship (Dudley *et al.*, 2008). Available space for farming is reduced thereby causing people to migrate from one farmland to another looking for available place to farm. Also, the traditional African worshippers are prevented from getting access to their traditional place of worship which in most cases is in the forest (Kaimowitz, 2003). It is against this background that this study examined the livelihoods conditions of the people and communities of the Stubbs Creek Forest Reserve.

### **The Study Area and methods of study**

The Stubbs Creek Forest Reserve is situated in the tropical mangrove rainforest region of Akwa Ibom State, Nigeria and lies approximately between latitudes 4°32' and 4°38' north of the Equator and longitudes 7°54' and 8°18' east of the Greenwich meridian (Olajide and Udofia, 2008). The Stubbs Creek Forest Reserve is bounded on the east by Mobil Producing Nigeria Unlimited (MPNU) installations. It lies between the estuaries of the Cross River and Qua Ibo River and Ntak to the west and Okposso and Unyenge communities adjacent to the Bight of Bonny (Atlantic Ocean) on the south and Stubbs Widdenham Creeks on the north (Olawuyi and Rahji, 2012). According to Akpan-Ebe

(2001) a greater part of the Stubbs Creek Forest Reserve is sandwiched between the Stubbs Creek to the north and Douglas Creek to the south both of which run parallel to Qua Iboe River estuary Figure 1).

The reserve cuts across three Local Government Areas of Esit Eket, Ibeno and Mbo as shown in Figure 1. Stubbs Creek is predominantly fresh water swamp forest that seasonally floods in some zones. It also comprises brackish-water swamp forest, mangrove forest in the eastern end of the reserve, secondary forest farmland, palm, bush and abandoned farms. The Stubbs Creek Forest Reserve was first created in 1930 by the Colonial Government of Nigeria under Order 45 which was further amended in 1941, 1955 and 1962, published in the gazette in 1955 as a forest reserve (Baker, 2003). According to Olajide and Udofia (2008), the Stubb Creek forest reserve currently covers an area of about 150 km<sup>2</sup> of land out of the original 310.80 km<sup>2</sup> at the inception. The reserve has rich floristic and fauna composition. The vegetation is a mosaic of lowland rainforest and mangrove swamp forest with a rich collection of mangrove species like *Rhizophora racemosa*, *Rhizophora harisonii*, *Rhizophora mangle*. Others include *Pterocarpus species* (Ukpa, African Nut), *Lophira alata* (Red Iron Wood), *Uapaca guineensis* (Sugar Plum), *Drypetes floribunda*, *Enantia chlorantha* (African White Wood) and *Sacoglottis gabonensis* (Cherry Palm). There are a host of herbs, climbers and grasses which play prominent roles in trade-medical, culinary and socio-economic life of the people.

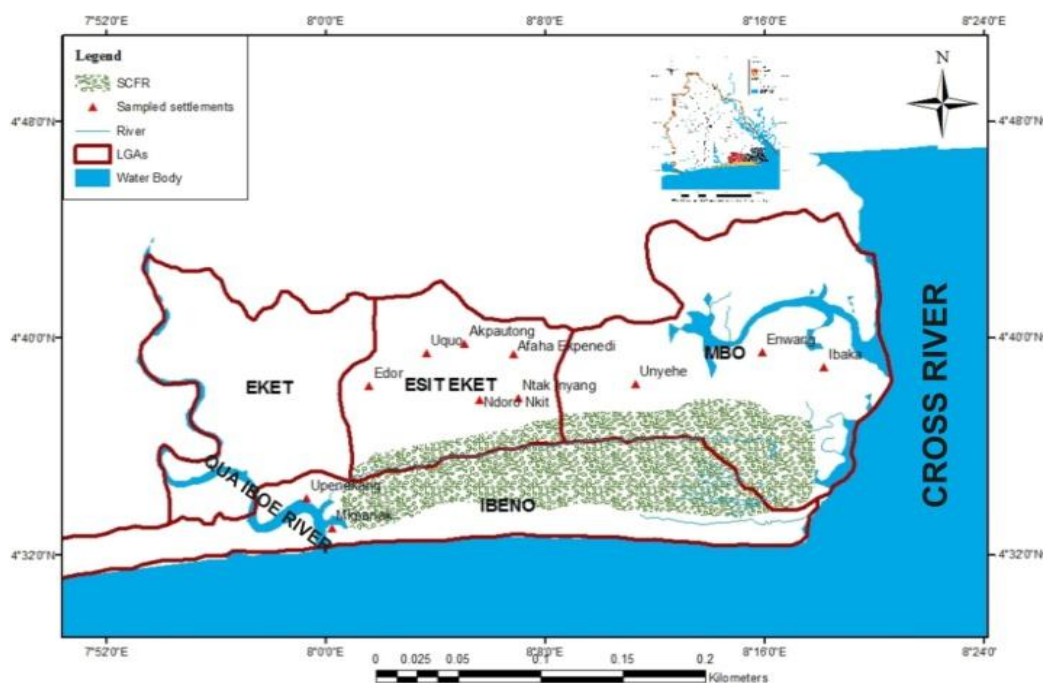


Figure 1: Location of Stubbs Creek Forest Reserve (SCFR) and Sampling Settlements

Source: Department of Geography, GIS Laboratory, Uniuyo (2013)

The survey method was adopted for this study using questionnaire as tool for data collection. A sample of 400 household heads as respondents was utilized for the study. Data was collected on socio-economic activities of the people to reveal their livelihood conditions. The research population was the household heads of the communities under study as shown in Table 1. According to the 2006 population census released by the Nigerian National Population Commission the population of the study communities was 56552 persons and using the national growth rate of 3.2 percent as estimated in Nigerian Demographic and Health Survey 2013, the population was projected to 2018 using the compound interest formula.

Table 1: Localities and their Projected Population

Localities	2006 Population	2018 Projected Population
Ntak Inyang	1,868	2,511
Udoro Nkit	2,613	3,513
Unyenge	3,931	5,285
Edor	4,251	5,715
Uquo	9,372	12,521
Ibaka	1,913	2,572
Enwang	2,655	3,569
Ukpenekang	10,578	14,222
Mkpanak	10,355	13,921
Akpautong	6,536	8,787
Afaha Ekpenedi	2,479	3,332
Total	56,552	75,948

Source: Adapted from National Population Commission (2006)

The population for the donor communities of the three local government areas where Stubbs Creek Forest Reserve situates was projected to be 75,948 persons for the year 2018. The sample size for this study was derived using the appropriate statistical formula – Yaro Yamane formula. The choice of this formula is informed by its reliability as it takes into consideration the population size and the level of error allowed. This formula is given as:  $n = \frac{N}{1 + N(e)^2}$ : where n = sample size, e = the tolerable level of error (5 percent), N = the population size being studied (Udofia, 2011). This implies that:  $n = \frac{75,948}{1 + 75,948(0.05)^2} = 396$  approximately 400 persons. Eight communities were sampled out of eleven for questionnaire administration. The communities are Ntak Inyang, Ibaka, Odoro Nkit, Afaha Ekpenedi, Edor, Akpautong, Nkpanak and Uquo.

### **Data Presentation and Discussion of Result**

Socioeconomic characteristics of respondents in the study area are an economic and social measure of individual respondents and families and this reflects the socio-economic status of the various communities studied as presented in Table 2 below.

Table 2: Socio Economic Characteristics of Respondents

		Uquo	Mkpanak	Akpauton g	Edor	Afaha Ekpenedi	Odoro Nkit	Ibaka	Ntak Inyang	Total	%
Gender	Male	73	87	60	40	22	26	20	19	347	86.75
	Female	22	18	6	3	3	-	-	1	53	13.25
Marital Status	Married	71	91	56	38	24	24	18	17	339	84.75
	Single	18	10	8	5	1	1	2	3	47	11.75
	Widow/widower	6	4	4	-	-	-	-	-	14	3.50
Age	41-50	10	35	20	10	3	7	9	4	98	24.50
	51-60	78	55	40	30	22	18	10	15	268	67.00
	61-70	5	10	6	3	-	1	1	1	27	6.75
	71 and above	2	5	-	-	-	-	-	-	7	1.75
Household Size	1-5	30	43	20	12	5	5	2	2	119	29.75
	6-10	50	48	40	30	8	16	10	3	205	51.25
	11 and above	15	14	6	1	12	5	8	15	76	19.00
Educational Attainment	Non formal	41	25	10	10	4	3	2	4	99	24.75
	Primary	36	45	23	25	11	10	8	12	170	42.50
	Secondary	15	30	32	8	10	13	10	4	122	30.50
	Tertiary	3	5	1	-	-	-	-	-	9	2.25
Occupation	Farming	46	27	9	4	3	5	3	16	113	18.80
	Fishing	06	26	-	2	-	-	15	4	53	8.82
	Trading	61	75	28	28	18	10	5	4	229	38.10
	Civil servant	5	10	7	2	-	4	-	1	29	4.83
	Artisan	59	48	29	14	9	8	4	6	177	29.45
Distance to Reserve	0km – 1km	25	10	14	4	7	7	9	15	91	22.75
	2km – 3km	40	25	12	9	5	6	4	2	103	25.75
	4km – 5km	23	30	15	10	10	9	6	2	105	26.25
	6km and above	7	40	25	20	3	3	1	1	101	25.25
Income Level per Month	₦10,000-20,000	45	15	42	20	13	14	8	12	169	42.25
	₦30,000-40,000	25	30	18	18	10	10	9	6	126	31.50
	₦50,000-60,000	20	40	-	4	2	2	3	2	73	18.25
	₦70,000-80,000	4	12	3	1	-	-	-	-	23	5.75
	₦90,000 above	1	8	-	-	-	-	-	-	9	2.25

Table 2 shows that the ages of the respondents clustered around 51 – 60years, thus making the respondents relatively mature enough for the information gathered. The socio-economic characters of the respondents showed that this age group has the highest number of respondents (67.00%) and thus, implies that majority of the respondents were in their active working period. Majority of the households were male while few were female, hence, it means that some women are household heads. Most of the respondents (42.5%) completed Primary School, 24.75% had no formal education and 30.50% had secondary education, while post secondary education (2.25%) recorded the least. In terms of the household size, the result shows that 29.75% of the respondents had household sizes of 1-5 persons while larger household sizes of 6-10 accounted for 51.25% of the respondents. Thus, the rural dwellers in these communities still have large family sizes. The most popular occupation in the study area is trading closely followed by artisans and farming, while a few of the people are employed by the government. Majority of the respondents in the study area (42.25%) have very low income of less than ₦30,000.00 per month. Considering today’s exchange rate, the daily income of many is less than \$1 US Dollar per day. This income could be said to be characterised with poverty which is typical of a rural community.

	Income	Male	Female	Age	Household size	Educatio n	Other occupational Activities	Distanc e
Farming	.795*	.813*	-.389	.718*	.916**	.529	-.196	.791*
	.033	.014	.341	.045	.001	.178	.642	.020
Fuel wood	.940**	.857**	-.583	.903*	.943**	.400	-.439	.930**

	.002	.007	.129	.002	.000	.326	.276	.001
Lumbering	.659	.692	.067	.458	.706	.775*	.149	.508
	.108	.057	.875	.254	.050	.024	.725	.199
Snail	.755*	.890**	-.397	.942*	.979**	.436	-.568	.964**
	.050	.003	.330	.000	.000	.280	.142	.000
Netum Spp	.694	.909**	-.385	.850*	.941**	.417	-.425	.889**
	.084	.002	.346	.008	.001	.304	.293	.003
Mushroom	.882**	.812*	-.662	.829*	.736*	.466	-.345	.811*
	.009	.014	.074	.011	.037	.244	.403	.014
Sand mining	.960**	.599	-.237	.501	.667	.738*	.070	.536
	.001	.117	.573	.206	.071	.037	.869	.171
Palm wine	.577	.720*	-.035	.627	.859**	.450	-.225	.692
	.175	.044	.935	.096	.006	.263	.592	.057
Palm Oil Processing	.802*	.907**	-.376	.856*	.961**	.471	-.402	.894**
	.030	.002	.358	.007	.000	.239	.324	.003
Fishing	.920**	.454	-.131	.511	.546	.578	-.105	.497
	.003	.259	.756	.195	.162	.134	.804	.210
Basket Making	.878**	.661	-.553	.726*	.648	.429	-.285	.704
	.009	.074	.155	.041	.082	.288	.494	.051
Wildlife Hunting	.808*	-.125	.656	-.103	.008	.415	.229	-.131
	.028	.768	.077	.809	.985	.306	.585	.758
Broom Making	.808*	.096	.348	.148	.200	.473	.075	.114
	.028	.821	.398	.726	.635	.236	.860	.788
Medicinal Plants	.853*	.713*	-.411	.747*	.898**	.538	-.348	.809*
	.015	.047	.312	.033	.002	.169	.398	.015

Table 3: Correlations of socio-economic and forest reserve livelihood variables

\*\* . Correlation is significant at the 0.01 level (2-tailed), \* . Correlation is significant at the 0.05 level (2-tailed)

In general, the forest reserve livelihood variables had strong correlation coefficient as highlighted above with socio-economic variables such as income, age, male, household size and distance. Weak correlation coefficients were observed mostly with education; the implication is that the educated people prefer to pick up jobs in the city. Other activities showed a negative correlation with the reserve livelihood variables, the implication may be that many of the respondents' major activities are outside the reserve. Female variable did not show any significant correlation, suggesting that female do not participate in forest activities or their few numbers (53) in this study could have influenced the result. The result in Table 3 is further discussed in their various categories.

**Farming Activities:** Farming had a strong correlation coefficient (.795) with income and this implies a strong relationship between farming and income. The implication is that people in the study area do farming to generate income and this agrees with the work of Nchukawe and Adejuwon (2012) that

farming generates high income in the rural areas. Farming had a strong and positive correlation coefficient (.718) with age which shows a strong relationship existing between farming and age. This can be explained that the more people grow in age, the more they pick interest in farming activities and vice versa. Strong and positive correlation coefficient (.813) also existed between farming and male respondents. The more the number of male gender, the more of farming activities carried out and vice versa. This affirms the fact that most of the subsistence farming activities is done majorly by male folk. Although a weak negative correlation coefficient (-.389) was established between farming and the female folk in the study area, this can be interpreted that women are opposed to farming enterprise even in their large number. Farming had a very strong and positive correlation coefficient (.916) with household size. The more enlarged the family size is, the more of farming activities carried out. In other words, larger family sizes provide the needed cheap labour required for farming enterprise. Ultimately, the more food the family will have to feed on and also make some income. An average correlation coefficient of .529 between farming and education implies a moderate relationship. Farming is averagely related to education and vice versa. This is an indication that the educated appreciate and value farming to augment the amount spent on the purchase of food items. Farming has a very weak negative correlation coefficient of -.196 with other activities, and implies that there is a negative relationship existing between farming and other activities, the more people get involved in other socio-economic activities, the less of farming activities they do and vice versa. Farming had a strong correlation coefficient (.791) with distance showing that there is a strong relationship existing between farming and distance. The nearer the distance, the more of farms activities carried out.

**Fuel wood Gathering:** Fuel wood had a very strong and positive correlation coefficient (.940) with income indicating a very strong relationship between fuel wood and income. This shows that the more fuel wood gathered, the more income made from it and vice versa. This indicates that people in the study area gather fuel wood to make income. Fuel wood also had a very strong and positive correlation coefficient (.857) with male gender which is an indication that there is a very strong relationship between fuel wood and male gender, and implies that most men folk are in the business of fuel wood gathering. Fuel wood had a moderately negative correlation coefficient (-.583) with female. Fuel wood gathering had a very strong positive correlation (.903) with age and implies that matured people take up fuel wood gathering as a means of livelihood. A strong and positive relationship (.943) exists between fuel wood and household size in the study area. The larger the household size, the more fuel wood gathered and vice versa. This is so because larger household sizes consume more domestic energy and



therefore need to gather more fuel wood for their domestic energy consumption as well as to make sales from it to boost their income. A positively weak coefficient of .400 was established between fuel wood and education. Fuel wood collection is weakly connected to education which means that education may not have a strong linkage to determine a large amount of fuel wood collected. Fuel wood gathering had a negative correlation coefficient with other activities showing. The more people are occupied with other activities, the less interest they have for fuel wood gathering. Lastly, there is a strong correlation coefficient (.930) between fuel wood gathering and the distance, and this demonstrates the fact that location has a very strong connection with the amount of fuel wood collection. Approximately 40 to 50 percent of the world populace depend on wood for fuel both for warmth and food preparation. In Africa 68 percent of all energy requirements depend on wood supplies (Gbadegesin and Olorunfemi, 2011). It is important to note that fuel wood as human first energy source, is more flexible than other known energy sources and has gained supremacy over other fuel resources mainly because it costs less and in some circumstances obtained free from the environment. In Nigeria, it is reported that about 262,763 metric tons of fuel wood is consumed annually and the utilisation of fuel wood has direct link with the poverty status of the people (Larnde and Olasupo, 2011).

**Lumbering:** Lumbering refers to large scale felling of trees for building, furniture making, as well as for other commercial and domestic purposes. Lumbering is favoured by availability of capital and government policies, and is said to be one of the major causes of deforestation. It can be carried out manually using axes, cutlasses and motorised chain saws (Ighei and Ohiembor, 2015). Lumbering had an average correlation coefficient (.659) with income and this shows an average relationship and is an indication that income is averagely linked to lumbering. An average correlation coefficient (.692) exists between lumbering and male folk and suggests that the two variables are not strongly related, an indication that the people do not really depend on lumbering for their livelihood. Lumbering has a weak correlation coefficient (.067) with female indicating a weak relationship between the two variables. This suggests that lumbering may not be associated with the female gender as lumbering requires much energy and strength. A weak correlation coefficient of .458 between lumbering and age was established and is an indication that few people irrespective of age engage in lumbering. Lumbering had a strong correlation coefficient (.706) with household size, suggesting strong relationship between lumbering and household size. Lumbering has strong correlation coefficient

(.775) with education, and this not surprising because some technicalities in the use of machine are needed and it is also capital intensive which is of advantage to the educated people.

**Honey Production:** Beekeeping and honey collection constitute another source of rural livelihood. This is a form of forestland use which is dependent on and can compliment forest conservation. There are two conservation concerns about beekeeping. The possibility of fire associated with honey harvesting and secondly, the felling of trees for wooden hives. Honey production had no correlation coefficient with any of the socio-economic variables in the study area; hence no relationship is also established. This may suggest that the respondents or people in the study area not involved in the activity of honey making in the study area.

**Snail Collection:** Snail had a very strong correlation coefficient (.735) with income, showing that a strong relationship exists between snail collection and income. This affirms the fact that from the onset of rainy season, a lot of snails are sold in the market to generate more income. The more snails collected, the more the income made and vice versa. Snail has a very strong correlation coefficient (.890) with the male gender. This is an indication that there is a very strong relationship existing between the two variables. It is also an indication that the male gender is involved in snail collection. The female folk is not committed to snail collection as a result of the fact that snails are nocturnal, hence collection is done by the male gender in the night. Snail collection had a very strong correlation coefficient (.942) with age household size (.979) indicating a very strong relationship existing between the two variables. As the household size increases, snail collection also increases and vice versa. Those with large household size will need more snails for their domestic and income sustainability.

A weak correlation coefficient (.436) exists between snail collection and education. This is an indication that snail collection is weakly associated with education. People do not need to be educated before they can venture into the business of collecting snails from the forest. Snail collection had a negative correlation coefficient with other activities, an indication of a negative relationship existing between snail collection and other activities. Those that are occupied with other socio-economic activities need no snail collection. The more people are involved in other activities, the less of snails they go looking for. Snail collection had a very strong correlation coefficient (.964) with distance which is an indication of a very strong relationship existing between the two variables. This suggests that the nearer the distance, the more of snails collected and vice versa. Those who live close to the

forest have more advantage and because of closeness can enter the forest even in the night to collect snails. Snail farming can be very profitable in Ghana, Kenya, Cameroon, South Africa and Nigeria, yet it is one of the most neglected animal rearing businesses in these countries. Snail farming provides one of the finest opportunities to make income within a short time. In Australia and USA, snail rearing is a big business, providing opportunities to many farmers. In UK, snails can be seen in many super markets and stores; this means that snail farming is a big business (Omeh, 2015).

**Gnetum spp (Afang):** Netumm spp had a moderate correlation coefficient (.694) with income. This may suggest that Gnetum spp collection is done majorly for private consumption and moderately as a source of income. Gnetum spp collection had a very strong correlation coefficient (.909) with male gender as more male folks go into the business of collecting Gnetum spp than women. A very strong correlation coefficient (.850) exists with age, showing the existence of a very strong relationship between the two variables. Gnetum spp had a very strong correlation coefficient (.979) with household size. Larger households will need more of Gnetum spp both for domestic and economic sustainability. Gnetum africanum (Afang) is a vine gymnosperm species found natively throughout Tropical African Forest spread in countries such as Cameroon, Angola, Congo, Central Africa and Nigeria. In Nigeria, it is eaten as a form of wild spinach. This vine helps to improve socio-economic activities as it is sold for consumption for medicinal purposes as well as for income generation (Ali, Assanta and Robert, 2011).

**Mushroom Harvesting:** Mushroom collection had a very strong correlation coefficient (.882) with income which is an indication that a very strong relationships exists between mushroom collection and income. The more of mushroom collected, the more of income generated and vice versa. This affirms the facts that market for mushroom is fast growing as the demand is high in big hotels as part of their special menu and are also exported to other nations. Mushroom has a very strong correlation coefficient (.812) with male gender indicating a very strong relationship existing between the two variables. This mean a large number of the male folk engage in mushroom collection. A very strong correlation coefficient of .829 was established between mushroom and age. Also larger households are more involved in mushroom collection than smaller households as shown by the very strong and positive correlation coefficient of .736. Mushroom collection is moderately (.466) associated with education suggesting that education is not a necessary factor in the collection of mushroom. Mushroom collection has a negative correlation coefficient (-.345) with other activities.

Owing to the growing demand for mushrooms, supply is not only from the forest but today mushroom farming gives small farmers a chance to increase their income, improve their health and offers an alternative means of livelihood to urban and city farmers. The process of growing mushroom is one of the easiest ways to earn a living and not much physical strength is required in its production. Its cultivation is also regarded as one of the science based branches of agriculture and horticulture. Edible mushrooms are considered as healthy food because their mineral content is higher than that of meat, fish and other vegetables. The protein content of fresh mushroom is about twice that of vegetables and four times that of oranges (Onebunne, 2013). Many opportunities abound in the growth of mushrooms as most of the big hotels in Nigeria have mushrooms on their menu, but these mushrooms are imported, meaning that local production will have a ready market and there is opportunity to export mushrooms to Europe and America once a good quality species are produced. Mushroom cultivation, apart from being a source of food can be a means of livelihood and a source of economic empowerment for rural poor farmers (Ekpo, Olasupo and Eriaube, 2009).

**Sand Mining:** Sand Mining is the removal of sand from the natural configuration and it is a valuable and main input in the construction industry in many parts of the world. Sand mining occurs both in small and large scale in major parts of rural Nigeria (Adedeji, Adebayo and Sotayo, 2014). Sand mining had a very strong correlation coefficient (.960) with income. The increase in income is as a result of an increase in sand mining and vice versa. This suggests that people venture into sand mining to make income. Sand mining showed an average correlation coefficient (.599) with male gender indicating that an average relationship exists between the two variables and suggests that sand mining is moderately linked with the male gender and this could be as result of the fact that sand mining is a business that very few people go into. This is true because sand mining is a tough work that can be handled by men. Results also revealed that there is also a moderate correlation coefficient (.501) existing between age and sand mining. This suggests that sand mining is moderately linked to age. It can be affirmed since it is an economic activity carried out by those who have the technical knowledge of it. Sand mining also showed a moderate correlation coefficient (.667) with household size. However, education had a very strong correlation coefficient (.738) with sand mining. This suggests that those who go into the business of sand mining are educated at least to some levels because of the technology involved.

**Palm wine tapping:** Palm wine tapping take place in forest areas. The saps of oil palm and raffia palm are tapped and used as wine. It is mainly the activity of men with very high return. Palm wine had an average correlation coefficient (.577) with income, indicating that an average relationship exists between palm wine tapping and income. This may suggest that those who tap palm wine in the study area do it moderately to enhance their income. Palm wine tapping had a very strong correlation coefficient (.720), with male gender, and implies that the male population plays a dominant role in wine tapping. It affirms the fact that palm wine tapping is the activity carried out by man. Palm wine tapping had a moderate correlation coefficient (.627) with age and suggests that age may not be a strong factor for palm wine tapping. A very strong correlation coefficient of .839 was established between palm wine tapping and household size. Palm wine tapping had a negative correlation coefficient (-.225) with other activities. The more people get occupied with other socio-economic activities, the less of palm wine tapping they do and vice versa.

**Palm Oil Processing:** The extraction of cooking oil from palm fruits occurs as an important source of income for men and women in the rural communities. Palm oil processing had a strong correlation coefficient (.802) with income, indicating a very strong relationship existing between the two variables. Palm oil processing increases as income increases and vice versa. This suggests that people go into palm oil processing to generate income for their upkeep. Palm oil processing also had a very strong correlation coefficient (.907) with male gender suggesting a large involvement of the male folk. A very strong correlation coefficient (.856) also exists with age indicating that age has a very strong relationship with the processing of oil palm. Palm oil processing has a very strong correlation coefficient (.961) with household size indicating that the more the number of household size, the more the quantity of oil palm processed. Oil palm processing has a negative correlation coefficient (-.402) with other activities revealing that oil palm processing is negatively associated with other activities. The more of other activities, the people get involved in, the less of the oil palm processing they carry out.

**Basket making:** Basketry as source of rural livelihood consists of traditional skills and local materials to produce a range of wooden articles for storage and processing agricultural crops as well as for aesthetic decorations. Basket making has a very strong correlation coefficient (.878) with income indicating a strong relationship existing between basket making and income. The more of basket made, the more of income generated and vice versa. This is an indication that baskets are made to generate income. Basket making has an average correlation coefficient (.661) with male gender and also an

average correlation coefficient (.648) with household size indicating that basket making has a moderate relationship with male gender and household size. On the other hand, male gender and household size had a moderate association with basket making. It can be suggested that basket making is an individual choice and does not have a strong link with male gender and household size. Invariably, basket making has a negative correlation coefficient (-.553) and (-.285) with both female gender and other activities respectively indicating a negative relationship existing among the three variables. Basket making had a very strong correlation coefficient (.726) with age and suggests that as the people grow older, they pick interest in basket making which is very possible because it will afford the elderly the opportunity to stay relaxed at home while making baskets.

**Fishing:** Both men and women are engaged in fishing activities in the riverine areas raising extra income to support their families. Fishing had a very strong correlation coefficient (.920) with income indicating that a very strong relationship exists between the two variables. The more fishing is carried out, the more of income made and vice versa. It can be affirmed that fishing is carried out to generate income. There is a weak correlation coefficient (.454) existing between fishing and male gender and also a negative correlation coefficient (-.131) with female gender. This suggests that fishing is an activity carried out by selected few who had chosen to become fishermen. Age, household size and education had moderate correlation coefficients (.511; .546; and .578) respectively with fishing indicating that these variables are not excessively associated with fishing. Similarly, other activities had a negative correlation coefficient (-.105) with fishing, revealing that the more of other activities are carried out, the less of fishing done and vice versa.

**Wildlife Hunting:** Wildlife has always been a major source of meat for the African people. Africans have been hunting and eating bush meat for centuries. It is an essential part of the diet, providing virtually the only source of animal protein in the rural areas and cities of equatorial Africa. For poor people who lack expensive refrigeration, the storage qualities of smoked bush meat only add to its dietary importance. Bush meat is also sold in local markets and is a major source of income to many rural households. Okewelu, Ewurum and Noutaha (2009) reported that since 2005 there has been an increase in the price of bush meat arising from increased demand. It is estimated that a hunter could earn as high as between ₦45, 500 and ₦150, 000 annually in Africa from commercial hunting. Wildlife Hunting had a very strong correlation coefficient (.808) with income. This agrees with the work of Okiwelu, Ewurum and Noutaha (2009). There is a negative correlation coefficient (-.103) existing

between wildlife hunting and age, an indication that there is a negative relationship between age and wildlife hunting. The older people grow the decline they show towards wildlife hunting and vice versa. This is to say that the elderly do not associate themselves with wildlife hunting in the study area. Wildlife hunting has a weak correlation coefficient (.008) with household size and suggests that hunting is not a socio-economic activity influenced by household size but it is a decision taken by individuals to embark on.

Wildlife hunting has a weak correlation coefficient (.429) with education and indicates that there is no strong association existing between these two variables. This may reveal that the educated take up hunting as a game which they do at their leisure. A weak correlation coefficient (.229) exists between wildlife hunting and other activities. The implication is that the more people are engaged in other socio-economic activities, the lesser they get themselves involved with wildlife hunting and vice versa. Grasscutters are rodents widely found in grassland clearings wet and marshy areas in Africa. In Nigeria, hunters kill millions of wild grasscutters every year, and are becoming increasingly scarce. There are many benefits that could be harnessed from the rearing of grasscutters which include health and nutrition, food security, gender development and opportunities for the disabled and most especially financial reward. The grasscutter is easy to house, though its handling requires skills.

**Broom Making:** Broom making is a year round source of income for women and it is made from oil palm leaf ribs or fronds. It is used basically for sweeping. Broom making had a very strong correlation coefficient (.808) with income indicating a very strong relationship between broom making and income. This shows that broom is made to generate income, the more broom made, the more income generated and vice versa, whereas, broom making has a weak correlation coefficient with male(.096), female(.348), age(.148), household size(.200), education(.473), other activities(.075), and distance(.114). This result suggests that the relationship between broom making and these variables is weak.

**Medicinal Plants:** Harvesting of medicinal plants is carried out by rural populace living near forest; who rely on herbal medicines for their health and dental care. Collection of herbal medicine is highly species specific primarily for local use. Some of these plants are also sent to the urban areas where they are bottled and sold as detoxifying medicines. Leaf materials form the major component of plant parts used as medicine to treat various ailment and livestock (Ekanem and Udoh, 2009). Edible wild plants

characterise the seasonal resources used as dietary supplement or as subsistence income from the sale of fruits and edible fungi. Medicinal plants collection had a strong correlation coefficient (.853) with income indicating that a very strong relationship exists between medicinal plants collection and income. The rural populace go into the business of selling medicinal plants extracts in the form of herbal medicine. Also, there is a very strong correlation coefficient (.713) with male gender indicating that the male folk dominate this activity. This suggests that men are those mostly involved in the harvesting and preparation of herbal medicinal products. Medicinal plants collection had a very strong correlation coefficient (.898) with household size and a negative correlation coefficient (-.348) with other activities. This suggests that medicinal plants collection decreases with an increase in other activities. The more people are occupied with other socio-economic activities the less interest they pick in the collection of medical plants.

In general, a lot of very strong correlation coefficient between the reserve variables and socio-economic activities were observed, revealing that there is a very strong relationship existing between forest reserve and the socio-economic activities. However, there was no correlation between honey and other socio-economic variables, some weak correlations were observed, while female and other activities reveal mostly negative correlations.

### **Conclusion and Recommendations**

The study has investigated livelihood activities in stubb creek forest reserve and established their relationships with socio-economic profile of the communities. Therefore, arising from the various livelihood activities in these communities, less pressure on the reserve should be expected. This development is likely to impact positively on the socio-economic activities and livelihoods of the people. On the basis of the findings in this study and in line with the issues concerning the forest reserve and socio-economic activities of the host communities in the study area, the following recommendations are made:

The livelihood activities of the people are tied to the forest and as such the communities should be made stakeholders in the management of the reserve. The reserve has a lot of potentials ranging from tourism, beekeeping, grass cutter farming to mushroom and snail farming to promote the socio-economic activities of the people and the communities. The forestry Department in charge of the management of the stubb creek forest reserve should come up with skill acquisition programmes aimed at imparting entrepreneurial skills to the forest communities so as to help improve their socio-economic



activities and livelihoods. Above all, there is need for support services such as health, education, pipe borne water, electricity and other infrastructures should be put in place for the people as part of the corporate social responsibilities of the stubb creek forest reserve management.

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