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Potentials Of Sawmill Wood Wastes Utilization As Household Energy Source In Benin City

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ABSTRACT: Utilization of sawmill wood wastes as household energy source in Benin City was investigated. A multi-stage random sampling technique was used to select 10 wards within the study area. Thirty households were then selected in each ward thus making a total of 300 respondents. The result showed that 67.2 and 14.5% of the respondents use sawmill wood wastes for cooking and for processing of farm produce respectively. It was observed in the study that 38% of the respondents household spend an average of ₦250:00 on sawmill wood wastes utilization weekly while 9.7% of them spend above ₦400.00 within the same period. Chi-square test analysis showed that household size and income level of respondents have significant impact on the quantity and amount of sawmill wood wastes utilized ($p < 0.05$).The marital status and sex of the respondents also have significant impact on the utilization of sawmill wood wastes ($p < 0.05$). Government should therefore encourage sawmill operators on the use of improved sawing techniques in order to minimise waste, thereby reducing over exploitation of the nation timber resources.

Key words: Sawmill, wood wastes, Household energy, Wood utilization.

Introduction

Nigeria is fortunate to possess a great variety of energy resources which are important for national and international development. These resources are renewable resources such as fuel wood and the non renewable resources like crude oil, natural gas and coal. The importance of these energy source to man cannot be over-emphasized, as the economic activities of most societies depend on the availability of energy, being a necessary ingredient of social, political and physical development (Jatau *et al*, 2006). The forest resources of developing countries are being ravaged due to the increasing demands for wood. Despite the introduction of modern forms of energy supply, the rising prices of alternative domestic energy sources have caused marked increase in the consumption of fuel wood during the last decade especially in the tropics. According to FAO (1985), about 200 million people the world over especially the rural people and the urban poor depend on fuel wood as their main source of energy. In Africa, fuel wood remain the largest energy source in both rural and urban areas with over 90% of the people depending on either firewood or charcoal for cooking and heating (Aju *et al*, 2006). In Nigeria fuel wood is the most important forest product used by majority of the people for cooking, heating and other domestic purposes. Current annual fuel wood consumption in Nigeria is estimated at 70 million m^3 (Papka, 1997). This figure account for over 90% of the total annual wood production in the country (NEST, 1991).

The history of sawmilling in Nigeria dates back to the 18th century with pit sawing as the earliest form of conversion while the first power driven sawmill was installed at the beginning of the 20th century

(Akachuku, 2000). Sawmill wood wastes according to Lucas (1995) are remnant produce during conversion and other processing operations. These by-products of log conversion can be classified into two categories, avoidable and unavoidable wastes. Unavoidable wastes are those wood wastes that cannot be avoided or prevented even where the saw kerf is minimal and the sawmill workers are efficient. Examples of such wastes include sawdust, slabs, wanes and bark. Avoidable wastes are those wastes generated during conversion which can ordinarily be avoided. Such wastes result from inadequate saw maintenance, improper sawing and lack of proper log impaction before sawing. This study was therefore carried out to evaluate the quantity and types of the various sawmill wood wastes generated during sawing operations and its level of utilization by consumers in the provision of their household energy needs.

Study Area

The study was carried out in Benin City. The City comprises three Local Government Areas namely, Oredo, Ikpoba-okha and Egor local government areas respectively. Benin City is located at 6.20N and about 5.60E. The ancient city is a low lying plain covered with porous Benin sand, that rise gently to the north-east. Its soils are derived from sand stones and shales and are of very recent deposits and highly susceptible to leaching and hence lose their fertility very fast (Egbe *et al*, 1989). The climate condition is marked with distinct wet and dry season with a rainfall pattern that varies from 2000mm to 1150mm a year. The mean monthly temperature is about 27^0c with a range of $22 – 35^0$c while the relative humidity range is from 79 – 90% (Beaks and Geomatics, 1999).

Data Collection and Analysis

The three local government areas that comprises Benin City were selected using the stratified random sampling techniques. These areas were further classified into three major categories based on population figures and commercial activities in the area that utilizes sawmill wood wastes as energy source. A total of three hundred structured questionnaires were administered to respondents. The data collected were subjected to simple descriptive statistics and Chi-square (x^2) analysis to test for significance differences and dependence of the parameters measured. The parameters examined include household size, amount spend on sawmill wood wastes, types of wood wastes generated by sawmills, pattern and purpose of utilization.

Results and Discussion

Demographic data of respondents

The results of the demographic data of respondents are presented in (Table 1). Among the 290 respondents, 39.7% were from Egor Local Government Area, 35.5% from Ikpoba-Okha Local Government Area while 24.8% were from Oredo Local Government Area. The reasons for the high percent of respondents in Egor and Ikpoba-Okha Local Government Areas could be due to the high prevalence of sawmill within the locality as a result of its semi urban nature and closeness to source of timber supply.The results also showed that most of the respondents are in their active ages, as 42.4% are between the ages of 41-50 years, while 27.6% are between the ages of 31-40 years. In terms of household size, respondents average family sizes were found to be six persons representing 46.6% per household. Respondents literacy level showed that 7.1% attained tertiary education, 68.4% have secondary education while 20.7% have primary education with only 14.5% as having no formal education. Also 68.7% of the respondents were females while 31.3% were males, an indication that majority of those using sawmill wood wastes as household energy were females. Whereas respondents marital status showed that 18.3% were single, 56.9% married, 16.2% divorced while 8.6% were widowed (Table1).

Table 1: Demographic data of respondents.

S/No.	Variables	Frequencies	Percentages
1.	**Study Areas**		
	Egor L.G.A.	115	39.7
	Ikpoba-Okha L.G.A.	103	35.5
	Oredo L.G.A.	72	24.8
	Total	290	100
2.	**Ages**		
	18 – 30	32	11.0
	31 – 40	80	27.6
	41 – 50	123	42.4
	51 – 60	37	12.8
	> 60	18	6.2
	Total	290	100
3.	**Family Sizes**		
	1 – 3 Persons	40	13.8
	4 – 6 Persons	135	46.6
	7 – 9 Persons	63	21.7
	10 – 12 Persons	37	12.8
	> 12 Persons	15	5.2
	Total	290	100
4.	**Educational Qualifications**		
	No Formal Education	47	16.2
	Primary Education	60	20.7
	Secondary Education	168	57.9
	Tertiary Education	15	5.2
	Total	290	100
5.	**Sex**		
	Female	198	68.3
	Male	92	31.7
	Total	290	100
6.	**Marital Status**		
	Single	53	18.3
	Married	165	56.9
	Divorced	47	16.2
	Widowed	25	8.6
	Total	290	100

Source: Field Survey 2008.

Major forms of sawmills wood wastes utilization and reasons for its preferences to other forms of domestic energy sources.

The results showed that timber offcuts were the most common and frequently used sawmill wood wastes as this represents 37.2% of the respondents. This was followed by wood slabs 29.3%. The utilization of sawdust accounted for 17.2% while wood barks represent 13.4%. The least utilized sawmill wood wastes were the planner shavings as this only accounted for 4.1% of the respondents (Table 2).The reasons for the high preference of timber offcuts and wood slabs by households could be due to its relative large size and

thus its economics of use. It also burns relatively well and provides satisfactory heat energy to its users. The respondents also gave reasons for the high preference of sawmill wood wastes to other sources of household energy to include their ready availability 33.4%, relative cheapness 29.3%, ease of use 14.1% , economics of use 15.5% as well as provide better taste to food 7.6% (Table 3).

Table 2: Major forms of sawmill wood wastes utilization.

Variables	Frequencies	Percentages
Sawdust	50	17.2
Slabs	85	29.3
Offcuts	108	37.2
Barks	39	13.4
Planner shavings	12	4.1
Total	290	100

Source: Field Survey 2008.

Table 3: Respondents reasons for the preferences of sawmill wood wastes as household energy source.

Variables	Frequencies	Percentages
Ready availability	97	33.4
Relative cheapness	85	29.3
Ease of use	41	14.1
Economics of use	45	15.5
Gives better taste to food	22	7.6
Total	290	100

Source: Field Survey 2008.

Pattern of sawmill wood wastes energy utilization

The results showed that majority of the respondents representing 67.2% use sawmill wood wastes for cooking, 14.5% for processing of farm produce, 10.3% for curing of tobacco, while 7.9% use it for the processing of forest fruits (Table 4). This is an indication that a high percentage of sawmill wood wastes is utilized for cooking purposes. This results agrees with the earlier finding of Sodimu *et al* (2003), the authors stated that majority of households in Nigeria especially among the rural dwellers, depend greatly on fuelwood as their main source of cooking energy. It has also been reported (FAO, 1995), that most of the World fuelwood harvest is used for cooking.

The extent to which sawmill wood wastes meet the energy needs of respondents are presented in (Table 5). The results showed that the utilization of sawmill wood wastes meet the household energy needs of about 80% of the respondents. They expressed satisfaction in the ability of the products to meet their domestic energy requirements and also help them save some income which would have been spend on alternative energy sources.

Table 4: Household use of sawmill wood wastes.

Uses of sawmill wood wastes	Frequency	Percentages
Cooking	195	67.2
Processing of farm produce	42	14.5
Curing of tobacco	30	10.3
Processing of forest fruits	23	7.9
Total	290	100

Source: Field Survey 2008.

Table 5: Percentage level of satisfaction in the utilization of sawmill wood wastes.

Level of satisfaction	Frequency	Percentages
< 50%	34	11.7
51 – 60%	38	13.1
61 – 70%	50	17.2
71 – 80%	153	52.8
>80%	15	5.2
Total	290	100

Source: Field Survey 2008.

Quantity of sawmill wood wastes utilization

The results presented in (Table 6) showed that majority of households in the study area representing about 50.7% of the respondents use between 11-15 kg of sawmill wood wastes weekly, 18.3% use 6 -10 kg, 12.8% use 16 –20 kg while about 10.3% utilizes 1–5 kg of sawmill wood wastes weekly. However, a small percent of the respondents representing 7.9% use above 20 kg of sawmill wood wastes weekly in meeting their domestic household energy needs. The high percentage of the respondents utilizing 11–15 kg of sawmill wood wastes weekly is due to the number of persons per household, since majority of the products are utilized as domestic energy source for cooking purposes. This finding agrees with the earlier report by Izekor and Okoro (2005) that most household in Benin City depends largely on firewood as their main source of energy for cooking and other domestic energy needs. Also Kaale (1984) reported that the utilization of fuel wood accounted for about 85% of total energy consumed in Nigeria.

Table 6: Weekly quantity of sawmill wood wastes utilization.

Quantity (kg)	Frequency	Percentage
1 – 5	30	10.3
6 – 10	53	18.3
11- 15	147	50.7
16 – 20	37	12.8
>20	23	7.9
Total	290	100

Source: Field Survey 2008.

Expenditure on sawmill wood wastes utilization

The weekly expenditure on sawmill wood wastes utilization are presented in (Table 7). The results showed that majority of the respondents representing 38% spend about N200:00 – N300:00 on sawmill wood wastes utilization weekly, 21.3% spend between N300:00 – N400:00, 18.6% spend N100:00 – N200:00 while 12.6% spend less than N100:00 weekly. However 9.7% of the respondents spend above N400:00 weekly on sawmill wood wastes utilization in the provision of their domestic household energy needs. The variations observed in the amount spend on sawmill wood wastes utilization depends on some social economic variables such as household size, income level, types of food consumed and purpose of utilization.

Table 7: Weekly expenditure on sawmill wood wastes utilization.

Amount (₦)	Frequency	Percentages
< 100	35	12.4
100 – 200	54	18.6
200 – 300	110	38.0
300 – 400	62	21.3
>400	28	9.7
Total	290	100

Source: Field Survey 2008.

Conclusion

This study have shown that the utilization of sawmill wood wastes could contribute substantially to household energy needs of residents in Benin City. The study also reveal the different types of wood wastes generated by sawmills and its pattern of utilization by household in providing their domestic energy needs. The quantity of sawmill wood wastes utilized by household depends on some social economics variables such as household size, income level, food types and purpose of utilization. Therefore government and all stakeholders in forestry business should adopt policies aimed at encouraging the utilization of sawmill wood wastes in the provision of energy for both household needs and industrial purposes. These wood wastes if fully utilized will help in reducing the over-exploitation of the natural forest and thus its conservation.

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