Energy Use and Agribusiness Activities of Peri-Urban and Rural Farming Households in Selected States of South-Western Nigeria

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***Abstract:-*Cooking is basic to human existence and soit is germane to the rural faming households, most of whom undertake agribusinesses in the rural and peri-urban of Nigerian cities and villages. It is used to transform food from the raw stage to another that is desirable for consumption. However, inefficient cooking practice in developing countries has resulted in significant environmental and health problems. This study therefore highlighted types of energy used, their effects and the need for clean and greener energy needed by the flora and fauna populations of the planet earth. Most respondents (23.3%) engaged in public sector employment which made them vulnerable when salaries were not paid especially when international economic dynamics were not in favor of the Nigerian crude. Fuel wood was mainly used for cooking (35.0%) and heating (24.3%). Charcoal, sawdust and gas were used for the same purposes. Kerosene was used for cooking (71.1%), heating (68.8%) and lighting (35.2%) while electricity was not only used for cooking (12.8%), heating (10.3%), lighting (78.4%) alone but for other things like refrigerating and drying (21.4%). The main problem of fuelwood was heath concerns (34.8%) while those of electricity were high price (21.4%) and scarcity (38.2%). Fluctuating price (68.8%) and high price (18.7%) were the problems encountered by the respondents as far as kerosene was concerned. Factors that influenced the choice of fuelwood as an energy source were community where respondents resided, significant ($p<0.05$), age, significant ($p<0.05$), education ($p<0.01$) and various factors for other fuel types used in the study area.**

Keywords: **Cooking, biomass, pollution, flora and fauna**

I. INTRODUCTION

Energy, livelihood and environment

Most businesses undertaken in rural and peri-urban of Nigerian cities and villages are agribusiness, small or agrarian in nature. They include firms and individuals handling inputs to the farm sector or produce farm products. They also handle the marketing, finance and process farm products, even individuals engaged in public sector employment combine one or more of these agribusiness ventures to supplement their job. Ecosystems, through the goods and services they provide, support human well-being. A key ecosystem service is energy provision, which directly and indirectly contributes to our collective well-being and livelihoods. However energy use also impacts ecosystems and can undermine the integrity of ecosystems. (IUCN, 2008). Inefficient cooking practice in developing countries results in significant environmental and health problems. More than 3 billion people worldwide, mostly from developing countries, still depend on solid fuels, including biomass (in particular firewood, dung, and agricultural residues) and coal, to meet their basic energy needs such as cooking, boiling water, and space heating, particularly in high altitudes (WHO, 2006). According to the World Health Organization (WHO) 2013 estimates, indoor air pollution was linked to 4.3 million deaths globally in 2012, in households cooking over coal, firewood, and biomass stoves. Every year around 488,200 persons in India, 8,700 persons in Nepal, and 49,400 persons in Bangladesh die prematurely due to illnesses related to household air pollution (hap) from solid biomass fuel burning in kitchens, mainly women and children (WHO,2009). Naturally, women and children are inseparable especially in developing nations where children are strapped to their mothers' back or side always; hence, children are prone to HAP when their mothers cook. Unfortunately, women and their relatives are not aware of the danger they expose their children and themselves unto as a result of what is referred to as normal routine in developing nations like Nigeria. Since women are the cooks in the natural setup of many developing economies, any effort to introduce awareness in this direction is not misdirected. Cooking is basic to human existence, the traditional approach to it is precarious and there is need to introduce modern and cleaner energy forms in developing nations. In Nigeria for example, women spend several hours in cities and villages roasting corn, smoking fish, processing oil palm fruits and preparing other traditional dishes using traditional solid biomass. Women exposed to indoor smoke are three times more likely to suffer from chronic obstructive pulmonary diseases (COPD), such as chronic bronchitis or emphysema, than women who cook with electricity, gas, or other cleaner fuels. The use of coal doubles the risk of lung cancer, particularly among women. Moreover, studies have linked exposure to indoor smoke to asthma, cataracts (Pokharel et al.2005), tuberculosis, blindness, and adverse pregnancy outcomes (in particular low birth weight) (Mishra et al. 2004), as well as ischemic heart disease, cataracts, interstitial lung disease, and nasopharyngeal and laryngeal cancers. It has been estimated that the improved access to modern cooking fuels has the

potential to avert between 0.6 million and 1.8 million premature deaths, on average, each year until 2030, including between 0.4 million and 0.6 million deaths per year of children under the age of five in sub-Saharan Africa, South Asia, and Pacific Asia (Pachauri, et al. .2012). Modern cooking facilities have the potential to significantly reduce the daily exposure of households (particularly women and children) to noxious cooking fumes – helping to avoid premature deaths caused by indoor air pollution. They can also help remove the burden of spending hours every day travelling long distances to gather fuelwood. (World Energy Outlook, 2016)

Modern Energy Forms and Development

Modern energy services enhance life of the poor in countless ways. Electricity provides the best and most efficient form of lighting, extending the day and providing extra hours to study or work. Household appliances also require it, opening up new possibilities for communication, entertainment, heating etc. It enables water to be pumped for crops, and foods and medicines to be refrigerated. (World Energy Outlook, 2016)

In the Nigerian setting, there is the general believe that a man's status can be measured by the energy form he uses. For instance, public electric power supply is erratic and epileptic, hence the need for a generating plant which can only be afforded by the elites. The poor and the uneducated use the solid biomass for cooking, heating and lighting. This fact has been known and demonstrated by different development agencies and scientists. Different forms of energy play an important role on human beings and have been considered symbols of development. Development agencies have shown that levels of wellbeing, progress and growth are associated with levels of consumption and energy demand (PNUD, 2003; World Bank, 2003a; and Calleja 2003.). Human well-being depends on material welfare, e.g. the basic material needs for a good life, health, good social relations, security, and freedom of choice and action (MEA, 2005). One of the most important basic material needs for a good life is modern form of energy. Modern forms of energy include :(i)the Solar Energy(ii) Hydroelectric Energy (iii)Fossil Fuels (Coal, Oil and Natural Gas) (iv) Wind Energy(v) Tidal Energy(vi)i Hydrogen Energy (vii) Wave Energy (viii) Geothermal Energy (ix) Biomass (x) Nuclear Power. Some of these energy sources are renewable while others are not. Energy sources like wind, Hydroelectric, geothermal, biomass and wave energy are said to be renewable because they can be replenished or recreated within a relatively foreseeable time limit for instance a lifetime, whereas, fossil fuels (coal, oil, natural gas) may take thousands and even millions of years to replenish and this may not happen in a lifetime. These energy sources are said to be non-renewable and their stock is being depleted continually without hope of immediate replenishment. According to Ellabban, *et, al.*, 2004, renewable energy is generally defined as energy that is collected from resources which are naturally replenished on a human timescale, such as sunlight, wind, rain, tides, waves, and geothermal heat.

The Essence of Clean and Green Energy Services

Clean energy is the one that does not emit greenhouse gases (GHGs) into the atmosphere. It does not impact the environment negatively through the release of pollutants or emissions. It is the one that makes the air, water and other ecosystem parameters to be cleaner. Cleaner energy services provision is a show of commitment by government, organizations, companies and even individuals to make the world a better place to live. Clean energy services reduce the contribution of carbon dioxide and other noxious emissions like carbon monoxide and sulfur dioxide into the ecosystem. Provision of a cleaner energy gives a world where developmental efforts place emphasis on the provision of technologies that favor the provision of better and healthier cooking conditions to women in the sub-Saharan and Asiatic nations. The world needs cleaner energy services since it has been established that dirty forms of fossil fuels release carbon dioxide and other noxious gas emissions into the atmosphere, this, coupled with the presence of heavy metals, organic pollutants and other chemicals from industrial wastes are responsible for biodiversity degradation, culminating in the so called climate change, a phenomenon that has created excessive heat in Europe and absurd flooding in Asia. Green energy services on the other hand are those that enhance and do no harm to the flora and fauna populations of the planet earth.

The specific objectives of the study are to:

a) analyze the various agribusiness modes the respondents were engaged in.
b) analyze the purpose to which the energy types were put by the respondents.
c) identify factors influencing the choice of the energy types used and to:
d) analyze constraints faced by the respondents

II. MATERIAL AND METHODS

Methodology

The Study Area

The study was carried out in Oyo, Osun and Ondo States, Southwest geo-political zone of Nigeria. This geo-political zone is dominated by Yoruba speaking people. Oyo State occupies a land area of 28, 454 square kilometers and has an estimated population of 6,617,720 (2006 Census estimations). Administratively, it is divided into 33 Local Government Areas and four Agricultural Development Project (ADP) zones, namely Oyo, Ogbomoso, Saki and Ibadan Ibarapa ADP zones. It has an average annual rainfall of 1091.4mm and average maximum and minimum temperatures of 44.56 ^{0}C and 24.43^{0}C respectively. Osun state occupies a land area of 9,251 square kilometers with three Agricultural Project (ADP) zones. Administratively, it is divided into 30 Local

Government Areas and 1 Area Council .Ondo State on the other hand has 18 Local Government Areas administratively with 2 ADP zones while each zone is made up of 2 ADP Areas. The state has a population of 3,441,024 people (National Population Commission, 2006).The state occupies a total land area of 15,500 square kilometers.

Sampling procedure and sample size

A multi stage sampling procedure was employed. The first stage was the purposive selection of four Local Government Areas from the study area, two Local Government Areas: Oriade and Egbedore from Osun state, Oyo East Local Government Area from Oyo state and Akoko South Local Government Area from Ondo state. The choice of these Local Government Areas was based on the peri-urban transitional nature combined with the desired characteristics of rurality as described by Lanjouw, (1999). Here, three distinct rural characteristics were identified; – (i) Rural Pisifera- These are **r**ural areas that are found next to the larger conurbations or area near the core urban centers. (ii) Rural Amazanado- These are rural towns/ villages with some basic infrastructure but a population of not less than 5000 persons. (iii) Rural Disperso- These are the remaining outlying rural areas that are very remote. The second stage involved partitioning the study area into three distinct portions as mentioned above. For instance, the Peri-urban combining areas near core urban centers were found in places like Agboye/ Molete,Apaara ,Jabata, Oke Apo and Owode in Oyo East Local Government Area ,Ijebu-Jesa,Ipetu-Jesa,Erinmo,Iwaraja,Ijeda and Owena in Ori-Ade Local Government Area, Awo,Ido-Osun,Okinni,Iragberi and Ara in Egbedore Local Government Area belonged to the second category while remote villages were in the third category. The third stage involved the choice of five wards each from the rural and the peri-urban parts of the Local Government Areas surveyed giving a total of 40 wards. The final stage was the random selection of 12 households from each ward giving a total of 480 respondents but 3 questionnaires from Egbedore Local Government Area were not analyzable, hence a total of 477 respondents were involved in the study.

Analytical Procedures

Descriptive Statistics

Frequency distribution tables and percentages were used to describe the socio-economic characteristics of the respondents as well as objectives (i), (ii) and (iv).

Inferential Statistics

Logit regression models are used to analyze objective (iii).Logit models can be used to analyze models where the dependent variable is dichotomous, categorical, or qualitative. The case of whether the household uses one form of energy or not is a binary one—the dependent variable has only two possible values, yes or no, usually coded numerically as 1 or 0, respectively. Linear regression models are inappropriate for predicting the outcome of such binary choices since the assumptions of the linear regression model are violated in that the error terms are heteroskedastic, correlated with the explanatory variables, and the predicted value would not necessarily fall within the logical range of zero to one. The Logit models are used to circumvent these problems. The Logit model is associated with the cumulative logistic probability function. The model was chosen because of the dichotomous dependent variables and because the technique has no restrictive distribution assumptions.

The logistic (logit) probability function is given as $Pi = 1/1+e^{-zi} = f(Z)$ ---------- (1)

Where Pi is the probability that a household i (i = 1, 2 … n) used a particular energy source. Index Zi is a random variable which predicts the probability of a household using an energy source or not. The probability Pi in equation 1 is further transformed to give equation 2.

$Pi = e^{zi} / 1+ e^{zi}$ ---------- (2)

Therefore for the ith observation, a household will be

$Zi = In\ Pi / 1-Pi = \beta o + \Sigma \beta o\ X$ ---------- (3)

Therefore, *ln* (P/1-P) = 1, if the household used an energy source *ln* (P/1-P) = 0, if otherwise

Implicitly, the model can be empirically estimated as:

$Y = \beta_o + \beta_i X_i + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 \ldots\ldots\ldots\ldots \beta_8 X_8$ --(4)

Where:

Y = Energy source status of the households sampled (1= if the household used the energy, 0 otherwise)

X_1=Community

X_2= Sex

X_3=Age

X_4 =Marital Status

X_5 =Level of Education

X_6 =Household Size

X_7 = Occupation

X_8 = Transportation

III. RESULT AND DISCUSSION

Table1: Distribution of households by Agribusiness activities.

Agribusiness Activities	*No of households*	Percentage
Farm Employment	*67*	14.0
Cassava Processing	*45*	9.4
Public Sector Employment	*111*	23.3
Food vendors, business, trading and hawking.	*102*	21.3
Hair Dressing	*20*	4.2
Frozen Food	*32*	6.8

Fish smoking	*40*	8.4
Akara/Pastry	*40*	8.4
Tailoring/sewing mistress	*20*	4.2
Total	*477*	100.0

Table 1 shows the types of Agribusiness undertaken by the respondents as their means of livelihood. A livelihood is an income generating employment or job. It is usually a legal and financial means of supporting one's existence through income it provides in this wise agribusiness. In this study however, most respondents (23.3%) engaged in public sector employment where they received salary supplemented by one agribusiness activity or the other. They were teachers, civil servants of various categories: secretaries, clerical staff, security personnel, and professionals like accountants and lawyers who had farming activities at their backyard or nearby. One essential feature of public or government workers in Nigeria is the type of energy used. They either use gas or kerosene stove.

The Nigerian economy is cash-run with the government as the greatest spender and therefore dependent on government's spending and payment of salary. When salaries are not forthcoming, the economy suffers and public servants go into temporary poverty as we had in recent times after the 2015 recession when both Federal and many State governments could not pay their workers salary. The Nigerian economy is also oil-dependent in that over 80% of government revenues come from the sales of crude oil, the price of which is determined by international economic dynamics. These economic dynamics were responsible for abysmal decline in price of crude oil and the recent recession in Nigeria. These categories of workers only shift from liquefied gas to kerosene stove when the economy goes into a recess. Food vendors, business, trading and hawking (21.3%) form another major set of Agribusiness activities in the study area. While most food vendor proprietors made use of fuelwood in their local restaurants (buka), the same may not apply to others in this category. These vendors claimed they used fuelwood because of the high number of customers they catered for. They cooked in the open or special tents designed for this purpose to limit the negative impact on their neighbors and the environment. Others like the traders and hawkers made use of kerosene stove mainly while some used liquefied gas in their cooking.

Farm Employment workers (14.0%) and cassava processors (9.4%) used fuelwood and other biomass for cooking and heating. Most farmers used fuelwood for their cooking while the cassava processors used it for processing cassava into (fufu) and gari which are very energy dependent. Fish smoking (8.4%) and Akara/Pastry (8.4%) are both energy demanding and also energy dependent. Most respondents in this category relied heavily on biomass energy especially fuelwood.

Hair dressing (4.2%), Frozen Food (6.8%) and Tailoring/sewing mistress (4.2%) made use of electricity essentially. While the hair dressers and tailors can supplement their work with manual tools, frozen food is heavily dependent on electricity supply. Electricity supply in Nigeria is erratic and epileptic hence these respondents used standby generators to safeguard their trade. When power supply is off, these respondents' generating plants spring into action leaving the environment with great noise and fumes pollution.

Table 2: Socio-Economic Characteristics of the Respondents

Variable	Frequency	Percentage
Sex: Male	187	39.2
Female	290	60.8
Marital Status: Single	139	29.1
Married	298	62.5
Divorced	18	3.8
Separated	22	4.6
Household Size: 1-4	175	36.7
5-8	238	49.9
9-12	47	9.9
13-16	12	2.5
17-20	5	1.0
Means of Transportation: Car	165	36.6
Bus	19	4.0
Motor Bike	159	33.3
Bicycle	18	3.8
Others	116	24.3
Education: None	50	10.5
Primary	80	16.8
Secondary	182	38.2
ND/HND	103	21.6
B.Sc.	53	11.1
M.Sc.	5	1.0
Ph.D.	4	0.8
Housing Quality: Mud House	51	10.7
Flats	156	32.7
Rooms facing each other(cemented)	270	56.6
Method of getting fuelwood:(None)	304	63.7
Adult Females	67	14.0
Children	106	22.2
Method of getting Gas:(None)	339	71.1
Filling Stations	85	17.8
Distributors	53	11.1
Method of getting Kerosene :(None)	80	16.8

Filling Stations	186	39.1
Distributors	210	44.1
Method of getting Electricity:(None)	62	13.0
National Grid	415	87.0
Generators	160	33.5

Socio-Economic Characteristics of the Respondents

Table 2 shows the socio-economic characteristics of the respondents**.**

Sex

Most respondents (60.8%) were females while (39.2%) were males. The implications are that the main purpose of purchasing most energy forms was cooking and the kitchen is regarded as an exclusive department for women who are usually in a married state in the African tradition. Males involved were either singles, divorced or separated. Cooking is one of the traditional requirements of a good housewife in many African cultures, heating to keep warm may not be necessary because of warm climate.

Marital Status:

Most respondents (62.5%) were married, (29.1%) were singles while 3.8% were divorced and 4.6% separated. Married households utilize much fuelwood usually gathered by their household members especially women and children.

Household Size:

Larger households require much energy in cooking than smaller ones hence the tendency to resorting to cheaper fuels. In the study area, 36.7% of the respondents had 1-4 members in their households while most respondents 49.9% had 5-8 members in their households, 9.9% had 9-12 members while others 3.5% had 13-16members in their households .

Means of Transportation:

Means of transportation become very important when movement of heavy loads is being contemplated. Gas cylinders are not easy to convey in the absence of a car or a bus, 36.6% of the respondents had cars, 4.0 % had buses, 33.3% travelled by Motor Bikes 3.8% had Bicycles and 24.3% had no means of transportation.

Education:

Education is an eye opener, hence people with higher educational levels weigh options and desist from undertaken ventures that are inimical to their wellbeing especially health. People with lesser education made use of less quality fuels like fuelwood or charcoal. In the study area, 10.5% of the respondents had no formal education, 16.8% had primary education, 38.2% had Secondary education, and 21.6% had ND/HND, 11.1% had a B.Sc. 1.0% had a M.Sc. while 4 respondents or 0.8% had a Ph.D.

Housing Quality:

Housing Quality is also as important as education in the wellbeing of people worldwide. It is the belief of many Nigerians that people living in flats scarcely use fuelwood. In the study area however, 10.7% of the respondents lived in mud houses32.7% lived in Flats while others 56.6% lived in rooms facing each other where walls were cemented It should be noted that all households living in mud houses were few in the Rural Amazanado and most in the Rural Disperso as classified by Lanjouw, (1999).

Method of obtaining energy fuel

Most respondents that utilized fuelwood obtained the product through adult females (14.0%) and children (22.2%). Gas was obtained through filling stations (17.8%) and distributors (11.1%). Kerosene was obtained through filling stations (39.1%) and distributors (44.1%). Electricity was obtained through the National Grid (87.0%) and the use of Generators (33.5%).

Table 3: Purpose for which energy fuel is put

Energy fuel Purpose

	Cooking	Heating	Lighting	Others
Fuel wood	(167) 35.0	(116) 24.3	---	---
Charcoal	(89) 18.7	(57} 10.7	---	---
Kerosene	(339) 71.1	(328) 68.8	(168) 35.2	---
Sawdust	(1)0.2	(6) 1.5	---	---
Electricity	(61) 12.8	(97) 20.3	(374)78.4	(102) 21.4
Gas	(127) 26.6	(49)110.3	---	---

Purpose for which energy fuel is put

Table 3 shows how energy fuel was utilized by the respondents. Fuel wood was mainly used for cooking (35.0%) and heating (24.3%). Charcoal, sawdust and gas were used for the same purposes i.e. cooking and heating by some of the households but the cases of kerosene and electricity were different. While Kerosene was used for cooking (71.1%), heating (68.8%) and lighting(35.2%) , Electricity was not only used for cooking (12.8%), heating (10.3%), lighting (78.4%) but for other things like refrigerating, drying in the salon ,driving basic tools and others(21.4%)

Table 4: Problems of fuel types

Fuel Types Problems

Fuel Types	Seasonality	Fluctuating Price	High Price	Problem To Health	Scarcity
Fuel Wood	(2) 0.4	(1) 0.2	(1) 0.2	(166)34.8	5(1.0)
Charcoal	(51) 10.7	(13) 2.7	(5)1.0	(5)1.0	(8)1.7
Electricity	(20) 4.2	(23) 4.7	(102} 21.4	(4)0.8	(182)38.2}
Gas	(2) 0.4	(25)5.2	(58) 12.2	(6} 1.3	(5) 1.0
Kerosene	(2) 0.4	(328) 68.8	(89} 18.7	{1) 0.2	(5)1.0

Table 4 shows the problems associated with different fuel types. The main problem of fuelwood as highlighted by the respondents was heath concerns (34.8%). One peculiar problem mentioned was redness of the eyes when exposed to heat and smoke of fuelwood. Other health problems mentioned included a characteristic smell that signifies somebody had just left a burning fuelwood zone, sneezing and running nose among others. The main problems associated with charcoal were seasonality (0.7%) and fluctuating prices (2.7%). Charcoal is cheaper and readily available during the dry season while the price soars in the wet season. Respondents attributed many problems to electricity in Nigeria to seasonality (4.2%) in that it is more available during the dry season but more epileptic during the raining season when thunderstorms break electricity poles and when electricity is not forthcoming, children belief the agency involved is drying "wet wires" . Fluctuating Price (4.7%) because customers are given estimated bills which are usually at the whims and caprices of the Electricity Distribution Company officials .High price (21.4%) in that consumers only paid what they saw on the bill together with tips demanded by the officials and not based exactly on what was consumed. Scarcity(38.2%) ,this happens regularly in Nigeria in that power can be off for days only to be on when it is about three days to the forceful collection of estimated bills. Fluctuating Price (68.8%) and High Price (18.7%) were the problems encountered by the respondents as far as kerosene was concerned. The same problems were cited for liquefied gas. The problems of the Nigerian economy based solely on the sales of crude petroleum are almost identical with the problems of petroleum products like the premium motor spirit (pms), the dual purpose kerosene (DPK) and the liquefied gas. These products were claimed to be subsidized but consumers paid more than the price displaced in the filling stations during scarcity. The filling station attendants only sold to the distributors who 'understood' the language of corruption. The distributors sell to retailers and consumers at higher prices right from the filling stations during scarcity. The price continues to soar the farther one is to the filling station. The poorest woman in the remotest village paid the highest price.

Factors influencing the choice of the energy used:

Table 5: Factors influencing the choice of fuelwood

Variable	Coefficients	Standard Errors	Z
Community	0.8036	0.0473	-2.13**
Sex	0.9076	0.2049	-0.41
Age	1.2485	0.1277	2.17**
Marital Status	1.0619	0.2100	0.30
Education	0.4817	0.0579	-6.07*
Household Size	1.0222	0.0389	0.058
Occupation	1.0052	0.1217	0.04
Mode of Transportation	1.3361	0.1079	3.59*
Constant	1.6280	1.3261	0.60

Pseudo R^2 =0.2008

Factors influencing the choice of fuelwood:

The Table 5 shows factors that influenced the choice of fuelwood as an energy source in the study area: Community where respondents resided was significant ($p<0.05$) but with a negative sign indicating that as respondents moved towards the urban centres, the lower the probability of using fuelwood as a source of energy. This is evident in the study area as fuelwood was peculiar to the daily use of those living in the rural areas but rarely used in the peri-urban and the urban parts of the cities surveyed. Also, people living in the urban conurbations used fuelwood only when they had festivals or big celebrations and burning of fuelwood is done in the open field or areas designated for such activities where neighbors were less hurt.

Age was significant ($p<0.05$) but with a positive sign implying that households with older people had higher probability of using fuelwood than the younger ones. Education was significant ($p<0. 01$) but negatively charged indicating that households with higher educational status had lower probability of using fuelwood. This is important in the study area as educated respondents rarely used fuelwood as a major source of energy supply. Mode of Transportation was significant ($p<0.01$) but with a positive sign implying that households with a mode of transportation had higher probability of using fuelwood than those with none probably because of the bulkiness.

Table 6: Factors influencing the choice of kerosene

Variable	Coefficients	Standard Errors	Z
Community	1.1087	0.0667	1.710***
Sex	1.3267	0.3375	1.110
Age	1.1287	0.1344	1.02
Marital Status	1.0856	0.2347	0.38
Education	1.1018	0.1298	0.82
Household Size	1.0298	0.0450	0.67
Occupation	1.2930	0.1563	1.42
Mode of Transportation	0.9349	0.0855	-0.74
Constant	0.6209	0.5414	-0.35

Pseudo R^2 =0.0721

The Table 6 shows factors that influenced the choice of kerosene as an energy source in the study area: The major factor influencing the choice of kerosene in the study area was the community in which respondents resided. Community was significant ($p<0.01$) but with a positive sign implying that as households moved from rural to the peri-urban, the higher the probability of using kerosene as an energy source. In the study area, while respondents used kerosene mainly for lighting especially their lanterns in the rural areas, those in the peri-urban used it for both lighting and cooking in their kerosene stoves.

Table 7: Factors influencing the choice of charcoal

Variable	Coefficients	Standard Errors	Z
Community	1.0870	0.0579	0.114
Sex	0.9982	0.2623	-0.010
Age	1.1610	0.1312	1.32
Marital Status	1.444	0.2888	1.84***
Education	1.0025	0.1154	0.02
Household Size	1.0190	0.0429	0.45
Occupation	1.3449	0.1824	2.18**
Mode of Transportation	0.9907	0.0912	0.10
Constant	0.0218	0.0204	-4.08

Pseudo R^2 =0.0908

The Table 7 shows factors that influenced the choice of charcoal as an energy source in the study area: Marital Status was significant at ($p<0.10$) and it is positively signed implying that being married increases the probability of using charcoal as an energy source probably because of the increase in the number of mouths to feed. Charcoal is a cheaper and affordable source of energy to a larger family .Occupation was also significant at ($p<0.05$) and had a positive sign. Low paying occupation increases the probability of using charcoal as an energy source than higher paying jobs.

Table 8: Factors influencing the choice of Electricity

Variable	Coefficients	Standard Errors	Z
Community	1.3879	0.0678	5.74*
Sex	1.4009	0.3307	1.43
Age	1.0876	0.1169	0.78
Marital Status	1.3167	0.2514	1.44
Education	1.6991	0.1855	4.85*
Household Size	0.9322	0.0386	-1.69***
Occupation	1.2014	0.1467	1.50
Mode of Transportation	0.8920	0.0725	-1.40
Constant	0.0102	0.0092	-5.08

Pseudo R^2=0.1590

Factors influencing the choice of Electricity:

The Table 8 shows factors that influenced the choice of electricity as an energy source in the study area: The community in which the respondents resided had a positive sign and it is significant at ($p<0.01$).This implies that being nearer the urban centres especially the peri-urban increases the probability of having access to electricity. Education also had a positive sign and significant at ($p<0.01$).This further shows that respondents with higher educational attainment had higher probability of using electricity for various activities in their homes. Since power supply is unstable generally in the study area, most of this category of people had generating sets that supplied electricity. Household size is also significant at ($p<0.10$) and positively signed showing that as the size of the household increases, the probability of using electricity as an energy source goes higher and becomes more expedient.

Table 9: Factors influencing the choice of Gas

Variable	Coefficients	Standard Errors	Z
Community	0.9069	0.0493	-1.79***
Sex	1.1278	0.2744	0.49
Age	1.0548	0.1202	0.47
Marital Status	1.0857	0.2345	0.38
Education	2.0872	0.3498	6.15*
Household Size	0.9685	0.4179	-0.74
Occupation	1.1944	0.1552	1.37
Mode of Transportation	0.7680	0.0670	-3.02*
Constant	0.0391	0.0359	-3.53

Pseudo R^2 =0.1567

Factors influencing the choice of Gas:

Table 9 shows factors that influenced the choice of gas as an energy source in the study area: Community in which the respondents resided played an important role especially if near the urban areas where there are filling stations. Community is significant at ($p<0.10$) and negatively signed showing as onemoves further from urban for instance into the rural , the probability of using gas as source of energy in the household decreased. In Nigeria, liquefied gas is stored in petroleum stations or designated sales stores usually located in cities and big towns. Education is significant at ($p<0.01$) and positively signed indicating respondents with higher educational status had higher probability of using liquefied gas as an energy source in their homes. Most educated households in study area used liquefied gas conveyed to their houses in cylinders while less educated households used other forms of energy sources. Mode of transportation is significant at ($p<0.01$) and negatively signed indicating respondents needed only a mode of transporting liquefied gas to their homes and increase in the consumption of liquefied gas may not increase the probability of more vehicles or motorbikes needed to carry gas cylinders.

The study concluded that the type of agribusiness undertaken, the community where respondents resided, education, the general economic condition of the country and the type of operation or purpose being contemplated all have influence on the energy types used in the study area

REFERENCES

[1]. CALLEJA, Tomas. "Dimensiones Humanistas de la Energía". Cuadernos Empresa y Humanismo No 43. 2003.

[2]. Ellabban, Omar; Abu-Rub, Haitham; Blaabjerg, Frede (2004). "Renewable energy resources: Current status, future prospects and their enabling technology". *Renewable and Sustainable Energy Reviews.* 39: 748–764

[3]. Global Development". MEA (2005) Millennium Ecosystem Assessment (2005) Penobscot River RestorationTrust,http://www.penobscotriver.org/Seedinitiative,http://www.seedinit.org/mainpages2/awards/2005/index
[4]. International Union for Conservation of Nature (IUCN): 2008, Energy, Ecosystems and Livelihood Initiative Rue Mauverney 28 Gland 1196 Switzerland."http://www.iucn.org/about/work/initiatives/energy_welcome/index.cfm?uNe"
[5]. Lanjouw, P. 1999. "Rural Nonagricultural Employment and Poverty in Ecuador."*Economic Development and Cultural Change* 48(1):91-122
[6]. Mishra V, Dai X, Smith KR, Mika L. Maternal exposure to biomass smoke and reduced birth weight in Zimbabwe.*Ann Epidemiol*. 2004; 14(10):740–747..
[7]. Pachauri S, Rao ND, Nagai Y, Riahi K. Access to Modern Energy Assessment and Outlook for Developing and Emerging Regions. IIASA, Laxenburg, Austria, 2012. Available on: http://pure.iiasa.ac.at/10145.
[8]. PNUD, Programa de las Naciones Unidas para el Desarrollo. "Ambiente y Energía". http://www.pnud.org.ve/temas/ambiente.asp. February, 2003.
[9]. Pokhrel AK, Smith KR, Khalakdina A, Deuja A, Bates MN. Case-control study of indoor cooking smoke exposure and cataract in Nepal and India. Int J Epidemiol. 2005; 34:702–708.
[10]. Pachauri S, Rao ND, Nagai Y, Riahi K. Access to Modern Energy Assessment and Outlook for Developing and Emerging Regions. IIASA, Laxenburg, Austria, 2012. Available on: http://pure.iiasa.ac.at/10145.
[11]. Pokhrel AK, Smith KR, Khalakdina A, Deuja A, Bates MN. Case-control study of indoor cooking smoke exposure and cataract in Nepal and India. Int J Epidemiol. 2005; 34: 702–8.
[12]. World Bank 2006.Living Standards Measurement Study. Available: http://www.worldbank.org/.
[13]. WEO-2016 Special Report: Energy and Air Pollution
[14]. World Health Organization (2009) The Energy Access Situation in Developing Countries: A Review Focusing on the Least Developed Countries and Sub-Saharan Africa, New York.
[15]. World Health Organization.Regional action plan and targets for prevention and control of noncommunicable diseases (2013–2020). 2013; New Delhi, India: WHO SEARO