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Assessment of the Availability and Utilization of Household Energy Supplies in Residential Buildings

Wahab, A.B[1]. Ayangade, J.A[1]. and Fasogbon, S.K[2].
[1]Department of Building, Obafemi Awolowo University, Ile-Ife, Nigeria.
[2]Departement of Mechanical Engineering, University of Ibadan, Nigeria.
E-Mail: wahabak2002@yahoo.com

ABSTRACT

The study examined the types of household energy used by residents in Ife Central Local Government, identified and evaluated the factors that affect the choice of household energy supply and identified the likely environmental consequences of the identified household energy utilization. This was done with a view to assessing the patterns of household energy supply and utilization and how to mitigate its likely impact on the environment. Four core wards in the Local Government were selected from the total of eleven wards and data collection was done with the use of primary and secondary data techniques. A total of 244 questionnaires were administered to the respondents and 151 were retrieved and thus indicating a return rate of 62%.

The result shows that the more prevalent energy supplies used by the respondents are electricity 139 (92.05%), kerosene 110 (72.85%) and the least form of energy used was solar energy 3 (1.99%). The most significant factor that influenced the choice of sawdust, firewood, kerosene, cola, solar energy, electricity and gas with Relative Importance Index (RII) of 0.83, 0.694, 0.704, 1.00, 0.900, 0.703 and 0.774 respectively. The study also shows that 68.20% of the respondents indicated that the consumption of energy supplies in buildings had impact on them and the environment with traces of smokes, smoke retention in the house and indoor pollution ranked with Relative Importance Index (RII) of 0.685, 0.680 and 0.631 respectively as the most significant likely impacts of the energy supplies used by the respondents. The study concluded that environmentally friendly energy supplies should be made available to the occupants with the adoption of good house-keeping practices in order to mitigate hazards associated with the consumption of unfriendly energy supplies.

Keywords: Energy Sources, Buildings, Occupants, Factors, Utilization, Effects.

INTRODUCTION

Energy is a vital bedrock for any reasonable, rapid economic growth and development of a nation. Any nation aspiring to develop in terms of technology requires energy as its driving force. Practical and sustainable development is more pronounced through provision and availability of viable and sustainable form of energy. In the light of this, Energy of different forms contributes greatly to the attainment of certain level of comfort in the built environment. Hence, energy is required for the adequate regulation and operation of a building in order to be able to perform its function to its full capacity. In consonant with this, (Rainer and Maurice, 2005) highlight energy as a key component of any poverty eradication and sustainable development strategy in developing countries.

Households generally use a combination of energy sources for cooking that can be categorized as traditional (such as dung, agricultural residues and fuelwood), intermediate (such as charcoal and kerosene) or modern (such as LPG, biogas, ethanol gel, plant oils, dimethyl ether (DME) and electricity) (Evans, 1986; DFID, 2002). Electricity is mainly used for lighting and small appliances, rather than cooking and represents a small share of total household consumption in energy items (IEA, 2006). In many African countries, including Nigeria, fuelwood is found to be detrimental to socio-economic life in Third World nations (Aina and Odebiyi, 1998). One problem of overdependence of fuelwood is deforestation. Trees are cut indiscriminately to meet the basic needs of the teeming population (Oppong, 1992). Beyond demographic factors are other factors such as inequality in access to resources; change from subsistence to large-scale commercial farming; and the gradual collapse of the traditional resource management system. All of these have further compounded the growing rate of deforestation in the Third World countries (Aina and Odebiyi, 1998).

According to Odil (1999), the links between energy and environment present a difficult paradox in the development debate. Energy is vital to economic development; poverty will not be reduced without greater use of modern forms of energy. At the same time, the provision of energy services-especially through the combustion of fossil fuels and biomass can create and contribute to adverse environmental effects such as indoor and urban air pollution, acid rain and global climate change. In rural areas, burning tradition fuels, such as firewood in open fires for cooking and heating, exposes poor women and children to indoor air pollution (IAP) primarily from harmful concentrations of particulate matter (PM) and other pollutants. Health impacts include

acute respiratory infection (ARI); notably pneumonia in children and chronic bronchitis in women (Kulsum, 2005).

The epileptic nature of the Nigerian oil and gas industry with regards to kerosene and cooking gas (LPG) supplies has made fossil fuel scarce and very expensive. As a result, most medium and high income persons who normally use fossil fuel and electrical energy as their primary sources of household energy could have resorted to biomass fuel either because they cannot afford to pay for the fossil fuel or because it is scarce. In addition, electricity is highly unreliable, suggesting a preponderance use of biomass energy at the expense of environment friendly fossil and electrical energy.

Over the years, electricity energy supply has been regarded as a major fuel use to supply energy for home appliances. But due to erratic electricity power supply, the use of generators in various residential building and industrial building has been common in urban centres in the country. Also, in some rural areas, the use of fire wood and crude oil derivatives such as kerosene for light and cooking purposes which generates smoke which could cause high health hazards to the residents if inhaled has been observed. Hence, this underscores an issue that needs to be looked into. This study will add to the body of knowledge by assessing various energy supplies available to the householders in the country by providing information of the patterns and effects of the energy supplies on the occupants and environment. It will also show the factors that influence the use of the energy supplies consumed in buildings by the householders. Hence, the aim of this research work is to assess the patterns of household energy supply and utilization with a view to mitigating its likely impact on the environment. The specific objectives of the research work are to: examine the types of household energy used; identify and evaluate factors that affect the choice of household energy supply and assess the impact of the household energy supply on the environment.

REVIEW OF LITERATURE

Sources of Energy in the Environment

People have always used energy to do work for themselves. Thousands of years ago, early humans burnt wood to provide light, heat their living spaces, and cook their food. Later, people used wind to move their boats from place to place. A hundred years ago, people began using falling water to produce electricity. Today, people use more energy than ever from a variety of sources for a multitude of tasks and our lives are undoubtedly better for it. Our homes are comfortable and full of useful and entertaining electrical devices. We communicate instantaneously in many ways and live healthier lives. We travel the world, or at least, see it on television and the internet. Petroleum is just one of the many different sources of energy we use to do work (Aina and Odebiyi, 1998). The energy sources used can be classified into two broad categories: non-renewable and renewable; and can still be classified into further groups.

Non-Renewable Energy Sources

Its sources include coal, petroleum, natural gas, propane, and uranium. They are used to generate electricity, to heat homes, to move automobiles, and to manufacture products. These energy sources are called non-renewable because they cannot be replenished in a short period of time. Petroleum, for example, was formed millions of years ago from the remains of ancient sea life, so we cannot make more quickly. We could run out of economically recoverable non-renewable resources someday**.**

Renewable Energy Sources

Energy that is renewable in nature includes biomass, geothermal, hydropower, solar and wind. They are called renewable energy sources because their supplies are replenished in a short time. Day after day, the sun shines, the wind blows, and the rivers flows. We use renewable energy sources mainly to make electricity. Is electricity a renewable or non-renewable source of energy? The answer is neither. Electricity is different from the other energy sources because it is a secondary source of energy. That means we have to use another energy source to make it.

Household Energy Consumption

Tighter state building energy codes have been a factor in the rise of residential energy efficiency. In addition, more new homes are being constructed to meet the targets of energy efficiency programmes, and 46 per cent of new home buyers cite energy efficiency as a primary consideration in their purchasing decisions (Odil, 1999). The household sector is responsible for about 15 to 25 per cent of primary energy use in OECD countries and for a higher share in many developing countries. Average per capital household energy use in developed countries is about nine times higher than in developing countries, even though in developing countries, a large share of household energy is provided by non-commercial fuels that are often not reflected in official statistics.

Historical trends in per capital household energy consumption by region for the period 1970 to 1995 represented in the most notable trend is the decline in per capital household energy consumption in North America, which in 1970, had much higher household energy consumption than any other region. The difference remains considerable but it decreased substantially. This decline is a result of several factors, including increased energy efficiency and saturation with domestic electrical appliances. Disparities in household energy use exist between rural and urban population, between highland low income groups within a country, and among countries. The major factors contributing to these differences are levels of urbanization, economic development, and living standards.

Energy efficiency depends on the type of fuel used and on the characteristics of particular appliances. In many developing countries, particularly in rural areas, traditional fuels such as fire-wood, charcoal and agricultural waste, constitute a major portion of total household energy consumption. The efficiency of a traditional firewood cooking stove is as low as 10-12%, compared with a liquefied petroleum gas (LPG) stove efficiency of more than 40%. Potential energy saving from the use of available efficiency technologies for cooking, heating, lighting electrical appliances and building insulation can reach as high as 75%. Unfortunately, diffusion of these technologies, especially in developing countries, is low. One of the main reasons for that is the high initial cost to the consumer, particularly relative to the low cash incomes in many rural areas (Oladosu and Adegbulugbe, 1997). Other factors include shortages of particular fuels, lack of a distribution network, and failure of the distribution system. Production and consumption of almost any type of energy have environmental impacts. Harvesting of firewood, in particular, contributes to deforestation, soil erosion, and desertification. In Nigeria, harvesting of firewood contributes to deforestation at a rate of about 400,000 hectares per year. If this trend continues, the country's forest resources could be completely depleted by 2020. Use of firewood as an energy source can also contribute to the accumulation of carbon dioxide, the main greenhouse gas, both because the process of burning firewood produces environmentally unfriendly gases. In addition, the use of biomass in traditional stoves exposes the users, mainly women and children, to high levels of indoor air pollution (Oladosu and Adegbulugbe, 1997).

Residential buildings include single-family detached and attached homes. Apartments and mobile homes. In recent decades, growth in household wealth and other factors have spurred demand for larger homes and more energy services, increasing energy consumption per household. Also, increased saturation of appliances and equipment, including computer and entertainment systems, has resulted in more demand for energy, particularly electricity. To some degree, the growth in housing unit size and demand for energy services has been affected by improvement in energy intensity. According to Olanipekun (2003), the factors that can influence energy consumption in buildings are shown in Figure 1.

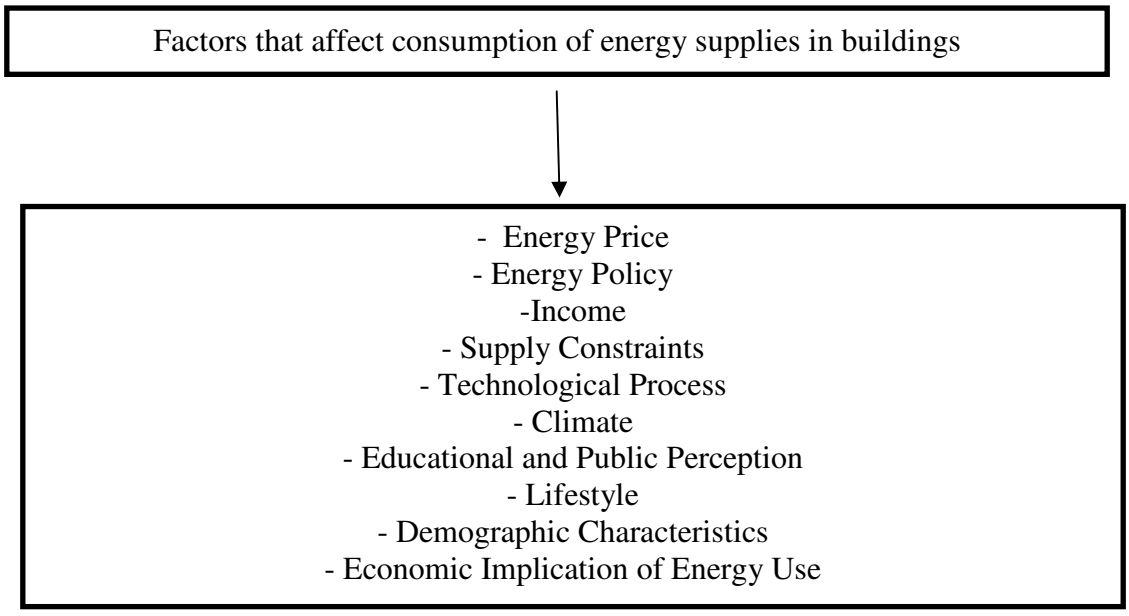

Figure 1: Illustration of Factors that can Influence Energy Consumption in Buildings.
Source: Olanipekun (2003)

Cost of Household Energy Supplies

Increase in the prices of energy supplies have been forcing households to either consume less of these products, or to fall back upon inferior sources of energy (UNDP, 2008). An assessment of the effect of some selected macro-economic shock on poverty showed that increase in the prices of petroleum products impacted badly on majority (72.90%) of poor households in Nigeria. The effect of the economic policies embarked upon by the Nigeria Government is that; within the past two decades, a litre of petrol increased in price first from ₦0.60 in 1991 to ₦1.00 in 1994 and ₦20.00 in 1998 (an increase of nearly 3000% in less than ten years. This currently stands at ₦64.00 per litre. Concomitantly, kerosene also increased in price from ₦0.27 per litre in 1993 to ₦6.00 in 1994 and ₦17.00 in 1998, and currently ₦84.00. While a 12.5kg cylinder gas rose in price initially from ₦200 in 1993 to ₦450 in 1998 and later to ₦1000 by the year 2000. By the year 2012, the price has moved to N97 per litre.

With regards to household consumption of energy for cooking in purposes, the proportion of consumers of firewood has continued to be on the increase. This is because consumers of kerosene, especially those belonging to the low-income class, are constrained to switch over to firewood or other fuels as an alternative energy source. Consequently, an increased participation of men and women in the fuelwood business was witnessed in the city with a concomitant increase in the cost of firewood. A bundle of fuelwood that cost ₦25 in 1992 was sold for ₦50 in 1994 and ₦40 in 1999. This quantity of fire wood is just about enough for the cooking needs of an average household in a day.

RESEARCH METHODOLOGY

The study was carried out in Ife Central Local Government of Osun State, Nigeria. The target populations were the residents of core wards of Ife Central Local Government, Ile-Ife Osun State Nigeria. The reason for selecting the core wards was that they constitute the most populated areas of the study area and the six wards fall in the core of this ancient city; and also because of their historic antecedent/background. The sample frame of a research work was the total population from which the sample size for the research was drawn. With regards to this study, the sample frame is the total number of residential buildings in the core area of Ife Central Local Government as shown in Table 2, which is 2,458 houses (NPC, 2009). For the purpose of this study, the simple random sampling technique was adopted to select the sample from the entire population. However, in the course of this study, 4 wards out of 11 wards in the study area were selected because they were the core wards of the study area. From the field survey, it was discovered that the core 4 wards in the study area had the following number of buildings: Ilare ward had 482 buildings, Iremo IV had 506 buildings, Iremo V had 635 buildings and More/Ojaja ward had 835 buildings (NPC, 2009) (Table 1).

Systematic sampling procedure was employed in the administration of questionnaires to the respondents. Having gotten the background on the number of residential buildings in the study area, systematic sampling of the houses was done by picking every 10^{th} building in the direction of movement along the major roads and streets within the selected wards. Questionnaires were administered on household in the study area. Where the pattern of development was not linear, houses were selected randomly. The questionnaires were administered to 10% of the 2,458 households, and 10% of residential buildings in each wards was administered questionnaire with, and therefore making the total numbered of questionnaire administered to equal to 244 (Table 2).

Table 1: Number of Residential Buildings Selected in the Study Area

Study Area	Core Wards	Number of Residential Buildings	Selected 10%
Ife Central Local Government	Ilare III	482	48
	Iremo IV	506	50
	Iremo V	635	63
	Moore/Ojaja	835	83
Total		2,458	244

Source: Field Survey

Table 2: The Core Wards Selected in the Study Area

Town	Local Government Area	Number of Wards	Core of the Town	Number of Questionnaires Administered	Total Population
Ile-Ife	Ife Central	11	4	244	167,204

Source: Field Survey

Data Collection and Analysis

The sources of data that was employed in the course of this study were primary data and secondary data. The primary data was obtained through the use of structured questionnaires that focussed on issues relating to types of energy consumed, the factors that influence the energy consumed and the assessment of the effect of the household energy supply on environment. The secondary data was obtained from the review of related textbooks, journals, articles, internet, records and any other publications on effect of household energy supply on the environment. The method of analysis that was used in this study includes both descriptive and inferential statistics.

Results and Discussions

A total number of 244 questionnaires were administered and 151 were retrieved, and this represents that about 62.00% of the questionnaires were retrieved for analysis. The results shows that about 31.11% of the respondents' ages fall between 51 and 60 years, 29.10% fall between 41 and 50 years and 26.50% fall between 31 and 40 years. The least age limits of the respondents occurred at 61-70(4.00%) and 71-80(4.00%) respectively. Majority of the respondents (55.00%) are mothers and about 93.40% of all the respondents are married. It is shown that 20.50% of the respondents had secondary school education while only 77.50% had tertiary school education, with majority of them (32.50%) had higher national diploma certificates and only 6.80% of them had Ph.D certificates. The income earning levels of the respondents vary with most of them (28.50%), earning between N71,000-N90,000 monthly and about 2.000% earned less than N10,000 monthly. The occupancy pattern of the respondents showed that most of them lived in bungalow apartments, with 49.70% living in bungalow (flat apartment), 15.20% in bungalow (face-me and face-you building) (Table 3).

Table 3: Socio – Economic Characteristics of the Respondents

Age Group of the Respondents in the Selected Buildings		
Age	**Frequency**	**%**
21-30	8	5.30
31-40	40	26.50
41-50	44	29.10
51-60	47	31.10
61-70	6	4.00
71-80	6	4.00
Total	151	100.00
Status of the Respondents in the Selected Households/Buildings		
Status	**Frequency**	**%**
Mother	83	55.00
Father	64	42.40
Offspring	4	2.60
Total	151	100.00
Marital Status of the Respondents		
Status	**Frequency**	**%**
Married	141	93.40
Single	4	2.60
Widow	6	4.00
Total	151	100.00
Tribe Affiliation of the Respondents		
Tribe	**Frequency**	**%**
Yoruba	131	86.80
Igbo	17	11.20
Hausa	3	2.00
Total	151	100.00
Religious Status of the Respondents		
Status	**Frequency**	**%**
Islam	76	50.30
Christianity	70	46.40
Traditional	5	3.30
Total	151	100.00

Educational Institutions Attended by the Respondents		
Status	**Frequency**	**%**
Primary	3	2.00
Secondary	31	20.00
Tertiary	117	77.50
Total	151	100.00
Number of the Respondents that had Tertiary Education Qualification		
Qualification	**Frequency**	**%**
ND	16	39.30
HND	38	21.40
BSc	18	28.60
MSc	37	7.10
PhD	8	3.60
Total	117	100.00
Net Income of the Respondents Per Month		
Income Level	**Frequency**	**%**
Less than N10,000	3	2.00
N10,000 - N30,000	24	15.90
N31,000 - N50,000	34	22.50
N51,000 - N70,000	14	9.30
N71,000 – N90,000	43	28.50
Above N90,000	27	17.90
No Response	6	4.00
Total	151	100.00
Occupancy Type of the Respondents		
Type of Building	**Frequency**	**%**
Bungalow (Flat Apartment)	75	49.70
Bungalow (Face-Me and Face –You)	23	15.20
Storey (Flat Apartment)	16	10.60
Storey (Face-Me and Face –You)	13	8.60
Duplex	24	15.90
Total	151	100.00

ENERGY SUPPLIES AND USES IN THE BUILDINGS

The result shows that 80.13% of the respondents are non-users of sawdust while 19.87% are users; 77.48% are non-users of firewood while 22.52% are users; 72.85% are users of kerosene while 27.15% are non-users; 92.05% are non-users of coal while 7.95% are users of coal; 98.01% are non-users of solar energy while 1.99% are users; 92.05% are users of electricity while 7.95% are non-users and 55.63% are non-users of gas while 44.37% are users (Table 4).

It is shown in Table 5 that about 77.00% of sawdust users used it for cooking, 0.00% used it for lighting, 13.00% used it for heating while 0.00% used it for powering electrical appliances. About 62.00% of the firewood users used it for cooking, 12.00% used it for lighting, 21.00 used it for heating while 0.00% used it for powering electrical appliance. About 77.00% of the kerosene users used it for cooking, 65.00% used it for lighting, 44.00% used it for heating while 0% used it for powering electrical appliance. 100.00% of the coal users use it for cooking, 0% used it for lighting, 0% used it for heating while 0% used it for powering electrical appliance. About 33.000% of the solar energy users used it for cooking, 100.00% used it for lighting, 67.00% used it for heating while 100% used it for powering electric appliances. In the same vein, 41.00% of the electricity users used it for cooking, 82.00% used it for lighting, 35.00% used it for heating while 85.00% used it for powering electric appliances; and 88.00% of the gas users used it for cooking, 16.00% used it for lighting, 28.00% used it for heating while 16.00% used it for powering electric appliances.

Table 4: Types of Energy Supplies Used by the Respondents

Type of Energy Supply	Users		Non-Users		Total
	F	%	F	%	
Sawdust	30	19.87	121	80.13	151
Fire wood	34	22.52	117	77.48	151
Kerosene	110	72.85	41	27.15	151
Coal	12	7.95	139	92.05	151
Solar Energy	3	1.99	148	98.01	151
Electricity	139	92.05	12	7.95	151
Gas	67	44.37	84	55.63	151

Table 5: Use(s) of Energy Supplies in the Buildings

ENERGY TYPE	COOKING					LIGHTING					HEATING					POWERING ELECTRICAL APPLIANCES.				
	Users		Non-Users		Total	Users		Non- Users		Total	Users		Non-Users		Total	Users		Non- Users		Total
	F	%	F	%		f	%	F	%		F	%	F	%		F	%	F	%	
Sawdust	23	77	7	23	30	0	0	30	100	30	4	13	26	87	27	0	0	30	100	30
Fire wood	21	62	13	38	34	4	12	30	88	34	7	21	27	79	34	0	0	34	100	34
Kerosene	85	77	25	23	110	72	65	38	35	110	48	44	62	56	110	0	0	110	100	110
Coal	3	100	0	0	3	0	0	3	100	3	0	0	3	100	3	0	0	3	100	3
Solar Energy	4	33	8	67	12	12	100	0	0	12	8	67	4	33	12	12	100	0	0	12
Electricity	57	41	82	59	139	114	82	25	18	139	48	35	91	65	139	118	85	21	15	139
Gas	59	88	8	12	67	11	16	56	84	67	19	28	48	72	67	11	16	56	84	67

FACTORS THAT INFLUENCE THE CHOICE OF ENERGY SUPPLY CONSUMED

The study shows that different factors influenced the choices of the available energy supplies by the respondents. The three most significant factors that influenced the use of sawdust are technology process, neatness and time of use with relative importance index of 0.833, neatness and 0.667 respectively while the three least factors are energy price, lifestyle and income with relative importance index of 0.373, 0.373 and 0.353 respectively. The three most significant factors that influenced the use of firewood are time of use, availability and lifestyle with relative importance index of 0.694, 0.665 and 0.653 respectively while the three least factors are social status, technology process and climate with relative importance index of 0.465, 0.359 and 0.312 respectively. Also, the three most significant factors that influenced the choice of kerosene as a form of energy supply by the respondents are availability, income and neatness with relative importance index of 0.704, 0.673 and 0.673 respectively while the three least factors are education social status, technology process and climate with relative importance index of 0.558, 0.527 and 0.404 respectively (Tables 6, 7 and 8).

Table 6: Factors that Influence the Use of Sawdust as a Form of Energy Supply.

Factors	1	2	3	4	5	Total	RII	Rank
Technological Progress	2	4	0	5	19	30	0.833	1
Neatness	0	0	13	4	13	30	0.800	2
Time of Use	0	2	16	12	0	30	0.667	3
Education and Public Perception	0	11	10	6	3	30	0.607	4
Climate	0	14	12	0	4	30	0.560	5
Reliability	7	0	23	0	0	30	0.507	6
Availability	0	15	15	0	0	30	0.500	7
Social Status	7	14	9	0	0	30	0.413	8
Energy Price	4	26	0	0	0	30	0.373	9
Lifestyle	4	26	0	0	0	30	0.373	9
Income	10	17	3	0	0	30	0.353	11

Table 7: Factors that Influence the Use of Firewood as a Form of Energy Supply.

Factors	1	2	3	4	5	Total	RII	Rank
Time of Use	0	6	12	10	6	34	0.694	1
Availability	0	5	21	0	8	34	0.665	2
Lifestyle	5	0	14	11	4	34	0.653	3
Neatness	6	7	5	4	12	34	0.653	3
Reliability	0	11	14	3	6	34	0.624	5
Income	0	17	12	0	5	34	0.559	6
Energy Price	11	7	9	3	4	34	0.494	7
Education and Public Perception	14	0	16	0	4	34	0.482	8
Social Status	17	5	4	0	8	34	0.465	9
Technological Process	19	9	0	6	0	34	0.359	10
Climate	22	5	7	0	0	34	0.312	11

Table 8: Factors that Influence the Use of Kerosene as a Form of Energy Supply.

Factors	1	2	3	4	5	Total	RII	Rank
Availability	0	6	59	27	18	110	0.704	1
Income	12	18	36	6	38	110	0.673	2
Neatness	16	8	30	32	24	110	0.673	2
Time of Use	3	37	27	9	34	110	0.662	4
Energy Price	2	28	40	21	19	110	0.649	5
Reliability	8	25	46	16	15	110	0.609	6
Lifestyle	17	17	38	22	16	110	0.605	7
Education and Public Perception	33	14	20	25	18	110	0.565	8
Social Status	21	11	51	24	3	110	0.558	9
Technology Process	43	4	26	24	13	110	0.527	10
Climate	45	36	20	0	9	110	0.404	11

Similarly, the study shows that the three most significant factors that influenced the use of coal as a form of energy used in buildings by the respondents are energy price, time of use and neatness with relative importance index of 1.000, 1.000 and 1.000 while the three least factors are education and public perception, reliability and lifestyle with relative importance of 0.800, 0.800 and 0.400 respectively. The three most significant factors that influenced the use of firewood are education and public perception, neatness and technology with relative importance index of 0.900, 0.900 and 0.800 respectively while the least three factors are availability, lifestyle and reliability with relative importance index of 0.400, 0.400 and 0.400 respectively. The three most significant factors that influenced the use of electricity are availability, technology process and neatness while the three factors are time of use, lifestyle and climate with relative index of 0.618, 0.585 and 0.493 respectively. Lastly, the three most significant factors that influenced the use of gas are neatness, income and climate with relative importance index of 0.774, 0.761 and 0.726 respectively while the three least factors that influenced its use are lifestyle, education and public perception and technology process with relative importance index of 0.661, 0.642 and 0.574 respectively (Tables 9, 10, 11 and 12).

Table 9: Factors that Influence the Use of Coal as a Form of Energy Supply.

Factors	1	2	3	4	5	Total	RII	Rank
Energy Price	0	0	0	0	3	3	1.000	1
Time of Use	0	0	0	0	3	3	1.000	1
Neatness	0	0	0	0	3	3	1.000	1
Climate	0	0	0	0	3	3	1.000	1
Technology Process	0	0	0	0	3	3	1.000	1
Income	0	0	0	3	0	3	0.800	6
Availability	0	0	0	3	0	3	0.800	6
Social Status	0	0	0	3	0	3	0.800	6
Education and Public Perception	0	0	0	3	0	3	0.800	6
Reliability	0	0	0	3	0	3	0.800	6
Lifestyle	3	0	3	0	0	6	0.400	11

Table 10: Factors that Influence the Use of Solar Energy as a Form of Energy Supply.

Factors	1	2	3	4	5	Total	RII	Rank
Education and Public Perception	0	0	0	4	4	8	0.900	1
Neatness	0	0	0	4	4	8	0.900	1
Technology Process	0	0	4	0	4	8	0.800	3
Income	4	0	0	0	4	8	0.600	4
Energy Price	0	4	0	4	0	8	0.600	4
Climate	0	0	8	0	0	8	0.600	4
Social Status	0	4	4	0	0	8	0.500	7
Time of Use	0	4	4	0	0	8	0.500	7
Availability	4	0	4	0	0	8	0.400	9
Lifestyle	4	0	4	0	0	8	0.400	9
Reliability	4	0	4	0	0	8	0.400	9

Table 11: Factors that Influence the Use of Electricity as a Form of Energy Supply.

Factors	1	2	3	4	5	Total	RII	Rank
Availability	9	12	47	33	33	134	0.703	1
Technology Process	28	10	29	14	53	134	0.681	2
Neatness	20	11	37	29	37	134	0.678	3
Energy Price	8	16	64	22	24	134	0.657	4
Reliability	4	30	45	34	21	134	0.657	4
Social Status	17	12	56	21	28	134	0.646	6
Income	16	31	33	17	37	134	0.642	7
Education and Public Perception	22	10	49	26	27	134	0.639	8
Time of Use	4	32	67	10	21	134	0.618	9
Lifestyle	15	30	57	14	18	134	0.585	10
Climate	32	44	33	14	11	134	0.493	11

Table 12: Factors that Influence the Use of Gas as a Form of Energy Supply.

Factors	1	2	3	4	5	Total	RII	Rank
Neatness	4	4	17	8	29	62	0.774	1
Income	8	0	19	4	31	62	0.761	2
Climate	0	14	13	17	18	62	0.726	3
Reliability	0	12	18	14	18	62	0.723	4
Time of Use	4	7	21	10	20	62	0.713	5
Availability	4	0	31	13	14	62	0.7086	6
Social Status	7	10	10	23	12	62	0.674	7
Energy Price	0	17	18	17	10	62	0.665	8
Lifestyle	8	7	23	6	18	62	0.661	9
Education and Public Perception	12	3	19	16	12	62	0.642	10
Technology Process	21	6	9	12	14	62	0.574	11

IMPACT OF THE HOUSEHOLD ENERGY SUPPLY ON THE ENVIRONMENT

The study shows that about 68.20% of the respondents were aware of the impact of domestic energy consumed on their health and environment while 31.800% were not aware (Table 13). This might be connected with their past experiences on the effects that are directly associated with the use of the various forms of the available energy supply in buildings. Table 14 shows the impacts that the respondents had during the course of using the forms of energy supply. It is shown that health effects in the body system, smoke retention in the house and indoor pollution were ranked as the most significant impact with Relative importance index (RII) of 0.685, 0.680 and 0.641 respectively while stains on building elements (walls, floors and roofs) was ranked as the least impact associated with the use of the available forms of energy in buildings with Relative Importance Index (RII) of 0.563.

Table 13: Does the energy consumed by the household have impact on you and the environment?

Response	Frequency	%
Yes	103	68.20
No	48	31.80
Total	151	100.00

Table 14: Responses on the Likely Impacts of the Household Energy Consumed

Impact	1	2	3	4	5	Total	RII	Rank
Health Effects in the Body (cough)	15	10	31	10	37	103	0.685	1
Smoke Retention in the House	11	21	26	6	39	103	0.680	2
Indoor Pollution	11	21	26	26	19	103	0.641	3
Reduced/Poor Indoor Ventilation	8	32	31	16	16	103	0.600	4
Production of Greenhouse Gases	17	25	26	19	16	103	0.584	5
Stains on Building Elements	31	7	29	22	14	103	0.563	6

DISCUSSION OF FINDINGS

It is shown from the results obtained during the study that the respondents have different socio-economic profile as seen in their age structure, marital status/roles in the household, educational qualifications and income level. All these indices are bound to affect the type, pattern and use of the available energy supplies by the respondents in the study area. The common forms of energy supplies used by the respondents are electricity, kerosene sawdust, gas, firewood while solar energy is the least form of energy used. These energy forms, particularly, electricity is used for most functions like cooking, lighting, heating, and powering electrical appliances. The respondents have much awareness of the impacts that are linked to the use of the available forms of energy in the buildings, as it was discovered that the energy supplies impact on the building elements; affect the bodily systems of the occupants and also cause indoor pollution in the buildings.

CONCLUSION AND RECOMMENDATION

The study shows that electricity energy is mostly used by occupants of the households in the study area followed by kerosene, firewood, sawdust, gas, coal and solar energy is the least form of energy used. It is also shown that most of the respondents spent much money on kerosene and electricity than any other form of energy supply. Different factors significantly influence the type of energy used by the respondents and the use of the available forms of energy supplies have impact on the building elements and the occupants. The most significant impacts of the forms of energy supplies consumed are cough, smoke retention in the house and indoor pollution which were mostly ranked in the.

Based on the results and findings of this study, there is need to adopt these measures in order to aid effective supply of energy to the household and also to reduce the likely impact on the occupants of the buildings. In view of the fact that most building occupants depend on electricity as a form of energy, government at all tiers should endeavour to intensify efforts on its generation, transmission and distribution to buildings regularly. Kerosene and gas should be made available at affordable prices to the householders. The building occupants that use gas must maintain good house-keeping practice by using it carefully and turn it off when not in use. The occupants need to be sensitized of the hazards associated with forms of energy in order to reduce the rate of occurrence of the hazards. Also, if any of the energy supplies is used, and it generates smoke, windows and doors need to be open to provide ventilation to the buildings and also reduce the rate of stains of the smoke on building elements.

REFERENCES

Aina O.I. and Odebiyi, A.I. (1998). Domestic Energy Crisis in Nigeria: Impact on Women and Family Welfare Africa Economic History No.26, pp. 1-14

Department for International Development (DFID) (2002). Energy for the Poor. Underpinning the Millennium Development Goals, London.

Evans, M. (1986). Change in Domestic Fuel Consumption in Central Mexico and its Relation to Employment and Nutrition. World Employment Paper Working Paper No.44. International Labour Organisation (ILO), Geneva.

Kulsum, A. (2005), Evironmental Health and Traditional fuel use in Guatenals, Environment Matters Annual Review

National Population Commission (2009). Notice on the Publication of the Publication of 2006 Census Final Results, Federal Republic of Nigeria, Abuja.

Odil, T.P. (1999): Energy and Environment. In: Environment Matters, I. Johnson (eds.), The World Bank Annual Review, Washington D.C., USA, pp. 48-49.

Oladosu, G.A and Adegbulugbe, A.O. (1997) Estimating Household Energy Demand in Developing Countries: A Framework, IKE, Universitat Stuttgart

Olanipekun, E.A. (2003) An Appraisal of Energy Conservation Practices in Some Selected Buildings at Obafemi Awolowo University, Ile-Ife. An Unpublished Thesis Submitted to the Faculty of Environmental Design and Management, Obafemi Awolowo University, Ile-Ife.

Oppong, C., (1992). Population, environment, and women: some issue in Africa. Conference proceedings. Population and environment, in Africa Gaborone, Botswana, 14-19, September.

Rainer, E. and Maurice, P. (2005): Establishment of a Bioenergy Clearing House for Poverty Alleviation in Sub-Sahara Africa, Partners for Africa, May 2005, Issue No.2

UNDP (2008) Issues and Options in the Energy Sector, World bank, Washington Dc, USA.