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CULTURAL AND SOCIO-ECONOMIC DETERMINANTS OF CLEAN ENERGY UTILIZATION IN SOUTHWEST, NIGERIA.

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ABSTRACT

Studies have focused on how why they use alternatives not on why they choose to combine or remained with inefficient sources of energy These studies have identified that the energy adoption and utilisation does not transit through the normal energy ladder linear pathway. This study identifying whether or not cultural factors play a role in energy adoption. Household survey was conducted in three hundred and forty households from seventeen local government areas of the Six states in south-west Nigeria. The study concluded that socio-economic status and religious beliefs were responsible factors for fuel switching and energy stacking in rural communities of south- west Nigeria. It found that marital status and electricity tariff significantly related to likelihood of utilising electricity for lighting. Belief in the traditional cooking was inversely related to the use of Gas for cooking.

Introduction

Currently, 15.3 million households lack access to grid electricity. For those connected to the national grid, supply is erratic at best. An estimated 72% of Nigerians depend solely on wood as a source of fuel for cooking. Despite this, many more Nigerians are climbing down the energy ladder – moving from electricity, gas and kerosene to fuel wood and other traditional biomass energy forms due to economic and social-cultural factors (Akintunde, 2019; Onyekwelu, 2020). Firewood is the dominant source of energy both in the urban and rural areas in the country (Akintunde, 2019; Onyekwelu, 2020). Most rural household use biomass fuels because of affordability and because they do not have sophisticated energy equipment. The use of biomass often worsens poverty and results in low welfare in households. Poverty is the focus of a range of specific public policies aimed not only at mitigation, but also at eradication. The government carried out reform in the energy sector towards making cleaner energy available to the poor people in the urban areas (Akintunde, 2019).

In Nigeria, the Energy Commission of Nigeria has a Renewable Energy Master plan but does not provide for social transition of the people towards cleaner energy. These ECN master plans were designed since 2006 and are currently being reviewed. The National Renewable Energy Master plan Project was initiated by the Federal Ministry of Environment in fulfillment of Nigeria's obligation as part of African strategy on emissions reduction. The long term renewable energy master plan for Nigeria is to address the challenges of moving towards clean, reliable, secure and competitive energy supply which is long overdue. The objective of this programme is to develop and implement strategies that will achieve a clean reliable energy supply and establish a mechanism to develop the sector based on international best practices to showcase viability for private sector participation. Setting up and implementing integrated renewable energy programmes that are expected to provide inputs to national sustainable development and agenda to meet the targets of the National Agenda on Emission Reductions; Millennium Development Goal; Vision 20:2020 Environment sub-sector; Clean Development Mechanism; and Federal Government Programme on development on alternative sources of energies.

The thrust in all major energy policies in the countries of the world is towards breaking the energy poverty circle which can only be achieved through the re-alignment of the nexus between energy poverty and socio-cultural factors that constraints the access, and adoption of cleaner energy sources. Extant literature has linked energy demand to energy poverty using macroeconomic variables (real income, electricity price, price of natural gas, price of oil, urbanization and weather) (Holtdahl & Joutz, 2005; Narayan *et al.,*2007; Nakagami, 2007) without considering the belief and culture of the people regarding energy sources and concurrent adoption of different alternatives at the households level. In addition, many households find themselves using unclean and inefficient energy sources due to the shortage or non-availability of clean energy sources. Some certain percentage of the urban populace still rely on biomass fuels sources for occasional use (Large social gathering cooking) and preparation of medicine and local delicacies (Suya) in the face of scarce resources due to desertification, insurgency, insecurity, and depletion in forest resources (NERC, 2013). Studies on clean energy adoption in Nigeria have focused more on poverty intensity and micro economic variables with lesser attention on why the energy adoption and utilization is diffused and do not follow the energy Ladder hypothesis (Akintunde, 2014; Nussbaumer, *et al.*, 2011; Ogwumike & Uzughalu, 2012).Studies have focused on how why they use alternatives not on why they choose to combine or remained with inefficient sources of energy These studies have identified that the energy adoption and utilisation does not transit through the normal energy ladder linear pathway. Thus this study contribute to knowledge and fill the existing gap in the literature by identifying whether or not cultural factors play a role in energy adoption and whether the adoption pattern follows the energy ladder hypothesis linear path way in energy adoption and utilization,

The broad objective of this study is to examine cultural and socio-economic determinants of clean energy utilization in South-west, Nigeria. More specifically, the study intends to:

1. Examine the pattern of energy use in urban areas.
2. Assess the socio-cultural variables influencing urban house hold utilization of inefficient and harmful sources of energy
3. Examine the effect of each of the socio-cultural variables on clean energy utilization among urban households?

Literature review

Two schools of thought in the energy transition paradigm. These are the energy ladder and stack

models explaining the transition of household from one energy sources to the other

Energy Ladder

The "energy ladder" is a commonly used concept in models of domestic fuel choices in poor countries. The assumption behind this model is that as a household's socioeconomic status increases, they will rationally choose for an energy carrier that is more advanced. This study examines whether the energy ladder model holds in stating that as income rises, households switch to a fuel better suited for their socioeconomic status or otherwise. Just as (Akintunde,2014; Ogunmike et al, 2009) have found the contrary, this study will examine whether gas and electricity fuel switching also occurs as income increases in developing countries.

Energy Stacking

The energy ladder model, however, has received many criticisms just as this study have identified that energy ladder hypothesis may not follow especially for developing Africa with strong family roots. The 'value-laden' nature of the model is also criticized as it depicts societies in a certain 'stage' of development. This study suggests that socio-cultural variables will play a major in energy utilisation and adoption in developing Africa. It suggests that people revert back to their traditional cooking practices for specific dishes. It also suggests that a combination of fuels is used instead of a linear transition to cleaner fuels. The study suggests this is because stoves are unfit for cooking traditional dishes, therefore, people revert to their traditional cooking practices.

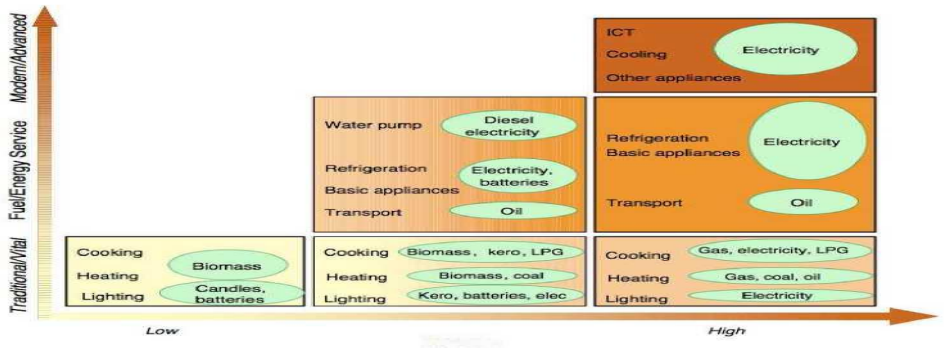
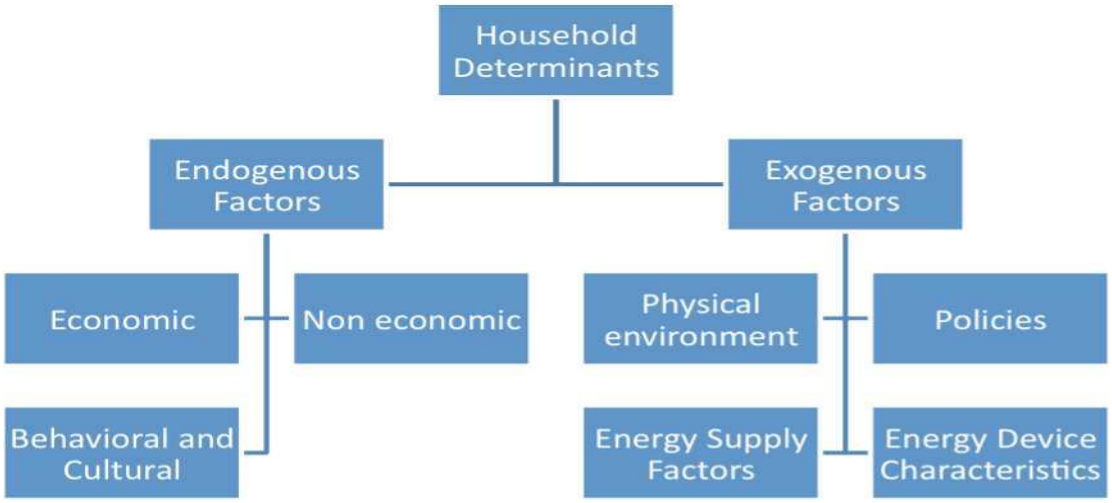


Figure 1: Foley's Energy Demand Ladder Model. ***Source: Hosier (2004)***

3.2.3 Determinants of Energy Choice

Over the years, studies have continued to focus on household energy transitions and the socioeconomic determinants that induce fuel switching (Hiemstra-van der Horst & Hovorka, 2008; Mekonnen & Kolhin, 2008; van der Kroon et al., 2011). The previous studies evaluate how households' social, economic, and cultural backgrounds affect or even control fuel choice and use.

Figure 2: Types of Household Determinants



Source: Authors Field Work (2021)

Endogenous Factors

Endogenous factors are those that pertain to the household level—or the so-called 'household characteristics'. The different factors will be subdivided into three sub-categories: economic, non-economic, and behavioral and cultural characteristics.

Economic Characteristics

Household income and other indicators such as household expenditure—used to describe a household's economic situation—are two of the most common factors used to explain fuel switching (Hiemstra-van der Horst, 2008; Mekonnen & Kolhin, 2008). Capital is described as one of the contributing factors for fuel switching but not specifically or necessarily the most important one. The overall trend found on the effect of household economies on fuel switching shows that poorer households do consume more firewood than richer households and that richer households consume more LPG or electricity than poorer ones. However, it does not fully validate the energy ladder model as it also states that more fuels are added to the energy mix when income increases rather than having households fully switch to cleaner fuels and abandoning their previous, more traditional fuels.

Non-Economic Characteristics

The social aspects of households such as household education – which also tests human resources – are positively linked to modern fuel consumption by studies (Rao & Reddy, 2007; Mekonnen & Kolhin, 2008). The size and structure, age and household, for instance, are also socially categorized. The trend suggests that the use of biomass as the main fuel of your choice will decline as household education increases. Mekonnen and Kolhin (2008) emphasize that the ability to use electricity or kerosene as a fuel supply rises as education increases. This shows that education families will learn more about the benefit of using renewable fuels or the drawbacks of biomass at least. Therefore, lack of sensibilities and education will contribute to prolonged use of biomass as primary fuel (Schlag & Zuzarte, 2008). The detrimental externalities resulting from the use of biomass and the advantages associated with modern fuels are also not considered by households. Campaigns for understanding and public education therefore all play an important role in facilitating the transition to alternative cooking.

Behavioral and Cultural Characteristics

Behavioural and cultural features influencing the choice of household fuel are relevant for inquiries but are often omitted. Nevertheless, some studies have been conducted which analyze cultural factors such as food preparation and conventional tariffs to either explain the prevalence as preferred fuel or to account for lower cleaner fuels adoption rates (Akintunde, 2014, 2019). The distinctive taste of foods cooked with charcoal or firewood is perceived by many to be stronger than the taste of gas or electric cooking. During cooking in Nigeria conventional foods such as skewers (suya) favoured using organic matter rather than LPG. In addition, these foods had the flavor. This shows that income is not the sole driver of energy transitions and that some deeply rooted cultural traditions— specific to

each household or even to each person—play a crucial role too.

Exogenous Factors

Other important factors determining fuel choice are the exogenous factors. These factors are those that lie outside the household domain and are considered external conditions that have an effect on fuel choice. As these factors lie outside the scope of this research, only a brief mentioning of each of the main driving forces will be presented. The first exogenous factor is physical environment meaning the specific country context and how, it location for example, affects energy use patterns. Urbanization for example has been shown to play a positive effect on modern fuel adoption (Hosier & Dowd, 1987). Climate also falls under this category as countries that have a higher temperature variability tend to use more biomass—as it is also used for heating (Schlag & Zuzarte, 2008).

The second exogenous factor is energy policies and regulations which refers to both government and market interventions and involvement that have a direct or indirect effect on energy use patterns. The case of Senegal's butanisation program is an example where modern fuel adoption was sparked through government intervention (Schlag & Zuzarte, 2008). The government implemented a project in the 1970's that provided subsidies for LPG fuel cylinders and taxed petroleum products. Through this, the government was able to incentivize fuel switching as the cost of switching was less than staying with biomass. As of today, the subsidies have been eliminated yet the market is continuing to grow, albeit at a slower pace.

The third factor is energy supply factors which relates to availability, affordability, accessibility and reliability of fuels (Kowsari & Zerriffi, 2011). There are several important factors falling under 'energy supply factors' that determine fuel switching. The price of traditional fuels compared to modern fuels is considered an important driving force for fuel switching (Mekonnen & Kolhin, 2008; Schlag & Zuzarte, 2008). Fuel costs—which can be influenced by high transport costs, national policy and other factors—can encourage or discourage biomass use. As charcoal and firewood are accessible, available and affordable in urban and urban areas, a switch to modern fuels is not encouraged as a need for an alternative is not felt. Another important factor according to Heltberg (2004) and Ouedraogo (2006) is electrification- as soon as people have access to electricity, the use of biomass as main fuel choice decreases. Electricity, as infrastructure are less developed in urban areas, therefore play a greater role in determining accessibility (Schlag and Zuzarte, 2008).

Finally, determining factors can also deal with characteristics that are specific to each device—or the 'energy device characteristics'. Under this category, technical factors such as stove cost, stove design and adapted cookware are studied (Schlag & Zuzarte, 2008). Device characteristics also refer to the acceptability of the stoves; about this Aguilar (1990) states that stoves need to be adapted to the use and not the user to the stove. Additionally, ICS need to be produced locally with local products and fit the user's needs. In their study, Masera *et al.* (2000) found that often switching to LPG does not only involve an investment in the stove but also in the cookware as many of the utensils used in traditional stoves are incompatible with LPG stoves.

Household Energy Transition & the Multiple Determinants of Energy Choice

From the previous literature we can observe that the transition from primitive to modern fuels is far more complex than depicted in the energy ladder model. First, there are theories other than the energy ladder model that assert that fuel use patterns are not explained solely through income. Second, determinants of energy choice—divided in two overarching categories—are responsible for shaping household energy use. Third, the transition to cleaner fuels is not always directional as it is also not always a full switch to a cleaner fuel but often a partial switch, or as Masera *et al.,* (2000) would put it, a use of 'multiple cooking strategies'. These "push and pull" factors that are determined by endogenous and exogenous factors make households move back and forward on the energy ladder.

It is important to note however that there are some gaps in the literature that should be looked into further. For example, cultural and behavioral factors are often ignored and little is actually understood of individual choices that continue the use of biomass (Foell, 2011). Studies on consumer choice, therefore, would add greatly to the study of household energy transitions as it would provide deeper insights on how women feel about using certain fuels and their actual struggles. Studies that merge endogenous and exogenous factors are also missing, as studies often focus on either one or the other but often do not link them. The problem with this strict divide is that household and country contexts are not seen as complementary units that interact and affect the other but as separate factors. This can ultimately lead to wrong interpretations of fuel transition obstacles.

Method

The study is a cross sectional survey. The study attempts an analysis of the relationship between the urban clean energy utilization and social cultural variables. The methods of analysis were both linear methods which include log regressions and multiple regressions analysis and the method of estimation is Ordinary Least Squares (OLS).

Population Sample

The location of the study was South-west states of Nigeria. six states with urban population in southwest Nigeria were chosen as the areas for this study. It is the melting pot of almost all the ethnic nationalities in Nigeria, it was anticipated to obtain broader and varied views of opinions because of its educational, commercial, political and social advanced status. Table 4.1 below shows the chosen senatorial districts with their corresponding LGAs and their inhabitants' population.

Sampling Technique

Seventeen urban LGAs constituted the units from which urban households were selected. Cluster sampling was adopted. This involved the division of the population into clusters or groups and drawing samples from the clusters. A cluster in this study was represented by the number of people of senatorial district. Seventeen urban LGAs that had presence of urban clean energy utilization from the three senatorial districts of Ekiti , Ogun, Ondo, Osun, Oyo and two out of three senatorial districts of Lagos states were considered. Lagos Central senatorial district has no urban local government area. This study utilise primary data gathered from the field. The sample technique adopted a multi-stage stratified sampling. At the first stage, from the each of the six southwest states senatorial district clusters, one local government was selected. In the second stage two areas under LGA were selected using simple random sampling from the selected LGAs.

Dependent Variable and Independent Variables

This section describes the identification strategy for the impact evaluation of economic effects from urban energy poverty.

Instrument

The data collection instrument used was a structured questionnaire. The 20-item questionnaire was divided into 5 sections. **Section A** consisted of closed-ended questions covering the demographic characteristics of the respondent. **Section B** captures pattern of household income. Sources and pattern of energy use. Perception of cultural utilization of energy sources. Cronbach's (2000) coefficient alpha was used to determine the internal consistency and reliability of the multiple item scales.

Model Estimation Equation

For the evaluation of determinant of energy poverty, the study utilise the outcome variables as the key dependent variables of interest. For those that are continuous, we estimate simple ordinary least squares (OLS) regression models, with standard errors clustered at hamlet level to reflect that treatment was administered at hamlet level as well. Given the distribution of the outcome variables, the study algorithmize them necessary to ensure normal distribution.

Model Specification

Clearly, the treatment variable is whether a household adopts cleaner and efficient energy sources in cooking, lighting and reading through electricity offered to the hamlet. Thus, once household utilized electricity for cooking, lightening, charging mobile and rechargeable and studying, for household as 0; while those who utilized biomass and fuels are coded 1 instead.

$b0 + b1$electrification (on/off grid) + $\boldsymbol{b}2$ household size + $\boldsymbol{b}3$ income + $\boldsymbol{b}4$ perception of energy sources + $\boldsymbol{b}5$ gender

Data Analysis

The used for the constructs in this study were standardized using Excel software before being imported into SPSS for the regression analysis. Multiple Regression were used to analyze the data, using Statistical package for Social Science (SPSS). The results were obtained based on the final predicted model.

Results

The objective of this chapter is to highlight the key trends and facts about the energy use pattern of the urban household.

5.2 Socio-demographic Characteristics of Respondents

Table 3: Percentage Distribution of respondents by Socio-demographic characteristics

		Frequency	Percent
Gender	Male	**163**	**47.9**
	Female	**177**	**52.1**
Age	20-29 years	**126**	**37.1**
	30-39 years	**151**	**44.4**
	40 years and above	**63**	**18.5**
Marital status	Single	**111**	**32.6**
	Married	**210**	**61.8**
	Separated	**16**	**4.7**
	Divorced	**3**	**.9**
Educational attainment	Attended pry school	**95**	**27.9**
	Completed Pry	**114**	**33.5**
	Attended Sec school	**70**	**20.6**
	Completed Secondary school	**61**	**17.9**
Religious affiliation	Christian	**141**	**41.5**
	Islam	**164**	**48.2**
	Traditional	**35**	**10.3**
	1-4 years	**59**	**17.4**
	5-9 years	**106**	**31.2**
	10 years and above	**175**	**51.5**

The table 5.2.1, above shows that 163(47.9%) are male while 177(52.1%) are female 126(37.1%) of the respondents belong to age bracket range between 20-29 years, 151(44.4%) fall between age range of 30-39 years and 63(18.5%) are 40 years and above of age.111(32.6%) of the respondents are single 210(61.8%) are married, 16(4.7%) are separated and 3(0.9%) are divorced. 95(27.9%) of the respondents attended primary school, 114(33.5%) completed primary school, larger proportion 70(20.6%) attended secondary school, 61(17.9%) completed secondary school education. 141(41.5%) are Christians, 164(48.2%) are Muslims and 35(10.3%) are traditionalist**.** The table above shows that 175(51.5%) of the respondents reported that they had spent between more than 10 years in the area, 106(31.2%) spent between 5-9 years and 59(17.4%) spent between 1-4years in the area.

Table 5.2.2: Percentage Distribution of Respondents by Socio-demographic Characteristics

		Frequency	Percent
Occupation	Farmers	101	29.7
	Artisans	65	19.1
	Student	23	6.8
	Traders	74	21.8
	Farm produce Processor	69	20.3
	Civil Servant	8	2.4
House hold size	1 – 3	60	17.6
	4-6	58	17.1
	7 – 9	185	54.4
	Above 10	37	10.9
Income distribution	2000-4000	85	25.0
	5000-7000	63	18.5
	8000 and above	192	56.5
Religious affiliation	Christian	141	41.5
	Islam	164	48.2
	Traditional	35	10.3
	1-4 years	59	17.4
	5-9 years	106	31.2
	10 years and above	175	51.5

Percentage Distribution of respondents by occupation revealed that101(29.7%) of the respondents are farmers, 65(19.1%) engage in transport, 23(6.8%) are student, 74(21.8%) are have a family size , 69(20.3%) are farm produce processor and 8(2.4%) are civil servant**.** 60(17.6%) were artisans, 58(17.1%) are farmers, 185(54.4%) engage in farming, 37(10.9%) are not working. 85(25%) of the respondents earned between 2000-4000 per month, 63(18.5%) reported earning between 5000-7000 Naira monthly and 192(56.5%) earned 8000 naira and above per month.

Pattern of Electricity and Energy Use

Table 5.3.1: Electricity consumption metering and cost

Type of metering	**Yes**	**No**
Conventional meter	229(67.4%)	111(32.6%)
Prepaid card	20(5.9%)	320(94.1%)
Unmetered	91(26.76%)	249(73.23%)
Total	**340**	**100.0**

Table 5.3.2 shows that majority 229(67.4%) of the respondents reported that they used conventional meter, 20(5.9%) used prepaid meters while 91(26.76%) were not unmetered or do not use electricity.

Table 5.3.3: Pattern of the energy use in the household

Energy source	Lighting	Cooking	Reading	Ventilation	Entertainment	No response
Electricity from grid	64(18.8%)	50(14.7%)	62(18.2%)	63(18.5%)	55(16.17%)	46(13.5%)
Kerosene	120(35.3%)	117(34.4%)	56(16.5%)	0(0.0%)	0(0.0%)	47(13.8%)
Petrol	144(42.4%)	0(0%	45(13.2%)	12(3.5%)	122(35.9%)	17(5%)
Diesel	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	116(34.1%)	224(65.88%)
Charcoal	0(0.0%)	116(34.1%)	0(0.0%)	0(0.0%)	0(0.0%)	224(65.88%)
Gas	0(0.0%)	100(29.4%)	0(0.0%)	0(0.0%)	0(0.0%)	69(20.3%)
Generator	103(30.3%)	0(0.0%)	36(10.6%)	65(19.1%)	104(30.6%)	32(9.4%)
Wood	0(0.0%)	340(100%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)

Table 5.3.3, above reveals that 64(18.8%) reported that they use electricity from grid for lighting, 50(14.7%) use it for cooking, 62(18.2%) use it for reading, 63(18.5%) reported using it ventilation, larger proportion 101(29.7%) use it for entertainment. 120(35.3%) use kerosene for lighting, 117(34.4%) use it for cooking, 56(16.5%) use it for reading. 114(42.4%) reported that they use petrol for lighting, 45(13.2%) use it for reading, 12(3.5%) use it for ventilation, 122(35.9%) use it for entertainment. For diesel, 116(34.1%) use it for entertainment. 116(34.1%) used charcoal for cooking. Gas was utilize by 100(29.4%) for cooking. Majority 103(30.3%) reported that they use generator for lighting, 36(10.65) use it for reading, 65(19.1%0 use it for ventilation, 104(30.6%) use it for entertainment. All of the respondent reported that they use wood for cooking.

Table 5.3.4: Energy technologies/appliances used for these household activities

Energy technologies	Lighting	Cooking	Reading	Ventilation	Entertainment	No response
Rechargeable lamp	95(27.9%)	0(0.0%)	81(23.8%)	0(0.0%)	0(0.0%)	76(22.4%)
Electric bulb	103(30.3%)	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	155(45.58%)
Kerosene stove	0(0.0%)	117(34.4%)	0(0.0%)	0(0.0%)	0(0.0%)	223(65.58%)
Gas cooker	0(0.0%)	22(6.5%)	0(0.0%)	0(0.0%)	0(0.0%)	318(93.5%)
Charcoal stove	0(0.0%)	116(34.1%)	0(0.0%)	0(0.0%)	0(0.0%)	224(65.88%)
Candle	106(31.2%)	0(0.0%)	115(33.8%)	0(0.0%)	0(0.0%)	0(0.0%)
Electric fan	0(0.0%)	0(0.0%)	0(0.0%)	132(48.7%)	0(0.0%)	208(61.17%)
Radio	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	340(100%)	0(0.0%)
Television/DVD	0(0.0%)	0(0.0%)	0(0.0%)	0(0.0%)	340(100%)	0(0.0%)

The table 5.3.4 reveals that 95(27.9%) reported that they use energy technologies/appliances like rechargeable lamp for lighting and81(23.8%) use it for reading. 103(35.3%) use electric bulb for lighting. 117(34.4%) of the respondents reported using kerosene stove for cooking. 22(6.5%) use gas cooker for cooking. 116(34.1%) respondents used charcoal stove for cooking. 132(48.7%)used electric fan for ventilation. All of the respondents 340(100%) reported that they use radio for entertainment only. The entire respondents use television/DVD for only entertainment

Table 5.4: Marginal Effects of the Binomial Logit Model for Household Energy Use for lightening

Variables	Electricity	Kerosene	Petrol	Diesel
Sex	-.375 (.25)	.133 (.32)	-.165 (.28)	.032 (.26)
Age	-.169 (.19)	.065 (.23)	-.095 (.18)	.003 (.19)
Marital Status	.355** (.21)	.203 (.26)	.097 (.19)	.057 (.22)
Educational level	.145 (.13)	-.120 (.17)	.097 (.12)	-.043(.14)
Religion	.300 (.19)	.337 (.23)	-.033 (.17)	.285 (.19)
Occupation	-.075 (.08)	-.044 (.11)	-.053 (.08)	-.050 (.09)
Household size	.053 (.14)	.132 (.19)	-.160 (.13)	-.078 (.14)
Income	-.072 (.16)	.039 (.20)	.276** (.15)	.248 (.16)
Cost	.406*** (.21)	-.355** (.18)	.118 (.16)	-.107 (.16)
Electricity supply	-.484 (.33)	-.561 (.45)	-.151 (.28)	-.310 (.33)
Socio-Economic Status	-.140 (.30)	-.149 (.37)	.301 (.27)	-.047 (.30)
Traditional cooking	-.311** (.18)	-.397** (.23)	.088 (.16)	-.204.(19)
Traditional herbs	.052 (.20)	.056 (.26)	-.337** (.19)	-.260 (.21)
Constant	-1.76 (1.6)	-.267 (1.85)	-.878 (.38)	-.041 (1.52)

Source: Authors' Computation

Note: (i) 0 did not use and use (ii) *** (**)* significant at 1%(5%)10% level respectively.

The result of the binomial regression reveals that marital status significantly related to likelihood of utilizing electricity for lighting but did not significantly relate using the kerosene, petrol, and diesel for lighting was significant at 5%. Also, income significantly relates to the use of petrol for lighting, but did not significantly relate to using electricity, kerosene and diesel for lighting at 0.05 levels. Electricity tariff significantly influenced the likelihood of utilizing electricity for lighting but was not significant associated with the decision to use kerosene, petrol and diesel for lightning. Furthermore, belief in the traditional cooking culture was inversely related to utilizing electricity and kerosene light. Lastly, traditional herbs inversely related to the use of petrol for lightening at 0.05 level.

Table 5.5: Binomial Logit Model for Household Energy Use for cooking.

	Electricity	Kerosene	Charcoal	Gas	Wood
Sex	.417 (.29)	.088 (.37)	-.117 (.23)	.120 (.23)	-.204(.86)
Age	.033 (.23)	-.154 (.26)	.051 (.18)	.141 (.17)	-.032 (.68)
Marital status	.112 (.25)	.078 (.28)	-.277* (.20)	-.035 (.19)	1.723 (.75)
Educational level	.026 (.16)	-.066 (.18)	-.008 (.13)	-.128 (.12)	.004 (.54)
Religion	.100 (.22)	.024 (.24)	-.220 (.18)	.167 (.17)	-1.41(.89)
Occupation	-.089 (.20)	.013 (.11)	.142** (.08)	-.112 (.08)	.041 (.28)
Household size	-.175 (.16)	-.099 (.18)	-.056 (.13)	.224 (.13)	-.009 (.55)
Income	.154 (.19)	.086 (.22)	-.162 (.15)	.206 (.15)	.622 (.70)
Cost of clean energy	-.073 (.19)	.313* (.18)	-.215* (.11)	-.174 (.15)	-.684** (.16)
Electricity supply	-.035 (.37)	.317* (.38)	.157 (.28)	-.115 (.27)	-2.54*** (.99)
Socio-economic status	.026 (.34)	-.094 (.39)	.203 (.28)	-.361* (.27)	1.58* (1.05)
Traditional cooking	-.173 (.21)	.025 (.23)	.059 (.17)	-.272** (.16)	-.126 (.62)
Traditional herbs	-.449** (.25)	-.674*** (.29)	.381*** (.18)	-.149 (.18)	-1.01* (.59)
Constant	-.952 (1.73)	-2.46 (2.10)	.234 (1.37)	1.31 (1.35)	-8.506 (5.34)

Source: Authors' Computation

Note: (i) 0 did not use and use (ii) *** (**)* significant at 1%(5%)10% level respectively.

The result of the Binomial regression reveals that marital status inversely related to utilizing charcoal as cooking fuel at 0.10% level of significance. The result also indicated that electricity tariff significantly related to utilizing kerosene for cooking while it is inversely related to the use of

charcoal and wood as cooking fuel at 0.10% and 0.01 levels of significance. The result further reveals that electricity supply significantly related to kerosene for cooking but inversely related to preference for wood as cooking fuel at 0.10% level of significance. Socio economic status was significantly and positively related to the use of gas for cooking but inversely related to preference for wood for cooking fuel. Belief in the traditional cooking beliefs was inversely related to the use of Gas for cooking. Belief in the use of biomass for traditional herbs preparation are inversely related to the use of electricity and kerosene for cooking but positively related to charcoal cook and inversely related to preference for wood for cooking fuel 0.10%, 0.05% and 0.01 level of significance.

Discussion

The study examined urban electrification and energy ladder hypothesis as well as how socio-economic variables serve as determinants of energy accessibility in urban areas. The study examined the pattern of energy use in urban areas and assess the impact of socio-economic variables on the demand for energy in the urban southwestern Nigeria. The result of the study revealed marital status, electricity tariff, electricity supply, socio-economic status, educational level and religion influenced the preference for cooking fuels. Household size, electricity supply, socio-economic status and traditional cooking positively related with extremely clean energy utilization levels. This finding is similar to Heltberg (2004), who found a strong link between likelihood of choosing modern fuels and the variables of consumption expenditure and education, the size of the household. In a similar investigation the study of Farsi *et al*.,(2007) who found that education and gender influence cost prices to impact on fuel choice. The result of the study revealed that the beliefs regarding the traditional cooking system determined the use of gas, kerosene, charcoal and wood as cooking fuel. This finding supports studies that have found that traditional cooking techniques and preferences and habits for food tastes determine the choice of energy system in urban households (Fitzgerald, Barnes and McGranahan, 1990). Heltberg 2004, 2005; IEA 2006; Chandrani 2013; Ogwumike *et al.,* 2014).Educational level, electricity tariff, socio-economic status and traditional cooking influenced the non poor status fuel utilisation.

Policy Recommendation

NGOs and policy makers can work together to provide economic incentives that will promote fuel switching. Households already familiar with more efficient energy however cultural practices still determined to a large extent the use of biomass fuels in the urban areas. Therefore, providing technology that inculcate the characteristics belief of the urban people provide efficient fuels can help ease the initial payment burden for those households who fully rely on biomass fuel. Another recommendation is to create national campaigns on the disadvantages of biomass and the advantages of more efficient energy fuels. When looking at determinants for fuel switching, economic, sociological and cultural factors arose as playing a role for the prevalence of charcoal. Income indirectly played a role as households continued their charcoal practices because of its availability in small amounts. This is said to be indirectly related to income because if a solution would be found to purchase small amounts of LPG or electricity then people would be more inclined to making that switch. Household size was also mentioned as a factor helping charcoal remain as the predominant fuel. On the other hand, cultural factors as tradition and habit arose often as reasons for charcoal use.

Supply side measures, the creation of an enabling environment, right institutional framework, policy consistency, appropriate incentive structure and security of investment to guarantee the flow of needed investment, appropriate pricing mechanism, and the regulator are needed to be combined to reduce the various constraint son power supply response to reform initiatives. Therefore, keeping the lights on would require effective management of the power system and a strong political will to ensure adequate, reliable, and cost-effective power supply to achieve the overall agenda of the government.

The study demonstrated that marital status, electricity tariff significantly related to likelihood of utilising electricity for lighting. Income and Belief in the traditional cooking culture and processing of traditional herbs inversely related to the use of petrol for lightening. Behavioural and cultural aspects are inextricably linked with how urban communities in the developing world live. They constitute part of the system that makes up their lives. The traditional cuisine is significant in the household energy choice. Household members prefer certain foods that are prepared with fuelwood. From a cultural perspective, traditional stoves are versatile and can be used for cooking, space heating, and preserving food since there are no refrigerators. The smoke is also used to preserve seed. The traditional fire and smoke are part and parcel of the livelihoods of the households in south west Nigeria. It is pertinent for governments, non-governmental

organizations and other interested parties involved with energy transition to initially understand how urban communities behave and appreciate why they do that before they introduce energy technologies which may be foreign to these communities. This will help in the development of energy technologies that may be compliant to the communities' way of life and these may be readily accepted. More research needs to be done on the significance of tradition and culture on energy choices and determinants and how these impact on energy transition.

Conclusion and recommendations

This study yields a number of insights into the analysis of electricity sector performance in Nigeria. Evidence shows that the power sectors have been significantly reformed over the past decade or thereabout. Despite the significant reforms, the deterioration in the quality and reliability of power supply services is worrisome. The country still suffers from incessant power outages. Declining infrastructure investment in the power sector, corruption, insecurity, governance structure, and political considerations have made the power sector reform initiatives ineffective. This, however, does not imply that, at the margin, power sector reform initiatives are not beneficial. The simple point is that there are many factors other than reforming the electricity sector that help explain the poor power supply performance of the country. These factors precede the reform process in the power sector. First, the small sample size prohibits the generalization of results. In addition, this study is a cross sectional survey which is a onetime snap shot of the energy situations. Panel data will serve a useful purpose in having an in-depth knowledge of clean energy utilization pattern in the area. This study is limited to southwest geographical zone as such the generalization of the study to other parts of the country is limited due to cultural and climatic variations. Future research should include a larger sample size with participants randomly drawn from the country, thereby providing a more representative sample of the population and greater generalisability of the study findings.

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