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URBAN AND PERI-URBAN COOKING ENERGIES DYNAMICS AMONG HOUSEHOLDS IN UMUAHIA ZONE OF ABIA STATE, NIGERIA

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Abstract

The research paper focused on the dynamics of urban and peri-urban cooking energies preference among the households in Umuahia zone of Abia State, Nigeria. In particular, the paper has analyzed the urban and peri-urban cooking energies consumptions dynamics and factors that affected households' cooking energies choice and difficulties in using cooking energies by households. Multi-stage purposive and random sampling methodology was used in order to select 120 household heads (60 urban and 60 peri-urban household heads). Data were gathered using structured questionnaire from primary source. Data were analyzed using descriptive statistics of mean and standard deviation and inferential statistics of multinomial logit model. The study findings depicted that the more frequently used sources of cooking energy among urban households in the region were LPG (Gas) (3.93), Electricity (3.24), Kerosene (2.75) and Charcoal (2.56). Alternatively, households in peri-urban/rural regions more frequently use fuelwood (3.80), charcoal (3.51), kerosene (2.85) and crop residues (2.77) as cooking energies. The socioeconomic variables that play major role in preference for cooking energies by the households are: location (urban and peri-urban), education, household size, income, primary occupation and age at 1 and 5%. Urban household problems in energy consumption for cooking include: unhealthy cooking with firewood and charcoal, dirty cooking of some energies e.g fuelwood, high cost of modern energy sources and increasing poverty among the people while and the challenges confronting peri-urban/rural households in cooking energy use include: increasing poverty among the people, high cost of modern energy sources, non-availability of modern energies and lack of regular supply of electricity. According to the results, the research other among them proposed subsidizing the prices of available clean sources of cooking energy in order to make them affordable to the majority of the low income households in the urban and peri-urban regions in the state.

Keywords: Dynamics, cooking energies, households, urban, peri-urban.

JEL Classification Codes: D12, Q41, R21

1.0 Introduction

Utilization of energy is simply one of the most critical aspects of the human experience and day-to-day living. The degree and character of energy use in any country are highly reflective of its economic importance and development (Danlami, 2017). All parts of a country's

economy, from agriculture, industry, domestic, services, and transport, depend on one or more sources of energy for functioning. At the household level, one is normally reliant on fuelwood, charcoal, kerosene, electricity, gas and others for cooking and general energy. Osunkwo et al. (2020) broadly classified household cooking energy sources as solid and non-solid fuels. The solid fuels include biomass such as wood, crop residues, dung and fossil fuels such as coal and charcoal, while the non-solid fuels include kerosene, electricity, and liquefied natural gas. Cooking energy can also be categorized by developmental level into: traditional (fuelwood, agricultural residues), intermediate (charcoal, kerosene, coal), and modern (solar, liquefied petroleum gas, and electricity). In Nigeria, like other developing countries, cooking energy is a dominant component of overall household energy consumption, and over 65% of total consumption is located both in urban and rural areas.

Fuelwood and charcoal are the most popular solid fuels, especially in rural communities among the low-income families. The use of fuelwood and charcoal had been linked to extensive smoking, which is harmful to consumers' health. The World Health Organization (2022) states that 3.2 million people globally die prematurely each year from indoor air pollution due to incomplete combustion of kerosene and solid fuels. Environmentally, such fuels result in greenhouse gas emissions, deforestation, and land encroachment. In contrast, middle and high-income households predominantly in urban areas are likely to employ modern and clean fuels such as LPG and electricity. However, Olujobi and Akintomiwa (2018) indicated that although urban dwellers use cleaner energy more frequently compared to rural dwellers, poor individuals in peri-urban and urban settings continue to depend on biomass-derived fuels like sawdust, charcoal, or firewood due to poor affordability.

Solid fuel alternatives, especially the new ones, are costly, in short supply, and in most cases inaccessible to the poor, hence making the poor to continue to dependent on traditional energy sources. Therefore, access to clean, safe, and affordable household energy is the hallmark of sustainability. Household energy use patterns in Nigeria and, more particularly in Abia State are influenced by socioeconomic determinants such as education, income, price of energy, and accessibility. The current study therefore sought to analyze these patterns, focusing on urban and peri-urban households Umuahia agricultural zone of Abia State. It especially dealt with use patterns of cooking energies, determinants of

households' decisions, and issues concerning these decisions.

2.0 Literature Review

Cooking Energies

Household cooking energies refer to the different types of energy sources that are used for cooking food in households. These sources include both traditional and modern fuels such as firewood, charcoal, kerosene, liquefied petroleum gas (LPG), electricity, and biogas. In many developing countries, traditional fuels such as firewood and charcoal are still widely used for cooking, particularly in rural areas. This is because they are often the cheapest and most accessible fuels. According to Danlami (2017), the use of traditional cooking energies for instance has a number of negative impacts on the environment and on human health, including deforestation, indoor air pollution, and respiratory illnesses. Mannir et al. (2024) noted that access to clean and sustainable cooking energy remains a major developmental challenge in Nigeria. In recent years, there has been a growing trend towards the use of modern cooking fuels such as LPG and biogas. These fuels are generally cleaner and more efficient than traditional fuels, and they can help to reduce deforestation and indoor air pollution. However, they can also more expensive and less accessible, particularly in rural areas (Emagbetere et al., 2016). Overall, the choice of household cooking energies depends on a range of factors, including cost, availability, cultural preferences, and environmental considerations.

Policymakers and development practitioners can play an important role in promoting the adoption of cleaner and more efficient cooking technologies, and in supporting households to transition to more sustainable energy sources. Edomah (2022) highlighted how disruptions in the supply chain negatively impacted the availability and affordability of kerosene and LPG for many households in 2021-2022, forcing them back towards fuelwood and charcoal use despite their health and environmental concerns. Mannir et al. (2024) expressed that Nigeria continues to grapple with issues of household energy access, with significant rural-urban disparities in cooking fuel choices and consumption patterns. Also in affirmation, Ibikunle et al. (2023) reported that as at 2022, over 85 million Nigerians still lacked access to clean cooking services, as defined by Sustainable Development Goal seven (SDG 7).

Urban and Rural Household Energy Consumption Patterns

Energy demand means any type of energy that is consumed to satisfy individual or household energy needs. Such consumption can appears inform of cooking, transportation, heating and cooling. Energy

commodities are used as a fuel and hence create demand for energy consumption. Household energy demand can be categorized into direct and indirect. The direct household energy demand is the household consumption of energy for space heating and cooling, transportation, use of appliance, lighting, water heating and cooking among others. On the other hand, the indirect household energy consumption constitutes the household energy use in the transportation and the creation of other goods. According to Edomah (2022), while modern fuels like kerosene, liquefied petroleum gas (LPG) and electricity are more widely utilized in urban centers, erratic supply chains and high costs hamper complete transition away from traditional biomass, even among city dwellers.

Urban household energy consumption patterns can differ from rural or peri-urban household patterns due to differences in living spaces, appliances, lifestyles and resource availability. Here are some common urban household energy consumption patterns: Thus, the use of multiple cooking energy sources in a household is evidently prevalent (Maina et al., 2021). Urban homes may be smaller and more densely packed, which can make it more difficult to maintain a comfortable temperature without the use of heating and cooling systems. However, urban areas also tend to have more efficient building designs and access to district heating and cooling systems, which can reduce energy consumption (Emagbetere et al, 2016). Urban households are likely to use more artificial lighting than rural households due to higher levels of indoor living and less natural light. Manya et al. (2024) shared that a large proportion of the population, particularly in rural areas, continues to rely heavily on polluting solid biomass fuels like fuelwood, charcoal and agricultural residues for meeting their cooking energy need.

In terms of electronic devices use, urban households use more electronic devices for cooking or for other households energy needs due to access to technology and services. However, reduced access to electricity and standby power reduce the use of electronics energy sources for cooking in rural or peri-urban households. Cooking appliances such as stoves and ovens can also use a lot of energy. For instance, the use of energy-efficient cooking methods such as microwaving and using small appliances like toaster ovens are more prevalent in urban areas due to readily available power, resources, accommodation type and household sizes.

Challenges of Cooking Energy Use

Generally, limited access to modern energy has been reported to have increased the level of fuel-wood consumption in African

countries. Therefore, it is pertinent to discuss the challenges surrounding sources of cooking energies use.

Electricity*:* According to Danlami (2017) and Olujobi and Akintomiwa (2018), out of the meager megawatts that are generated in Nigeria, the electricity remains of poor quality and supply. As a result, many people have to depend on their power generators to meet their demands. Nigeria spends an estimated 5 trillion Naira ($14billion) annually for importing, fueling, and maintaining generators. Mannir et al. (2024) identified major challenges of consumers in the use of electricity and LPG for cooking to include high risk of fire accidents and high cost of the commodities. It is for this reason that the majority of the households in Nigeria have to shift to the use of fuelwood and charcoal because they cannot afford the cost of generator purchase, fueling, and maintenance.

Kerosene*:* In Nigeria, kerosene is mostly used for lightening in the rural areas, while for cooking and boiling in the urban areas. The National Bureau of Statistics (2016) reported that the declining household disposable income had lowered down the amount of kerosene being used in 2016 to 195.8 million liters in the third quarter, against 263.5 million recorded in 2015. The high cost of kerosene is due to a constant increase in price by successive governments by way of de-regulation and wholesalers hoarding. Price increase on kerosene has made households drastically reduced kerosene consumption. De-regulation and malpractice of kerosene middlemen have been the major challenge of kerosene used in Nigeria.

Liquefied Petroleum Gas (LPG*):* Liquefied petroleum gas is a clean and efficient energy source used by modern households with superior burning characteristics. Cooking gas is not a likely substitute for even electricity by poor households. Nigeria produces LPG in a large quantity as it occupies the sixth position in LPG production in the world and coming second in the African continent. The gas reserve is estimated at 170 million cubic meter feet, making it the tenth-largest gas reserve in the world. Aminu and Ojo (2021) stated that clean energy sources such as cooking gas, kerosene and gasoline are scarce in the rural areas and often sold at a price far above the official pump prices, the supply of these alternatives is highly constrained and unreliable. Nigeria holds the sixth position in LPG production in the world, unfortunately, it is the lowest country in Africa in terms of LPG consumption due to cost beyond the reach of average Nigerian consumers.

Fuelwood and Charcoal:

Charcoal made from wood has been in use as energy source since ancient times and is still widely used nowadays in many countries. According to African Forestry and Wildlife Commission (2020), millions of people in sub-Saharan Africa who have few other options, especially those who live in urban and peri-urban areas, rely on charcoal as a locally accessible fuel for cooking and heating because it is relatively clean compared to burning wood or agricultural waste. Fuelwood and charcoal remain dominant energy source in the developing world in both rural and urban areas (Vihi et al., 2023). There are some notable negative implication of continues use of firewood for cooking. For instance, large-scale charcoal production has continued to worsen deforestation, land degradation, and climate change. Also, continuous use of firewood and charcoal for cooking are known to have some health implications, including a high risk of respiratory diseases as well as cardiovascular problems. Hence, continuous exposure to indoor air pollution from these fuels cause immediate issues like coughing, eye irritation, and breathing difficulties that may lead to long-term chronic illnesses and even death. Aminu and Ojo (2021) submitted that the combustion of fuelwood emits smoke with particles that have adverse effects on the health of users. Piabuo and Puatwoe (2020) stated that indoor combustion of fuelwood and charcoal are referred to as 'kitchen killer' because about 1.6 million deaths have been registered as a result, accounting for 2.7% of the global disease burden. Mohapatra et al. (2018) equally reported that the most common forms of respiratory tract infections as a result of exposure to smoke due to cooking with firewood and charcoal are dry cough, breathing problems, neurologic problems, cardiopulmonary, cardiovascular diseases, asthma and lung cancer.

3.0 Materials and Method

The research took place in Umuahia agricultural zone of Abia State, southeast Nigeria. Abia State is structured into three agricultural zones: Aba, Ohafia, and Umuahia. Umuahia agricultural zone being the major area of focus for the study comprise five (5) Local Governmental Areas (LGAs) namely: Umuahia North, Umuahia South, Ikwuano, Isiala Ngwa North and Isiala Ngwa South with a total estimated population of 1,169,093 (Abia State Government, 2025).

Respondents were selected using a multi-stage sampling approach. Stage one was purposive selection of two LGAs from Umuahia Agricultural zone and the two LGAs that were sampled were Umuahia North LGA for urban and Ikwuano LGA

for (peri-urban). At stage two, 60 urban household heads were randomly sampled from Umuahia North LGA to represent the urban group. At stage three of the sampling, three peri-urban/rural communities were selected from Ikwuano LGA. Fourthly, from each of the three sampled communities, two peri-urban villages were randomly sampled giving six villages in total. Lastly, from each of the six peri-urban villages, ten (10) households' heads were randomly chosen, which resulted in 60 peri-urban households heads and making the entire sample size to be 120 households (60 urban and 60 peri-urban).

Structured questionnaire was used for primary data collection. Descriptive and inferential statistics were applied to analyze data. Descriptive statistics such as means and standard deviations were used to establish cooking energy trends, while a multinomial logit model was used to establish determinants of household energy choice. Under the usage of cooking energy, respondents rated frequency of use on 4-point scale of: Very Often (4) Often (3), Rarely (2) and Very Rarely (1). Similarly, energy consumption-related constraints were scored on yet another 4-point scale of: Very Serious Challenge (4), Serious Challenge (3), Less Serious Challenge (2), and Not Serious Challenge (1). These were used to calculate boundary limits and interpret results accordingly.

Table 3.1: Likert Scale Responses

Response Category	Value	Boundary Limit
Very Often/Very Serious Challenge (VO/VSC)	4	3.50 – 4.00
Often/Serious Challenge (O/SC)	3	2.50 – 3.49
Rarely/Less Serious Challenge (R/LSC)	2	1.50 – 2.49
Very Rarely/Not Serious Challenge (VR/NSC	1	1.00 – 1.49

Source: Field Survey, 2025

Based on this computation, the items whose mean values range from 3.50-4.00 were interpreted as "Very Often/Very Serious Challenge" while those with a mean value of 2.50-3.49 were interpreted as Often/Serious Challenge, then mean values within the range of 1.50-2.49 were interpreted as Rarely/ Less Serious Challenge while means that ranged from 1.00 – 1.49 were interpreted as Very Rarely/Not Serious Challenge.

Multinomial logit model was employed in order to estimate those variables which determine household choice of energies for cooking. Mostly used cooking energies within the nation in the homes are: Electricity, Kerosene, Liquefied Petroleum Gas (LPG) and Firewood/Charcoal where

household would be likely to have most preferred cooking energy. However household socioeconomic structure was the determining factor of the preference or selection of type of cooking energy. Therefore, as Y within this study, the dependent variable, is greater than two, an estimate of determinants of household choice or preference for cooking energies was based on a multinomial logit model. Multinomial Logit Model is an analysis or technique model applied for management of selection of three or more competing response alternatives (Kartels, et al, 1999). The estimation is to be done by a set of coefficients: β(1), β(2), β(3) and 4. Thus, four sets of this model, one of four types of

X_5 = Monthly income (in Narra)

X_6 = Primary occupation (1 if farming, 0 if otherwise)

X_7 = Ownership type of house/accommodation (1 if owner, 0 if tenant)

X_8 = Age of household head (in years)

4.0 Results and Discussion of Findings

Cooking Energies Mix among Urban and Peri-Urban Households

Table 4.1 shows that in urban households, LPG (Gas) was the predominantly used as cooking energy (3.93), followed by electricity (3.24), kerosene (2.75), and charcoal (2.56), all of which were frequently used. Fuelwood (2.03) is rarely utilized, while biogas (1.45) and crop residues (1.02) are very rarely utilized. These results concur with those presented by Olujobi and Akintomiwa (2018), who reported that LPG is one of the most utilized cooking fuels in urban households. Though, the result of this study seems to contradict that of Yongolo, Mkelenga, and Mpeta (2023) who surveyed Tanzania's cooking energy and found 84% of the urban households to mainly use charcoal, 11.3% gas. This shows charcoal is the major urban domestic cooking fuel in Tanzania, as compared to the Nigerian scenario where LPG is the dominant one. The contrast between the two studies may be attributed to variations in local consumption patterns

response category of energy type was considered as base outcome. The dependent variable Y was maintained 1 where household preferred/selected Electricity, 2 where household preferred/selected Kerosene, 3 where household preferred/selected Liquefied Petroleum Gas (LPG) and 4 where household preferred/selected Firewood/Charcoal.

In Multinomial Logit Model,

Yi = 1 if 'Electricity', 2 if 'Kerosene', 3 if LPG and 4 if 'Firewood/Charcoal'

X_1 = Location (Urban 1, Rural/Peri-urban = 0) Discriminant Variable

X_2 = Gender (1 if male, 0 if female)

X_3 = Years of education (number of years)

X_4 = Household size (number of persons)

and levels of availability of resources locally between the two countries.

On the other hand, peri-urban residences had high utilization of fuelwood (3.80) and charcoal (3.51) for household cooking energy. Kerosene (2.85) and crop residues (2.77) were also extensively utilized, and LPG (2.46) and electricity (2.34) had the lowest usage. Mannir et al. (2024) further opined that peri-urban and rural residences in turn depend mainly on firewood, charcoal, and other biomass residues for cooking.

Table 4.1: Mean Ratings of Urban and Peri-urban Households Heads on the Extent of Use of Various Cooking Energy Sources.

	Umuahia Urban			Umuahia Peri-Urban		
Various Cooking Energy Sources	$\overline{X}$	**SD**	**Remarks**	$\overline{X}$	**SD**	**Remarks**
Electricity	3.24	0.49	**Often**	2.34	0.62	**Rarely**
Kerosene	2.75	0.57	**Often**	2.85	0.58	**Often**
LPG (Gas)	3.93	0.44	**Very Often**	2.46	0.60	**Rarely**
Biogases	1.45	0.62	**Very Rarely**	1.04	0.74	**Very Rarely**
Charcoal	2.56	0.60	**Often**	3.51	0.45	**Very Often**
Fuelwood	2.03	0.55	**Rarely**	3.80	0.43	**Very Often**
Crop Residues (kernel shells etc)	1.02	0.78	**Very Rarely**	2.77	0.59	**Often**

Source: **Field Survey, 2025**

Factors Influencing Households' Choice of Cooking Energies

The multinomial logit (MNL) model was applied to estimate the socioeconomic determinants of household choice of cooking energy sources, as presented in Table 4.2. The χ^2 statistic as the likelihood ratio was highly significant ($p < 0.0000$). The explanatory variables were found to have satisfactory predictive power with a Pseudo R^2 of 0.7862, implying that the postulated factors explained about 79% of the variation in household cooking energy choices. The model fitted well and was technically in line with the previous expectations concerning the nature of relationships between the dependent and independent variables. The most important determinants in energy decision were shaped by location of household, education level, size of family, income, principal occupation, and age.

Household location (1 for urban and 0 for peri-urban/rural) was significant, showing a high positive relationship with the use of kerosene (5%) and LPG (1%), but a negative association (5%) with firewood

use. This implies that there is greater probability of adopting kerosene and LPG among urban households, and use of firewood is considerably lower in urban areas. Onambele and Lawin (2023) found a significant relationship between education level, residential area/locality as either rural or local and household's choice of cooking energy. This finding agreed with the submission of Onyekuru et al. (2020) who reported that firewood, as one of the oldest sources of energy, remains more prevalent in peri-urban and rural residences compared to urban residences. The Nigerian Bureau of Statistics (2012) also referred to this, where the data showed that about 73% of rural households use firewood (and charcoal) for cooking. Frank (2014) also argued that LPG would not be an effective substitute for most rural households, whereas Aitken (2007) observed that urban households want to use LPG as a major cooking fuel.

Education was also an important determinant of cooking energy options. The results showed that educational level of the heads of households was positively and significantly correlated with the use of kerosene and LPG (1% level) but negatively correlated with firewood consumption (1% level). This suggests that education improves the chances of the household use of kerosene and LPG while decreasing their utilization of firewood. Adetayo et al. (2021) pointed out education as an important driver for kerosene consumption. Danlami (2017) stated that higher levels of education enhance the use of improved, cleaner energy sources like electricity and LPG. In agreement, Kitole, Tibamanya, and Sesebo (2023) found education and income levels to be imperative drivers for the use of cleaner cooking energy. The findings of this study also corroborated that of Egunjobi (2020) and Shamaki and Bucham (2019), who highlighted education of the household head as being crucial in determining the choice of cleaner energy. Osunkwo et al. (2020) also concluded that education and income are key drivers of household energy choices.

Family size was also a crucial variable that was positively and significantly correlated with firewood consumption. This is indicative of the fact that larger families tend to be dependent on firewood for cooking. This finding is consistent with Adeyemi and Adereleye (2016), who discovered family size to be a major determinant of usage in cooking fuel. Egunjobi (2020) also pointed out that family size is a strong social determinant of energy consumption patterns among urban and rural households. Income remains a primary driver of household's adoption of firewood, kerosene, and LPG. It was found that households' heads income was

positively and significantly associated with the likelihood of kerosene (5%) and LPG (1%) use, and negatively associated with fuelwood use. This suggests that higher income levels increase the likelihood of kerosene and LPG use but decrease firewood consumption. These results align with that of Osunkwo et al. (2020) and Adetayo et al. (2021) who revealed that income has a strong impact on kerosene consumption. Also, Imran, Özçatalbaş, and Bakhsh (2020) showed that increased income considerably increases the adoption of LPG and decreases reliance on firewood.

Table 4.2: Estimates of Socio-economic Determinants Influencing Households' Choice of Cooking Energies.

	Coefficients		
Dependent Variables	**Kerosene (2)**	**LPG [Gas] (3)**	**Fuelwood (4)**
Location (Urban or Rural)*	0.01746 (2.33)**	0.13284 (5.26)**	-0.06125 (-7.52)***
Gender	-0.24927 (-0.45)	0.94364 (0.84)	0.71227 (0.21)
Education	0.09256 (3.55)***	1.35381 (5.62)***	-0.47621 (-4.18)***
Household Size	-0.02798 (-1.05)	0.01731 (0.64)	0.14625 (2.62)**
Income	0.04794 (2.66)**	1.31007 (3.54)***	-0.09765 (-3.92)***
Primary Occupation	-0.72548 (-1.81)*	-0.41558 (-4.74)***	0.82863 (6.95)***
Accommodation Type	1.10712 (1.51)	-0.24159 (-0.39)	-0.39278 (-0.50)
Age	0.04794 (1.63)*	-0.00382 (-2.34)**	0.03439 (3.55)***
CONSTANT	1.23475 (5.38)***	5.42296 (7.32)***	14.16894 (8.13)***

Note: Electricity (1) is the Base Outcome
Location* is Discriminant Variable
*** denotes 1%, ** denotes 5%, *denotes 10%
Figures in parenthesis () are z-ratios
Number of obs = 120
Likelihood ratio stat (χ^2) = 0.0000.
Pseudo R^2 = 0.7862

Source: Field Survey, 2025

In the same vein, Ocen et al. (2024) established that higher monthly income households opt for electricity and gas as alternatives, while poor households will use kerosene, charcoal, and fuelwood. Shamaki and Bucham (2019) further indicated that income remains a determinative parameter in household energy choice decisions. Moreover, Ocen et al. (2024) highlighted that broader financial factors, including credit access, financial inclusion, prices, and affordability of cooking devices, play a big role in determining energy choice.

The first occupation coefficients (as farm work = 1 and others = 0) expressed a

negative and statistically significant relationship with kerosene and LPG at 10% and 1% levels respectively, but strong and positive with firewood at the 1% level. This indicates that households whose heads are primarily farmers tend to be more likely to make use of firewood and utilize kerosene and LPG to a smaller degree. This discovery resonates with Adetayo et al. (2021), who noted occupation as an efficient predictor of dependency on fuelwood. This is supported by the outcome of Adeyemi and Adereleye (2016), Egunjobi (2020), and Kago (2016), who posited that occupation contributes significantly to the use of energy, with wealthier households adopting cleaner and more expensive fuels like LPG, while poor rural households typically use cheaper alternatives like firewood and charcoal.

Age was also significant, with the results showing a positive correlation with kerosene (10%) and firewood (1%), but with a substantial and negative impact (5%) on LPG choice. The trend shows that older heads of households will more likely depend on kerosene and firewood, but prefer fewer LPGs. The results align with Adetayo et al. (2021), who found that age is a main driver in the use of kerosene. The result is also consistent with Danlami (2017), who corroborated that the older household heads are bound to employ the use of kerosene instead of the new alternative.

Challenges in Cooking Energy Consumption among Households

As presented in Table 4.3, several challenges were faced in the availability of cooking energy for urban and peri-urban/rural households. For the urban households, it is indicated in the findings that the biggest hurdles are at a mean of 3.50–4.00 on the four-point scale. Tops among these are the unhealthy aspects of cooking using firewood and charcoal (3.85), the dirtiness of some energy sources such as firewood and charcoal (3.83), the high cost of modern means of energy (3.53), and the increased level of poverty among the families (3.50). Such findings reveal that while urban homes may be more favorably placed to access these modern energy sources like LPG and electricity, economic affordability and health concerns remain significant barriers.

In evidence of this finding, Ocen et al. (2024) emphasized that the price and affordability of cooking stoves and fuel sources are particularly determining for household choices on energy consumption. This means economic considerations have priority over health and environmental concerns so that households continue to rely on cheaper but hazardous traditional energy sources. The analysis of urban households shows that several factors pose

notable challenges in their use of cooking energies. Among the most significant are the unstable electricity supply (3.35), the longer duration required for cooking with fuels such as firewood (3.23), and the smokiness that alters food aroma and taste (2.90).

Table 4.3: Mean Ratings of the Respondents on Challenges in Cooking Energy Use among Urban and Peri-urban/Rural Households.

SN	Challenges associated with the use of cooking energies among urban and peri-urban/rural:	Urban			Peri-urbal/Rural		
		$\overline{X}$	SD	Rmk	$\overline{X}$	SD	Rmk
1	High cost of modern energy sources	3.53	0.49	**VSC**	3.90	0.54	**VSC**
2	Non-availability of modern energy in my locality	1.20	0.81	**NSC**	3.82	0.44	**VSC**
3	Inconvenience in the use of some energies	2.28	0.65	**LSC**	3.21	0.61	**SC**
4	Increasing poverty among the people	3.50	0.48	**VSC**	3.93	0.40	**VSC**
5	Lack of other energy sources	2.00	0.73	**LSC**	3.06	0.59	**SC**
6	Fear of fire accidents/gas explosion	2.76	0.51	**SC**	3.43	0.53	**SC**
7	Lack of willingness to adopt modern energy	1.86	0.80	**NSC**	2.33	0.81	**LSC**
8	High level of illiteracy of some household heads	2.43	0.56	**LSC**	3.52	0.50	**VSC**
9	Lack of regular supply of electricity	3.35	0.47	**SC**	3.77	0.49	**VSC**
10	Longer cooking duration of some energy source e.g. fuelwood and charcoal	3.23	0.49	**SC**	3.40	0.54	**SC**
11	Dirty cooking of some energy e.g. firewood; charcoal	3.83	0.44	**VSC**	3.24	0.56	**SC**
12	Unhealthy effect of cooking with fuelwood and charcoal	3.85	0.42	**VSC**	2.85	0.73	**SC**
13	Large family/household size	2.62	0.59	**SC**	2.96	0.70	**SC**
14	Smoky cooking affects the aroma and taste of food	2.90	0.61	**SC**	2.27	0.82	**LSC**
15	High rate of used up/exhaustion of some energies e.g. gas, kerosene	2.53	0.63	**SC**	3.55	0.47	**VSC**

Note: $\overline{X}$ ***=*** *Mean;* ***SD =*** *Standard Deviation;* ***VSC*** *= Very Serious Challenge;* ***SC*** *= Serious Challenge;* ***LSC*** *= Less Serious Challenge;* ***NSC*** *= Not Serious Challenge ;* ***Rmk*** *= Remark.*

Source: **Field Survey, 2025.**

Other concerns include the fear of gas explosions or fire outbreaks (2.76), the burden of large household sizes (2.62), and the quick exhaustion of fuels like kerosene and LPG (2.53). On the other hand, issues such as illiteracy among some household heads (2.43), the inconvenience of certain energy sources (2.28), and the lack of alternative energy sources (2.00) were perceived as relatively minor. Similarly, the lack of interest in adopting modern energy technologies (1.86) and the non-availability of modern energy within the locality (1.20) were not considered pressing barriers

among urban respondents in Umuahia urban.

In contrast, peri-urban and rural households reported more critical obstacles in meeting their cooking energy needs. The most severe among these were the widespread poverty of households (3.93), the high cost of modern energy technologies (3.90), the limited access to modern fuels (3.82), and the irregular supply of electricity (3.77). Equally concerning were the frequent exhaustion of fuels like kerosene and LPG (3.55) and the low literacy levels of some household heads (3.52). Ocen et al. (2024) observed that poor energy literacy and limited awareness of environmentally friendly practices significantly shape the energy choices made by households.

Other pressing issues for rural and peri-urban households include the fear of accidents associated with gas explosions (3.43), the longer cooking times linked to firewood and charcoal use (3.40), the unclean nature of fuels such as firewood and charcoal (3.24), and the inconvenience of some energy sources (3.21). Additional difficulties were the scarcity of alternative fuels (3.06), the large household sizes (2.96), and the adverse health effects of cooking with firewood and charcoal (2.85). Cimini and Moresi (2022) highlight that socio-economic dynamics, including family size, dietary habits, and cultural cooking traditions, remain decisive in shaping household energy preferences. Meanwhile, less serious problems in rural settings were smoke affecting food aroma and taste (2.27) and the lack of willingness to transition to modern fuels (2.33). In line with this, Williams et al. (2020) emphasize that personal attitudes and socio-cultural beliefs strongly influence household cooking energy decisions.

5. Conclusion and Recommendations

This study explored the dynamics of cooking energy use among urban and peri-urban households in Umuahia zone of Abia State, Nigeria. The data, derived from household heads, revealed clear variations in energy choices across settings. Urban households showed relatively higher use of modern energy sources such as LPG and electricity, though affordability, supply instability, and safety concerns remained significant. Conversely, Umuahia peri-urban/rural households demonstrated greater reliance on traditional fuels like firewood and charcoal, driven by poverty, low literacy levels, and limited availability of modern alternatives. The research underscores that socio-economic characteristics strongly shape household energy use, with poverty and the high cost of modern fuels standing out as major determinants.

In line with the findings of the study, the following recommendations are made;

i. Government and stakeholders should introduce subsidies for clean energy options such as LPG and electricity to improve affordability among low-income households across both urban and peri-urban regions.

ii. Socioeconomic challenges including poverty reduction, income improvement, and household welfare must be addressed, as low-income households are more likely to depend on traditional fuels that endanger human health and the environment.

iii. There is a need to increase the supply and distribution of clean fuels such as LPG and electricity to ensure accessibility for rural and peri-urban households, thereby reducing dependence on biomass fuels

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