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International Journal of Research Publication and Reviews

Journal homepage: www.ijrpr.com ISSN 2582-7421

Livelihood Pattern and Fuelwood Consumption among Households in Ibiono Ibom Local Government Area, Akwa Ibom State

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ABSTRACT

The study set out to investigate livelihood pattern and fuelwood consumption among households in Ibiono Ibom Local Government Area, Akwa Ibom state, Nigeria. Descriptive research design was adopted and a multi-stage sampling technique comprising stratified and random sampling techniques was employed to select household heads as study respondents. Based on the statistically determined sample size, 374 copies of a structured questionnaire were distributed to respondents, but 297 copies were retrieved as valid and suitable for analysis, giving a response rate of 79.4%. The study found out that the primary sources of energy for households in the study area are kerosene, firewood and liquefied petroleum gas. Also, fuelwood is frequently used daily in the study area. Livelihood pattern of households in the study area include: crop production, selling of goods in the market, non-farm wage employment, livestock production, selling of fuelwood and non-timber products as well as farm wage employment. Households' fuelwood consumptions are mainly for water heating, cooking, drying, roasting and ironing. The key factors that influence households use of fuelwood include economy households' income level, availability of the fuelwood and size of the household. Result also indicates that there is a significant relationship between the income levels, livelihood pattern of households and fuelwood consumption among households. The researcher recommended among others that the government should invest in research, technology and development programs to improve the efficiency, affordability and sustainability of alternative sources of energy and reduce the overdependence on fuelwood in the study area.

1. Introduction

Livelihood pattern refers to the combination of activities, resources, and strategies that individuals or households engage in to secure their basic needs and improve their well-being. Livelihood patterns are shaped by various factors, including socio-economic conditions, geographical location, available resources, and cultural contexts. The concept is often used in the field of sustainable development and poverty alleviation to understand how people make a living and what influences their economic activities (Arnold *et al.,* 2023). Key components of a livelihood pattern include income sources which entails the various ways through which individuals or households generate income, such as employment, entrepreneurship, agriculture, or other economic activities. Another component is assets and resources which involves the tangible and intangible resources that people possess, including land, livestock, skills, education, and social networks.

Livelihood Strategies is also a component of livelihood pattern. It describes the approaches and methods individuals or households use to sustain themselves, including diversification of income sources, risk management, and adaptation to changing circumstances (Heltberg, 2003). Others are: expenditure pattern, cultural and social factors as well as access to services. Expenditure Patterns explains how income is allocated for different needs, including food, shelter, education, healthcare, and other essential requirements. Cultural and Social Factors include the influence of cultural practices, social norms, and community structures on livelihood choices and patterns. Access to services entails the availability and accessibility of essential services like education, healthcare, and infrastructure, which can significantly impact livelihood patterns. Understanding livelihood patterns is crucial for policymakers, researchers, and development practitioners as it helps in designing targeted interventions and policies that can improve the well-being of communities. Additionally, Van der Kroon *et al.* (2013) confirms that it aids in identifying vulnerabilities and challenges faced by individuals or groups, contributing to the development of sustainable and context-specific solutions. Livelihood assessments and analyses are common tools used to explore and understand these patterns in different contexts.

Fuelwood is the primary source of cooking energy for households in many developing countries. In Nigeria, the vast majority of the populace depends on forest resources in meeting their various household energy uses. The country lost 81% of its old growth forest in just fifteen (15) years (1990-2005) as a result of uncontrolled subsistence agriculture and the collection of fuel wood which has destroyed the country's forest (Maryam, 2010). In northern part of Taraba state, accelerated degradation and depletion of wood land resources particular by fuel cutting is one of the most serious environmental problems. Here, woodland resources have long been a target of ruthless destructions through wood collection particularly. It is of little wonder therefore that such practice of indiscriminate felling of trees for fuel wood is on the increase (Maryam, 2010).

According to Abdul-Hamid *et al.* (2020), daily usage of fuelwood by household as a source of energy leads in Taraba State, Nigeria, recording 81.9% probably because it is the only source of energy for every day livelihood and also due to lack alternative source, while those that consume on weekly, monthly and no specific regulation followed probably because there are alternatives such as corn stalk, cow dung and kerosene in their areas. Each household consumed 1-5 bundles in a day and a bundle is a number of tree pieces of tied fuelwood weight 5kg.

This is in line with the works of Smith (1984) and Knapp *et al.*, (1989) who said fuelwood is the only common source of energy as a basic requirement for everyday life for cooking, heating and lightening. This also confirms the work of Heltberg (2003) who reported that fuelwood is an essential daily resource needed in the households to survive, it is needed for light, heat and cooking. According to Van der Kroon *et al*. (2013), knowing fuel choice practices is important because it depends on a variety of factors, making knowledge of the factors that influence a household's fuel choice significant (Mekonnen and Kohlin, 2009). The setting in which decisions are made at home reveals a complex and intuitive web of factors influencing behavioral patterns (Van der Kroon *et al*., 2013). However, compared to research on the fuel transition process, the depiction and further explanation of these examples of fuel consumption have sadly unfortunately received significantly less scrutiny (Masera *et al*., 2000).

According to Farsi *et al*. (2005), the lack of markets for energy-using equipment and apparatus as well as access to increasingly marketable fuels have an impact on rural families' energy choices. The decision to use one type of fuel over another is typically based on local availability and trade probability costs associated to gathering the fuel (typically fuelwood, animal dung, and other biofuels), rather than on household spending constraints, costs, and expenses. The task of presenting options under these circumstances is challenging, and there is typically little information available regarding the amount of time needed for the collection of these fuels or the opportunity costs (Farsi *et al*., 2005).

The overall amount of energy used in rural areas is made up of fuels like fuelwood, charcoal, and agricultural waste. Rural households collect fuel from a variety of places, such as animal dung, adjacent forests, open space, and occasionally even from nearby stores. The energy carriers are used for a variety of purposes, including heating, lighting, cooking, and water. While some homes cook with LPG and heat their water either with electricity or fuelwood, many families cook and heat their water using wood (Schipper, 2000). Urban families, however, typically have a wider selection and more notable access to modern commercial fuels and energy sources, utilizing end-user technology and machines that provide them a competitive advantage over rural households.

Visitation to the study area revealed that not all of the villages in the Ibiono Ibom Local Government have had their homes electrified. This has left most households to depend on and still frequently utilize fuelwood. Researchers like Ateba *et al.* (2018) and Bhatt (2004) have found that individuals use fuelwood because they lack access to electricity. However, ahead of all observations, the situation in Ibiono Ibom Local Government Area is special because homes there still use fuelwood despite being electrified. There is need to investigate the reason these electrified households still utilize fuelwood is necessary to be studied.

2. Conceptual Framework

The conceptual framework adopted in this study is the fuel stacking theory. Fuel stacking refers to a variety of fuel consumption patterns where households choose and blend fuels from both the lower and higher rungs of the energy ladder. The energy ladder describes the idea of household energy choices. 'Fuel stacking,' as it is sometimes referred to, is a key characteristic of energy use in rural families. As homes can switch between energy sources depending on the availability and cost of the fuels, fuel stacking promotes adaptability and endurance to the fuel supply (Louie 2018). Using multiple fuels or stacking fuels more accurately captures how households in middle-income countries choose to consume fuel (Mekonnen and Kohlin, 2009).

Van der Kroon *et al*. (2013) and (2014) claim that modern fuels are only appropriate as partial substitutes for conventional fuels and are not a viable replacement for them. This leads to the use of multiple fuels; additional reasons for this include fluctuations in the cost of commercial fuel (Leach, 1992), periodic shortages of modern fuels (Hosier and Kipondya, 1993; Kowsari and Zerriffi, 2011), the increased cost of appliances associated with using modern fuels specifically (Davis, 1998), and tendencies leading households to choose traditional fuels in part (Masera *et al*., 2000). The complexity of the fuel switching process thus suggests the existence of a variety of factors other than wealth that may have an impact on fuel use. This prompted a few authors to explore increasingly complex modeling techniques.

Masera and Navia (1997) noted that many homes in middle-income nations do not adopt the energy ladder's linear transition and single-fuel exchange. Instead, these households use a variety of fuels—including any levels listed on the energy ladder—and exchange them. Utilizing various fuels improves energy security and allows for the collection of various fuels where they are most needed (Grimsby, 2013). The requirement to secure enough energy in an environment where supplies may be erratic and ineffective is the primary driver behind the use of different fuels (Masera *et al*., 2000).

In relating the framework to the study area, the fundamental premise of the fuel stacking theory is that homes have access to a variety of energy supply options, ranging from the simplest to the most advanced and environmentally friendly (Leach, 1992; Hosier, 2004). The transition is frequently used by various households to conceptualize the path toward moving up the energy ladder. According to Hosier (2004), this may be described as a direct move (usually upwards) and a key component of financial growth. Moreover, in Ibiono Ibom Local government the major sources of income are farming, trading, craft work, fishing, hunting, and so on. The area is heavily cultivated. These activities are primary in nature and depend on natural and forest resources for sustenance.

3. Methodology

The study area is Ibiono Ibom Local Government Area. Ibiono lbom is a Local Government Area in Akwa Ibom State and one of the 31 Local Governments in the State of the south-south region of Nigeria. It has its administrative headquarters at Oko Ita. The area of the local government was created out of Itu Local Government Area in December 1996. It lies between coordinate5°14′0″N and 7°53′0″E . The Local Government Area covers an area of 2,761.76 square kilometers. Ibiono Ibom Local Government has eleven (11) political Wards, and two hundred and twenty-one (221) villages. (National Bureau of Statistics (NBS), 2014). Ibiono Ibom is bounded on the North by Itu Local Government Area, on the West by Ini and Ikono Local Government Area and on the South by Uyo Local Government Areas (see Figure 1). The conspicuous geographical feature on the East of Ibiono is the Cross River with its numerous tributaries which are rich in aquatic organism including fish, reptiles and mollusks (Medianigeria, 2022). Ibiono Ibom Local Government Area is located in the tropical rain forest zone of Nigeria. It however has the fresh water swamp grassland in the northern part. It has tall and woody trees with evergreen leaves all year round. The high temperature, heavy rainfall and high relative humidity in Ibiono Ibom favours plant growth. These factors, coupled with the clayey-loamy soil, favour the growth of luxuriant trees in the area.

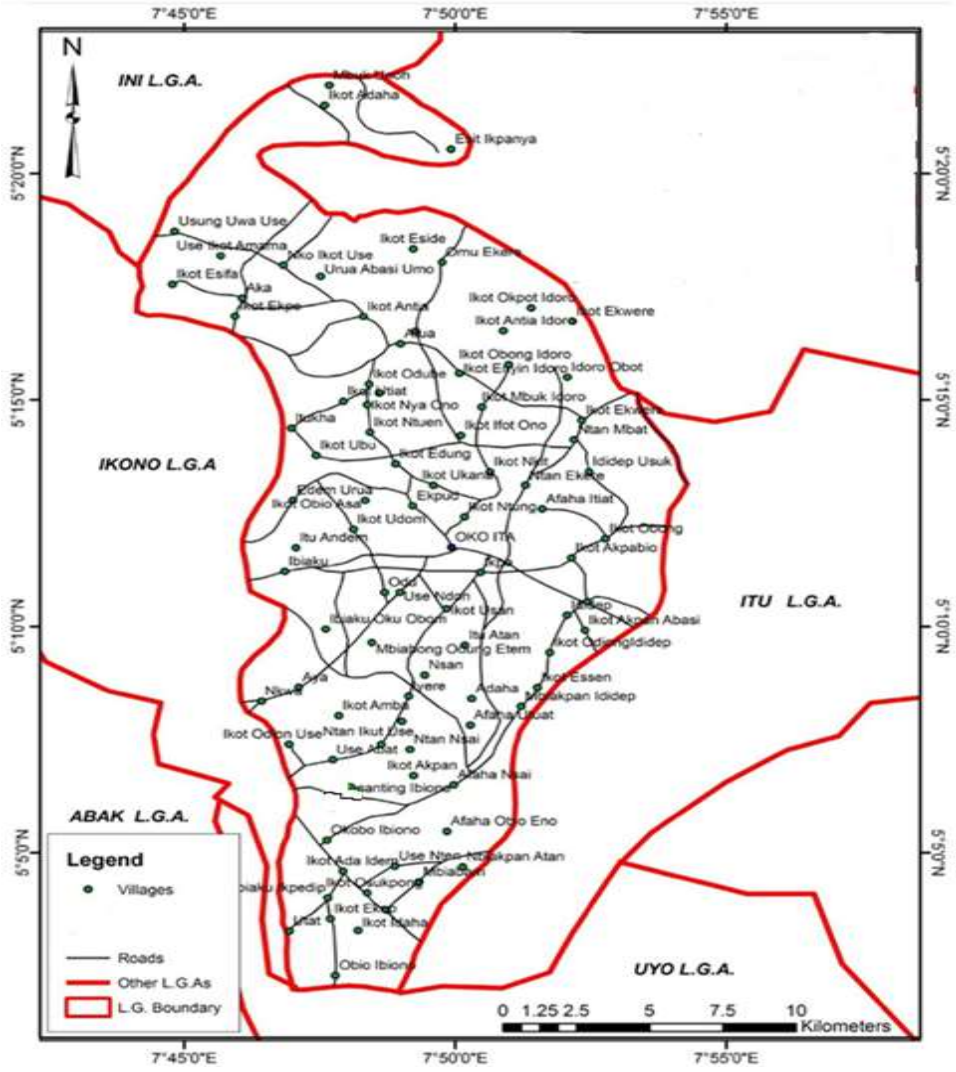

Figure 1: Map of Ibiono Ibom Local Government Area

This study employed a descriptive survey research design to generate statistical data and acquire data about individuals or a group's opinions, pertaining aspects of various characteristics, attitudes, and prior experiences by asking questions and tabulating the answers that are crucially important to households when deciding what kind of domestic energy to use. Data was obtained through self-administered questionnaire, survey and observation. Using the 2006 population figures of 2,263 households, the population was projected to 5,725 households in 2023. The copies of questionnaire were administered on a total sample size of 373 households. The selection of the respondents was done using the simple random technique to get information from the targeted population. The data so obtained was analysed using mean scores and spearman's rank correlation coefficient.

3. Data Presentation and Analysis

Table 1: Livelihood Pattern of Households

S/N	Livelihood Pattern	Mean Scores
1	Crop Production	3.485
2	Livestock Production	2.673
3	Farm Wage Employment	2.620
4	Non-farm wage employment	2.805
5	Selling of Fuelwood and non-timber products	2.623
6	Civil service	1.559
7	Workers in a private organization	2.162
8	Selling of goods in the market	3.438
9	Craft work	1.993
10	Hunting	1.626

Source: Researcher's Fieldwork (2024)

Table 1 shows the responses on respondents' livelihood patterns. The table indicates that crop production with a mean score of 3.485, is the livelihood pattern of most respondents engage in. Other livelihood patterns respondents mostly engage include selling of goods in the market (mean = 3.438); non-farm wage employment (mean = 2.805) and livestock production (mean = 2.673). Civil service with a mean score of 1.559 is the livelihood pattern that respondents least engage in. The analysis above revealed that, from an average mean value of 2.5, the following could be said to constitute the livelihood pattern of households in the study area: crop production, selling of goods in the market, non-farm wage employment, livestock production, selling of fuelwood and non-timber products and farm wage employment.

Table 2: Household Fuelwood Consumption

S/N	Fuelwood Consumption	Mean Scores
1	For cooking	2.808
2	For baking	1.276
3	For heating water	3.101
4	For space warming	1.522
5	For drying	2.808
6	For lighting	1.768
7	For ironing	2.724
8	For roasting	2.727

Source: Researcher's Fieldwork (2024).

Table 2 shows the responses for the questions that focused on respondents' Household fuelwood consumption. The table indicates that heating water with a mean score of 3.101, is the household's activity for which fuelwood is most frequently used for. Other activities for which fuelwood is frequently used include cooking (mean = 2.808) and drying (mean = 2.808) and roasting (mean = 2.727). Baking with mean score of 1.276, is the households' activity for which fuelwood is least used.

Test of Hypothesis

The study set out to test the hypothesis that there is no significant relationship between the Livelihood Pattern of households and fuelwood consumption in Ibiono Ibom Local Government Area. In order to test the hypothesis, Spearman's Rank Correlation coefficient was performed on the data and the result is presented in Table 3 (see end of document).

The analysis in Table 3 presents the relationship between livelihood pattern of residents in Ibiono Ibom LGA and fuelwood consumption. The result shows that at p-values of < 0.05, crop production relates with water heating (0.041) and drying (0.013), livestock production relates with ironing (0.024), non-farm wage employment correlate negatively with space warming (0.024), market selling correlates with ironing (0.038), craftwork correlates with water heating (0.049) and drying (0.041). The analysis shows that there is a significant relationship between livelihood pattern and fuelwood consumption in Ibiono Ibom LGA. This result caused the null hypothesis to be rejected and the alternative accepted.

4. Discussion of Findings

The findings have shown the livelihood patterns of the sampled households to involve crop production, selling of goods in the market, non-farm wage employment, livestock production, selling of fuelwood and non-timber products as well as farm wage employment. However, the result from the Spearman's Rank Correlation for the formulated hypotheses showed that the p-values for livelihood pattern is less than the alpha level of significance (0.05) this therefore implies there is significant association between livelihood pattern (crop production, livestock production, non-farm wage employment, market selling and craftwork) and fuelwood consumption (for heating, drying, ironing, space warming), in Ibiono Ibom Local Government Area. The result agrees with the work of Rehfuess *et al*. (2006) showed how energy is needed for a variety of household activities, including cooking, heating water, and space heating, in both rural and urban families. Hosier and Dowd's (1987) study in Zimbabwe also found that households with easy access to fuelwood tend to prefer it more. According to Muller and Yan (2016), the biophysical state, ownership factors, socioeconomic issues, and the accessibility and availability of energy sources all affect how these interactions play out. The effects of social and economic factors that affect fuel alternation have repeatedly been realized. This study has established that fuelwood is the major source of energy in Ibiono Ibom Local Government Area, based on their agricultural and nature-dependent livelihood pattern.

5. Conclusion and Recommendations

The study on livelihood pattern of households in the study area shows residents engaged in crop production, livestock production, farm wage employment, sales of fuelwood and non-timber products and these activities require the use of fuelwood. The study also showed that fuelwood is mostly used for water heating (warming). This is based on the fact that Ibiono Ibom Local government situates in the tropical rainforest zone, with fresh water, rivers, streams, swamps and estuaries, thereby increasing the humidity of the area and the need for warming. There is therefore a strong association between livelihood pattern (crop production, livestock production, non-farm wage employment, market selling and craftwork) and fuelwood consumption (for heating, drying, ironing, space warming) in the study area.

Owing to the importance of trees in the ecosystem and continuity of life, alternative sources of fuel should be encouraged as well as afforestation so as to avert drought and deforestation in the study area. The government should invest in research, technology and development programs to improve the efficiency, affordability and sustainability of alternative sources of energy and reduce the overdependence on fuelwood in the study area. Furthermore, to improve livelihood patterns in the study area, income-generating activities should be supported for the adoption of improved and alternative energy sources such as cookstoves, biogas produced from animal and agricultural wastes. Microfinance and credit facilities through subsidies and financial incentives should also be provided to enable households invest in alternative sources of energy.

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Table 3: Spearman's rho Correlation Coefficient on Livelihood Pattern of Households and Fuelwood Consumption

		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18
1	Crop production	1.000	.021	.115*	.160**	.093	-.174**	.104	.166**	-.025	-.156**	.025	-.154**	.119*	.010	.144*	.057	-.014	.051
2	Livestock production		1.000	.006	-.120*	.005	.052	-.022	-.059	-.008	-.041	-.033	.066	.038	.046	-.003	-.060	-.131*	.025
3	Farm wage employment			1.000	.502**	.876**	-.858**	.916**	.774**	.125*	-.581**	.215**	-.635**	.801**	.544**	.928**	.473**	-.157**	-.468**
4	Non farm wage				1.000	.359**	-.719**	.493**	.815**	.123*	-.330**	.219**	-.713**	.322**	-.131*	.496**	.491**	.396**	-.086
5	Fuelwood sales					1.000	-.806**	.807**	.624**	.318**	-.610**	.098	-.480**	.721**	.712**	.904**	.609**	-.409**	-.595**
6	Civil servant						1.000	-.766**	-.855**	-.052	.608**	-.204**	.706**	-.757**	-.329**	-.878**	-.488**	.072	.253**
7	Private worker							1.000	.801**	.216**	-.452**	.216**	-.661**	.671**	.525**	.878**	.467**	-.079	-.558**
8	Market seller								1.000	.124*	-.493**	.273**	-.843**	.614**	.220**	.795**	.463**	.121*	-.218**
9	Craft work									1.000	-.125*	-.053	-.186**	-.114*	.352**	.119*	.583**	-.079	-.588**
10	Hunting										1.000	-.047	.512**	-.728**	-.407**	-.606**	-.376**	.376**	.171**
11	Cooking											1.000	-.240**	.145*	.021	.204**	.045	.128*	.008
12	Baking												1.000	-.490**	-.136*	-.649**	-.372**	-.186**	.103
13	Heating water													1.000	.467**	.791**	.261**	-.307**	-.165**
14	Space warming														1.000	.606**	.582**	-.647**	-.570**
15	Drying															1.000	.497**	-.280**	-.416**
16	Lighting																1.000	-.143*	-.549**
17	Ironing																	1.000	.185**
18	Roasting																		1.000

*correlation is sig. at the 0.05 level (2-level); ** correlation is sig. at the 0.01 level (2-level)