

THE DETERMINANTS OF HOUSEHOLD ENERGY CONSUMPTION IN JIMETA, ADAMAWA STATE

By

***Akut, Y. B. and **Adebayo, A. A.**

*Dept. of Geography,

Federal College of Education, Zaria.

**Dept. of Geography,

Modibbo Adama University of Technology, Yola.

08036250303 yabqutt@yahoo.com**ABSTRACT**

This study examines the relationship between household size, income, the type and amount of energy consumed by households in Jimeta. Data sets were obtained from a survey of 228 systematically selected households in six wards using structured questionnaires. The data sets were subjected to descriptive statistics: chi-square, correlation and regression analysis. The results show that kerosene and fuel wood are the main energy sources used for cooking while electricity dominate kerosene for room lighting. Both household size and income correlate positively with expenditure. However, the result of the step-wise regression shows that house hold size has a higher contribution than income.

INTRODUCTION

Energy is critical to any modern and growing economy. Energy heats, cools and lights our homes and businesses, powers our factories fuels our cars and increasingly underpins the fabrics of societal communication through modern technology (Ladislav, 2011). Modern energy services contribute to poverty eradication, saves lives, improves health and helps provide for basic human needs. Energy plays the most vital role in the economic growth, progress, and development, as well as poverty eradication and security of any nation. Uninterrupted energy supply is a vital issue for all countries today. Future economic growth crucially depends on the long-term availability of energy from sources that are affordable, accessible, and environmentally friendly (Oyedepo, 2012; ExxonMobil, 2012; Economic Consulting Associates, 2014; Tessama, Davis, Tella and Lambe, 2013)

Energy supports the provision of basic needs such as cooked food, a comfortable living temperature,

lighting, the use of appliances, piped water or sewerage, essential health care (refrigerated vaccines, emergency, and intensive care), educational aids, communication (radio, television, electronic mail, the World Wide Web), and transport. Energy also fuels productive activities including agriculture, commerce, manufacturing, industry, and mining. Conversely, a lack of access to energy contributes to poverty and deprivation and can contribute to the economic decline. Little wonder it has been described as the oxygen of the economy and the life blood of growth (Voser, 2012).

Nigeria has significant energy resources, including over 36 billion barrels of oil, 187 trillion cubic feet of gas and 4 billion metric tons of coal and lignite. The country also has a large amount of renewable energy resources including hydroelectricity, solar, wind and biomass energy. Hydro resources (small and large hydropower) are estimated at 14,750 MW, solar radiation is estimated at 3.5–7.0 kWh m⁻² day⁻¹, wind energy potential of 150,000 terra joule per year (generated by

an average wind speed of 2.0–4.0 m/s) and biomass at 144 million tons per year, (Oyedepo, 2012).

Unsustainable human energy practices have led to environments being destroyed, together with increased incidence of pollution. Such practices allow carbon emissions to cause climate change which eventually results in global warming, (Ganda, and Ngwakwe, 2014). Also, fossil fuels have the disadvantage of non-renewability on a human time scale, and cause other potentially harmful effects on the environment, (Nelson, 2015).

Paramount in the domestic demand for firewood is the expectation that heavy cooking of traditional staple foods (such as grain porridge and yams) will continue to be done. Wood is widely perceived as economical, fast and gives food a better flavor. Such perceptions are linked to the fact that cooking habits are less susceptible to change. Cooking with modern energy requires the acquisition of relatively costly equipment, the skills necessary for its use, and a value system motivating consumers to use alternative energies, such a value system will be affected by education, occupation and socio-economic status.

Wood does have an advantage over its competitors, in that its supply system is too diverse to be controlled by a small group of distributors who can profit from a period of scarcity. For those without generators, electricity supply is monopolized by the PHCN which is notoriously unreliable particularly at times of peak demand. Alternative energies are affected by international as well as national policy changes. The partial removal of subsidies on petroleum products and the prevailing scarcity leading to the unofficial hike in kerosene price, coupled with the electricity outages experienced in Jimeta with the concomitant inconveniences may lead to what Olayiwola, Okesoto and Akinpelu (2016) describes as being trapped in energy crisis, a situation in which the nation suffers from a

disruption of energy prices/power interruption that threaten economic and national security.

With the escalation of the price of all forms of energy however, such alternatives are now beyond the reach of all but the affluent and mainly urban minority. Similarly, the various renewable sources of energy now being developed are likely to have much influence on the household fuel-supplies of the country's rural and urban poor for a long time to come. This study examines the determinants of household energy consumption in Jimeta-Yola.

Objective of the Study

The study examines the relationship between household size, income and expenditure on energy.

Hypotheses

There is no statistically significant relationship between household size and expenditure on energy.

Study Area

Jimeta is located 9.28 latitude and 12.46 longitude and it is situated at elevation 154 meters above sea level. Jimeta has a population of 248,148 making it the biggest city in Adamawa. Jimeta is made up of 11 wards which include: Alkalawa, Doubeli, Demsawo, Gwadabawa, Jambutu, Karewa, Limawa, Luggere, Nassarawo, Yelwa and Ajiya. The various nationalities resident in Jimeta include Fulani, Bwatiye, Vere, Laka, Chamba, Higgi, Mumuye, Hausa, Kilba, Lunguda, Bachama, Igbo, Yoruba, Tiv, among others. While each nationality maintains its distinctive language and dialect, Fulfulde, Hausa and English are widely spoken.

The peoples' occupations vary from one ethnic group to the other but they are mainly farmers, cattle rearers and fishermen. The Fulani engage mainly in cattle rearing and dairy production while riverine communities combine fishing with farming. Jimeta has a tropical climate characterized by dry and wet seasons.

The rainy season commences in April and ends in October. The rainfall, apart from its seasonality is also characterized by a single maximum – usually August. The mean total annual rainfall experienced within the study area is 910mm. Generally, August and September are the wettest months. Maximum temperature could be as high 42° C in April, while it drops to 18.3° C between December and January (Meteoblue.com, 2016).

Jimeta is strategically situated in the central part of Adamawa State with a combined characteristic of both the sub-Sudan and northern Guinea Savannah vegetation. The true vegetation of the area has for years

been modified by human activities and hence traces of the climatic climax are difficult to come by. Most of the trees shed their leaves during harmattan, grasses die and are burnt off. Some indigenous species include *Parkia biglobosa* (locust bean tree), *Vitellaria paradoxa* (Shear butter), *Tamarindus indica* and *Azadiracta indica*. The soils are mainly of alluvial material found along the flood plains of the Benue River. They are deep, poorly drained with medium texture and have sandy loam, silt or loamy sand surface horizon. These soils are highly fertile and heavily cultivated through irrigation.

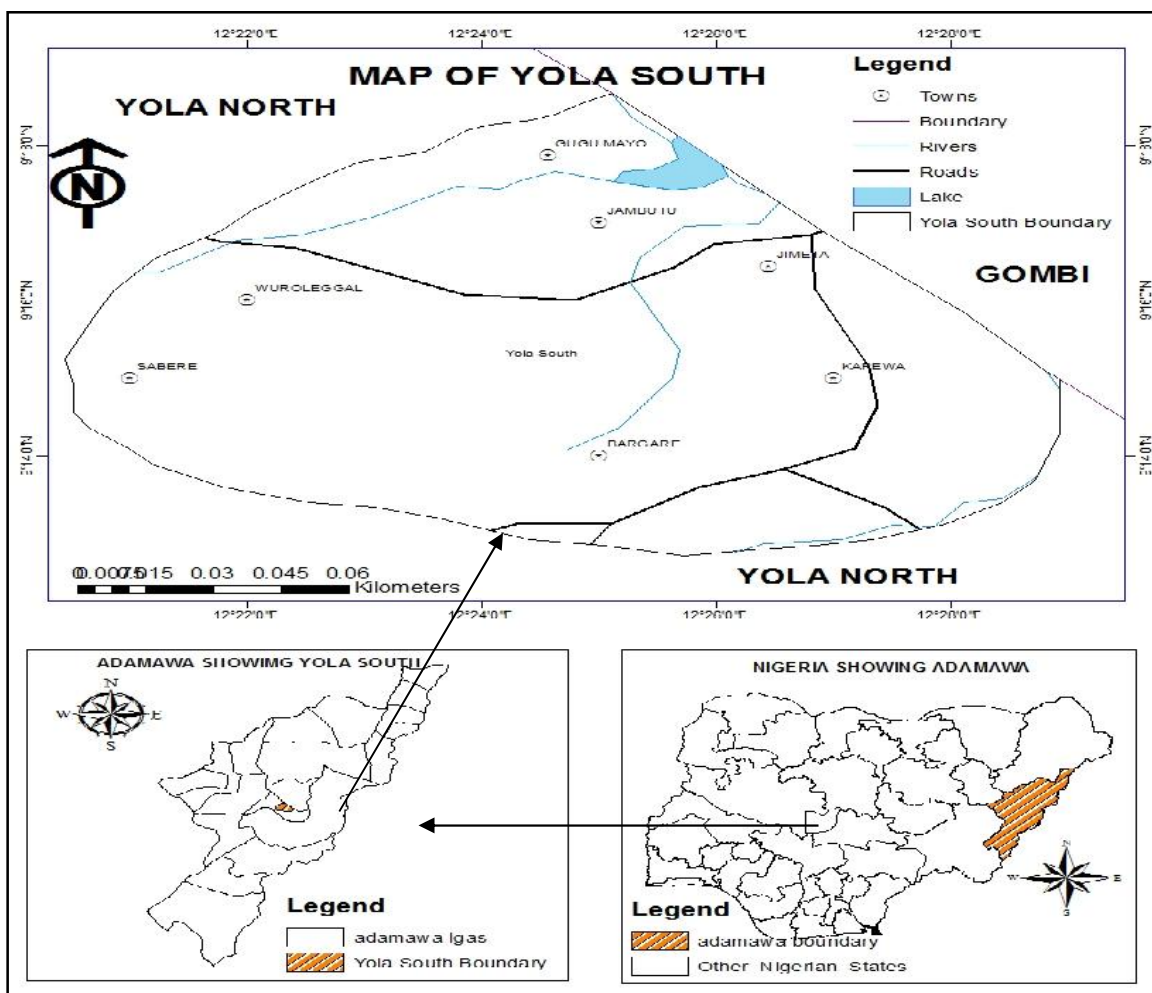


Fig.2: Location of the Study Area

Source: Google Earth, 2016.

MATERIALS AND METHOD

The sampling frame consisted of 228 households randomly selected from 6 systematically selected wards. The figure was arrived at from registered voters list of Jimeta residents aged 18 years

and above from the INEC using a constant sampled fraction of 0.4. The 6 wards represent 54.5% of the wards in Jimeta. Also, 30 fuel wood vendors from the 6 wards were interviewed.

Table 1: Sampled wards according to Population

Ward	Population		Respondents
Doubeli	12,487	$0.4/100 \times 12,487$	50
Luggere	6,607	$0.4/100 \times 6,607$	27
Nassarawo	12,581	$0.4/100 \times 12,581$	50
Karewa	9,695	$0.4/100 \times 9,695$	39
Gwadabawa	9,104	$0.4/100 \times 9,104$	36
Yelwa	6,448	$0.4/100 \times 6,448$	26
	TOTAL		228

Source: INEC, 2012

The systematic sampling technique was employed in this study. Every 5th household in a street was randomly selected and administered with a questionnaire. Fuel wood retailers were randomly selected from each ward. The questionnaires were administered over a period of 3 months. Of the 228 questionnaires administered, 200 (87.7%) were returned.

Both descriptive and inferential statistics were used in this study. In order to determine the relationship between family size, income and energy expenditure, the Bivariate correlation analysis was used while stepwise multiple regression analysis was employed to examine the relative contribution of family size and income to energy consumption. Also, Chi-square (χ^2) was used to determine the association between income group and type of energy used and also to test the null hypothesis.

RESULTS AND DISCUSSION

Table 2: Household Income Stratification (naira), Size (pers/household) and Expenditure

Income Group	Income Distribution (Naira)	Average Monthly Income	Average monthly Expenditure on Energy	Percentage on income spent on Energy (%)	Average Household Size
Low	Less than 6,000	3,957	698	18	8.3
Lower Middle	6,000-15,000	10,247	1,000	10	6.2
Upper Middle	16,000-49,000	29,230	1,482	5	8.2
High	50,000 and above	130,000	1,693	1	7.3

Source: Field Survey, 2012.

Table 3: Correlation between household expenditure with size and income

Household variable	Correlation coefficient
Size	0.673
Income	0.289

$r = >0.2540$ is significant at 0.01%

Table 4: Step-wise regression of Expenditure on household size and income

Household Variable	R ²
Size	45.35%
Income	2.97%

Field Survey, 2001.

DISCUSSION OF RESULTS

The socio-demographic structure of Jimeta is characterized by a large size with an average of 6.8, corresponding with Adegbulugbe and Akinbami's (1992) 6.8 for Nigeria and Kilahama's (1994) 6.0 for Tanzania. Lack of education and unwillingness to adopt family planning may account for the large family sizes of the low-income groups, while that for the high -income class could be due to the extended family culture of Africans as well as the ability to employ housemaids who reside in such households (table 2).

Table 2 also reveals that households in the low income groups use about 18% of their monthly income on energy. The energy mix for this group is mainly fuel wood and kerosene. In the middle income class, 15% of monthly income is expended on energy and for the high income earners, a meager 1% is committed to energy which comprise electricity and kerosene. This is not unconnected with the use of stand-by generators to supplement power from the national grid. It implies that the large family sizes of the low and middle income groups coupled with the fact that they rely more on high combustion, low calorie energy sources (fuel wood and kerosene) could be responsible for rise in percentage income expended on energy. For the high income class, the low percentage of income expenditure recorded

does not include the cost of buying and fueling a generating set and the use of high-efficiency energy sources. Relationship between household income, size and expenditure

In order to test the hypotheses (relationships between household income and expenditure on energy and between household size and expenditure), the two variables (household size and income) were subjected to correlation analysis (table 3). Household expenditure on energy is significantly correlated with household size and income at 0.01%. Household size has the highest positive correlation with energy expenditure ($r = 0.673$). The large average household size in Jimeta (6.8) has given credence to this result.

The result of the bivariate correlation discussed above only depicts the relationship between household size, household income and household expenditure on energy. It does not, however, indicate the level of importance of each of the variables influencing expenditure. In order to therefore clearly identify the variable that is critical to expenditure on energy, the two variables were subjected to step-wise regression analysis (table 4).

The result shows a positive correlation between household size and income with expenditure at 0.05%. The two variables collectively accounted for

48.32% of the variation in household expenditure. However, household size has the highest contribution (45.35%). The second variable, household income contributed only 2.97%. The implication of this finding could be linked to the use of fuel wood by households with large family size in the highbrow areas like the G.R.A and Commissioners' Quarters, for 'convenience'.

CONCLUSION

There exists a positive correlation between household size, income and expenditure on energy. However, household size contributed more to the observed variations in expenditure on energy as the large family sizes of the low and middle income groups is responsible for the rise in percentage income expended on energy

RECOMMENDATIONS

The following recommendations are hereby presented based on the findings of the study

1. Since kerosene and fuel wood are the major cooking fuels, improved kerosene and fuel wood stoves should be produced and made available to the urban poor at subsidized rates.
2. Coal briquettes should be made available to diversify the energy base of the urban poor.
3. The location of Jimeta in the savannah zone is suitable for the generation of solar energy. The technology is simple and has the dual advantage of renewability and environmental protection.

REFERENCES

Olayiwola, K.O., Okesoto, J.O. and Akinpelu, A.A. (2016). Energy Crisis: Implication on Poverty Alleviation and Sustainable National Development.

- https://www.academia.edu/4176134/Energy_Crisis_Implication_on_Poverty_Alleviation_and_Sustainable_National_Development
Economic Consulting Associates (2014). Correlation and causation between energy development and economic growth. Evidence on Demand. Retrieved from <http://www.evidenceondemand.info/correlation-and-causation-between-energy-development-and-economic-growth>.
- Ganda, F. and Ngwakwe, C. C. (2014). Role of energy efficiency on sustainable development. *Environmental Economics, Volume 5, Issue 1, 86*
- INEC (1999). Register of Voters' List. INEC, Abuja-Nigeria.
- Ladislav, S.O (2011). *Energy and Development Trends*. CSIS, Washington DC.
- Nelson, S.A. (2015). Energy Resources. Tulane University <http://www.tulane.edu/~sanelson/eens1110/energy.htm>
- Oyedepo, S.O (2012). Energy and sustainable development in Nigeria: the way forward. *Energy, Sustainability and Society. Springer, 2012:15*
- Oyedepo, S. O. (2012). On energy for sustainable development in Nigeria. *Renewable and Sustainable Energy Reviews* www.elsevier.com/locate/rser
- Tessama, Z. Davis, M., Tella, C.V. and Lambe, F (2013). Mainstreaming Sustainable Energy Access into National Development Planning: The Case of Ethiopia. Stockholm Environment Institute Working Paper NO. 09
- Vaser, P. (2012). Energy, the Oxygen of the Economy. World Economic Forum, USA/IHS CERA https://www.meteoblue.com/en/weather/forecast/modelclimate/jimeta_nigeria_2336056. Accessed 01-08-2016