Nigerian Journal of Ecology (2000) 2: 17-22

ISBN: 978-2169-01-3

VARIABILITIES IN THE WEEKLY HOUSEHOLD ENERGY EXPENDITURES: THE SCENARIO FROM IJESA ZONE, OSUN STATE, NIGERIA.

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ABSTRACT

Nigeria was among the ten most populated countries of the world in the mid 1990s. Increased population leads to increased exploitation and usage of resources most especially energy, which is consumed for production by industries and for domestic chores by households. This consumption of energy, and any other goods and services will require the household's expenditures and patterns. These will be dictated by a host of factors especially household variables. This paper, therefore evaluates the variabilities in the weekly household energy expenditures in Ijesa Zone of Osun State Nigeria. A multi-stage sampling procedure was used to administer structured questionnaire in six major towns of the zone. The study shows that there are different structures in the household expenditures in the towns and these were buttressed by the staggered values of the co-efficient of determination obtained from the multiple regression analyses of the average weekly household energy expenditure as influenced by the different independent variables.

Keywords: deforestation, disposable income, high population, household energy sources, multiple coefficient of correlation.

INTRODUCTION

Nigeria is one of the ten countries that account for 60% of the world population which was estimated to be about 5.7 billion in the mid 90s (Sutton, 1996). Continued increases in global population must result in ever-greater demand for and exploitation of the earth's resources. Increased exploitation of the earth's resources will lead to increased wealth of the people of the universe but increased wealth is always associated with increased consumption of energy. In Nigeria, energy, either for industrial or domestic purposes, could be obtained from either renewable sources such as hydro, wind, direct solar and wood resources or non-renewable resources such as fossil fuel or nuclear sources. It must be noted, however, that an increased consumption of energy is often accompanied by deleterious effects on the environment especially the effusion of carbon and its oxides into the atmosphere. Whatever the case, energy will continue to be utilized and this implies that some capital outlay will have to be expended on energy from the various sources and in different quanta.

The consumption of electricity, kerosene and cooking gas requires some expenditure of money. The capital outlay on energy consumption in Nigeria will be better imagined when it is recalled that the country consists of thirty six states and the Federal Capital territory.

Osun state is in the southwestern part of Nigeria and has Osogbo as its headquarters Osun State consists of Ife, Ila, Osun and Ijesa provinces (Udo, 1981). The Ijesa province, called zone in this study, was divided into four local government areas (LGAs) as at the time of this study. It had been further divided into six LGAs.

Ijesha zone has Ilesa as the central town. Ilesha lies on latitude 7° 40' North and longitude 4 ° 45' (Federal surveys, 1978). Ijesha zone is bounded in the east and south by Ondo State and Ife zone respectively. It is demarcated from Ondo State by River Owena. The topography is highly undulating and the soils are sandy clayey to sandy loams. The soil developed on quartz schists and amphibolites. Ilesa and its surroundings lie within the moist lowland evergreen forest belts of the Western part of Nigeria. The forest have three layers of trees consisting of lower and middle storeys. A discontinuous layer of taller emergents forms the third layer. Shrubs and herbs could be present. Grasses are uncommon. The land is well drained by numerous rivers and stream among which are Rivers

Oni, Osun, Oora and Oba (Udo, 198). Ijesa zone has a high population density of 250 persons per square kilometer (Onibokun, 1983). The Federal Office of Statistics (1985) explained that a household consists of all people who live under the same roof and have the same eating arrangement.

The household, must of necessity consume and expend some amount of money on goods and services. The household consumption expenditure therefore refers to all expenses on all goods and services consumed by the households. A good way of assessing the economic levels of the households is to find out how the households utilize their income in a given community (Agbalaka, 1974). Such a study will show the expenditure patterns of the different segments of the community and could be useful pointers to the quanlity(ies) of life of the composite segments of the community. It also provides a good basis for comparing the consumption levels among the various segments of the community. (IDRC, 1986).

This paper, therefore, aims at highlighting the variations in the household energy expenditures among some communities in the Ijesa Zone of Osun State, Nigeria.

METHODOLOGY

The study was carried out in the Ijesa Zone of Osun State, Nigeria. The sampling tools were a structured questionnaire and two hundred and twenty households were sampled in six towns of the zone. These towns were Ilesa, Ijebu-Jesa, Osu, Ibokun, Ipetu-Jesa and Imesi-Ile.

The households were randomly sampled without replacement, and the sampling intensity used was 0.1% which was based on the 1991 provisional census figures for the sampled towns. A multi-stage sampling procedure was used in collecting the data for the study. Seventy copies and thirty copies were administered on Ilesa and on each of the remaining five towns, respectively. In all, 220 households were sampled. The commnities were classified using the characteristics of having large or small populations, availability or non-availability of infrastructural facilities and social set-ups as used by Onibokun (1983 and FOS (1985).

The household energy expenditures in the communities were calculated by adopting the mostly used method of obtaining the sums of the products of the various quantities of the household energy sources and their respective unit costs (Herderson and Quandt, 1980) i.e.

$$Y_E = p_1q_1 + p_2 q_2 + p_3 q_3 + p_4q_4 + ... px\ qx \quad .....(1)$$

Where

Y_E = Total weekly household energy expenditure

$P_1 ... qx$ = Unit costs of the various sources of household energy.

$q_1 ... qx$ = quantities of the various sources of household energy consumed.

The results obtained are presented in tables of costs percentages and percentage part bar graphs. Multiple regression analysis were carried out to determine the extents to which some variables influenced the weekly household energy expenditure (Y_E) i.e.

$$Y_E = b_o + b_1 x_1 + b_2 x_2 + ... + b_1 x_1 \quad (2)$$

Where

Y_E - weekly household energy expenditure

b_o = expenditure constant

$b_1 ..... b_1$ = coefficient of the independent variables

$x_1 ..... x_7$ = specific sizes of the independent variables

The computation and analyses were done with the aid of computer as the computational procedures required for most multiple regressions are of such complexity as to preclude hand or manual calculation (Zar, 1974). The analytical tool used was the statistical package for social. sciences (SPSS). The multiple regression analyses provide the coefficients of determination (R^2) and the coefficient of multiple correlation (R). The R^2 was used to explain the degrees of variability in the dependent variable (Y_E) from the viewpoint of the independent variables ($x_1 ... x_7$) while the R evaluates the degree of association between Y_E and $x_1 .....x_7$ (Freese, 1974, and Zar, 1974).

RESULTS AND DISCUSSIONS

i. General

The identified four major sources of household energy are fuelwood, kerosene, electricity and cooking gas. Other less utilized fuel are charcoal, palm-kernel, dry cassava sticks, bamboo stems, stems of *Chromolaena odorata* and saw dust.

Based on Onibokun (1983) and FOS (1998) criteria, the towns were categorized as follows:

Ilesa - Urban

Ijebu-Jesa, Ibokun and Osu - Semi Urban

Ipetu-Jesa, and Imesi-Ile-Rural

There were no consumption of cooking gas among the sampled households in Ipetu-Jesa and Imesi-Ile.

(ii) Aggregate - Household energy expenditure

The aggregate weekly household expenditure on fuelwood (FW), kerosene (KR) electricity (EL) and

cooking gas (CG) among the sampled households in the six towns are stated in Table 1. The fuels, in order of importance based on expenditure levels, are fuelwood, kerosene, electricity and cooking gas. The clear domination of the aggregate household energy expenditure by fuelwood is quite indicative of a proponderance of low-income households (Phillips 1993 and Famuyide et al. 1996). The low income could have restricted the choices of the low-income household to the cheap ones and the fuel that readily serves this purpose is fuelwood. The low disposable income, high population coupled with the fears of gas exploison are sufficient reasons to have relegated CG to the background as it is a highly inflammable fuel and considered a commodity for the high income class (Leslie, 1971). The near equality in the aggregate expenditures on EL and CG, though low, are indicative of low utilization of electricity and cooking gas in the Ijesa Zone, IDRC (1986) had observed that there is an increased demand for electricity at higher income levels as people, and households, with higher incomes acquire appliances which are electricity dependent.

Table 1: Aggregate Weekly Household Energy Expenditure (=N=)* In The Ijesa Zone.

Town/Fuel	FW	KR	EL	CG	Total
Ilesa	188.5	314.27	140.97	310.00	953.74
Ijebu-Jesa	216.73	151.00	88.79	34.00	490.52
Ibokun	257.74	213.00	30.15	27.00	527.89
Osu	182.40	145.00	37.70	12.00	377.10
Ipetu-Jesa	191.75	118.37	66.84	0.00	376.96
Imesi-Ile	277.10	137.40	24.00	0.00	438.59
Total	1,314.22	1,078.64	388.84	383.00	3,164.80
	(41.53)	(34.08)	(12.29	(12.10)	

Source: Famuyide (1995)

* Percentages (%) in parentheses

iii. Weekly household energy expenditure

The mean household energy expenditure, for the towns will show the average weekly cost of procuring the various sources of energy to the sampled household. This is important for as Agbalaka (1974), had observed, planning is considerable in terms of explicit specifications and elaboration of development policy objectives in its tasks of raising the social welfare of the individuals. Average consumption, albeit expenditures, must be quite useful in making necessary the different socio-economic conditions prevailing in the towns.

Consequently, the higher income people in the urban town of Ilesa and semi-urban towns of Ijebu-Jesa, Ibokun and Osu would prefer such fuels which are neat to handle and are less burdensome i.e. kerosene, projections for the demand for and supply of resources. Table 2 shows the average weekly household expenses on the four sources of energy in the studied zone.

It is to be noted that fuelwood dominated the average weekly household energy expenditures in four of the towns while kerosene took the largest chunk in Ilesa and Osu. The expenditures on electricity and cooking gas, in those towns where it was used, had varying proportions of the household energy expenditures. These observed patterns are due to cooking gas and electricity. This is contrary to happenings in the rural towns, Ipetu-Jesa and Imesi-Ile, where the preferred fuel is fuelwood for it's seeming 'cheapness' while overlooking the drudgery involved in fuelwood utilization, its handling and

Table 2: Average weekly household energy expenditure (=N=)* in Ijesa Zone

Town/Fuel	FW	KR	EL	CG	Total
Ilesa	2.89	4.96	2.24	3.54	13.63
	(21.20)	(36.39)	(16.43)	(25.77)	(100)
Ijebu-Jesa	7.22	5.21	5.25	1.66	19.34
	(37.33)	(26.94)	(27.15)	(8.58)	(100)
Ibokun	7.13	5.04	4.19	1.24	17.60
	(40.51)	(28.64)	(23.81)	(7.24)	(100)
Osu	4.45	5.02	2.69	0.40	12.56
	(35.40)	(39.94)	(21.40)	(3.18)	(100)
Ipetu-Jesa	5.01	4.67	2.88	0	12.56
	(39.89)	(37.18)	(22.93)		(100)
Imesi-Ile	7.83	5.09	1.69	0	14.61
	(53.59)	(34.84)	(11.59)		(100)
Total	5.97	4.90	1.77	1.74	14.38
	(41.52)	(34.08)	(12.31)	(12.10)	(100)

Source: Famuyide (1995)

* *Percentages (%) in parentheses*

the dirts it causes on cooking utensils. Moreover, electricity and kerosene are used not only for cooking, heating but also for lighting and providing energy for other household appliances while fuelwood is used exclusively for cooking purposes. The high fuelwood energy expenditure proportions recorded for the rural and semi-urban towns of Imesi-Ile, Ipetu-Jesa, Ibokun and Osu are, therefore, not unexpected. The high value obtained on fuelwood in Ijebu-Jesa, is rather surprising as the town ought to have enjoyed some considerable "ripple effects" of its proximity to Ilesa. The variations and the structures of the average weekly household energy expenditures, in the studied zone, are as shown in Figure 1. Fuelwood accounted for between 21.20% and 53.59% of the household weekly energy expenditure with Imesi-Ile having the highest and Ilesa having the lowest. The variability on the composition of the various weekly energy expenditures among households sampled in these six towns commence being elucidated here.

iv. Results of the regression analyses

The factors which were observed to have influenced the household energy expenditures are the unit prices of fuelwood, kerosene and electricity and these are denoted by x_1, x_2 and x_3 respectively. Others are household size (x_4), household income (x_5), seasonal variations in the consumption of fuelwood and kerosene (x_6 and x_7). The regression models for Ilesa and Ijebu-Jesa with low R^2 were subjected to further step-wise regressions. The values obtained were still low. Hence, the decision to settle for the models presented for Ilesa and Ijebu-Jesa above.The high values of the coefficient of multiple correlation R being between 63 and 88, shows that there is great degree of association between dependent variables and independent variables. The significant of some variables means that they did occur at zero chances.Going by these values, Ilesa and Ijebu-Jesa could be grouped together while Ipetu-Jesa and Imesi-Ile occupied the rear group with Ibokun and Osu coming in between these two extremes. Ilesa and Ijebu-Jesa are, to a large extent, inhabited by people who are either salary earners or traders and who have higher incomes than those of these other places and could afford to go for other sources of household energy (Famuyide, et al, 1996). Similarly, the socio-economic conditions operating in these two towns could permit people eating out of their different homes. These and others could have accounted for the lower efficiencies observed in the regressions for the urban towns than the rural towns.

Ilesa

$$Y_E = 2.77 + 0.22\,x_1 + 0.41x_2 + 0.41x_3 + 1.0x_4 + 0.0007x_5 + 0.83x_6 - 0.61x_7$$
(1.94) (1.96) (0.856) (3.2) (3.96^{-10}) (0.758) (0.229)**

Ijebu - Jesa

$$Y_E = 2.60 + 1.37x_1 + 0.63x_2 - 2.11x_3 + 1.36x_4 + 0.0003x_5 + 0.86x_6 - 0.86x_7$$
(1.59) (1.56) (0.1) (2.58) (38.86) (1.09) (0.65)

Ibokun

$$Y_E = 11.96 + 2.05x_1 + 2.19x_2 + 35.83x_3 + 0.11x_4 + 0.0006x_5 - 1.39x_6 + 2.29x_7$$
(1.33) (1.32)* (0.124)** (3.54) (2716) (1.137) (0.952)**

Osu

$$Y_E = 7.33 + 0.59x_1 - 1.09x_2 + 5.30x_3 + 0.72x_4 + 0.0007x_5 + 0.89x_6 - 0.89x_7$$
(2.53) (1.07) (0.154) (3.926) (2996.6) (0.691) (1.059)

Ipetu-Jesa

$$Y_E = 2.01 + 0.9x_1 + 0.32x_2 + 7.03x_3 + 1.28x_4 + 0.0002x_5 + 0.39x_6 - 0.59x_7$$
(1.694) (1.772) (0.13)** (3.564) (2956.6) (0.942) 0.992)

Imesi-Ile

$$Y_E = 0.11 + 0.31x_1 + 0.003x_2 + 10.74x_3 + 1.342x_4 + 0.0002x_5 + 1.62x_6 - 2.76x_7$$
(1.803) (1.074) (0.114)** (4114) (2333.4) (1112) (1.064)**

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1. Figures in parentheses are standard errors.

* Significant at 5%.

** Significant at 1%.

v. Policy implications of these results.

The average weekly household energy expenditure patterns (Fig. 1) shows that feulwood will remain a dominant household source of energy as long as income distribution continues to be strongly and negatively skewed against the low income earners in our society. Yet, Ojo (1995) had projected that the supply of fuelwood will remain much lower than the demand for it in the period of 2000 to 2010. Similarly, Barbara (1992) had observed that economic development requires increased use of raw materials and energy. Consequently, an increased demand for energy sources, particularly fuelwood, should be envisaged and necessary plans and strategies that will meet the increased demand should be vigoriously pursued and put in place. A high population growth rate and low income are pointers to the imminent pressure which will be put on the fast diminishing natural forests in the Ijesa zone of Osun State. This increased demand will lead to the environmental problems of deforestation, soil erosion, pollution or destruction of underground and surface water. Measures that will not only meet the materials needs of the present but will also ensure the ability of future generations to meet their own needs should not be compromised but must be vigorously pursued and institutionalized.

CONCLUSION

The study has shown that there are wide variabilities in the average weekly household energy expenditures in the six towns studied in Ijesa zone of Osun State. It has, also, shown that fuelwood occupied a pride of place in the household energy expenditure in the zone now and will do same in the future. This will exert pressures on the natural forests in the zone and this pressure will engender environmental problems. The need to avert these will require considering the following suggestions.

i. There should be vigorous extension program that will promote the concept of family and communal Woodlots through the various agroforestry practices.

ii. The Osun State government should as a matter of priority embark on the establishment of fuelwood plantations in the zone and the state.

iii. The present management practice of considering forestry issues as public (government) matters need to be reviewed and conscientious efforts made to allow the various communities to participate in the management of the forest estates within their boundaries but particularly on their land.

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Table 3: Values of R^2 and R for regression models.

Town/Statistic	R^2	R
Ilesa	0.42	0.65
Ijebu-Jesa	0.40	0.63
Ibokun	0.52	0.72
Osu	0.63	0.79
Ipetu-Jesa	0.78	0.88
Imesi-Ile	0.75	0.87

Source: Famuyide (1995)