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Multidimensional Energy Poverty in the South-South Geopolitical Zone of Nigeria

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ABSTRACT
This paper analyzed multidimensional energy poverty in the south-south geopolitical zone of Nigeria using the National Bureau of Statistic 2009-10 National Living Standard Survey (NLSS) data. Whereas results at the zonal level showed 83.2% of inhabitants are energy poor and are deprived of 90.3% of the weighted indicators state level results showed that 92.1%, 96.7%, 91.9%, 76.8% 60.1% and 83.1% of inhabitants in Akwa-Ibom, Bayelsa, Cross-rivers, Delta, Edo and Rivers States were energy poor and are deprived of 95%, 85.1%, 95.3%, 88.2%, 86.8% and 90.2% of the weighted indicators respectively, thus energy poverty in the zone is both acute and pervasive. Energy poverty in the zone also has rural-urban, educational attainment and occupational dimensions. The study therefore recommended that energy poverty reduction efforts should include education/enlightenment programmes at the work place, schools, rural areas, and in all the states of the zone, and should be all inclusive.
Keywords- Headcount, Intensity, Multidimensional Energy Poverty Index, and Relative-risk ratio

1. Introduction

Energy is the live wire of any economy. Give the people energy you would have solved a large proportion of their problems. Not only is energy needed for domestic consumption, its availability creates an enabling environment for small-scale businesses to thrive. The hair barber, the hairdresser, the woman who sells fish by the roadside, that woman that deals on sachet water, fishermen, farmers, sculptors, etc all needs one form of energy or the other to foster their businesses, thus energy is not only an end but also a means to an end. For the purpose of household health and environmental sustainability having access to a modern cooking fuel is also important.

The importance of energy to any society could be seen in the following areas as enunciated by Karekezi, et al, (2004):

- Energy plays an important role in enhancing food security through greater use of energy based technologies for irrigation and water pumping. These technologies do not only ensure year-long food supply but also generate additional income for poor households, especially those in rural areas.
- Access to modern and affordable forms of energy is crucial for job creation this could have a direct effect on poverty reduction.
- Increased access to modern forms of energy is vital in the transformation of: agriculture-based economies where significant animate energy is used into industry-based economies, where modern forms of energy form the fulcrum on which the more-advanced value-added activities that characterize more industrialized economies stands.
- Improved low-cost cooking stoves reduce the amount of fuel used this translates into direct cash savings. Also, they reduce respiratory health problems that are associated with smoke emission from traditional biomass stoves and offer a cleaner air, a better home and working environment. Other benefits from low-cost cooking stoves include the reduction of the burden placed on women and children in fuel collection, creating more time for women to engage in other activities, including income-generating ones.
- Modern forms of energy play an important role in improving access to safe water and sanitation in developing countries.
- Modern forms of energy and the services they provide enhance modern health services, the facilities to provide them, and the professional and health sector workers who deliver them. They do not only provide electricity for lighting, refrigeration and modern medical equipment but are also linked to heat-related services through the availability of cleaner and affordable fuels for institutional uses.
- Universal access to electricity and modern as well as cleaner forms of energy for cooking provide a wide range of high quality energy services even when the amount of energy used is modest.
- Finally, availability of modern and cleaner forms of energy helps in safeguarding the natural environment and contributes to sustainable development.

The above also tells why the measure of energy poverty takes into account three major deprivations which are: (i) access to electricity (ii) access to modern cooking fuel; and (iii) access to clean indoor (fresh) air.

In spite of the importance of energy majority of studies on poverty in Nigeria have focused more on income poverty. While the literature is replete with empirical work on poverty in the south-west, south-east and northern zones of Nigeria there is particular dearth on empirical works relating to the south-south and or energy thus a lacuna exists in the literature.

It is important to note that the south-south geopolitical zone which has sustained the Nigerian economy since the discovery of oil crude in 1956, up to this moment still have majority of its inhabitants suffering from energy poverty. They depend mostly on firewood and sawdust and other biomass fuels as their major source of cooking fuel. Most of them still use open lantern and candle sticks for lighten thereby not only exposing the environment to further degradation in addition to that caused by the activities of oil multinationals, but also the individuals to health hazards due to indoor and or noise pollution.

It is also clear from the foregoing that not everybody will suffer energy deprivation at the same degree thus making it imperative to have an understanding of the specific degree of deprivation a household in a particular state would likely suffer relative to other degrees of deprivation compared to other states, which state is more seriously hit by the phenomenon, and what percentage of the people are more deprived. This will facilitate policy formulation and ease the problem often associated with properly targeting the poor for possible intervention(s).

It is in light of the foregoing that this paper analyzes multidimensional energy poverty and empirically examined its determinants in the South-South Geopolitical Zone of Nigeria.

2. Literature Review

There has been a replete of empirical works on poverty in the literature but specific efforts on studying multidimensional poverty in general and multidimensional energy poverty in particular is scanty. For example, Akerele and Adewuyi(2011) were concerned with the incidence, depth and severity of poverty in Ekiti state of Nigeria, Onu and Abayomi (2009) concentrated on poverty among households living in Yola metropolis of Adamawa state of Nigeria, Obayelu and Awoyemi (2010) focused on poverty profile across geopolitical zones in rural Nigeria. Ogwumike and Akinnibosun (2013) were concerned with the determinants of poverty among farming households in Nigeria. Adeyonu, Oni, Okoruwa and Omonona (2012) studied poverty level among farmers in rural areas of Oyo State of Nigeria. Onyemauwa, et al, (2013) were concerned with the effect of household poverty level on child labour participation among households in Isoko North Local Government Area of Delta State of Nigeria. The study of Fabiyi, et al, (2008) focused on the incidence and severity of poverty among small-scale farmers in five local government areas of Ogbomoso ADP Zone, Oyo State of Nigeria. Aigbokhan (2000) concentrated on the inequality and poverty profile in Nigeria during the period 1985-1997, Babatunde, Olorunsanya and Adejola (2008) looked at the determinants of farm household poverty in south-western Nigeria. Olawuyi and Adetunji (2013) focused on the incidence, severity and the determinants of household poverty in Ogbomoso Agricultural Zone of Oyo State, Nigeria.

Nussbaumer, et al, (2011) developed the multidimensional energy poverty index (MEPI) and estimated energy poverty for African countries reporting the Headcount and Intensity ratios for the various countries. Results amongst others showed that 81% of Nigerians are energy poor and are deprived of 75% of the indicators. Ogwumike and Uzughalu (2012) adopted this methodology and showed that 75.5% of Nigerians are energy poor but did not report the intensity ratio.

From the foregoing it is clear that empirical works on energy poverty is scarce. Almost all the works reviewed focused on incidence gap and severity of poverty using the FGT model only Nussbaumer, et al, (2011) and Ogwumike&Uzughalu (2012) looked at multidimensional energy poverty but their studies were at Continental and National levels. It is a known fact that studies at national levels often mask the peculiarities to subunits. Thus this paper would contribute to knowledge and fill the existing gap in the literature by paying particular attention to multidimensional energy poverty and focusing on the south-south geopolitical zone of Nigeria while comparing the MEPIs amongst the individual states that constitutes the zone.

3. Methodology

3.1 Study Area

The south-south geopolitical zone of Nigeria located at latitude 4^0N longitude 6^0E is made up of Akwa-Ibom, Bayelsa, Cross-river, Delta, Edo and Rivers states. It covers an area of 84,587km^2. It has a coastline spread over 540km and was described by the World Bank in 1995, as the World's largest Wetland and "Africa's largest delta." The area is bordered to the South by the Atlantic Ocean and to the East by Cameroun. The inhabitants of the zone include the Izons, Urhobo, Isoko, Ikwere, Ika, Ukwuani, Abua, Itsekiri, Ogoni, Efik, Ibibio, and Bini (Ibaba, 2005; Etekpe, 2007). The region has diverse vegetation belts from the largest rain forest in Nigeria to mangrove swamps, savannahs, mountains and waterfalls with rare animals, including endangered species and

unusual plant families, making it one of the world's richest biodiversity centres attracting scientists and tourists alike. Little wander until the environmental degradation and disturbance of the ecosystem through oil exploration and exploitation activities, fishing has been a major economic activity in the area. Agriculture is important; yams, cassava, plantains, oil palms and bananas are the main crops grown. The inhabitants also participate in palm oil milling, lumbering, palm wine tapping, local gin making, trading, carving and weaving.
The most important mineral in the area is petroleum. Other minerals include natural gas, clay and industrial sand. Oloibiri where crude oil was first found in commercial quantity in Nigeria is located in Bayelsa one of the states in the geopolitical zone.

3.2 Data
This study used secondary data that were collected during the National Living Standard Survey (NLSS) of households carried out between 2009 and 2010. That is the latest national data collected by the Federal Republic of Nigeria on different aspects of households' activities. The sample design adopted a multi-stage stratified sampling. At the first stage, from each State and the Federal Capital Territory (FCT, Abuja) clusters 120 housing units called Enumeration Area (EA) were selected at random. In the second stage 10 housing units from the selected EAs were randomly selected. A total of 600 households were randomly chosen in each of the States and 300 from the FCT, summing up to 21,900 households in all (NBS, 2010). However, some households did not fully complete the questionnaires. Therefore, data were available only for 19,158 households. In Akwa-Ibom, Bayelsa, Cross-river, Delta, Edo and Rivers states data were available for 510, 524, 501, 416, 556 and 381 households respectively bringing the number to 2,888. Households' characteristics were appropriately weighted for cross-sectional differences. It was the weighted data for these six states which constitute the south-south geopolitical zone of Nigeria that was adopted for this study.

3.3 Model Specification
3.3.1 Multidimensional Energy Poverty Index (MEPI)
Following the work of Nussbaumer, et al, (2011) we constructed a Multidimensional Energy Poverty Index(MEPI) using three major indicators of energy deprivation. These indicators include access to modern cooking fuel, indoor pollution and access to main electricity and or electricity from generator.
Light: A household is deprived of light if its source of light is not main electricity/generator set and it is assigned 1 and 0 if otherwise which is the deprivation index.The deprivation index is then weighted by 0.2
Modern cooking fuel: A household is deprived of modern cooking fuel if its main cooking fuel is not electricity, cooking gas/oil or kerosene and it is assigned the value of 1 and 0 otherwise.The deprivation index is then weighted by 0.4.
Indoor pollution: a household is deprived if it cookson stove or open fire (no hood/chimney) oris using any fuel besides electricity and/or gas and the household is assigned the value 1 and 0 otherwise. The deprivation index is then weighted by 0.4.
After computing the deprivation indexes for all households, the energy poverty score for each household, c_i is then computed as the sum of household weighted deprivation.
The Multidimensional Energy Poverty line, z of 1/2(= 0.5) is adopted. A household is energy poor if it is deprived of more than 50% of the indicators. Therefore a household whose sum of weighted deprivation is greater than or equal to 0.50 is classified as energy poor and households whose sum of weighted deprivation is less than 0.50 is energy non-poor.
We then computed the multidimensional poverty index (MEPI) as follow:
Energy Poverty Headcount:

$$H = 1/N \sum_{i=1}^{q} hsize_i \quad . \quad . \quad . \qquad (1)$$

Energy Poverty intensity:

$$A = \sum_{i=1}^{q} (c_i * hsize_i) / \sum_{i=1}^{q} hsize_i \quad . \quad . \quad . \qquad (2)$$

Multidimensional Energy Poverty Index

$$MEPI = H * A \quad . \quad . \quad . \qquad (3)$$

Where: H is the Headcount of Energy poverty, i(1,2,…,q)is the ith poor household to the qth (last) poor household, $hsize_i$ is the household size of the ith poor household, N is the population size (sum of all household sizes), A is Energy poverty intensity, c_i is the sum of the ith household weighted deprivation (poverty score) and MEPI is the multidimensional poverty index.

3.3.2 Determinants of Multidimensional Energy Poverty

A multinomial logistic (mlogit) regression model was employed to estimate the relative risk a household facescompared to a referenceoutcome (indicator) if its weighted deprivation is greater than the constructed poverty line given her socioeconomic characteristics. The mlogit model involves estimating a set of coefficients, β_k^jcorresponding to each outcome (indicator):

$$\Pr(Y_i = j) = \frac{e^{X_i\beta_k^j}}{\sum_{k=0}^{3} e^{X_i\beta_k^j}}, j = 1, 2, 3 \quad . \quad . \quad . \quad (4)$$

Where:

Y_i=1 if household is energy non poor (sum of weighted deprivation < 0.5)

Y_i=2 if the household suffers moderate energy poverty (0.5 ≤sum of weighted deprivation< 0.8)

Y_i=3 if the household suffers acute energy poverty (sum of weighted deprivation ≥ 0.8)

The model, in equation (4) is unidentified since there is more than one possible solution to β_k^j that leads to the same probabilities for y = j. Therefore to identify the model, equation (4) is normalized by setting one of β_k^j to 0. That is arbitrarily set for instance β_k^1 = 0, the remaining coefficients β_k^2toβ_k^3then measure the change relative to the Y_i = 1outcome. The outcome whose β_k^j is normalized to 0 is the reference category. The coefficients will differ if a different outcome is chosen as a reference categorybecause they would be interpreted differently, but the predicted probabilities for Y_i = 1, 2, 3 will still be the same. Thus any parameterization will be a solution to the same underlying model.

Setting β_k^1 = 0, the equation becomes:

$$\Pr(Y_i = j) = \frac{e^{x_i\beta_k^j}}{1 + \sum_{j=2}^{3} e^{X_i\beta_k^j}}, j = 1, 2, 3 \quad . \quad . \quad . \quad (5)$$

$$\Pr(Y_i = 0) = \frac{1}{1 + \sum_{j=2}^{3} e^{X_i\beta_k^j}}, j = 1, 2, 3 \quad . \quad . \quad . \quad (6)$$

The relative probability of a household being at risk of degree j compare to the reference risk is then measured as

$$Pr\left[\frac{Y_i = j}{Y_i = 0}\right] = e^{X_i\beta_k^j}, j = 1, 2, 3 \quad . \quad . \quad . \quad (7)$$

Since X and β are vectors (X_i=X_1,X_2, …X_k) and (β = $\beta_1^{(j)}$, $\beta_2^{(j)}$, . . ., $\beta_k^{(j)}$) respectively, the ratio of a relative risk with respect to a unit change in X_i is

$$\frac{e^{\beta_1^j x_1 + \cdots + \beta_i^j (x_i + 1) + \cdots + \beta_k^j x_k}}{e^{\beta_1^j x_1 + \cdots + \beta_i^j x_i + \cdots + \beta_k^j x_k}} = e^{\beta_i^j} \quad . \quad . \quad . \quad (8)$$

Thus taking the exponent of a coefficient gives the relative-risk ratio for a one-unit change in the corresponding variable (risk is measured as the probability of a household being deprived of degree j relative to a reference degree of deprivation) (see Greene, 2008; Hosmer Jr. and Lemeshow, 2000; Long, 1997; Long and Freese, 2006 and Treiman, 2009).

4. Results and Discussion

Table 1 showed multidimensional energy poverty in the south-south geopolitical zone of Nigeria. The zonal multidimensional energy poverty headcount ratio (H) showed that 83.2% of people dwelling in the zone are energy poor. Also, that 92.1%, 96.7%, 91.9%, 76.8% 60.1% and 83.1% of the inhabitants in Akwa-Ibom, Bayelsa, Cross-rivers, Delta, Edo and Rivers States are energy poor respectively.These results mean that the zone suffers acute energy poverty (that is, people in the zone are deprived at least of all of the indicators of a single dimension or a combination across dimensions). Also, while Akwa-Ibom, Bayelsa, Cross-rivers and Rivers states suffered acute energy poverty respectively only Delta and Edo states were moderately energy poor on headcount ratio basis. The zonal intensity ratio (A) of 0.903 indicates that people of this zone are deprived of 90.3% of the weighted indicators. Looking at the state level, the results showed that the intensity ratio for Akwa-Ibom, Bayelsa, Cross-rivers, Delta, Edo and Rivers States were 0.95, 0.851, 0.953, and 0.882 respectively, indicating that multidimensional energy poverty was more intense in Cross-rivers state where the poor are deprived of 95.3% of all the weighted indicators followed by Akwa-Ibom (95%), Rivers (90.2%), Delta (88.2%), Edo (86.8) and Bayelsa (85.1%). This is quite revealing in that although Bayelsa state had greater proportion of people living in energy poverty their degree of deprivation is the least in the zone, while Rivers which had one of the lowest headcount ratios had one of the highest intensity ratio. The intensity ratios also imply that energy poverty in the zone is both acute and pervasive. The MEPI or adjusted headcount ratio showed that at the zonal level on the average, the poor people in the zone are deprived of 75.1% of the indicators showing moderate energy poverty. Whereas poor people in Akwa-Ibom, Bayelsa and Cross-rivers states suffered acute energy deprivation as indicated by their respective MEPI of 87.5%,82.3% and 86.7%, energy poor people in Delta, Edo and Rivers states suffered moderate deprivation of 67.7%, 52.3% and 75% respectively. On table 2 it was observed that 16.72% of people in the zone were non energy poor, 71.05% and 12.22% suffered acute and moderate energy poverty respectively. Furthermore, greater proportion of people in Akwa-Ibom and Cross rivers state suffered acute energy poverty (86.08% and 86.83% respectively) compared to Bayelsa, Delta, Edo and Rivers States which recorded 63.17%, 70.19%, 55.22% and 65.09% acute energy poverty incidence respectively. This perhaps explains why the natural environment in the zone is endangered. These have serious implications for sustainable development and policy formulation.

Table 1: MEPI in the South-South Geopolitical Zone of Nigeria

State	Headcount ratio (H)	Intensity ratio (A)	MEPI = (H*A)	Degree of Energy Poverty
Zonal	0.832	0.903	0.751	Moderate
Akwa-Ibom	0.921	0.950	0.875	Acute
Bayelsa	0.967	0.851	0.823	Acute
Cross-river	0.919	0.953	0.876	Acute
Delta	0.768	0.882	0.677	Moderate
Edo	0.601	0.868	0.523	Moderate
Rivers	0.831	0.902	0.750	Moderate

Source: Author's Computation

Table 2: Energy Poverty Classification by Intensity

State	Acute (%)	Moderate (%)	Non Energy Poor (%)
Zonal	71.05	12.22	16.72
Akwa-Ibom	86.08	5.49	8.43
Bayelsa	63.17	33.02	3.82
Cross-river	86.83	4.79	8.38
Delta	70.19	7.69	22.15
Edo	55.22	5.76	39.03
Rivers	65.09	17.00	18.11

Source: Author's Computation

On the determinants of multidimensional energy poverty the study estimated a multinomial logistic regression with the base outcome "non-poor" the other outcomes were moderately poor and acutely poor. Results of the relative-risk ratios are presented on table 3. The results showed that Bayelsa state, Cross-rivers and Rivers states are more likely to be moderately energy poor relative to being non-energy poor than Akwa-Ibom state while Delta and Edo states are less likely to be moderately energy poor relative to being non-poor compared to Akwa-Ibom state. However, only the coefficients on Bayelsa and Edo states were statistically significant at 5% level while Delta and Rivers states only became significant at 10% level. Also, Rural dwellers are more likely to be moderately energy poor relative to being non-poor compared to their urban counterparts and female headed households are also more likely to be energy moderately poor than being non-poor compared to male headed households. However only the Rural coefficient was statistically significant. All the coefficients on marital status were statistically not significant. On occupation group the results showed that households headed by people in all endeavours (Professional, Administration, Clerical, Sales & related, Services & related, Agric& forestry, Productn & Trans, Mfg& Processing and Others) are more likely to be moderately energy poor relative to being non-poor compared to households headed by students and retirees respectively. But only Clerical, sales and related and production and transportation were statistically significant, Agriculture and forestry only became significant at 10% level. On education group whereas households headed by people who have attained Primary and Secondary education as their highest level of education are more likely to be moderately energy poor compared to those who had no form of education, those headed by people with tertiary education are less likely to be moderately energy poor and only the coefficient on Tertiary education was statistically significant. Although households headed by older people, having higher per capita expenditure and larger share of food expenditure as percentage of total expenditure are more likely to be moderately poor and households with more people within the age bracket of 15 and 60 years old, marrying late and with higher dollar per day food expenditure are less likely to be moderately energy poor none of these coefficients was statistically significant. Furthermore, Delta, Edo and Rivers states are less likely to be acutely energy poor compared to Akwa-Ibom state and the coefficients were all significant at the 1% level. Also, though Bayelsa and Cross-rivers states seem more likely to be acutely energy poor the coefficients on them were statistically not significant. Rural households are more likely to be energy acutely poor compared to their urban counterparts and female headed households are less likely to be energy poor compared to their male counterparts. The results also revealed that being professional, Clerical officer, sales & related endeavour, services & related jobs, Agriculture and forestry, Production and transport and manufacturing & processing and other fields are more likely to suffer acute energy poverty than retirees and students however only the coefficients on Professional, Clerical, Sales & related, Services & related, Agric& forestry and Productn& Trans were statistically significant. These results implies that energy poverty in the south-south geopolitical zone of Nigeria has spatial, Sector and occupational dimensions.

Table 3: Determinants of MEP

Energy Poverty	Relative risk ratio	Standard error	z-statistic	p-value
Non Poor	Base outcome			
Moderately poor				
Bayelsa State	13.312	4.998	6.89	0.000***
Cross-rivers state	1.081	0.420	0.20	0.842
Delta State	0.552	0.194	-1.69	0.091*
Edo State	0.316	0.107	-3.40	0.001***
Rivers State	1.921	0.643	1.95	0.051*
Rural	7.125	1.429	9.79	0.000***
Female	1.106	0.394	0.28	0.778
Polygamous (mon)	0.947	0.253	-0.20	0.840
Informal union	0.000002	0.001	-0.03	0.974
Divorced	2.738	1.748	1.58	0.115
Separated	0.910	0.434	-0.20	0.843
Widowed	0.791	0.326	-0.57	0.569
Professional	2.662	1.635	1.59	0.111
Administration	5.251	9.935	0.88	0.381
Clerical	5.166	3.196	2.65	0.008***
Sales & related	3.495	1.993	2.19	0.028**
Services & related	2.212	1.552	1.13	0.258
Agric& forestry	2.315	1.176	1.65	0.098*
Productn& Trans	5.287	3.850	2.29	0.022**
Mfg& Processing	2.081	1.711	0.89	0.373
Others	2.461	1.708	1.30	0.194
Elementary	0.877	0.742	-0.16	0.877
Primary	1.139	0.537	0.28	0.783
Secondary	1.238	0.272	0.97	0.330
Tertiary	0.343	0.163	-2.26	0.024**
Others	1.039	0.331	0.12	0.905
Household size	0.959	0.035	-1.13	0.259
Ageyrs	1.023	0.020	1.12	0.265

Age1560	0.792	0.153	-1.21	0.228
Age at first birth	0.999	0.159	-0.07	0.948
Per capita expendi	1.000	0.000002	0.47	0.639
Fdexpshare	1.230	0.554	0.46	0.647
Dpdpr	0.840	0.166	-0.88	0.377

Table 3: Cont'd

Energy Poverty	Relative risk ratio	Standard error	z-statistic	p-value
Non Poor	(Base outcome)			
Acutely Poor				
Bayelsa State	1.486	0.477	1.23	0.217
Cross-rivers state	1.195	0.329	0.65	0.518
Delta State	0.316	0.076	-4.77	0.000***
Edo State	0.200	0.0447	-7.22	0.000***
Rivers State	0.472	0.120	-2.95	0.003***
Rural	17.966	2.542	20.41	0.000***
Female	0.883	0.248	-0.44	0.658
Polygamous (mon)	0.978	0.204	-0.11	0.913
Informal union	0.417	0.771	-0.47	0.636
Divorced	1.354	0.229	0.53	0.594
Separated	0.600	0.439	-1.34	0.181
Widowed	1.376	0.028	1.00	0.318
Professional	2.331	0.996	1.98	0.048**
Administration	1.695	2.812	0.32	0.750
Clerical	3.308	1.505	2.63	0.009***
Sales & related	3.131	1.255	2.85	0.004***
Services & related	3.149	1.587	2.28	0.023***
Agric& forestry	2.228	0.762	2.34	0.019***
Productn& Trans	4.422	2.465	2.67	0.008***
Mfg& Processing	1.228	0.755	0.32	0.747
Others	2.193	1.081	1.59	0.111
Elementary	0.561	0.383	-0.85	0.397
Primary	1.541	0.558	1.19	0.232
Secondary	1.092	0.192	0.50	0.614
Tertiary	0.734	0.229	-0.99	0.321
Others	0.870	0.218	-0.56	0.577
Household size	0.985	0.028	-0.53	0.598
Ageyrs	1.012	0.015	0.79	0.428
Age1560	0.882	0.131	-0.85	0.397
Age at first birth	1.008	0.013	0.66	0.507
Per capita expendi	1.000	0.000002	0.36	0.715
Fdexpshare	0.994	0.348	-0.02	0.987
Dpdpr	0.895	0.141	-0.70	0.481
No of obs	2625			
LR Chi2 (66)	1027.61			
Pro > Chi2	0.0000			

Source: Authors' computation

5. Conclusion and Recommendations

This study concludes that if appropriate majors are not put in place to tame the menace of energy poverty the zone will not only continuously mortgage the prospects of future generation being able to meet their needs but also endanger the lives of the present generation. This is because the people will naturally resort to the use crude of biomass fuel which would eventually lead to deforestation, exposure to unclean indoor air and other environmental and health hazards that may result from noise generated from power generating sets and green house gases. The paper therefore recommend based on her findings that efforts to curb energy poverty should target rural dwellers, households in Bayelsa, Akwa-Ibom, and Cross-rivers states after which these could then be extended to Rivers, Delta and Edo states in that order. Furthermore, energy poverty reduction efforts should included education/enlightenment programmes at the work place, schools, rural areas, and in all the states in the zone.

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