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An Analysis of the National and Zonal Levels of Multidimensional Energy Poverty in Nigeria

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Abstract

This study used data from the 2018–19 National Living Standard Survey to analyse multidimensional energy poverty at the national and zonal levels in Nigeria. The approach from Nussbaumer et al. (2011) was used in the study. Results at the national level indicated that 95% of Nigerians were energy poor, missing 74% of the weighted indicators, and having a 70% MEPI. With the exception of the south-west, where it is mild, all zones were determined to have severe energy poverty. Additionally, the North-West contributed the most to energy poverty, while the South-west had the lowest proportion. Regarding industry, sex, and profession, the South-South is most severely affected. It was determined that there is severe and widespread energy poverty in Nigeria. Therefore, it was suggested that state and local governments start working on rural electrification projects and link cities to the national grid. Cooking gas and other readily available clean energy sources must be made inexpensively and accessible in rural regions.

Keywords: *Multidimensional Energy Poverty Index, Poverty, Nigeria*

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Background to the Study

The absence of access to modern, sustainable energy services and goods is known as energy poverty. It is characterised as an environment in which there is insufficient option for obtaining sufficient, dependable, reasonably priced, safe, and ecologically acceptable energy services. It is difficult to overstate how crucial it is for any nation's development process to have inexpensive access to modern energy services and goods. It improves livelihood prospects for everyone by fostering an atmosphere that is conducive to the growth of small and medium-sized enterprises as well as the effective and efficient use of contemporary healthcare services. Clean and efficient energy resources are required to have a beneficial impact on the lives of the impoverished. It eliminates the need to spend time gathering fuel for cooking. Cooking energy sources that are clean, like gas, electricity, etc., indicate rising living standards. Poverty in developing nations is characterised by a significant reliance on traditional fossil fuels and biomass fuel, as well as a shortage of power, according to the UN. Because it impedes industrial activity and the employment it creates, a lack of electricity both exacerbates and maintains poverty (IEA and United Nations, 2010).

In situations when efficient energy technology and sufficient energy supplies are unavailable, the impoverished frequently rely on biomass energy, animal power, and their own labour to maintain subsistence levels of existence. As a result, they are probably going to deplete environmental capital and cause unsustainable development and environmental damage. Energy resources must be developed in order to lower poverty, raise living standards, and better meet people's fundamental requirements. Clean energy is necessary for improved healthcare facilities and services, as well as for high-quality education and information access. Achieving fair, robust, and sustainable development can also be facilitated by the accessibility and cost of renewable energy supplies.

Three main deprivations are considered when measuring energy poverty: (i) lack of access to power; (ii) lack of contemporary cooking fuel; and (iii) lack of clean indoor (fresh) air. This is based on the idea that having access to electricity allows people to benefit from things like information and communication technology, freezers, and electric irons in addition to providing light.

Despite the obvious significance of energy, there aren't many research on energy poverty in Nigeria in the literature. For cooking fuel, the majority of Nigerians mostly rely on firewood, sawdust, animal dung, and other unprocessed biomass fuels. The majority of them continue to light with an open lantern and candlesticks, putting people's health at risk from interior pollution and adding to the already existing environmental damage brought on by the operations of oil multinational corporations. In addition to adding to air pollution, the enormous number of individuals using generator sets raises the risk of hearing impairment from noise pollution.

Not everyone experiences energy deprivation to the same extent, so it's important to understand the precise levels of deprivation households experience across the nation, by

sector (urban and rural), by gender (male and female), by occupational group, and by factors that contribute to energy poverty in Nigeria. This will make it easier to formulate policies and solve issues that arise from accurately identifying the impoverished for potential interventions. This background informed the analysis of multidimensional energy poverty in Nigeria in this research.

Literature Review

The literature has a plethora of empirical studies on energy poverty. Jibrin, et al, (2022) conducted an analysis of "multidimensional poverty in Nigeria using statistical and geospatial modelling: A case study of Jigawa state". Their research aimed to determine the geographical distribution pattern of poverty in Jigawa State as a case study and to provide a geospatial analysis of Nigeria's multidimensional poverty. Consequently, understand the reasons behind Jigawa's complex poverty situation and make the state's first-ever poverty map. Furthermore, to examine the patterns of poverty in the nation, focusing on Jigawa in particular. The results showed a changing trend in state poverty in Nigeria between 1996 and 2019. Using Jigawa state as a case study, the distribution of poverty showed that the state's high prevalence of poverty is mostly due to its natural resources. Natural drainage, fertile soil, flat topography, and vegetation pattern all aid other people's poverty levels in different parts of the state.

The magnitude of multidimensional poverty in Nigeria was conceptually investigated by Akinyetun et al. (2021), with a focus on Oto/Ijanikin, a semiurban suburb of Lagos State. They used secondary data on the occurrence of multidimensional poverty in Nigeria, as well as primary data collected from the research region. concentrating on metrics like housing, clean water, healthcare, power, and education. They discovered that Nigeria has multifaceted poverty with several indices pertaining to healthcare, education, and living conditions, in addition to income. The study comes to the conclusion that multidimensional poverty is a real problem in Nigeria.

Alemu (2019) measured the degree of poverty in Nigeria and how it differed among states and zones using a multifaceted methodology. It looks at how wellbeing factors affect average poverty and provides a tool to help with different project planning phases. The research reveals the following: Nigeria has a high rate of poverty—52 percent on average—whether it is measured by income or by a mix of factors other than income. The pattern of growth and the absence of spending measures that benefit the poor may help to explain this. The majority of Nigeria's poverty is concentrated in three geopolitical zones in the north: North East, North West, and North Central.

Pasternak (2000) discovered a significant correlation between indicators of human well-being and energy and power use. In nations with high levels of electricity use, the ratio of primary energy consumption to electric energy consumption was found to be about constant. In the Human Development Scenario, the worldwide primary energy consumption was estimated using this ratio. For 60 populous nations that account for 90% of the world's population, they found a positive association between the yearly per capita

electricity consumption and the Human Development Index (HDI). Additional findings indicated that the HDI peaked at around 4,000 KWH of power consumed annually per person. According to Clancy et al. (2003), 2.8 million families in England or 13% of all households were considered to be living in fuel poverty in 2007. Additionally, they demonstrated that fuel poverty in the UK was not of the same magnitude or type as it was in sub-Saharan Africa.

In order to address the demands of electrifying the impoverished, Stephen et al. (2004) investigated Kenya's potential for renewable energy sources both now and in the future. Due to financial and technological constraints, they restricted the investigation to solar and hydro technologies. They concluded that Kenya's current Rural Electrification Fund (REF) fulfils the promise of solar and hydropower for electrifying the impoverished. The findings indicated that Kenya's yearly revenue from rural power connections increased by 42% in response to a 10% increase in the Rural Electrification Fund (REF). They also demonstrated the favourable correlation that exists between poverty and energy availability and consumption.

In 2004, Pachauri and colleagues introduced various methods for quantifying energy poverty by using household-level data from India. They came to the conclusion that having access to and using clean, efficient energy sources improves well-being because they discovered a positive correlation between well-being and their utilisation. Elahee (2004) discovered that reducing poverty requires having access to electricity. Growth and energy availability are closely correlated. Energy access was predicted to become a serious issue in developing countries in the near future, mostly due to shocks from rapid population expansion and rising fuel prices.

Tennakoon (2009) examined Sri Lanka's situation with regard to energy poverty. To measure energy poverty, two methods were used: the pricing approach and the quantitative technique. Sri Lanka is experiencing a high degree of energy poverty, according to pricing method results (83% energy poverty), while quantitative approach results showed that cooking energy poverty is particularly high because of cooking stove inefficiencies. India's urban and rural energy poverty was examined by Shahidur et al. (2010). According to the estimations, 22% of families in India's urban regions and 28% of homes in its rural parts had low incomes and low energy usage, respectively. People who were poor in energy were also poor in income.

Marcio et al. (2010) used the Sen Index, the Gini coefficient, the Lorenz Curve, and the Poverty Gap to examine how energy poverty affects inequality in the Brazilian economy. It was determined that increased rural electrification improves energy equality. Jain (2010) investigated the energy-related issues that Indian rural and urban households were facing. According to the findings, there was around 89% energy poverty in India's rural areas and 24% in its cities. Additionally, it demonstrates that 56% of Indian households have access to electrical outlets. The cost of electricity alone accounts for over 12% of the income of the poor. All facets of human wellbeing, including the development of jobs,

access to water, education, healthcare, and productivity in agriculture, are negatively impacted by energy poverty. People who are energy poor lack access to power and clean water, and they must spend a significant amount of time and money on fuel. Mirza and Szirmai (2010) used data from the 2008–2009 Energy Poverty Survey (EPS) to examine the features and effects of utilising various energy services. It was shown that 96.6% of homes in rural areas experience an energy deficit. In Pakistan's Punjab province, severe energy poverty affects 91.7% of rural families out of all rural residents.

Sher et al. used PSLM data in 2014 to use Alkire and Foster's (2007) technique to quantify Multidimensional Energy Poverty (MEP) at the province level in Pakistan. The findings revealed that the MEP Headcounts of the households in the provinces of Punjab, Sindh, Khyber Pakhtoon Khaw (KPK), and Baluchistan were 47%, 51%, 69%, and 66%, respectively. The primary cause of MEP Headcount in each of Pakistan's four provinces was found to be indoor pollution, with cooking fuel standing in second. The multidimensional energy poverty index (MEPI) was created by Nussbaumer et al. (2011), who also calculated energy poverty for African nations by providing headcount and intensity ratios for the various nations. According to their findings, 81% of Nigerians lack access to 75% of the indicators and are energy poor. Using this technique, Ogwumike and Ozughalu (2012) demonstrated that 75.5% of Nigerians live in energy poverty; however, they did not provide the intensity ratio.

In their research, Edoumiekumo et al. (2013) looked at multidimensional energy poverty in Nigeria's South-South geopolitical zone and found that the multidimensional energy poverty index (MEPI) was 0.751, the zonal head count ratio was 0.832, and the intensity ratio was 0.903. Additionally, they demonstrated that, according to MEPI, three of the six states in the zone had severe energy poverty, while the remaining three experienced mild energy poverty. All six states experienced extreme deprivation, with Bayelsa State experiencing the least amount at 0.851. Using data from the 2009–2010 National Living Standard Survey, Edoumiekumo and Karimo (2014) investigated multidimensional energy poverty in Bayelsa State, Nigeria, and its implications for sustainable development. They found that 82% of the indicators were not available to 96% of the state's population. The worst affected were rural residents, of whom 82% were lacking in 82% of the parameters and 98% were energy poor. They also demonstrated how severe and widespread energy poverty is, affecting every area of the state.

It is evident from the above that there are few empirical studies on energy poverty in general and multidimensional energy poverty in particular. While Ogwumike and Ozughalu (2012) concentrated on the household head without accounting for household size, Edoumiekumo et al. (2013) and Edoumiekumo and Karimo (2014), who weighted for household sizes, were concerned with a particular zone and state, respectively, Nussbaumer et al. (2011) concentrated on the continental level. By focusing on the National and Zonal level indices and giving special emphasis to Nigeria's multifaceted energy poverty, this research will advance knowledge and close a gap in the literature.

Methodology

Nature and Source of Data

Secondary data from the National Living Standard Survey (NLSS) of households conducted in 2018 and 2019 were utilised in this study. That is the most recent national data on various elements of household activities that the Federal Republic of Nigeria has gathered. A multi-stage stratified sampling strategy was used in the sample design. In the first phase, 120 housing units known as Enumeration Areas (EAs) were chosen at random from each State and the Federal Capital Territory (FCT, Abuja). Ten dwelling units were chosen at random from the designated EAs for the second stage. A total of 21,900 households—600 from each of the States and 300 from the Federal Capital Territory were selected at random (NBS, 2010). However, several homes did not finish the questionnaires, therefore only 19,158 households' data were accessible. The characteristics of the households were suitably weighted to account for cross-sectional variations. This study used weighted data for it.

Model Specification

Using three primary measures of energy deprivation, this study created a Multidimensional Energy Poverty Index (MEPI), taking a cue from Nussbaumer et al.'s (2011) work, which was mentioned by Apere and Karimo (2014). These indications include having access to contemporary cooking fuel, main power or a generator, and fresh air (within a residence free of pollution).

a. **Light:** The light source in a household is given a value of 1, or 0 if it comes from a generator or other secondary electrical source. Next, a weight of 0.3 is assigned to the deprivation index.
b. **Modern cooking fuel**: If a family does not use electricity, cooking gas or oil, or kerosene as their primary cooking fuel, they will obtain a value of 1 or 0. It is said to contain contemporary cooking fuel in the other scenario. The weight of the deprivation index is therefore increased by 0.4.
c. **Clean indoor air**: a home receives a value of 1 and 0 if it uses any fuel other than electricity and/or gas, cooks over an open fire without a hood or chimney or uses any other type of fuel. Then a weight of 0.3 is applied to the deprivation index.

The energy poverty score for each household is then calculated as the total of the household weighted deprivation, after the computation of the deprivation indexes for each household. It is decided to use the multidimensional energy poverty line, z of 1/2(= 0.5). If a household lacks more than half of the signs, it is considered energy poor. Therefore, a household whose sum of weighted deprivation is greater than or equal to 0.5 is classified as energy poor and households whose sum of weighted deprivation is less than 0.5 are energy non-poor.

We then computed the multidimensional poverty index (MEPI) as follows: Energy Poverty Headcount:

$$H = {}^{1}/_{N} \sum_{i=1}^{m} hldsize_i \dots\dots\dots\dots\dots 1$$

The poverty intensity ratio is given by:

$$A = \sum_{i=1}^{m} (c_i * hldsize_i) / \sum_{i=1}^{m} hldsize_i \ldots\ldots\ldots\ldots\ldots 2$$

Multidimensional Energy Poverty Index (MDPI) is given by:

$$MEPI = H * A \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 3$$

Where: H is the Headcount of Energy poverty, i(1,2,…,q) is the ith poor household to the qth (last) poor household, $hldsize_i$ 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.

Results and Discussions

Table 1: MEPI in Nigeria and Contribution by Sector, Gender and Occupational Group

Sector	Headcount ratio(H)	Intensity ratio(A)	MEPI = (H*A)	Degree of Energy Poverty	Contribution to MEPH (%)
National	**0.97**	**0.75**	**0.73**	**Acute**	**100**
Sector					
Urban	0.97	0.75	0.73	Acute	77.82
Rural	0.91	0.78	0.71	Acute	22.18
Gender					
Male	0.93	0.76	0.71	Acute	89.14
Female	0.97	0.75	0.73	Acute	10.86
Occupation					
Agriculture	0.90	0.79	0.71	Acute	69.89
Others	0.98	0.78	0.76	Acute	30.11

Note: MEPH is Multidimensional Energy Poverty Headcount.
Source: Author's Computation

The distribution of multidimensional energy poverty in Nigeria by sector, gender, and occupation was displayed in Table 1. According to the national level data, 75% of Nigerians are devoid of 75 percent of the weighted indicators and 97% of them experience energy poverty. Energy poverty in Nigeria appears to be severe, as shown by the Multidimensional Energy Poverty Index (MEPI) adjusted head count ratio of 73%. Energy poverty is severe in both urban and rural homes, households led by men and women, the agricultural industry, and other occupational groupings, according to the distribution. Rural households' share of energy poverty was 22 percent, whereas urban families' share was 78 percent. In terms of multidimensional energy poverty headcount (MEPH), families headed by males made up 89% of the total, while households led by women made up 11%. Although families in the agricultural sector contributed more to energy poverty than those in other sectors, with the agricultural sector accounting for

70% of national MEPH, while those in other sectors only made up 30%, both suffered from severe energy poverty. This result deviates little from Apere and Karimo's study in 2014.

T**able 2:** MEPI in Nigeria and contribution by Geopolitical Zones of Nigeria

Geopolitical Zone	Headcount ratio (H)	Intensity ratio (A)	MEPI = (H*A)	Degree of Energy Poverty	Contribution to MEPH (%)
National	**0.97**	**0.75**	**0.73**	**Acute**	**100**
North-Central	0.92	0.71	0.65	Moderate	14.17
North-West	0.90	0.76	0.68	Moderate	16.34
North-East	0.93	0.84	0.78	Acute	20.07
South-East	0.96	0.73	0.70	Acute	18.13
South-West	0.94	0.72	0.68	Moderate	17.25
South-South	0.91	0.70	0.64	Moderate	14.04

Source: Author's Computation

The distribution of Multidimensional Energy Poverty by geopolitical zone, as shown in Table 2, indicated that while households in the South-South had the lowest share of energy poverty (14.04 percent), the North-East contributed the most (20.07 percent), followed by South-East (18.13 percent), South-West (17.25 percent), North-West (16.34 percent), and the North-Central (14.17 percent). This suggests that households in the Northern part of Nigeria contributed more to energy poverty than their counterparts in the Southern parts of the nation (14.17 percent).

Table 3: Percentage Distribution of respondents according to main Source of cooking fuel

Zone	Main Source of Cooking Fuel								Total
	Fire wood	Charcoal	Crop residue	Animal waste	Kerosene	Gas	Electricity	Others	
North Central	17.12	0.84	0.19	0.41	3.52	0.16	0.84	0.19	23.27
North-East	14	0.21	0.85	0.98	0.21	0.67	0.24	0.54	17.7
North-West	14.2	0.02	0.01	0.03	4.21	0.3	0.09	0.15	19.01
South-East	10.85	1.24	0.26	0.09	4.21	1.02	0.02	0.32	18.01
South-West	13	0.11	1.92	0.02	1.4	0.12	0.08	0.22	16.87
South-South	0.25	0.21	0.06	0.12	3.92	0.26	0.09	0.23	5.14
National	69.42	2.63	3.29	1.65	17.47	2.53	1.36	1.65	100

Table 3 presents the percentage distribution of Nigerians based on their primary source of cooking fuel. It showed that a greater proportion of the population lacks access to modern cooking fuel than does have it. 69.42 percent of the population used firewood, 2.63 percent used charcoal, 3.39 percent used crop residue, and 1.65 percent used animal waste, bringing the total percentage of the population lacking modern cooking fuel to

76.99 percent. Notably, only 1.36 percent of the national population uses electricity, 17.47 percent uses kerosene, 2.53 percent uses gas, and 1.64 uses other types of cooking fuel, which is a major wakeup call the Nigerian government. Apere and Karimo (2014) made a similar discovery.

Table 4: Percentage Distribution of respondents according to main source of lighting

Zone	Main Source of lighting								Total
	Kerosene	Gas	Main electricity	Generating set	Battery	Candle	Firewood	Others	
South-South	8.12	1.24	3.54	0.3	0.09	0.02	0.21	0.14	13.66
South-East	7.39	0.23	4.82	0.64	0.01	0.03	1.2	0.09	14.41
South-West	8.01	0.98	6.2	0.12	0.04	0.04	0.12	0.38	15.89
North-central	12.34	0.18	5.91	0.06	0.01	0.08	0.31	0.11	19
North-east	11.02	0.21	4.57	0.1	0.05	0.05	0.23	0.03	16.26
North-west	13.12	0.68	6.82	0.06	0.03	0.05	0.01	0.01	20.78
National	60	3.52	31.86	1.28	0.23	0.27	2.08	0.76	100

Source: Authors' computation from the National Bureau of Statistics, 2019 National Living Standard Survey Data

The percentage distribution of Nigerians by primary lighting source was displayed in Table 4. It showed that the number of persons without access to light is higher than the number of those who do. Kerosine was used by 60% of respondents, gas by 3.5 percent, main electricity by 31.86 percent, producing set by 1.28 percent, battery by 0.23 percent, candle by 0.27 percent, firewood by 2.08 percent, and other illumination sources by 0.76 percent. The findings of Apere and Karimo (2014) support this conclusion.

Table 5: MEPI in the six Geopolitical Zones of Nigeria and Contribution by Sector, Gender and Occupational group

Geopolitical Zone	Head count ratio (H)	Intensity ratio (A)	MEPI = (H*A)	Degree of Energy Poverty	Contribution to MEPH (%)
North-Central	**0.98**	**0.73**	**0.72**	**Acute**	**16.08**
Urban	0.92	0.84	0.77	Acute	76.73
Rural	0.96	0.72	0.69	Moderate	23.27
Male	0.96	0.8	0.77	Acute	97.2
Female	0.96	0.68	0.65	Moderate	2.8
Agriculture	0.92	0.79	0.73	Acute	79.95
Others	0.89	0.88	0.78	Acute	20.05
North-West	**0.96**	**0.75**	**0.72**	**Acute**	**26.28**
Urban	0.99	0.75	0.74	Acute	59.08
Rural	0.79	0.85	0.67	Moderate	40.92
Male	0.9	0.76	0.68	Moderate	82.41
Female	0.9	0.74	0.67	Moderate	17.59
Agriculture	0.78	0.72	0.56	Moderate	39.46
Others	0.91	0.82	0.75	Acute	60.56
North-East	**0.92**	**0.78**	**0.72**	**Acute**	**19.54**
Urban	0.94	0.74	0.70	Acute	76.7
Rural	0.98	0.68	0.67	Moderate	23.3
Male	0.92	0.71	0.65	Moderate	82.95
Female	0.96	0.75	0.72	Acute	17.05
Agriculture	0.92	0.74	0.68	Moderate	59.82
Others	0.89	0.77	0.69	Moderate	40.18
South-East	**0.97**	**0.75**	**0.73**	**Acute**	**13.29**
Urban	0.94	0.75	0.71	Acute	23.86
Rural	0.92	0.71	0.65	Moderate	76.14
Male	0.92	0.76	0.70	Acute	93.02
Female	0.94	0.71	0.67	Moderate	6.98
Agriculture	0.96	0.73	0.70	Acute	67.81
Others	0.93	0.74	0.69	Moderate	32.19
South-West	**0.95**	**0.72**	**0.68**	**Moderate**	**12.52**
Urban	0.95	0.72	0.68	Moderate	74.94
Rural	0.94	0.7	0.66	Moderate	25.06
Male	0.95	0.71	0.67	Moderate	98.95
Female	0.92	0.74	0.68	Moderate	1.05
Agriculture	0.93	0.74	0.69	Moderate	18.63
Others	0.96	0.72	0.69	Moderate	81.37
South-South	**0.9**	**0.82**	**0.74**	**Acute**	**12.29**
Urban	0.98	0.72	0.71	Acute	76.53
Rural	0.94	0.76	0.71	Moderate	23.47
Male	0.93	0.77	0.72	Acute	79.32
Female	0.96	0.73	0.70	Acute	20.68
Agriculture	0.96	0.76	0.73	Acute	70.35
Others	0.95	0.78	0.74	Acute	29.45

Source: Author's Computation

Energy poverty was severe not only in the North-Central region but also among urban residents, homes headed by men, households in the agricultural sector, and households

in other sectors, as indicated by the data in Table 5. With an MEPI of 0.77, 84% of urban homes were devoid of weighted indicators, 92% of which were energy impoverished. Male-headed families accounted for 96% of energy impoverished homes, agricultural households for 92%, and other sector households for 89%. Meanwhile, the percentage of disadvantaged households was 72%, 79%, and 88%. Additionally, their respective MEPIs were 77, 73, and 78 percent. Acute threshold of 0.70 MEPI was somewhat below households in the moderately energy deprived category. The North-Central zone contributed 16.08 percent of the nation's energy poverty, which is slightly less than the amount reported by Apere and Karimo (2014). The highest contributions came from male-headed households, urban households, and agricultural households, which accounted for 97.2, 76.73, and 79.95 percent of the total.

With severe energy poverty, the North-West accounted for 26.28 percent of the country's occurrence. In metropolitan regions and among households with a higher proportion of economic activity in other sectors, there was acute energy poverty. Once more, families in the agricultural sector had the lowest MEPI of 0.56, indicating that those experiencing moderate energy poverty were quite near to experiencing acute energy poverty. families led by men accounted for the largest share of energy poverty in the zone (82%), followed by families in occupations other than agriculture (61%), and households in urban areas (59%). Energy poverty was particularly severe in the Northeast's metropolitan areas and among households led by women. Although the zone's share of the country's energy poverty was 19.54 percent (a little higher than Apere and Karimo, 20214), male-headed households made up the majority of this share (83 percent), followed by those in urban settlements (77 percent) and households in the agricultural sector (59 percent).

In the South-East, however, households led by men, those in the agricultural sector, and urban households experience significant energy poverty. These categories also made greater contributions to the zone's energy poverty: homes headed by men made up the largest share, contributing 93% of the total, followed by houses in rural regions (76%), and households in the agricultural sector (68%). Energy poverty was moderate in the South-West, as reported by Apere and Karimo (2014), but it was higher in male-headed households (99%) than in female-headed households (81%) or in urban areas (75%). This was true regardless of the sectors, gender, or occupational groups. In comparison to other zones, there is less of a variation between the portions here. Energy poverty is severe and widespread in the South-South geopolitical zone, affecting all spheres of society, including gender and occupational categories. Male-headed households contributed more (79 percent), followed by those in urban areas (77 percent) and those in the agricultural sector (70 percent). All of these groups—urban dwellers, male- and female-headed households, households in the agricultural sector, and those in other sectors—suffered from acute energy poverty.

Conclusion and Recommendation

This study concludes, based on the evidence, that energy poverty affects all areas, sectors, genders, and professional categories in Nigeria and is both severe and pervasive. In

contrast to Ogwumike and Ozughalu's (2012) study, this one shows that 95% of Nigerians live in energy poverty and lack 74% of the weighted indicators, adjusted head count ratio, and MEPI of 70. The later research, which did not disclose the intensity ratio or the MEPI, revealed that 75.5% of Nigerians live in energy poverty. Furthermore, data differs from that of Nussbaumer et al. (2011), who showed that although their reported intensity ratios were similar, 81% of Nigerians had low energy. The research offers the MEP distribution by sector, gender, occupational categories, and geopolitical zones, which further diverges from Nussbaumer et al. (2011) and Ogwumike and Ozughalu (2012). The study offers zonal indicators of multidimensional energy poverty in the south-south geopolitical zone; however, it differs from Edoumiekumo et al. (2013) in that the latter did not account for MEP metrics in the six states in the zone. The MEP indicators for each of the six geopolitical zones, the national level, and the characteristics of the male-female, rural-urban, and agriculture-other sectors in each geopolitical zone are how this study differs from the others we evaluated. Thus, the study recommends that, state government should vigorously embark on rural and urban electrification drive. Also, state and national government should invest in other sources of clean energy sources.

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