

Understanding the Measurement, Drivers and Consequences of Energy Poverty: Insight from the Existing Literature

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ABSTRACT: Energy poverty is one of the development challenges that requires the attention of international communities and policymakers. This paper reviews the concept of energy poverty and various instruments of measuring energy poverty devised by different authors. The paper also discusses the major socioeconomic drivers of energy deprivation based on the insight gained from the existing studies conducted in various locations. The major drivers of energy deprivation constitute demographic and socioeconomic variables as extracted from empirical evidence. The review also examines the impact of energy poverty on household socioeconomic outcomes. Lack of access to clean energy affects households in various respects, including retarding human capital development, among other things. Therefore, this paper contributes to the existing literature by extracting the major drivers of energy poverty from the existing empirical studies. Understanding the drivers of energy poverty can help policymakers devise appropriate mechanisms for eradication.

KEYWORDS: Energy poverty, Definitions, Measurement, Determinants, Effects

1. INTRODUCTION

The availability of clean energy is paramount for individual and national development. As economic agents, households need adequate clean energy to live decent lives. Energy poverty is a socioeconomic problem affecting households in developed and developing nations. Energy-poor families in developing nations are exposed to solid fuel use due to lack of access to clean energy (Palei, 2022). However, energy-poor households in advanced countries have access to clean fuel but cannot afford adequate energy services (Al Kez et al., 2024; Burguete, 2023). Therefore, the issue is more complicated in developing than in advanced nations.

The terms energy poverty and fuel poverty are sometimes used synonymously. However, the later refers to the situation of advanced countries where energy-poor households cannot afford to keep their homes at normal temperature due to low income, high cost of energy or inefficient housing. On the other hand, energy poverty refers to the situation of developing nations where households lack access to adequate, reliable modern energy services (Halkos & Gkampoura, 2021; Thomson et al., 2017). It can be said that the term energy poverty is broader than fuel poverty, as it encompasses both affordability and accessibility issues. Despite the efforts of the international community to mitigate energy deprivation, the COVID-19 pandemic and the ongoing tension in Ukraine endangered millions of people worldwide to energy poverty (International Energy Agency, 2022). It has been observed that within 3 years, the number of people worldwide who spend up to 10 percent of their earnings on fuel had risen by 160 million in 2022 (IEA, 2022). Similarly, the energy progress report reveals that in 2022, about 685 million people worldwide could not afford electricity. The report further indicates that 2.1 billion people could not get clean cooking fuels (Schweinfest et al., 2024). However, most people without access to electricity and clean cooking fuel dwell in Sub-Saharan Africa and South Asia. At the global level, efforts were made to alleviate energy poverty. The declaration of 2012 as the "International Year for Sustainable Energy for All" by the United Nations is a milestone in energy poverty eradication (Pachauri & Spreng, 2011). The declaration focused on environmentally friendly energy. Under the program, several green energy projects worth multi-billion US dollars were implemented, particularly in Brazil, India, and Nigeria (Sustainable Energy for All, n.d.). One decade ago, the UN developed a development agenda called Sustainable Development Goals (SDGs). The SDGs consist of 17 goals that nations worldwide should seek to achieve by 2030. Access to clean energy holds a significant position in the SDGs because goal seven is focuses on fighting energy poverty. The goal is 'to ensure access to affordable, reliable, sustainable and modern energy for all.' The goal has a targets to be achieved globally in 15 years from its inception. With the inception of SDGs, a remarkable achievement

Understanding the Measurement, Drivers and Consequences of Energy Poverty: Insight from the Existing Literature

in access to clean fuel was witnessed globally. For instance, the population of non-electrified people decreased from 957.5 million in 2015 to 685 million in 2023 (International Energy Agency et al., 2024). An improvement has also been witnessed in using clean cooking fuel because the number of people using dirty fuels decreased from 2.7 million in 2015 to 2.1 million in 2023 (International Energy Agency et al., 2024). However, in Sub-Saharan Africa, the number of non-electrified people has increased from 566.1 million in 2010 to 571.1 million in 2022 (Schweinfest et al., 2024). This implies that the region was left behind in achieving universal access to clean. Thus, more policy measures should be implemented to tackle the issue.

Energy poverty is one of the socioeconomic issues that bedevil countries worldwide. This could be why universal access to clean energy is included in the current global development agenda (sustainable development goals). Numerous studies have been conducted on the determinants and impacts of energy deprivation on household socioeconomic outcomes. This paper seeks to review such studies to provide insights on tackling energy poverty from the existing empirical studies. The paper aims to review the measurements, causes, and effects of energy poverty. Understanding the causes and effects of energy poverty is important for policy-making on energy poverty eradication. The paper also explores the research gap on the study of the measurement, determinants and impact of energy poverty. This will pave way for future research in energy poverty.

2. CONCEPT OF ENERGY POVERTY

The concept of energy poverty gained popularity following the work of Boardman in the United Kingdom in the early 1990s; before that period, energy poverty was treated as poverty. Boardman (1991) argued that fuel poverty is different from poverty since fuel poverty cannot be reduced by increasing the income of households. According to Bouzarovski et al. (2018), Boardman was the first author on energy poverty. When she published her book on energy poverty, many academics and policymakers couldn't understand her point for separating energy poverty from poverty. Two decades later, the concept of energy poverty became popular among stakeholders. Nevertheless, Lewis had earlier proposed the idea of fuel poverty in 1982 (Healy & Clinch, 2002). The work of Boardman formed the basis for the fuel poverty threshold in the United Kingdom; this could be why it's more popular in the literature.

According to Boardman (1991), "Fuel poverty is the inability to afford adequate warmth because of the inefficiency of the home." However, (IEA, 2017) sees energy poverty as "a lack of access to modern sources of energy (electricity and non-solid fuels) needed to provide basic energy services like lighting, cooking and heating". Similarly, Day et al. (2016) viewed energy poverty as "an inability to realize essential capabilities as a direct or indirect result of insufficient access to affordable, reliable and safe energy services, and considering available reasonable alternative means of realizing these capabilities." However, Widuto (2023) Defined energy poverty as the inability of a household to meet its domestic energy needs. The definition suggested by Day et al. (2017) and IEA (2016) provides vital insight into energy poverty in the context of developing countries because they emphasize access to clean energy to satisfy the essential energy services to households. As stated earlier, access to clean energy to provide critical energy services is the key issue in developing countries. However, the Boardman and Widuto definitions were made in the context of advanced countries as they focus on affordability.

3. MEASUREMENT OF ENERGY POVERTY

There is no convergence among authors on how energy poverty is measured. Thus, different authors suggested various measurements of energy poverty using different methods. In other words, multiple authors suggested different criteria or thresholds for measuring energy poverty. Generally, the requirements for setting an energy poverty threshold are categorized into expenditure/income approach, self-reporting approach, and consensual approaches (Halkos & Gkampoura, 2021).

3.1 Expenditure Approach

The expenditure approach determines energy poverty, focusing on household energy expenditure information and primarily compared with income. Sometimes, a threshold is provided, and if the household energy expenditure reaches it, it becomes energy-poor. One of the good sides of this approach is that the data on household energy expenditure is easy to collect and is comparable across time and space (Halkos & Gkampoura, 2021). Nevertheless, the expenditure approach considers only the affordability of energy services while neglecting access to clean energy. Thus, the indicator doesn't address the issue of energy deprivation in developing countries. The prominent energy poverty indicators developed based on this approach include the Ten Percent Indicator, and the Low-Income-High-Consumption Indicator.

3.1.1 Ten Percent Indicator

This indicator for measuring energy poverty was developed by Boardman (1991), and the latter was adopted in the United Kingdom as an official measurement of energy poverty (Robinson, 2021). According to this indicator, a household is energy-poor

Understanding the Measurement, Drivers and Consequences of Energy Poverty: Insight from the Existing Literature

if it spends 10 percent of its income on energy services. This measurement is income-based, and it provides a threshold that any household whose energy expenditure is beyond the threshold, the household is considered energy-poor. The measurement is easy to calculate because, with little information from the household, energy poor can be identified. However, the drawback to this approach is that the threshold set was arbitrary. There is no justification for setting 10 percent. Additionally, the indicator is too narrow, as it considers only affordability. It doesn't consider the actual energy needs of the household. The indicator may be misleading due to the issue of underconsumption. Some households may consume little energy to keep their bills low. The 10% indicator was explicitly designed for developed countries. The approach did not consider the issue of energy access, which limits its application to developing countries.

3.1.2 Low Income- High Consumption Indicator (LIHC)

This is another measurement of energy poverty under the expenditure approach. In this context, a household is energy-poor if the following two conditions are fulfilled:

- a. If households' energy consumption is beyond the median (national average) and
- b. If households spend that amount, they will be left with remaining income below the official poverty line.

Satisfying the first condition only will not make household energy poor. Thus, it's necessary but insufficient for the household to be considered energy-poor. LIHC indicator considers the poverty line, which links general poverty with fuel poverty. According to Oxley (2020), LIHC is an indicator that serves two purposes: It shows the number of households with lower incomes and high energy expenditures. It also measures the fuel poverty gap. The household energy cost is based on modeling, not actual spending. Some low-income households cannot even spend what they should spend to keep their houses at an average temperature. It is, therefore, calculated by combining the households' fuel requirement with the fuel price.

However, one of the drawbacks of this indicator is that the LIHC doesn't extensively address the multidimensional nature of energy poverty. More so, the indicator calculates energy poverty based on modeling rather than actual information. The indicator is technically demanding and requires adequate data. Thus, it's difficult to estimate because sufficient data is needed to model the energy costs. The LIHC is a relative rather than absolute measurement. Therefore, comparing countries over a time horizon would be difficult.

3.2 Consensual Approach

The consensual approach to defining energy poverty focuses on various household energy situations, such as fuel affordability, access to clean energy, utility bills, and household warmth. This approach uses multiple indicators to measure or determine household energy poverty. Under this approach, various measurements for energy poverty were developed, such as the energy development index, Multidimensional Energy Poverty Index, etc.

3.2.1 Energy Development Index (EDI)

The Energy Development Index (EDI) is another instrument for measuring energy poverty. It was first designed by the International Energy Agency (IEA) to calculate the extent of energy access; it is mainly used for regional comparison (Ligus & Peternek, 2021). Zero is the lowest value of the index, and one is the highest value. Therefore, 'the higher the index, the higher the energy access; the reverse is the case.' The index is a composite function which constitutes four (4) indicators:

- 1) Per capita energy consumption by firms
- 2) Per capita consumption of electricity by households
- 3) Percentage of clean fuels in the entire energy consumed by households (access to modern cooking energy)
- 4) Electrification rate.

EDI measures how much a country transits to modern or clean fuel. Each indicator is represented as an index between zero and one. EDI data is easy to calculate and analyze. It is a simple measurement compared to LIHC. However, it is more suitable for macroeconomic data than microdata. It was designed to make comparisons among regions in terms of energy development. The index uses a few indicators to measure energy access. The index also uses an electricity connection indicator to capture access to electricity. Electricity connection is sometimes misleading because a household may be connected to electricity but lacks an adequate supply. The index should have considered how often households get electricity supply instead of electricity connection. This is because some households, especially in developing countries, cannot pay electricity bills. Another limitation of EDI is that it emphasizes electrification rather than energy services enjoyed by energy consumers and the quality of the services.

3.2.2 Multidimensional Energy Poverty Index (MEPI)

This is a recent development in measuring energy poverty. It was introduced to address the problems associated with conventional measurements that see energy poverty from one or a few dimensions. Energy poverty is multidimensional and it should be

Understanding the Measurement, Drivers and Consequences of Energy Poverty: Insight from the Existing Literature

measured in terms of multiple indicators. Nusbaumer et al. (2013) developed the MEPI following the work of Alkire & Foster (2011), theoretically underpinned by the Capability Approach. Nussbaumer et al. (2013) based their index on the argument that energy poverty is a deprivation that households face regarding energy services. Households need energy services to live in good condition. Thus, energy poverty deprives individuals of different dimensions of energy services.

Table 1. Nusbaumers' Multidimensional Energy Poverty Deprivation Thresholds

Dimension	Indicator
Cooking	Clean cooking energy: household is cooking with fuel other than LPG and Electricity; deprivation score 0.2 Indoor pollution: household is cooking with dirty energy without a chimney; the deprivation score is 0.2
Lighting	Electricity: The household is not connected to electricity. The deprivation score is 0.2
Energy services obtained from household appliances	Household appliances: There is no fridge or fan in the house. The deprivation score is 0.13
Education	Education appliances: The household doesn't have a TV or Radio. The deprivation score is 0.13
Communication	Communication gadget: there is no handset or telephone in the house. The deprivation score is 0.13

Source: Nusbaumer et al (2013)

Table 1 shows the six indicators of MEPI. The indicators were drawn from the five essential dimensions of energy services. Each dimension has one indicator, except cooking, which has two indicators. The total deprivation score is 0.99; it is shared across the indicators. Cooking has the highest weight (0.4), and lighting has 0.2. According to the Index, lighting is the second most crucial household energy. Household appliances, entertainment/educational appliances, and communication have 0.13 each. Therefore, cooking has the highest weight (0.4) among all components of the index.

The threshold for MEPI is 0.33, which means 'if the deprivation score reaches 0.33, the household is multidimensional energy poor'. The incidence of energy poverty is calculated by energy poverty headcount (H). The formula is donated as:

$$H = 1/N \sum_{i=1}^q C_i > K \quad (2.1)$$

Where N= Sample size, C_i =population of households that deprivation score greater than or equals cut-off, the K=energy deprivation cutoff

Intensity of energy deprivation is donated as:

$$A = \sum_{i=1}^q C_i(k) / \sum_{i=1}^q C_i \quad (2.2)$$

Where: ' $\sum_{i=1}^q C_i(k)$ ' is the mean deprivation scores of the energy-poor households in the sample'

$$\text{The overall MEPI} = H * A \quad (2.3)$$

Equation 2.1 refers to the incidence of energy deprivation in the sample. The incidence represents the percentage of energy-poor households in the sample. It is obtained by dividing the number of energy-poor households by the sample size, then multiply by one hundred (100). The energy-poor household is any household in the sample whose total energy deprivation score reaches the threshold (0.33). Equation 2.2 measures the intensity of energy deprivation. In other words, it's a mean deprivation score in the sample. It's obtained by dividing the deprivation scores of all the energy-poor in the sample by the total energy-poor. Finally, the overall multidimensional energy poverty index is obtained by multiplying the incidence of energy poverty (H) by the severity of energy poverty (A), which is mathematically represented in equation 2.3.

However, MEPI can be criticized for the following reasons. First, it focuses on access to electricity without considering its affordability and availability. Second, MEPI covers only six indicators, which seems inadequate to explain energy deprivation. The index explains only the intensity and incidence of energy poverty but doesn't measure inequality. Energy services may not be equally distributed among a particular household population.

Various authors developed various Multidimensional Energy Poverty Indexes to measure energy poverty in developing nations and address the limitations of Nusbaummer's index. For instance, Ssennono et al. (2021) had developed a Multidimensional energy poverty index to define who is energy-poor among farming households in Uganda. Wali et al. (2025) had developed a Multidimensional Energy Poverty Index to measure rural energy poverty in Nigeria. Robles-Bonilla (2021) modified Nusbaummer's index to measure energy deprivation in Mexico while addressing the country's peculiarities.

3.3 Self-Reported or Subjective Approach

Understanding the Measurement, Drivers and Consequences of Energy Poverty: Insight from the Existing Literature

Apart from expenditure and consensual approaches to energy poverty, there is the self-reported or subjective approach. The subjective approach was unscientific and is based on household self-assessment reported by households during the survey. For instance, households may be asked how they paid their electricity bill. Do they face difficulties in buying fuel? Are they satisfied with the heating facilities in their house during winter? This approach measures energy poverty in some European countries (Charlier & Legendre, 2021). For instance, Italia's National Energy Strategy defined energy poverty as "difficulty of purchasing a minimum set of energy goods and services or access to energy services that implies a diversion of resources, in terms of expenditure or income, higher than a normal value" (Creutzfeldt et al., 2020). Similarly, the European Commission defined energy-poor households as households that spend too much or even twice the average on energy products and face difficulties paying their energy bills (Creutzfeldt et al., 2020). These two definitions constitute both expenditure and self-reported approach.

4. DETERMINANTS OF ENERGY POVERTY

Energy poverty is a socioeconomic phenomenon that various demographic and socioeconomic factors can influence. The determinants of energy poverty can also be explained from the demand and supply point of view. Authors worldwide confirmed the influence of socioeconomic variables on energy deprivation.

The household's education status is a demographic variable determining energy access. Households with higher education status are expected to be non-energy poor compared to those with lower educational status. Education increases awareness, including the health implications of using dirty fuel. This will make the household embrace modern cooking facilities. Much of the empirical works confirm that as a household's educational status increases, it becomes non-energy-poor, and the reverse is the case. Adeyonu et al. (2022) found an inverse relationship between energy poverty and education of household heads in Nigeria. Similarly, (Koomson & Danquah, 2021)(30)(Koomson & Danquah, 2021) using Ghanaian nationally representative panel data, found that educated households are less likely to be energy-poor. Findings from Sri Lanka using quintile regression analysis confirmed a negative relationship between energy poverty and the education of the household head (Jayasinghe et al., 2021). A panel study conducted by Awan et al. (2022) in Pakistan revealed that education of the household head reduces the likelihood of energy deprivation among Pakistani households. A similar finding was obtained in a study conducted in seven West African countries (Compaore et al., 2024).

Moreover, the household's income is one of the drivers of energy poverty. Income is essential for the affordability of clean energy. A household with higher income levels may have a better chance of purchasing LPG cylinders, LPG refilling, household appliances, paying electricity bills etc. The energy ladder theory posits that as the income of a household rises, it increases the consumption of clean energy. Thus, the transition from traditional (dirty) to modern (clean) fuel occurs when the income of the households increases. Therefore, traditional fuels are inferior goods, while modern fuels are normal goods. A study of the determinants of energy poverty conducted in Egypt and Jordan revealed that households with low-income levels face the risk of energy poverty in both countries (Bélaïd, 2020). Moreover, Huang et al. (2022), in a study conducted in six provinces in China using three years of panel data, confirmed the influence of household income on reducing multidimensional energy deprivation.

Family size also determines energy poverty. A larger families may find it so challenging to afford and maintain modern energy facilities, due to family burden. They likely opt for traditional biomass, which is relatively cheap and does not require the initial installation cost. In the rural areas of developing countries, households get the biomass for free through collection. Studies conducted on various developing showed association between energy poverty and family size (Adeyonu et al., 2022; Compaore et al., 2024; Lin & Zhao, 2021). Moreover, it was pointed out that family composition influences energy poverty. The chances of energy poverty are reduced when most family members are productive. A study conducted in Japan reveals that families with a high number of elderly persons, pregnant women, or disabled persons suffered more from energy poverty (Castaño-Rosa & Okushima, 2021).

Moreover, the age of the household head is another determinant of energy poverty. Households headed by elderly people suffer from energy poverty in most developing countries, as the empirical works show. The empirical findings revealed a positive relationship between energy deprivation and household age (Castaño-Rosa & Okushima, 2021). Elderly people may negatively perceive clean cooking fuel, particularly LPG. This reduction can reduce the adoption of clean cooking fuel. Besides that, the cost of installing clean cooking facilities may discourage people not at a productive age from adopting them.

Furthermore, the gender of the household head is among the influencer of energy poverty. Thus, there is a gender issue in energy poor. Gender is one of the essential demographic variables nowadays due to the ongoing agitation for gender equity at the global level. Most empirical evidence shows that female-headed households are more likely to be energy-poor than males (Gafa & Egbendewe, 2021; Okushima, 2021). However, an empirical finding from Egypt and Jordan revealed that male-headed households

Understanding the Measurement, Drivers and Consequences of Energy Poverty: Insight from the Existing Literature

are more likely to be energy-deprived (Bélaïd, 2020). Similarly, (Koomson & Danquah, 2021) reported that female-headed households in Ghana are less likely to be energy poor. This variation occurs when the female who heads the household is rich. The occupation of the household head is another socioeconomic driver of energy poverty. Studies confirmed the strong association between energy poverty and occupational status. It was found that salary earners are less likely to be energy-poor than non-salary earners (Abbas et al., 2021). This is because most salary earners in developing countries are workers in the formal sector. However, non-salary earners are self-employed from the informal sector. In the studies conducted in India, a high incidence of energy poverty was recorded in farmers' and laborers' households (Rizal et al., 2024).

Residential location is also considered a determinant of energy poverty. It has been observed that there is an urban-rural divide in energy access globally because 80 percent of the non-electrified people are rural dwellers (Schweinfest et al., 2024). Evidence from Nigeria shows that rural households are more likely to be energy-poor than urban households (Ashagidigbi et al., 2020). Most rural areas have high energy deprivation due to a lack of electrification and transportation problems, making it challenging to supply LPG. The availability of biomass in rural areas is also another factor that makes rural dwellers choose biomass as their cooking and heating energy.

The price of clean energy influences energy poverty. Widuto (2023) argued that a hike in energy prices is associated with energy poverty. As prices of clean energies (electricity and LPG) increase, many households are bound to be energy-poor, depending on various factors such as income levels of the households, availability of close substitutes, etc. Low-income groups are expected to have elastic demand, which makes them very sensitive to clean fuel price shocks. Thus, low-income earners will be more affected by the clean energy price hike than high-income groups. Therefore, subsidies for clean energy can increase its consumption and reduce energy poverty. In addition to the price of clean energy, a study conducted in Pakistan reported that household expenditure on clean energy reduces the chances of energy poverty among Pakistanis (Liu et al., 2022).

Moreover, credit access is considered an economic variable that reduces energy deprivation. The availability of credit facilities motivates consumers to purchase goods and services, as asserted by the permanent income hypothesis and life cycle hypothesis (Deaton, 1992). Similarly, the study conducted by Ashagidigbi et al. (2020) revealed that access to credit significantly reduces energy poverty among households in Nigeria. This implies that credit access allows households to afford modern cooking facilities, appliances, and other electric gadgets.

5. EFFECTS OF ENERGY POVERTY

Access to energy is vital for the socioeconomic outcomes of households. The ability to live a decent life is dependent on energy access. Educational and medical care systems cannot perform effectively without an adequate and reliable electricity supply. However, energy deprivation leads to detrimental effects on the household's socioeconomic outcomes. Therefore, energy poverty affects families in many ways, including health, education, employment opportunities, standard of living, etc.

Energy poverty retards the teaching and learning process. Nowadays, teaching and learning are supported by electronic media, especially in developed countries, regardless of the level of education. In advanced countries, most teaching pedagogies occur online (Rafi et al., 2021), and instructional materials are electronic media, such as audio and audio-visual resources. Therefore, energy deficiency hinders individuals from enjoying modern teaching and learning resources. Moreover, children need a reliable electricity supply for reading and other educational activities at home after daylight hours. It has been found that children with adequate access to modern lighting energy spend more time reading than those from energy-deprived households (Olanrele et al., 2020).

Women and children in rural areas of developing countries take responsibility for collecting firewood and farm residues to meet daily cooking energy requirements (Nduka, 2021). This exposes them to drudgery and many risks. Energy poverty increases the likelihood of risky sexual behavior among female teenagers in Ghana (Adu et al., 2024). Thus, the collection of wood and residues makes girls vulnerable to sexual assault and injuries.

Empirical evidence revealed a significant causal relationship between energy deprivation and negative health outcomes. Wali et al. (2025), in a cross-sectional analysis of rural households in Nigeria, found that energy poverty leads to respiratory disease, chronic eye disease, and child mortality. Energy-poor households in developing countries use dirty cooking fuel (farm residues, animal dung, wood, etc). These fuels have a high carbon emission, which endangers households with numerous health complications. Rafi et al. (2021), using two-year panel data analysis in India, reported that energy deprivation leads to the significant sickness among children of India. Besides the aforementioned diseases, energy poverty is also associated with mental health issues. A sizeable literature confirmed the evidence of the influence of energy poverty on depression among energy-poor households in various countries (Li et al., 2022; Shupler et al., 2022; Xu et al., 2022; Zhang et al., 2022). These studies reported that energy-poor families suffer more from depression in comparison with non-energy-poor families. The inability of households to afford adequate energy to keep their homes at the required temperature during winter makes them depressed.

Understanding the Measurement, Drivers and Consequences of Energy Poverty: Insight from the Existing Literature

Furthermore, energy deprivation is associated with adverse education outcomes. It has been agreed that there is an association between energy poverty and school absenteeism in developing countries. This is because children of energy-poor households spend a couple of hours on a collection of wood (Nduka, 2021). Some children dedicate some days in a week to wood collection. As empirical studies observed, this activity reduces their school attendance (Banerjee et al., 2021; Wali et al., 2025). Thus, energy poverty is associated with school absenteeism and dropout.

Energy deprivation aggravates income poverty. This is because energy access makes households participate in productive activities at home, which raises incomes. However, the unavailability of clean energy may deprive households of doing some income-generating activities at home. Energy deficiency also reduces employment opportunities by paralyzing industrialization. An empirical finding from Pakistan confirmed the influence of energy poverty on income poverty and environmental degradation (Batool et al., 2023).

6. CONCLUSION

Energy plays a vital role in societal well-being and national development. Lack of access to modern energy is a global phenomenon affecting households in advanced and developing countries. This study concludes that the authors have no consensus on what constitutes poverty. However, energy poverty in the global south refers to the lack of access to clean energy. On the other hand, in the global north, energy poverty is considered to be the inability to provide adequate energy for household energy services. Although, various multidimensional energy poverty indices have been developed to capture energy deprivation in the global south, there is no universally accepted index that reflects the diverse contexts of the developing countries.

This paper concludes that various factors affect households' likelihood of being energy-poor. These factors include household size, income, educational status, gender, and age of the household head. In addition to the aforementioned factors (demographic variables), the price of clean energy and credit access have been identified as determinants of energy poverty. Residential location is also among the determinants of energy poverty. Thus, households in rural areas are more likely to be energy-poor than those in urban areas. The study gap identified by the paper regarding the determinants of energy deprivation is that, the existing studies focus primarily on the demand side factors. However, few studies have examined how supply-side variables affect energy poverty. The paper also concludes that energy poverty has a detrimental effect on socioeconomic outcomes. It has been established that lack of access to clean energy leads to negative education and health outcomes such as respiratory diseases, child mortality, and school dropout, among other things. Most of the literature on effects of energy poverty had examined the impact on education and health outcomes. However, few literature studied the impact of energy poverty on environmental degradation. Therefore, future studies may focus on specific environmental issues: desert encroachment, biodiversity depletion, deforestation etc.

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Understanding the Measurement, Drivers and Consequences of Energy Poverty: Insight from the Existing Literature

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