The Impact and Coping Strategies of Energy Poverty on Human Well-being

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Abstract

This paper explores the characteristics of global energy poverty, analyzes its impact on human well-being, and proposes strategies to combat it. Affordable clean energy is identified as the seventh Sustainable Development Goal by the United Nations. However, with only six years left to achieve the 2030 vision of the SDGs, energy poverty remains a pressing issue, especially in the global south. Therefore, it is crucial to examine the challenges posed by energy poverty to human well-being and propose effective strategies to address the associated social risks and promote sustainable development.

1. Current Status of Global Energy Poverty

Energy poverty is generally defined as a state where households struggle to afford the energy required for daily living or lack access to modern fuels (Li et al., 2023). There have been efforts by policymakers worldwide to promote clean energy and eliminate energy poverty. By 2020, the number of people globally lacking access to clean cooking fuel decreased from 3 billion in 2010 to 2.4 billion, while the number of people without access to electricity reduced from 1.2 billion in 2010 to 733 million (IEA et al., 2022). Despite progress over the past decade, the ambitious goal of eradicating energy poverty by 2030 remains challenging.

Energy poverty not only affects a significant portion of the global population but is also unequally distributed. The majority of those affected reside in developing countries, particularly in Africa. For instance, in 2020, the countries with the highest population lacking access to electricity were Nigeria (92 million people), the Congo (72 million people), and Ethiopia (56 million people) (IEA et al., 2022). Energy poverty primarily affects the low-income segment of the population within these countries. The Russo-Ukrainian conflict, for example, has led to an increase in energy prices, pushing more low-income households into energy poverty (Guan et al., 2023).

2. Challenges of Energy Poverty to Human Well-being

Energy poverty imposes threats to human well-being. Firstly, the absence of clean energy leads to indoor air pollution, negatively impacting health (Basu et al., 2024). Traditional biomass cooking methods emit harmful gases, increasing respiratory issues, infant mortality rates, and health risks for the elderly. Energy poverty also affects cognitive and non-cognitive abilities, as the inability to meet basic cooking, lighting, and heating needs can lead to higher levels of depression and mental health issues.

Secondly, energy poverty hinders progress towards gender equality (Verma & Imelda, 2023). Women in most developing countries are primarily responsible for household chores, and energy poverty has specific gender implications within families, limiting women's development. The collection of biomass fuel, low combustion efficiency, indoor air pollution, and resulting health issues significantly restrict women's labor supply and their participation in the workforce.

Thirdly, energy poverty reduces the quality of life (Burlig & Preonas, 2024)as well as enable the effect of interventions to be evaluated over time. Methods. A total of 2032 people aged 70 years and over recruited by stratified random sampling, and information obtained regarding physical and functional health, and psychological factors. The frailty index (FI. Energy is essential for household heating, cooking, and lighting. In energy-deprived settings, families struggle to provide adequate lighting and learning conditions, forcing children to assist with biomass collection, compromising their education time and efficiency.

Lastly, energy poverty is closely connected to environmental and climate concerns (Zhou et al., 2022), posing substantial risks to human well-being. Communities affected by energy poverty heavily rely on conventional biomass fuels, contributing to air pollution and greenhouse gas emissions. Resolving energy poverty requires the provision of clean and sustainable energy sources, which can effectively reduce carbon emissions and mitigate the impact of climate change.

3. Strategies to Address Energy Poverty in China

As one of the largest developing economies, China has made significant progress in addressing energy poverty issue. In particular, four strategies have been implemented to alleviate energy poverty across the country.

Firstly, strengthening energy infrastructure, such as electricity grids and gas pipelines, is crucial to ensure reliable energy access for all. Infrastructure plays a vital role in increasing the availability of clean energy. For example, China's "West-to-East Gas Transmission" project, which delivers natural gas from Western China to the major target consumer markets in Southeast China as well as users along the lines, has addressed the scarcity of natural gas resources in eastern China, making it one of the most widely used clean energy sources in the country.

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Secondly, subsidies are provided for the adoption of clean energy and related appliances. Biomass fuels are often cost-free compared to modern energy sources like electricity and natural gas, causing low-income households to resort to non-clean fuels due to financial constraints. Subsidizing clean energy is essential in alleviating the energy burden on households. Additionally, proactive measures should be implemented to incentivize households to transition out of energy poverty, allowing them to benefit economically. For example, China has implemented the "photovoltaic poverty alleviation" policy, which effectively tackles both energy poverty and poverty reduction. This policy entails the placement of solar panels on the roofs or agricultural greenhouses of low-income households. The government covers the majority of the installation expenses, with a small portion being funded through credit resources. This allows these households to produce enough electricity to fulfill their daily requirements, and any excess electricity can be sold to the national grid. This policy combines the promotion of energy transition and the increase of household income.

Thirdly, enhancing energy literacy is crucial. Providing technical training and financial support in energy-deprived areas can promote the adoption of clean energy. Increasing energy literacy among the energy-deprived population is necessary for promoting energy transition. China has implemented a number of initiatives aimed at enhancing the public's literacy and awareness of clean energy and energy-saving products. For instance, new energy vehicles in China are identified by green license plates, while traditional vehicles bear blue or yellow plates. Likewise, energy efficiency labels are prominently displayed on Chinese appliances. These educational efforts have successfully increased residents' understanding of energy issues and their willingness to embrace clean energy solutions.

Lastly, stimulating market development and creating job opportunities are essential for addressing energy poverty through income effects. Strong job prospects increase household income. While clean energy promotion projects and foreign aid can provide short-term relief for energy poverty, establishing a thriving energy market and avenues for income growth are fundamental long-term solutions for households to afford clean energy. For example, China has implemented market-oriented reforms in its energy sector, which has resulted in the creation of a substantial number of employment opportunities and an enhanced reliability of energy supply through the introduction of market competition.

4. Conclusion

Energy poverty poses significant challenges to human well-being, particularly in developing nations and among low-income populations. It affects various aspects, including health, gender equality, child development, and climate issues. Addressing energy poverty requires a multifaceted approach involving improved access to modern energy, increased energy literacy, and the development of energy markets.

Acknowledgements

This work was financially supported by the National Natural Science Foundation of China (723B2019, 72022014), 2022 Youth Innovation Team of Shaanxi Universities and the Research Grants Council of Hong Kong (11503223, N_CityU146/23).

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