



Socioeconomic determinants of energy poverty at the household level

Doreen Katangaza Rubatsimbira and Rodgers Naijuka

- Energy poverty, understood as the inability to access sufficient, affordable, and clean energy for everyday household needs such as cooking and lighting, affects many households in Uganda and remains one of the most significant yet often underestimated barriers to the country's development.
- Electricity access alone does not capture the full extent of energy poverty. Despite a tripling of electricity access in Uganda since 2013, over 90% of households still rely on firewood and charcoal for cooking.
- This study identifies energy poverty hotspots across Uganda using a multidimensional index, uses the obtained index to carry out a national spatial hotspot analysis, and explores the household-level factors driving energy poverty vulnerability, based on a survey of 472 households.
- Energy poverty hotspots are concentrated in twelve districts across all four of Uganda's regions, including urban areas like Wakiso and Kampala, implying that energy poverty is not exclusively a rural problem.
- Low household income, large family size, and engagement in subsistence farming are the most significant drivers of energy poverty, while education, especially among women, reduces the vulnerability.
- The distribution of high-energy poverty vulnerability across twelve districts, together with evidence that it reflects a combination of income inadequacy, limited education, and supply-side constraints, suggests that addressing energy poverty requires coordinated action from multiple stakeholders.

POLICY BRIEF UGA-25079

MARCH 2026

This project was
funded by the IGC

theigc.org

DIRECTED BY



FUNDED BY



Introduction

This study examines the socioeconomic drivers of energy poverty at the household level in Uganda. According to the International Energy Agency and International Monetary Fund, energy poverty is broadly defined as the inability to access sufficient, affordable, and clean energy for household needs, such as lighting and cooking. Energy poverty is therefore wider than simply lacking an electricity connection. A household may be connected to the grid yet remain energy poor if that connection is unaffordable, unreliable, or insufficient to meet its needs.

Uganda has made substantial progress in expanding electricity access, with national coverage rising from 14% in 2013 to over 45% by 2021, and rural access increasing from just 3% to 36% over the same period. Electricity access increased further to 60% by June 2024. Yet more than 90% of households continue to rely on biomass (firewood and charcoal) for cooking. Biomass dependence is not only a serious health hazard, but it also places a heavy time burden on women and children who collect fuel, limiting their opportunities for education and income generation.

One of the main challenges is that most researchers have measured energy poverty in Uganda almost entirely through electricity access alone (Munro & Bartlett, 2019; Nussbaumer et al., 2012; Kay et al., 2021). The exclusion of critical dimensions of deprivation related to affordability, quality, reliability, cleanliness, and adequacy relative to household demand underestimates both the extent and intensity of energy deprivation.

While recent studies have begun adopting multidimensional approaches (Ssennono et al., 2021), evidence on the socioeconomic determinants of household vulnerability remains limited. We address this gap by constructing a Multidimensional Energy Poverty Index (MEPI) drawing on the framework of Alkire and Foster (2022). We then undertake a nationwide hotspot mapping exercise that indicates the intensity of energy poverty across the country. Finally, we examine the socioeconomic characteristics of energy poverty based on data collected from 472 households.

The research addresses the following questions:

- What is the intensity of energy poverty in Uganda when assessed using a multidimensional approach?
- Which household socioeconomic characteristics are associated with energy poverty?
- How do these drivers differ between male- and female-headed homes?
- What policy interventions are most likely to reduce energy poverty in the most affected areas?

Policy motivation for research

Energy access is fundamental to Uganda's economic development and the wellbeing of its residents, as the energy sector feeds directly into key sectors such as agriculture, manufacturing, health, and education. Without affordable and reliable energy, households and businesses remain trapped in low-productivity livelihoods, constraining economic growth. Moreover, the country's tenfold-growth development strategy compounds the challenge, as demand for energy is projected to surge as the economy expands.

Effective design and implementation of energy policies and welfare programmes require granular, spatially referenced evidence on where energy poverty is most severe and the socioeconomic characteristics of the most vulnerable households. Such evidence is currently almost non-existent, limiting the precision with which interventions can be targeted.

Key findings

Research question	Finding
<i>What is the intensity of energy poverty in Uganda when assessed using a multidimensional approach?</i>	Energy poverty is widespread across Uganda, but is most intense in 12 districts referred to as hotspots. These are Bundibugyo, Ntungamo, Isingiro, and Kisoro in the western region; Kampala, Wakiso and Kayunga in the central region; Jinja, Bukedea, Soroti, and Katakwi in the eastern region; and Oyam in the northern region. The high vulnerability in these areas reflects a combination of limited supply infrastructure,

affordability constraints, and adverse household-level socioeconomic conditions. The inclusion of urban areas among the energy poverty hotspots implies that vulnerability is not restricted to rural areas.

Which household socioeconomic characteristics are associated with energy poverty?

Household income. Families with higher earnings are consistently less energy poor, regardless of where they live. Without sufficient purchasing power, households cannot afford grid connection fees, cleaner fuels, or modern energy appliances, even when these are available nearby.

Occupation type. Households engaged predominantly in subsistence farming record the highest energy poverty of any occupational group in the study. Despite being the most common livelihood, subsistence farming rarely generates the cash savings or surplus income needed to invest in modern energy, reflecting a close link between low livelihood and energy deprivation.

Education. Attaining higher education reduces energy poverty significantly. The effect is especially strong for women. Households headed by educated individuals score measurably lower on the energy poverty index. Education raises awareness of cleaner energy options, improves the ability to navigate financing options, and is associated with higher long-run incomes. Among female-headed households, the effect of education is roughly twice as large as among male-headed ones.

Energy demand: The higher the unmet energy demand, the higher the energy poverty vulnerability. Unmet demand is estimated by households that want electricity but lack a grid connection.

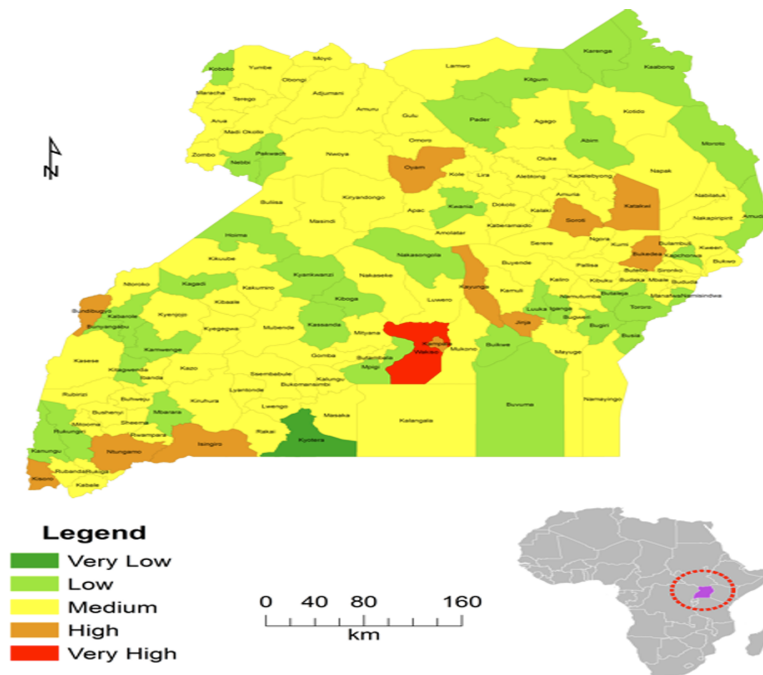
What role does gender play in energy poverty?

Women in energy-poor households bear the heaviest burden as they are involved in collecting fuel, consequently losing time for education and income generation, and having fewer resources to invest in clean energy. Notably, women's decision-making power alone, without accompanying income and resources, is not sufficient to reduce energy poverty. Empowerment and resource provision must go together.

What role do government programmes like the Parish Development Model (PDM) play in reducing energy poverty?

Although 42% of the households reported participating in the PDM, none had used the programme's facilities to adopt modern energy technologies, indicating an implementation gap that requires urgent attention. While the PDM framework, particularly pillars two and four, prioritises infrastructure, economic development, and the expansion of electricity and social services to underserved communities, households have yet to utilise government financing schemes to improve energy access.

Figure 1: Energy poverty spatial hotspots



Policy impact

This study provides policymakers, development partners, and local authorities with a new evidence base for targeting energy interventions in Uganda. The spatial hotspot maps, which highlight twelve highly vulnerable districts, provide an operational tool for Government intervention programmes. Given that energy poverty persists even within semi-urban and urban districts like Wakiso and Kampala, it challenges the assumption that rural electrification is the ultimate solution to energy deprivation.

By demonstrating that income, occupation, education, and gender are the dominant drivers of household vulnerability, not just physical infrastructure, the study reframes the policy challenge. Expanding the grid remains necessary, but it is not sufficient. Households must also be able to afford connections and recurrent energy costs, have the education to navigate markets and government programmes, and be supported through livelihoods that generate investable income. This means the energy sector alone cannot solve energy poverty.

Policy recommendations

Target income-enhancing interventions and financial inclusion in hotspot areas:

Since low household income is the strongest driver of energy poverty, livelihood support programmes and financial inclusion initiatives should be prioritised in the twelve identified districts. Income support should be integrated with inclusive energy financing to ensure sustained progress.

Promote productive use of energy: Subsistence farmers need integrated support that connects cleaner energy to income generation. Households adopting solar systems or improved cookstoves should be supported to use these investments productively — for agro-processing, small retail, and other income-generating activities. A productive-use model strengthens the economic case for clean energy adoption and reduces the risk of households reverting to biomass fuels when incomes fluctuate.

Invest in girls' education and adult literacy in hotspot districts: Education plays a key role in reducing energy poverty, particularly among women. Households with higher education levels are more likely to adopt cleaner energy due to greater awareness of its health and economic benefits. Expanding girls' schooling and adult literacy programmes in the twelve hotspot districts should therefore be treated as part of energy policy. These investments strengthen women's ability to access information, participate in markets, and adopt modern energy technologies, with benefits that grow over time and across generations.

Address unmet electricity demand: Accelerating last-mile connections in hotspot districts is therefore essential, alongside affordability measures such as subsidised tariffs and instalment payment options. Where grid expansion is too costly, off-grid solar and mini-grids should be promoted, with strong quality standards to protect households from poor-quality products and maintain trust in renewable energy.

Mainstream gender in energy policy: Expanding women's access to energy financing, technical training, and participation in energy awareness sessions can unlock economic opportunities. Energy planning and monitoring should also include gender-specific indicators. Importantly, empowerment efforts should be paired with access to resources, since decision-making power alone does not reduce energy poverty.