

Can Market Mechanisms Facilitate Energy Access for People Living in Extreme Poverty?

Part 1: Understanding the Relationship Between Energy Access and Extreme Poverty

Appendix 7.2f

Energy Access among People Living in Extreme Poverty in Zambia with a Focus on Rural Residents

1. Introduction

This review is one of a series of six,¹ looking at energy access for people living in extreme poverty in specific country contexts.² It has been carried out as part of a wider study entitled ‘Can Market Mechanisms Facilitate Energy Access for People Living in Extreme Poverty?’ under the Transforming Energy Access programme. Zambia was chosen for review as an example of a country in southern Africa which has one of the 20 largest energy access deficits among people living in the country in extreme poverty in Indo-Pacific and sub-Saharan Africa, and availability of relevant information.

Each of the reviews also looks at issues around energy access for a specific demographic group who experience differential levels of extreme poverty or lack of energy access; have distinctive energy needs; and/or face distinct barriers to achieving energy access. This review looks specifically at extreme poverty and energy access among people living in rural areas. This group was chosen as the focus in Zambia because of its large rural area and low population density.

Some of the key findings from the research include:

- **People living in extreme poverty in Zambia have significantly lower levels of energy access than the rest of the population.** We estimate that some 7.6 million people living in extreme poverty have no effective access to electricity and some 12.3 million have no access to clean cooking energy. **Financial support will be needed if people living in extreme poverty are not to be left behind.**
- **People living in extreme poverty in rural Zambia have only marginally lower levels of energy access than rural households with higher incomes.** This reflects very low levels of energy access overall in rural areas, driven by high reliance on grid electricity and undeveloped off-grid markets.
- **Cost is the main reported obstacle to grid connection and adoption of solar home systems and clean cookstoves by people living in extreme poverty in Zambia.** Market mechanisms which address affordability thus have the potential to enable a significant proportion to achieve access.
- **Between 38% and 50% of people living in extreme poverty in Zambia are unwilling to pay for energy even in instalments and with subsidies.** Cost is the reason given for this unwillingness, indicating that higher levels of financial support may be needed, as well as other barriers overcome, if they are to be reached.
- **Almost a third of people living in extreme poverty in Zambia who would not buy an improved cookstove say it is because they do not see it as necessary** - market mechanisms supporting modern energy access for cooking will need to be accompanied by awareness campaigns if they are to be successful.

Information on the methodology used; definitions of terms and acronyms; and the sources referenced can be found in the report ‘Part 1: Understanding the Relationship Between Energy Access and Extreme Poverty’.

2. Country context

Zambia is a landlocked middle-income country in southern Africa with a population of 19 million people in 2022; this is projected to nearly double to 37 million by 2050 (EPPSA, 2022).



Figure 1: Map of Zambia (Source: CIA, 2023)

Zambia is considered a politically stable country with successful democratic elections held every five years (World Bank, 2023a). After many years of a one-party state, Zambia became a multi-party state in 1991. The current President, Hakainde Hichilema, was elected in August 2021 (ibid).

Zambia achieved rapid GDP growth between 2000 and 2010 (averaging 7.7% per year), lifting the country into middle-income status (AFD, 2016). However, the growth of the economy has slowed in recent years due to a fall in global copper prices since 2011, and low hydropower generation due to insufficient rainfall (ibid).

The COVID-19 pandemic further damaged the Zambian economy with a historic contraction of GDP in 2020 (World Bank, 2023a). However, the economy rebounded in 2021 with GDP growing at 4.6%, supported by improved copper prices, more favourable rainfall and market confidence. The outlook for economic growth through 2025 is also optimistic (ibid).

3. Extreme Poverty

Zambia's extreme poverty rate was 61.4% (9.7 million people) in 2015 (the last year survey data was collected), having fallen from 68.5% in 2010 (World Bank, 2023b). The poverty gap also fell from 35.4% in 2010 to 32.8% in 2015 (ibid). This moderate decline was despite steady growth in the country's GDP per capita (averaging 1.8% per year) over the period meaning that the country has one of the lowest growth-poverty elasticities in Southern Africa. Economic growth has slowed considerably since 2015, remaining below population growth, restricting progress in reducing poverty.

Other factors have exacerbated extreme poverty in the country in recent years. Poverty projections based on sectoral GDP-per capita growth suggest that extreme poverty increased by 2 percentage points (to 63.4%) between 2015 and 2020, with a similar increase in both rural and urban areas. Poverty increased significantly in rural areas following a major drought in 2018 and in urban areas in 2019 following a fall in global copper prices. Both rural and urban areas were also impacted by the COVID-19 pandemic with monthly earnings falling in both areas in 2021 (ibid). Based on a projected increase of 0.41% between 2019 and 2023 (Hadad et al, 2023), we estimate that the extreme poverty rate remained at 63.4% in 2023.³ This represents 13.1 million people, a rise in absolute terms since the last year data was collected.

4. Rural poverty

In 2015 (the last year survey data was recorded), 84% of Zambia's rural population were living in extreme poverty (World Bank, 2023b). The World Bank (2021) report that poverty in rural areas, at the national poverty line, increased from 73.6% in 2010 to 76.7% in 2015.

Macro-economic shocks have been a key driver of increasing rural poverty in recent years. The World Bank (2023b) report that poverty increased significantly in rural areas following a major drought in 2018. Covid-19 and more recent disruptions to global food supplies caused by the Ukraine War have worsened food security for rural households with the share skipping meals or running out of food increasing between 2020 to 2022 (ibid).

Other drivers of rural poverty include a lack of high-income earning opportunities and dependence on natural resources (CPAN, 2021). Those engaged in wage labour, charcoal burning and firewood or reed collection, fishing and farming, and some beer brewing and selling are more likely to live in extreme poverty. Such livelihoods are threatened by environmental challenges including declining soil fertility; increasing rainfall variability; declining fish stocks, river and lake levels; flooding; and deforestation. In addition, incomes from farming (the most widespread livelihood among Zambia's chronically poor) are declining because of diminishing land plots. Livestock ownership is also low limiting access to manure (to improve soil fertility), milk, cash income and savings. Others classed as destitute survive on remittances from wealthier family members, handouts or begging (ibid).

With 54.2% of Zambia's population (11.2 million people) living in rural areas in 2022 (slightly below the 58% average for sub-Saharan Africa) (World Bank, 2023f), and if rural poverty rates are assumed to have moved in line with national poverty rates since 2015, this would imply 87% (some 9.7 million people) of the rural population living in extreme poverty as of 2023.⁴

5. Energy access

Background

Zambia has 2,800 MW of installed electricity generation capacity, 85% of which is hydro based (USAID, 2023). This includes hydro (2,393 MW); coal (333 MW); thermal/diesel (122 MW); thermal/HFO (91 MW) and solar (91 MW) (ibid). The Zambian Government is addressing growing electricity demand by building new hydropower plants and increasing the capacity of existing ones (largely through public-private partnerships) (EPPSA, 2022). It has also sought to diversify energy supply since the mid 2010s. Zambia has great potential for solar power through both solar photovoltaic (PV) and thermal generation, with over 3,000 sunshine hours annually. The country also has vast undeveloped wind, geothermal, and uranium power (ibid).

Zambia's off-grid solar market has grown in recent years due to regulatory reforms enabling greater private sector investment (GOGLA, 2021). Rural areas have a higher concentration of off-grid solar devices: 87.2% of rural households who have access use it as their primary source of energy. Solar lanterns are the most popular off-grid solution, followed by rechargeable batteries and standalone systems. A high number of un-electrified households means that there is significant market opportunity for off-grid solutions, estimated at US\$234 million. However, the relatively small size of the market currently and poor affordability among end-users remain barriers to investment (ibid).

Key policies and programmes

The Zambian government has an official target of achieving universal electricity access by 2030 (GOGLA, 2021). Clean cooking has played only a minor role in Zambia's energy policies and strategies and there are currently no coherent targets to increase access to clean cooking specifically (MECS, 2022). However, interest has increased in recent years in response to growing forest degradation and deforestation and the government is working to establish a national clean cooking committee within the Ministry of Energy (ibid).

Key energy policies include:

Rural Electrification Act (2003, updated 2023): established the Rural Electrification Authority (REA) to increase access to electricity in rural areas from 3% to 51% by the year 2030, primarily through installation of solar systems and grid extension (GOGLA, 2021)

Rural Electrification Master Plan (REMP): this plan also guides the REA. It has identified 1,217 rural growth centres as targets for electrification from 2008 to 2030.

The Renewable Energy Feed-In Tariff Strategy (REFIT): introduced in 2017 to accelerate investment in small-and-medium-sized renewable energy projects up to 20 MW.

The National Energy Policy 2019: introduced by the Ministry of Energy with support from the European Union to promote scale up of clean energy technologies and construct solar home systems and mini-grids between 2020 to 2025 (ibid).

Sector support programmes include:

- **The Africa Clean Energy Technical Assistance Facility (ACE-TAF):** an FCDO funded programme to support private sector delivery of energy access through stand-alone solar systems (GOGLA, 2021).
- **Energy Access Explorer (EAE):** an online, open-source, geospatial platform launched in 2021 to enable integrated energy planning and identify high priority areas where access can be expanded.
- **The Mobilising Renewable Energy Investments Programme:** supports investment in decentralized energy projects by improving access to finance and supporting industry associations and regulation for private investment.
- **USAID's Southern Africa Energy Programme (SAEP):** a regional geospatial model to advance energy policy and regulatory reform and investment in power generation and electricity access (ibid).

Energy access levels

As of 2021, 46.7% of people in Zambia had access to electricity and 10% of people had access to clean cooking (IEA et al, 2023). Progress in electricity access since 2017, when it stood at 40.3%, is in line with the average for sub-Saharan Africa (ESMAP, 2023). Access to clean cooking has actually declined since 2015 when it was 14.1% (ibid). Energy access is also regionally uneven, with 89% of urban, but only 15% of rural, residents having access to electricity in 2021 (IEA et al, 2023). Similarly, 20% of urban dwellers, but only 2% of rural residents, had access to clean cooking (ibid).

When people were asked, as part of the World Bank's (2023c) Multi-Tier Framework energy access diagnostic survey carried out in 2017, what access they had to energy, only 32% of people in extreme poverty (compared with 56% of the rest of the population) had a grid connection (see Fig 2).⁵ Use of off-grid electricity was low, with only 3% of people living in extreme poverty, and 1% of the rest of the population relying on off-grid solutions (mainly solar lanterns). A further 12% of people living in extreme poverty used dry cell batteries. We

estimate that 66% of those living in extreme poverty, had no effective modern electricity access (MTF tier 1 or higher), compared to 44% of people who had higher incomes.⁶

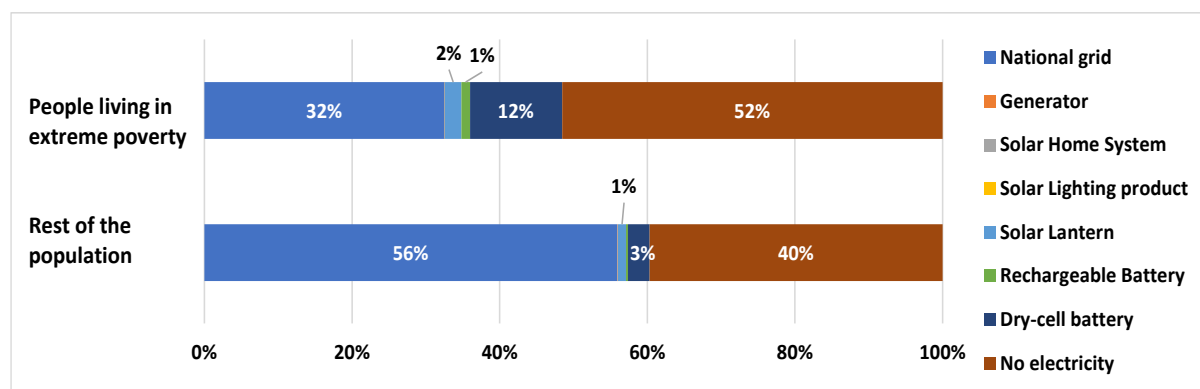


Figure 2: Electricity access by technology (based on data from World Bank, 2023c)

Based on the 46.7% general level of electricity access in 2021, reported through the SDG7 tracking process (IEA et al, 2023), and if it is assumed that the ratio between lack of access among people living in extreme poverty and the whole population remains as estimated from the MTF survey data (ie 66% vs 60%), the percentage of people living in extreme poverty in Zambia who lack electricity access can be estimated at 58%, 7.6 million people.

About 13% of people living in extreme poverty, compared with 31% of those not living in extreme poverty, were using stoves fuelled by clean energy (predominantly electricity) for cooking when the MTF survey was carried out (see Fig. 3). Very few (<1%) people living in extreme poverty, or the rest of the population, were cooking with LPG or using an improved cookstove. Most people living in extreme poverty, and the rest of the population, (73% and 67% respectively) were cooking on a 3-stone fire or a traditional manufactured stove. Of the 15% of people living in extreme poverty who used another form of cookstove, almost all reported cooking with firewood.

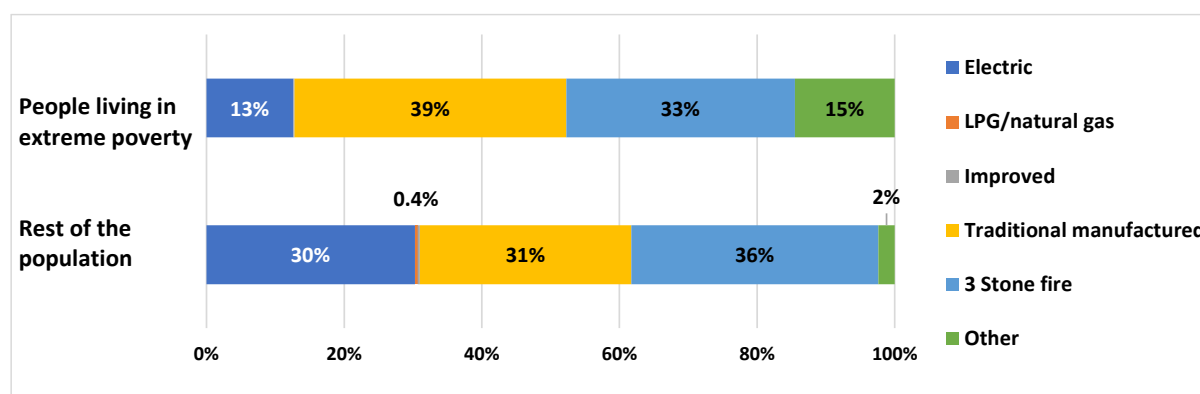


Figure 3: Cooking by type of stove (based on data from World Bank, 2023c)

Based on the 10% national level of clean cooking energy access in 2021, reported through the SDG7 tracking process (ibid), and assuming that the ratio between lack of access among people living in extreme poverty and among the whole population remains as estimated from the MTF survey data (ie 87% vs 83%), it can be estimated that 95% of people living in extreme poverty in Zambia, 12.3 million people, lack access to clean energy for cooking.

Energy access levels in rural areas

In 2021, 14.5% of Zambia's rural population had access to electricity (World Bank, 2023d), with access having risen from ~4% between 2014 to 14% in 2017 and then stagnated (ibid). In 2021, only 2.2% of people in rural areas had access to clean cooking (World Bank, 2023e), with access having stalled at just over 2% since 2012 (ibid).

From the MTF surveys in 2017, less than 4% of people living in extreme poverty in rural areas (and only 8% of the rest of the rural population) were connected to the grid. Off-grid access was utilized by 5% of people living in extreme poverty in rural regions (compared to 3% of the rest of the rural population). Overall, we estimate that 93% of people living in extreme poverty,⁷ and 90% of people on higher incomes,⁸ in rural areas had no effective modern electricity access.

The 2017 MTF survey data also indicated that only 1.7% of people living in extreme poverty in rural areas had access to stoves burning clean fuels (compared to 4.5% of better-off people). Most households continued to depend on traditional biomass to meet energy needs. However, biomass resources are often overexploited for rural use and supply to urban areas, resulting in forest degradation around major cities (Kachapula-Mudenda et al, 2018).

Based on the 14.5% general level of electricity access in rural areas in 2021 reported through the SDG7 tracking process (IEA et al 2023), and assuming that the ratio between lack of access among people living in extreme poverty and the whole population remains as estimated from the MTF survey data (ie 93.1% vs 92.6%), the percentage of people living in extreme poverty in rural areas in Zambia who lack electricity access can be estimated at 85.9%, 8.3 million people.

Similarly, based on the 2.2% general level of clean cooking energy access in rural areas in 2021 reported through the SDG7 tracking process (ibid), and assuming that the ratio between lack of access among people living in extreme poverty and among the whole population remains as estimated from the MTF survey data (ie 98.3% vs 98.1%), the percentage of people living in extreme poverty who lack access to clean energy for cooking in rural areas in Zambia can be estimated at 98%, 9.5 million people.

6. Energy needs of people living in extreme poverty

There is limited evidence to indicate to what extent the energy needs of those living in extreme poverty correspond with or differ from those of the wider population in Zambia.

As part of the 2017 MTF survey (World Bank, 2023c), people in Zambia who used off-grid solar were asked about electrical appliances they would like to be able to use (see Fig. 4).⁹ Some 45% of people living in extreme poverty (compared with ~17% among the rest of the population) who were asked expressed a need for additional appliances.

Radios were most desired by people living in extreme poverty (but none of the rest of the population), followed by televisions. Refrigerators were another priority for people living in extreme poverty, as well as computers or tablets and fans. A variety of other needs, notably electric stoves, kettles and inverters, were also identified by people living in extreme poverty.

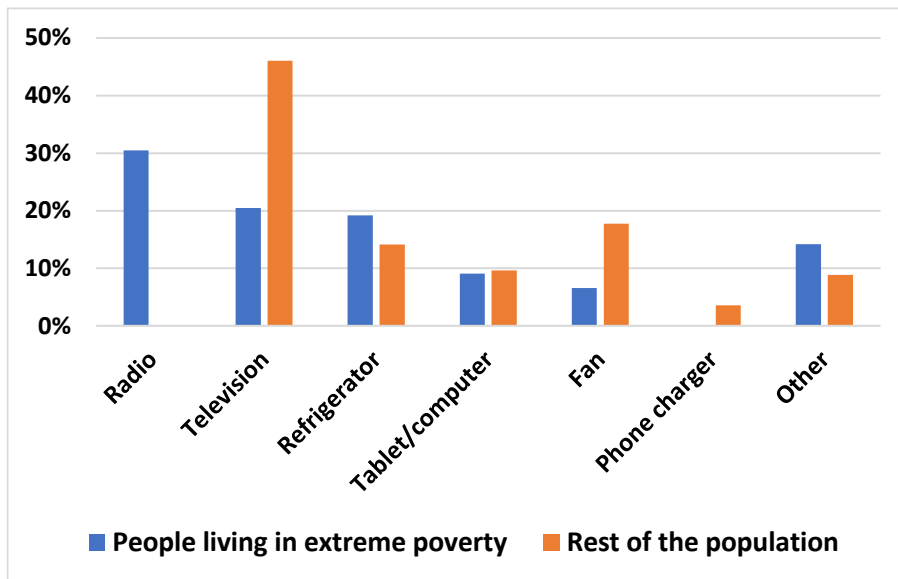


Figure 4: Additional appliances wanted (based on data from World Bank, 2023c)

There thus appear to be differences between the priorities of people living in extreme poverty and the rest of the population. However, when, for example, people living above the extreme poverty line express no interest in radios, it may be because they already have radios or because they feel able to aspire to having televisions. We also do not know whether people did not have appliances because their energy supply could not support them, or because they could not afford the appliances themselves.

Energy needs of people living in extreme poverty in rural areas

A range of energy needs are evident in rural Zambia, centring around household, productive and communal activities. Phiri (2017) reports that electricity is mainly used at household level. Lighting is vital to improving wellbeing and safety, as well as study conditions for children. Reliance on traditional biomass (firewood and charcoal) for cooking is high, so clean alternatives are needed to reduce indoor-air pollution, drudgery and time poverty (especially for women and girls) and deforestation. Electrification programmes can, however, disadvantage low-income groups who are often dependent on selling charcoal, candles and firewood for income (Phiri, 2017).

Two thirds of Zambia’s population depend on rainfed agriculture, making them vulnerable to changes in rainfall caused by climate variability and change (Oxfam, 2021). Productive uses of energy, such as water pumping, agro-processing and cold storage, are needed to improve incomes and resilience to environmental challenges and to reduce drudgery from manual activities. Productive uses of electricity in rural areas are limited and mainly constrained to lighting for extension of working hours for shops and bars (Phiri, 2017). More such uses need to be made available and affordable to low-income households, as part of broader programmes of leading to more remunerative forms of employment (ibid).

Electricity access is also needed to improve the provision of communal services such as health, education, informational and communication and transportation in rural areas. Electrifying communal services has wide ranging benefits, for example, improving retention of health and educational staff, as well as outcomes, in rural areas (Phiri, 2017).

The energy needs identified for rural areas of Zambia thus reflect those found in rural parts of developing countries across sub-Saharan Africa (and other regions).

7. Affordability, willingness to pay and other barriers

People in Zambia were asked, as part of the MTF energy access diagnostic survey carried out in 2017, about their willingness to pay for energy access (World Bank, 2023c).

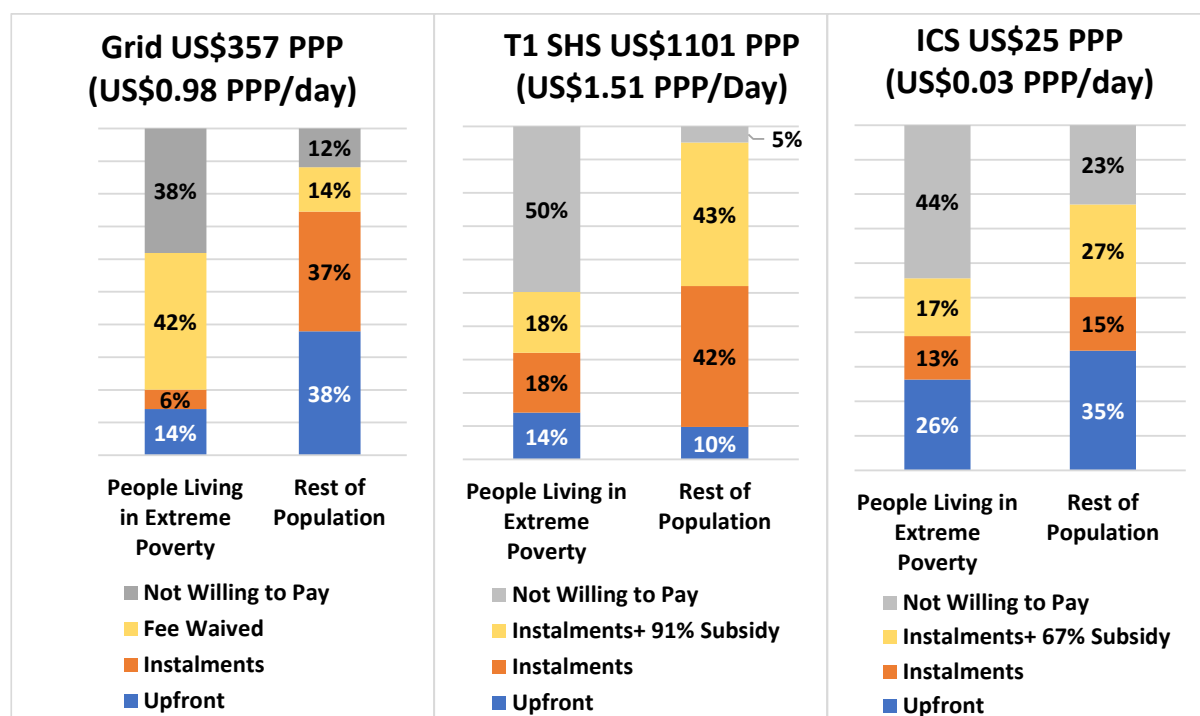


Figure 5: Willingness to pay for grid connection, solar home system or improved cookstove (based on data from World Bank, 2023c)

Some people living in extreme poverty were willing to pay upfront for each of a grid connection, solar home system or (basic) improved cookstove, despite the relatively high cost of grid connection and solar systems (see Fig. 5).¹⁰ However, willingness to pay upfront was lower among people living in extreme poverty than among the rest of the population.

The option to pay in instalments significantly increased willingness to pay for energy access among people living in extreme poverty, though to a lesser degree (at least for electricity) than for the rest of the population. Waiving the fee for grid connection and subsidizing the cost of a solar home system or improved cookstove further increased percentages of people willing to pay, but left willingness among people living in extreme poverty lagging the rest of the population. A significant proportion (38% - 50%) of people living in extreme poverty remained unwilling to pay even on these terms.

A small number (<1%) of people in extreme poverty who had no grid connection were waiting to be connected (see Fig. 6). A significant percentage (40%) could not connect to the grid because of distance. However, it was the cost of connection which formed the main barrier to connection for the highest single percentage (46%) of people living in extreme poverty. (Ongoing electricity costs were the barrier for less than 1% of respondents.)

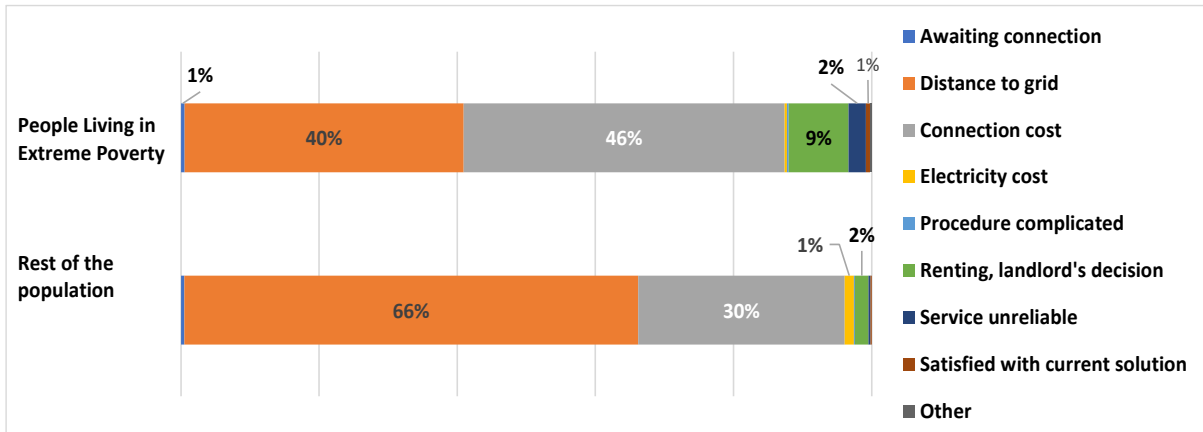


Figure 6: Barriers to grid connection (based on data from World Bank, 2023c)

Only a small percentage of those living in extreme poverty who were unwilling to connect to the grid said it was because of the connection cost, but a very high percentage (~85%) said they could not afford the costs of wiring their house (see Fig 7). The majority (90% and 64% respectively) of those living in extreme poverty who were unwilling to pay for a solar home system or improved cookstove also said it was because of the cost.

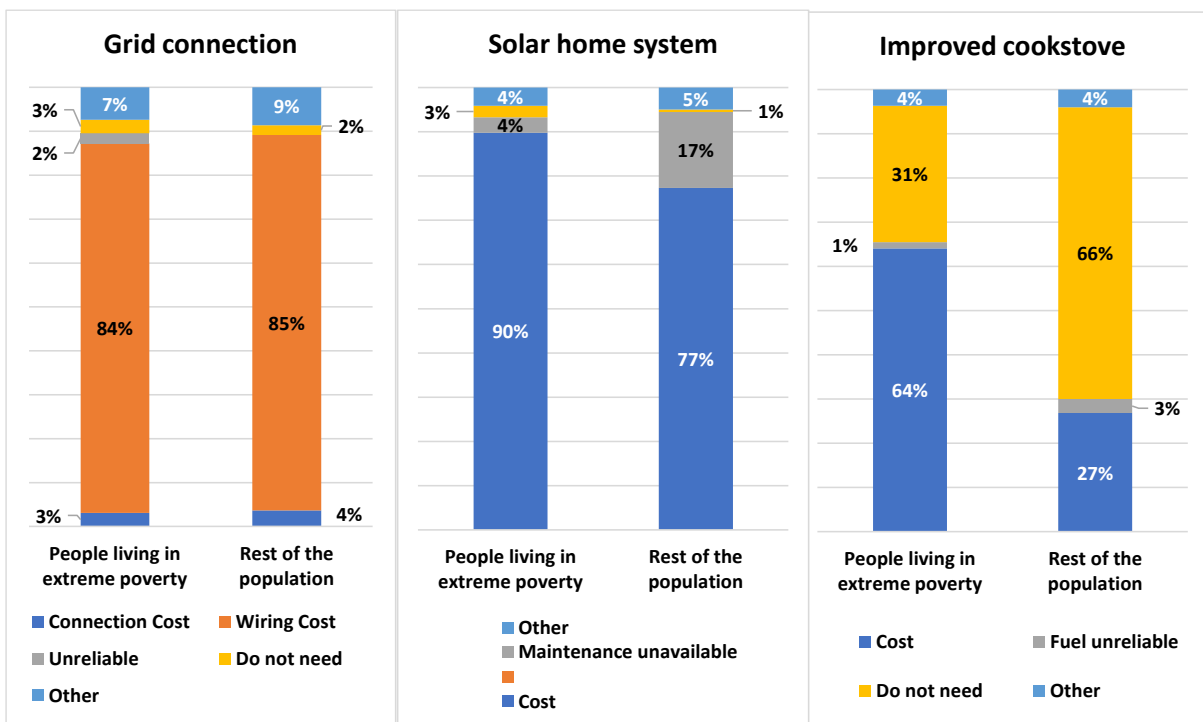


Figure 7: Reasons for unwillingness to pay for grid connection, solar home system, and improved cookstove (based on World Bank, 2023c)

The main barrier to grid connection, other than cost and distance, for people living in extreme poverty (particularly in urban areas), was the need to have their landlord's agreement (see Fig 6). (Very few people saw the application process as a barrier).

Only 2% of people living in extreme poverty did not want to connect to the grid because it was unreliable, and a similar percentage gave this as the reason they would not pay for a grid connection (see Figs. 6 and 7). Low availability of maintenance services was the reason ~4%

of people living in extreme poverty (and a significantly higher percentage of the rest of the population) were unwilling to pay for a solar home system, and unreliable fuel supplies were the issue for ~1% of those unwilling to pay for an improved cookstove.

Only ~1% those living in extreme poverty said they did not have a grid connection because they did not need one (see Fig 6), and only ~2-3% who were unwilling to pay for a grid connection or a SHS, said it was because they did not need electricity (see Fig. 7). However, ~31% of people living in extreme poverty who were unwilling to pay for an improved cookstove, said they did not need one.

Barriers to energy access in rural areas

The cost of extending the grid to rural areas in Zambia is high due to difficult terrain and the dispersed and remote nature of rural populations (Kachapulula-Mudenda et al, 2018). Oxfam (2021) reported that grid-scale projects, such as new hydropower plants, would take over 10 years to reach rural communities and are estimated to cost \$2,000 per connection. Efforts to extend the grid have also been hindered by weak generation, transmission and distribution infrastructure (Kachapulula-Mudenda et al, 2018). Heavy reliance on hydropower and increasingly frequent and severe droughts have made power cuts a regular occurrence for those in rural areas who have a connection. This is likely to worsen with ongoing climate change. Meanwhile, despite recent growth (see section 4) the off-grid solar market remains small (ibid).

The limited extent of the grid system mitigates against adoption of energy appliances in rural areas (where the MTF survey found only 2% of households using electric stoves, compared with 16% nationally). Poor quality of electricity supply (worsened by overreliance on hydropower affected by delayed rainfall); suppliers' limited access to financing (including climate and carbon finance options); lack of alternative livelihoods for those involved in charcoal production; lack of after-sales services and limited availability of replacement parts as these are imported; and limited quality control due to a lack of e-cooking standards, all hamper access for those within reach of the grid system.

Awareness, misconceptions, and negative experiences have lowered willingness to adopt modern energy in rural areas (Kachapula-Mudenda et al, 2018). These barriers have persisted due to poor communication of the benefits and functional characteristics of modern technologies within national strategies. This has been made worse by lower access to digital media and levels of literacy among rural households (English is the official language of Zambia and the primary language used in marketing of energy products) (ibid).

Demand-side barriers to clean cooking, and e-cooking specifically, in Zambia (including in rural areas) are significant and include low awareness of technologies; low awareness and lack of training around energy efficiency and technologies' short and long-term costs; and reluctance to adopt e-cooking because of unreliable electricity supply (MECS, 2022). In addition to a lack of clear policies and targets, the enabling environment for e-cooking is also hindered by a perception among policymakers that this will burden the national grid (based on the inefficiency of some, but not all, cookstoves currently in use) (ibid). Other clean cooking options, which might be viable for urban areas remain largely unknown in rural areas of Zambia, with no use of LPG or biogas reported (Luzi et al, 2019), in part perhaps because electricity is seen as the aspirational clean cooking option.

The ability to address barriers to energy access in Zambia is hindered by limited information on household energy use, including knowledge, perception and attitudes (Kachapula-Mudenda et al, 2018).

8. Factors limiting market mechanism reach

Market mechanisms are intended to overcome affordability, and potentially other barriers, to energy access. However, certain factors may affect the capacity of those in extreme poverty to take up mechanism support (i.e. mechanism's reach to these groups).

Experience with financial support in general

People's experience with financial support is likely to influence willingness or ability to use market mechanisms for energy access. Some 24% of Zambia's adult population, but only 16% of those in the poorest 40%, had an account with a formal financial institution in 2021 (World Bank, 2023g). For the population as a whole, account ownership was lower in rural areas (16% of adults) compared to urban areas (34%). The World Bank's Findex Database shows that barriers to account ownership included distance from financial institutions (affecting 31% of survey respondents); financial services being too expensive (28%); having insufficient funds (69%); lack of necessary documentation (25%); lack of trust in financial institutions (11%); religious reasons (7%); or because someone in the family already has an account (5%) (ibid).¹¹ Those living in extreme poverty are likely to be more affected by key barriers to financial inclusion affecting the whole population including high cost of financial services and having insufficient funds to open accounts. Those living in rural areas are also likely to be more affected by distance from financial services given their lower prevalence. Limited experience with financial support in general may limit willingness or ability to use market mechanisms.

General and financial literacy

General and financial literacy are likely to affect the extent to which people in extreme poverty can understand and derive benefit from market mechanisms. Zambia has a relatively high national literacy rate at 85.12% of the adult population in 2023 compared to a global average of 86.9% (wisevote, 2023). Financial literacy is also higher than other countries reviewed in this series at 40% of the adult population in 2014 (S&P, 2014).¹² However, barriers to formal education affect those in extreme poverty to a greater extent than the wider population (Global Citizen, 2020). There is evidence that access to education is lower in rural parts of Zambia than in urban areas suggesting that this challenge is more severe for rural populations (Room to read, 2023). This suggests that understanding of market mechanisms is likely to be lower for this groups, necessitating additional support.

Experience borrowing from financial institutions

Experience borrowing from formal financial institutions may affect people's willingness to engage with market mechanisms. The World Bank (2023g) reports that only 6% of adults in the poorest 40% of the population had borrowed money from a financial institution or using a mobile money account in 2021. A higher proportion (36%) had borrowed from family or friends. For the population as a whole, borrowing from a financial institution or using mobile money was lower in rural areas (9%) than in urban areas (22%) in 2021 (ibid). Limited engagement with financial institutions, either saving or borrowing with them, will mean that people are less likely to have credit histories or records of regular savings, potentially hindering the implementation of business models involving repayments. It may also create reluctance to engage with mechanisms where borrowing is involved. This challenge is likely to be especially severe for those in rural areas where borrowing is lower, likely reflecting the lower penetration of financial institutions and mobile money.

PAYGo infrastructure

PAYGo mechanisms typically involve payment via mobile credit (by sending a text message) (IRENA, 2020). Therefore, their reach is primarily dependent on mobile phone ownership and network coverage. Mobile money account ownership may also influence the ease in which customers can engage with this mechanism (ibid). Around 93% of the population were covered by at least a 2G network in 2019 (mAccess, 2023) and 62% of adults owned a mobile phone in 2021 (World Bank, 2023g). Only 24% of adults in the poorest 40% of the population had a mobile money account in 2021. For the whole population, account ownership was lower in rural areas (31% of adults) compared to urban areas (55%) (ibid). This suggests a more challenging environment to increase uptake of PAYGo for people living in extreme poverty, especially those in rural areas.

9. Key findings and conclusions

- **People living in extreme poverty in Zambia have significantly lower levels of energy access than the rest of the population.** We estimate that ~58%, some 7.6 million, of people living in extreme poverty have no effective access to electricity and ~95%, some 12.3 million, have no access to clean energy for cooking. **Financial support is likely to be needed if people living in extreme poverty are not to be left behind.**
- **People living in extreme poverty in rural Zambia have only marginally lower levels of energy access than rural households with higher incomes.** This reflects very low levels of energy access overall in rural areas, driven by high reliance on grid electricity (which does not extend to rural areas) and undeveloped off-grid markets.
- **Cost (including wiring costs) is the main reported obstacle to grid connection and adoption of solar home systems and clean cookstoves by people living in extreme poverty in Zambia.** Market mechanisms which address affordability thus have the potential to enable a significant proportion of those living in extreme poverty to achieve access.
- **Willingness to pay for energy access is generally lower among people living in extreme poverty than among the rest of the population in Zambia. The option to pay in instalments, and subsidies, increase willingness to pay** but still leave gaps between those living in extreme poverty and the rest of the population.
- **Between 38% and 50% (depending on the technology) of people living in extreme poverty in Zambia remain unwilling to pay for energy even in instalments and with subsidies.** Cost is the reason given for this unwillingness, indicating that higher levels of financial support may be needed, as well as other barriers overcome, if they are to be reached.
- **Almost a third of people living in extreme poverty in Zambia who would not buy an improved cookstove say it is because they do not see it as necessary** - market mechanisms supporting modern energy access for cooking will need to be accompanied by awareness campaigns if they are to be successful.

- **Reliance on their landlords presents a barrier to electricity access for nearly a third of those living in extreme poverty in urban areas**, so market mechanisms which incentivise landlords could bring benefits.
- **Markets for off-grid electricity and clean cooking options such as LPG or biogas, (alongside electric cooking) will need development and support** if people in rural areas of Zambia are to gain access to electricity and clean cooking.
- **Those living in extreme poverty in Zambia, especially those in rural areas, are more affected by factors likely to limit market mechanism reach than the rest of the population.** More support to improve awareness and understanding around market mechanisms for these groups is needed.

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11. Endnotes

¹ The other reviews in this series are of Ethiopia, Kenya, Nepal, Nigeria and Rwanda

² Defined by the World Bank as those living on less than US\$2.15 per day at 2017 purchasing power parity (PPP) <https://www.worldbank.org/en/news/factsheet/2022/05/02/fact-sheet-an-adjustment-to-global-poverty-lines>

³ We had previously estimated, based on regional movements in poverty rates between 2015 and 2019, an extreme poverty rate for Zambia 57.7% in 2023, and it is this figure which has been used to estimate numbers of people living in extreme poverty without energy access across sub-Saharan Africa and Indo-Pacific.

⁴ Estimated rural extreme poverty rate = $84\% \times 63.4\% / 61.4\% = 87\%$

⁵ We re-analysed data from this survey, available from the [World Bank Data Catalogue](#) to compare the responses given by people living in extreme poverty with responses from others, living above the extreme poverty line.

⁶ We estimate, from figures in the Zambia Beyond Connections: Energy Access Diagnostic Report that 0.5% of grid connections and 40% of off-grid solutions in Zambia did not achieve tier 1 electricity access.

⁷ We estimate, from figures in the Zambia Beyond Connections: Energy Access Diagnostic Report (Luzi et al, 2019) that 0.5% of grid connections and 40% of off-grid solutions in Zambia did not achieve tier 1 electricity access.

⁸ At just over 8% of the rural population as a whole having access it is a significantly lower level of access than that reported under the SDG7 tracking process (World Bank, 2023), but close to the figure of 91.3% rural residents having no or Tier 0 access given in the Zambia Beyond Connections: Energy Access Diagnostic Report (Luzi et al, 2019)

⁹ This question was only asked of people who used solar devices, a small sub-set of those who had electricity access.

¹⁰ It is recognized that responses given regarding willingness-to-pay cannot be taken entirely at face value, and so percentages of people saying they would be willing to pay at a particular price point may not be entirely realistic. However broad inferences may be drawn from the overall pattern of responses.

¹¹ The World Bank surveyed approximately 1,000 people in each of more than 160 countries included in the Findex Database, using a randomly selected, nationally representative sampling method.

¹² S&P's Global Financial Literacy Survey measured the concept in terms of understanding of four key elements of financial decision making: risk diversification, inflation, numeracy and compound interest. A person was considered financially literate if they could answer 3 out of 4 questions related to these topics correctly.