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Supplementary material for this article is available [online](#)

Abstract

Uganda's rapid urbanisation poses service delivery challenges, particularly to the poorest neighbourhoods which are home to over half of the urban population. Only 63% of urban households have access to grid-electricity, and access deficits are most felt in slums despite their proximity to the grid. This study investigated the electricity access challenge in Uganda's slums and the socio-political issues that shape access, from the perspective of multiple stakeholders. Using mixed methods, eight semi-structured interviews were conducted with key stakeholders and surveys (N = 35) conducted in Nakulabye slum, Kampala. The supply-side barriers identified were low consumption loads in households which makes electricity provision financially unviable for the utility, insecure land tenure and inadequate housing which present practical and safety barriers. High costs and tariffs constrain access, as does poor quality and unreliable supply, and inadequate infrastructure. Regardless, households use electricity beyond simply lighting and phone charging, and a variety of businesses in the slum rely on electricity. The interviews revealed tensions in the priorities of different stakeholder groups, with the regulator striving to balance the interests of the utility, policymakers, and end-users. Wider issues emerged as the politicization of service delivery, limited data and capacity of city councils, and influences from external actors and events. Understanding local contexts is crucial, because prevailing policy regimes and socio-political environments either stifle or foster electricity access for low-income groups. The energy injustices and access deficits were acknowledged by all respondents, but there were differences in opinion regarding the root causes of the challenge, which could have negative implications for solution-finding efforts. Generally, the extent of the challenges faced is unknown outside the slum communities, and future work could explore the lived experiences of electricity access, to inform equitable electricity provision.

1. Background

On 23rd May 2019, Uganda's largest electricity distribution utility, Umeme Ltd, disconnected grid supply from over 10,000 residents of Kasokoso slum, one of the largest and most populous slums in Kampala. A local radio station reporting on the incident that evening said that the disconnections followed reports of 'power theft and illegal connections' that had reportedly put residents' lives in danger (Capital FM 2019). According to the utility, 90% of the electricity dispatched to the slum was being lost to 'power theft', which also overloaded and damaged infrastructure. The mass disconnection created total darkness and fear of increased insecurity in the slum prompted dialogue between the community, utility, local leaders, and security personnel towards regularising electricity connections in the slum. Only six years prior, the same slum broke into violent riots, protesting a proposal to evict and relocate the slum to make way for an upscale housing estate and residential apartments

(Dobson *et al* 2014). Such incidents are common in Uganda's capital Kampala and other cities, and they will only worsen as the country rapidly urbanises.

Uganda is still a majorly rural country by population (only 23% of the population lives in urban areas), but it is urbanising at a fast rate, with the urban population increasing by 300,000 people every year (Uganda Bureau of Statistics 2016). However, the capacity and resources of municipal governments and city councils have lagged this rapid urban growth, creating deficits in services and infrastructure provision, and worsening inequalities, urban poverty, and slum incidence. Kampala's 60+ slums are home to over half a million people (Actogether Uganda 2014), but they occupy only a quarter of the total city area (World Bank 2017) and are dispersed across the city, often located in flood-prone areas, road and railway reserves, or vacant undeveloped land. As such, most slums are under constant threat of eviction, are vulnerable to climate change risks and disasters, and are not serviced in any meaningful way by city councils and utilities.

As many countries emerge from and manage the shocks of the Covid-19 pandemic, urban areas across the world - which were hit the most - are scrambling to 'build back better', by adapting and fortifying infrastructure and service provision to their most vulnerable populations (UN-Habitat 2020). The 17th edition of the Uganda Economic Update (World Bank 2021) released in 2021 noted that the economy sharply shrunk to its slowest pace in three decades, and the closure of small businesses and the urban informal economy sent millions more people engaged or employed in these sectors into poverty. Early evidence (Ministry of Finance Planning and Economic Development 2020) suggests that the energy sector too was severely impacted—electrification projects stalled, revenue collections and demand for electricity decreased, and utilities' operating costs increased. These impacts will be most felt by slum dwellers whose livelihoods depend on the informal economy, and who were, in any case already facing barriers to accessing electricity even before the pandemic. Electricity in Uganda's cities is delivered by private utilities, with the tariffs being one of the highest in the region (\$20 cents kWh⁻¹ for domestic consumption).

Therefore, there is an urgent need now to examine the electricity access dynamics in Uganda's slums, from the perspective of key stakeholder groups, including those outside the slums who influence electricity provision to these communities. The opinions, interests, and experiences of certain stakeholder groups e.g., utilities, NGOs working in slums, researchers, policymakers, development partners and funders are important to capture because their outlook and the decisions they make impact on the energy experiences of slum communities. Of course, the lived experiences of slum communities are also of utmost importance, as has been demonstrated by many studies done elsewhere (Lipu and Bhuiyan 2014, de Bercegol and Monstadt 2018, Sheridan *et al* 2020, Mensah and Birch 2021, Sebbanja and Santpoort 2021, Twinomuhangi *et al* 2021). However, in order to better contextualise the electricity access challenge in Uganda's slums, this study also sought the perspectives of other stakeholder groups who directly or indirectly influence electricity provision to slum communities.

The aim of the study was to gain a better understanding of the electricity access challenge in Uganda's slums by drawing on the perspectives and experiences of key stakeholders, to situate electricity provision and access in the prevailing policy and socio-political environment, identify the tensions and contextual issues that shape electricity access, and identify any data and information gaps. The intention is for this research to inform interventions targeted at slum dwellers which are affordable, acceptable, and scalable.

In the sections that follow, the paper gives a brief overview of energy access in slums before presenting the theoretical gaps and opportunities for research. Next, the methods used are discussed and the results discussed thereafter. The article concludes with recommendations and suggestions for future work.

2. Energy access in slums

By 2020, 63% of urban households in Uganda used the main grid as their main source of electricity and 15% used off-grid sources (mini-grid generators, solar home systems, solar lighting systems and lanterns, and rechargeable batteries) (Uganda Bureau of Statistics 2020). 22% of urban households had no electricity supply, and these are more likely to be in low-income neighbourhoods given that access in poor urban communities and informal settlements is still limited and challenging (Murengezi 2009). In the slum settlements sampled for the national slum upgrading strategy and action plan (MoLHUD 2008), nearly all households (96.3%) used wood fuels to cook and only 35.8% of the households had access to electricity. Considered from the multi-tier framework definitions (The World Bank 2015), these estimates for electricity access could be lower, given that some households access electricity through informal connections and the quality of these connections is not known. One study in Mathare slums, Nairobi, Kenya (Kovacic *et al* 2019) found that although 93% of sampled households were connected to grid electricity, over half of them were informal connections. Currently, the state of electricity access in slums—how many households are connected (formally or informally), the quality of supply, barriers to access, the access challenges faced—is not known. Similarly, the perspectives of key actors who influence electricity access and provision to slums and urban areas are not known - specifically considering

the social, economic, and political context within which electricity is provided and accessed by the urban poor. Most of the available data and information are outdated or missing in crucial details that would be essential for strategizing and planning for slums. For instance, the current slum upgrading action plan was released in 2008 in response to Target 11 of Millennium Development Goal 7 (United Nations 2000) and it has not been updated since. These gaps impede evidence-based decision making and service provision to slums.

As with most other services (Caprotti *et al* 2022, Munro 2020), slums are located in close proximity to the electricity grid or sometimes literally ‘under the grid’, but electricity access in these settlements is constrained by demand-side and supply-side factors. Contentious land ownership and shanty dwellings have negative implications for service delivery, as do cost-related barriers. Large scale service delivery to slums requires heavy infrastructure investments, which only a few private sector players with enough capital and funds can mobilise. If not well regulated, this can create monopoly utilities that price the poor out of essential services or deprioritise service provision to poorer neighbourhoods (Parienté 2017). Uganda’s largest electricity utility, Umeme Ltd, is a private entity which has been operating on a 20-year concession since 2005 and is the sole electricity provider in most cities. Service provision priority maybe given to certain consumer segments or affluent urban neighbourhoods who can readily pay for the service, leaving slums with inadequate infrastructure and supply.

Slum households may not access or use electricity even when the infrastructure exists in their neighbourhood because of the high associated costs—Uganda’s electricity tariff for domestic consumption ($\$20 \text{ cents kWh}^{-1}$)³ is one of the highest in the region. In other instances, practical constraints like congestion and limited physical access into the slum, or the illegitimate status of the settlement and insecure land tenure hinder access to services (Mimmi and Ecer 2010, Broto *et al* 2017, Stellenbosch University 2021). In Enkanini settlement (Stellenbosch, South Africa), residents have waited for electricity grid connections for several years, despite the settlement bordering a wealthy neighbourhood and an industrial area, both of which are connected to grid electricity (Smit *et al* 2019). For other settlements, being connected to the grid may not guarantee access, particularly during peak periods when demand outstrips supply, electricity is rationed and preferentially supplied to affluent neighbourhoods (Rateau and Jaglin 2020). Regardless, energy access remains one of the top-priority needs in Uganda’s slums (van Leeuwen *et al* 2017, to the extent that many households and businesses in the settlements acquire informal connections to access electricity.

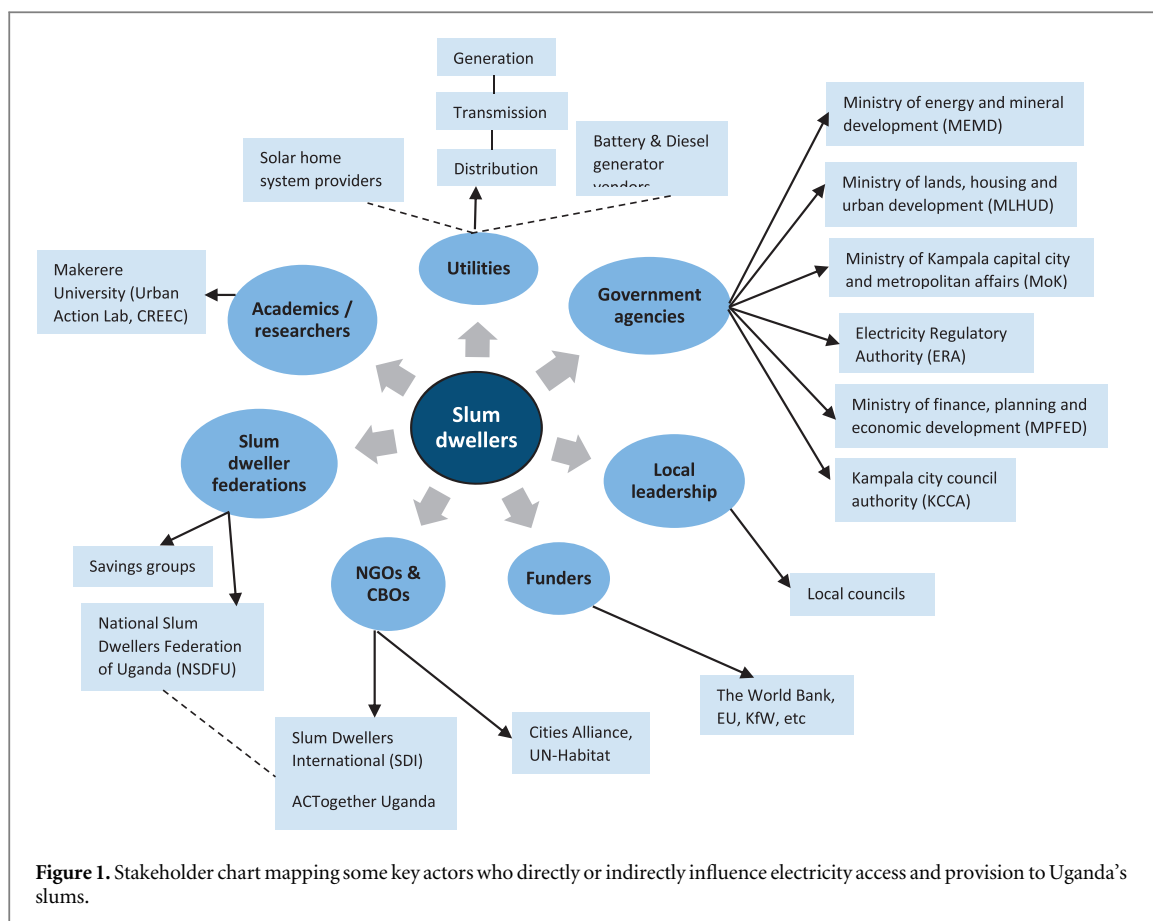
Investigating the perspectives of relevant stakeholder groups who are charged with or concerned with energy services in urban communities, will enable a better understanding of where the current delivery models fall short, how electricity provision to the urban poor fits into the prevailing policy and socio-economic environment, and how best slum communities and utilities can be supported to co-create solutions to overcome the barriers to accessing decent electricity services in slums.

3. Theoretical frameworks and opportunities for research

The challenge of electricity access in Uganda’s slums is one that spans multiple institutional arrangements and responsibilities. Firstly, it raises questions of the urban poor’s precarious citizenship in cities—where insecure land tenure and inadequate housing hinder service delivery to slums (UN-Habitat 2007, Dobson *et al* 2014, de Bercegol and Monstadt 2018, Sebbanja and Santpoort 2021). It is also about slum dwellers’ socio-economic wellbeing in general—where pervasive poverty, unemployment and subsistence livelihoods contribute to growing slum populations with low purchasing power for goods and social services including energy and electricity. Specifically for Uganda, it is also about the current energy policies and the private sector-driven electricity provision model, which underprivilege and overlook poor urban neighbourhoods. It follows that the issues of land and housing, incomes and livelihoods, and energy systems and policies are inextricably linked with each playing a key role. In addition, energy decisions made at the local level (in slum households and communities) are also shaped by exogenous actors and processes; be it through national development plans and policies, budgetary allocations and constraints, prevailing political and economic conditions, or influences from external funding and development partnerships. However, many conceptualizations of the electricity access gap in slums have not considered the influences of national and global actors, institutions, and processes on access and usage at the local level.

Some evidence (Kovacic *et al* 2016) shows that in addition to the technical and methodological aspects that impact energy access in informal settlements, epistemological uncertainty also complicates slum upgrading and electrification efforts. These uncertainties manifest as the multiple dimensions, perspectives and interpretations held by different stakeholders regarding the extent of deprivation in poor urban neighbourhoods. In *Urban Poverty in the Global South* (Mitlin and Satterthwaite 2012), Mitlin and Swatterthwaite argue that urban poverty remains grossly misdefined, underestimated, or downright ignored, summarised by the book’s first sentence,

³ Tariff for the first quarter of 2022.



'We believe that the scale and depth of urban poverty is ignored within most low-income nations, many middle-income nations and globally'. Based on experiences from setting up the African Centre for Cities at the University of Cape Town, Pieterse (2014) examines the epistemic practices and priorities of urban scholarship in Africa and emphasises the lack of accurate data and inadequate local institutional capacities needed to co-produce and 'build a knowledge edifice from the ground up'. These gaps broadly impact urban planning and service provision in southern cities, particularly in low-income communities. Similarly, they affect how the energy access challenge is perceived by whom, which slum electrification interventions are offered, how they are implemented, and ultimately what outcomes they deliver for communities. Others (Narayanan et al 2017) argue that enlisting the support and participation of ancillary stakeholders (such as NGOs, community-based organisations, and research institutions) in addition to utilities and city councils can augment bottom-up partnerships for last-mile service delivery to the urban poor. Therefore, understanding the perspectives of key actors and stakeholders is crucial to delivering equitable energy solutions to slums.

There is a need to contextualize these issues (Broto et al 2017), by drawing on theoretical frameworks that will enable the electricity access challenge to be: (1) analysed from multiple perspectives at neighbourhood, national, and international level; and (2) expose the injustices inherent in the electricity access mechanisms available to slum communities. This informed the theoretical grounding for this study which employed multi-stakeholder analysis and energy justice frameworks. Stakeholder analysis yielded the key stakeholder groups in figure 1, from which some stakeholders were selected and interviewed.

Urban inequality and service deficits in slums are often studied from a climate vulnerabilities and physical infrastructure perspective (e.g., housing, WASH, waste disposal) because these are more overt challenges (Sims 2012, Marx et al 2013, Narayanan et al 2017). But inequality is also deeply embedded in electricity access, in the existing energy systems, energy policies and energy practices, and thus far, few studies have investigated these in Uganda's slums. Some conceptual frameworks examine energy poverty using justice and capabilities approaches (Day et al 2016, Jones 2020), while others (OPHI 2018) have considered the multi-dimensionality of energy access and energy poverty (Nussbaumer et al 2012) in developing countries and resource-constrained settings. Other adaptations to these discourses (Ssennono et al 2021) have considered energy deprivations in Uganda, but these have focused on energy poverty incidence across regions and on disparities in grid electricity access between urban and rural areas. There is a need to investigate the electricity access gap in slums from an equity and justice perspective.

Sovacool *et al* (2016) liken the unequal distribution and inadequate access to modern energy services to a violation of distributive justice. Distributive justice theories argue that people are entitled to and have a right to access basic energy services that can meet at least their basic needs and allow them to enjoy a basic wellbeing (Jenkins *et al* 2018, Sovacool *et al* 2016). It considers the ways in which goods and resources are distributed among a given population and what informs this distribution, be it social class, wealth, need, merit, utility, entitlement, or right (Dobson 1998, Jones *et al* 2015). Others (Bouzarovski & Simcock 2017) use distributive justice principles to spatially examine energy injustices and vulnerabilities, and energy poverty variations within neighbourhoods, cities, countries, and regions. (Sovacool and Dworkin 2015) propose an energy justice framework that presents energy justice as a *conceptual tool*, as an *analytical tool* and as a *decision-making tool*. These tools are relevant to the electricity access challenge in slums, as they centre around energy availability, affordability, equity, governance, sustainability, etc. Follow-on work (Sovacool *et al* 2016) develops three key themes that can guide a reframing of energy decision-making from a justice perspective: (1) distribution of costs and externalities of energy systems, (2) distribution of benefits derived from energy systems, (3) representation in energy decision making processes.

Injustices must also be considered as the subtle or understated ways in which energy services are unfairly provided, in ways that can perpetuate inequality, exclusion, and marginalization (Sovacool *et al* 2017). For instance, the lack of affordable, reliable, and safe electricity affects slum dwellers' wellbeing and their ability to engage in gainful social and economic activities. Energy justice principles maintain that energy access is a basic human right that should be availed to everyone, regardless of socio-economic class, location, geopolitical influences, etc (Bradbrook and Gardam 2006, Kondongwe 2019, Löfquist 2020, Munro *et al* 2017). This is useful for understanding the demand-side aspects of electricity access such as the lived experiences, access mechanisms and costs, consumption and usage, and the risks associated with inadequate access in low-income neighbourhoods. The energy injustices in Uganda's slums manifest mostly as the inadequate access to electricity services despite the settlements' close proximity to the grid and surplus power generation, and the negative implications of this access gap on people's well-being and livelihoods. This study broadly sought to understand how electricity is provided and accessed in Uganda's slums, and how the available energy systems and policies benefit or disadvantage poor urban communities.

4. Methods

The methodology followed a mixed methods approach; qualitative data were collected through semi-structured interviews, and quantitative and qualitative data were collected using a structured survey. In terms of priority and sequencing the methods as described by Bryman (2012, p. 632) and Denscombe (2010, p. 144), the qualitative interviews were the main data-collection approach, and they were conducted before the surveys. The mixed methods approach was chosen for completeness, that is, 'to bring together a more comprehensive account of the area of enquiry' (Bryman 2012, p. 633).

4.1. Surveys

4.1.1. The case study

Nakulabye slum in Rubaga division was selected as the case study. Established as early as the 1890's and with an estimated 5,500 households, it is one of the oldest and most populous slums in Kampala. The utility incurs one of its highest non-technical energy losses here—by 2014, half the energy dispatched to the settlement was being lost to informal connections, costing the utility \$2million annually. The utility is currently piloting social initiatives in the settlement to train community members in livelihood skills, certify the *kamyufu*⁴, sensitise and improve relations with the community (Umeme Limited 2020). Access into the slum community was facilitated through a collaboration with (ACTogether Uganda 2022), a local NGO affiliated with Slum Dwellers International (Slum Dwellers International 2022), which has worked closely with slum communities in Uganda for nearly two decades. Other considerations for selection were the settlement's secure land tenure and permanence, mix of residences and businesses, and proximity to the city centre which eased access.

4.1.2. Data collection

Survey questionnaires (N = 35) were administered to 18 households and 17 small businesses in the slum. Given the small sample size, participants were selected through purposive sampling to optimizing for a balanced representation of households and businesses of varying demographics, energy profiles, size, and socio-economic standing. The characteristics of the sampled households and businesses are shown in table 1. Purposive sampling ensures that selection focuses on a small number of hand-picked participants who best fit the inclusion criteria

⁴Uncertified electricians operating in the slum, who informally connect households to the grid.

Table 1. Characteristics of the households and businesses which participated in the survey.

Characteristic		Households (N = 18)	Businesses (N = 17)
Electricity source	Grid	100%	94%
	Solar home system (N = 1)		6%
Household Size	Single occupant	11%	
	2–5 occupants	56%	
	6–10 occupants	28%	
	Over 10 occupants	6%	
Business size	Micro (1–2 employees)		88%
	Small (3–5 employees)		12%
Length of stay in the settlement	Less than 1 year	11%	6%
	2–5 years	28%	53%
	5–10 years	28%	18%
	Over 10 years	33%	24%
Home or business premises ownership	Own	33%	6%
	Rent	67%	94%
Types of businesses	Food restaurants		41%
	Grocery kiosks		35%
	Others (Casino, Carpentry, Hair salon, Electrical repairs, Tailoring, Nuts grinder*) ^a		36%

^a One food restaurant had the nuts grinding as an additional business. To showcase the wide variety of small businesses operating in the slum, we have listed it as a separate business entity.

Table 2. The stakeholders who participated in the semi-structured interviews.

Stakeholder group	Stakeholder	Description
Utilities	Umeme Limited	Uganda's largest and main electricity distribution company, currently serving over 1.5 million customers
Policy makers	Electricity Regulatory Authority (ERA)	The ERA regulates the generation, transmission, distribution, sale and import of electricity and ensures that all licensed service providers comply with licence conditions. It also sets and revises tariff structures
NGOs	Slum Dwellers International (SDI)	The SDI is a network of community-based organisations called slum dweller federations with presence in 32 countries and hundreds of cities across Africa, Asia, and Latin America
Development partners	Cities Alliance (Uganda Country Program)	Facilitates partnerships with local governments, city councils, NGOs, government agencies, and slum residents to undertake slum upgrading projects and co-develop solutions to alleviate poverty in slums
Academics and researchers	Several in Uganda, Rwanda, South Africa, and the UK	Researchers who have conducted extensive research with slums or low-income settings in Africa, and specifically on energy access

(Denscombe 2010, p. 35). ACTogether Uganda and local council leaders assisted in identifying and recruiting participants. All the households were connected to the electricity grid, and one of the businesses used an off-grid solar home system.

4.2. Semi-structured interviews

Eight semi-structured interviews were conducted with select stakeholders—see table 2, selected from the stakeholder chart in figure 1. Participants were chosen based on their experience or expertise of working in informal settlements or resource-constrained settings in low-income countries, or for their central role in enabling access to electricity access and other service provision in cities. To ensure sufficient depth and breadth of knowledge on the topic, all the participants were senior members in their organisation or institution of affiliation and had several years of working experience in energy and development. The interviews were conducted online on Zoom or Microsoft Teams and lasted between 1 and 1.5 hours. Each interview was then transcribed and coded using both inductive and deductive codes. The first-level coding resulted in 41 distinct codes which were further refined to 33 codes and then thematically analysed in NVivo and grouped into four broad themes.

Each interview followed an interview guide, with discussion topics centred around three broad themes: (1) the context within which electricity is provided to slums, (2) perception of the access challenges in slums, and (3) opportunities for intervention. The first theme sought to understand policy, socio-political, and economic environments within which electricity is provided to informal settlements. The second theme examined different stakeholder groups' perspectives on electricity access in slums, aiming to ultimately gauge their knowledge and awareness of access challenges in slums, and identify synergies or tensions in their understanding of the challenge. The last theme sought to uncover potential solutions and opportunities for intervention.

Most of the respondents had expertise and experiences outside the Ugandan setting. These were welcomed as valuable input into the discussion, often corroborating similar observed patterns in Uganda or revealing disparities between countries and regions. As each interview progressed, the details discussed often varied slightly between respondents depending on their expertise and specific experiences. This allowed respondents to speak freely, with the interviewer only stewarding the discussion, prompting for more details where required, and redirecting the conversation if it strayed.

4.3. Limitations of the methods used

One of the main preoccupations and merits of quantitative research is generalisation, in addition to measurement, causality and replication (Bryman 2012, p. 175). Generalisation ensures that the sample is representative of the study population and therefore findings can be generalised to the entire population. As this was a pilot study, the sample size of 35 surveys was significantly less than required for adequate statistical representation. The intention of the surveys was to complement the semi-structured interviews and to provide preliminary incite for a larger survey conducted later. The survey also took a case study approach by collecting data from only one out of over 60 settlements in Kampala, therefore the findings cannot be assumed generalizable for other settlements in the city. Despite this, case studies allow the use of multiple research methods and data sources, and they are a manageable way to engage with research that is socially complex and intricate (Denscombe 2010, p. 62). Lastly, we acknowledge the sensitive nature of the question on informal electricity access in the survey, responses to which cannot not be said to be completely true and accurate.

Most qualitative research is influenced by interpretivism (Bryman 2012, p. 36), from which stems its most common criticisms related to subjectivity and bias, transparency and difficulties in generalising and replicating findings. Regardless, qualitative methods are lauded for their flexibility (Mack *et al* 2005, p. 4) in allowing open-ended questions and responses and an elaborate interaction between the researcher and respondents which partly helps to mitigate the generalisation concerns. In this study, we recognise and acknowledge these shortcomings in the interview questions asked, responses received and their interpretation during data analysis. Shortcomings related to data interpretation were partly mitigated by using a two-level iterative coding process during data analysis, with duplicate and inconsistent codes eliminated before thematic grouping. We also recognise that not all stakeholders from the stakeholder map were interviewed, which limits the scope of the findings. Furthermore, the views of respondents were based on their individual expertise, experiences, and perspectives and therefore should not be generalised. Lastly, we are aware of the positionality of the researchers in both the surveys and interviews and acknowledge the bias associated with this.

5. Results and discussion

5.1. Electricity access experiences in the slum

5.1.1. Access mechanisms

Except for one business that used a solar home system, all the sampled households and businesses were connected to the grid. Majority (67%) of the households were rented, therefore the process of acquiring an electricity connection and associated fees were handled by landlords in 59% of businesses and 33% of households. Experiences of acquiring an electricity connection varied between households, but in general most found the process costly, bureaucratic, unclear, and lengthy.

5.1.2. Informal electricity access

Although almost all the sampled households were connected to the grid, 24% of these were informal connections - see figure 2. Some households did not know if their connection was formal or not, because they shared an electricity meter with other households or they paid their electricity bills to the landlord and therefore did not directly interface with the utility. Majority (80%) of the households with an informal connection did not pay connection fees, but all the businesses paid connection fees to unlicensed electricians or cartels, locally known as '*kamyufu*'. Although not captured in this study, it is common that some consumers use both connection modalities i.e., formal connection during the day and switch to an informal connection at night, to evade detection by the utility or law enforcement. It is important to note that given the sensitivity of this subject,

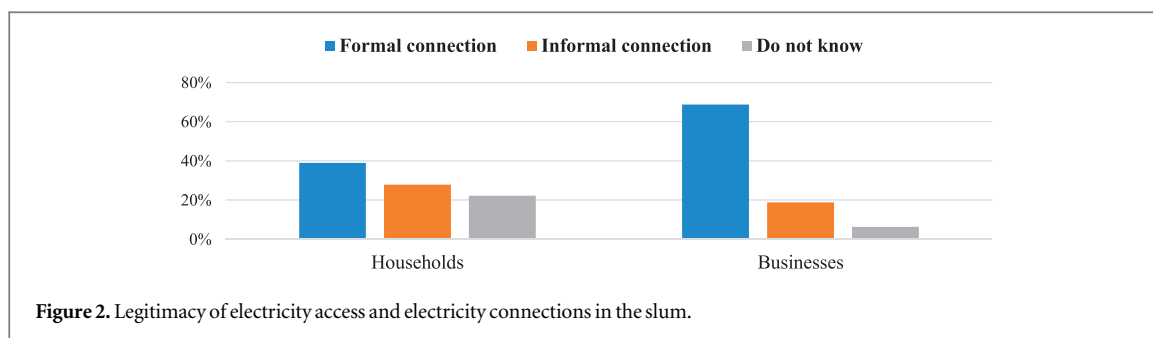


Figure 2. Legitimacy of electricity access and electricity connections in the slum.

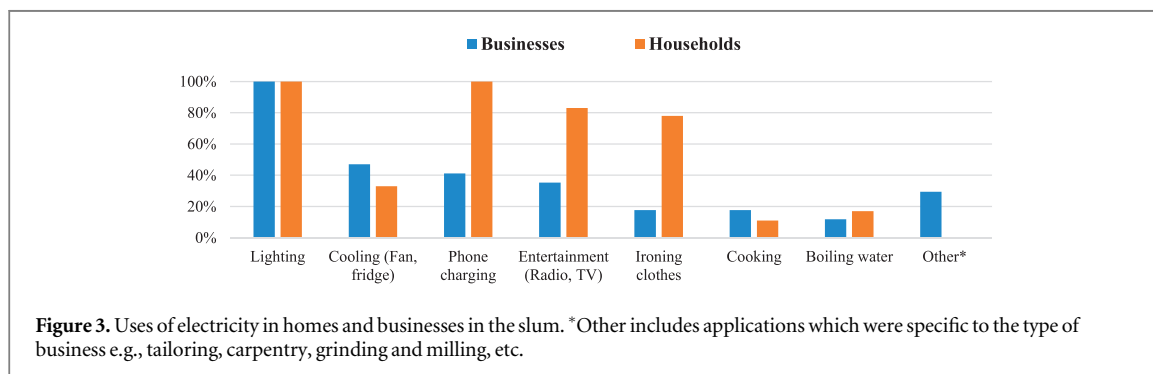


Figure 3. Uses of electricity in homes and businesses in the slum. *Other includes applications which were specific to the type of business e.g., tailoring, carpentry, grinding and milling, etc.

many households may withhold or not fully disclose this information, therefore informal access may be more prevalent than these findings reveal. Informal connections were mostly made by the consumers themselves or the landlord or the *kamyufu*⁵ by directly tapping from overhead lines, bypassing electric meters, or connecting via a neighbour.

Most used an informal connection because it was a cheaper option and for others, it was the only option provided by landlords. One business reported savings of over UGX 50,000 shillings (\$15), and another saves between UGX 10,000 and 25,000 shillings (\$3 - \$8) every month by using an informal connection. The stakeholder interviews revealed that inadequate housing and land tenure also encourage informal electricity access, which was often referred to as ‘electricity theft’ and ‘illegal connections’. This exclusionary language shows that while slum dwellers improvise and negotiate access to electricity through informal channels, these efforts are commonly perceived as illegal practice by external actors, perpetuating marginalisation.

‘These [slum dwellers] are the poor, it’s not that they don’t want to pay the bills, but they are kind of disadvantaged. As a result, they end up stealing electricity. So they’re using other forms of energy—charcoal and firewood and all that, but most of them are stealing power. Containing power theft in slums is a risky business because enforcement becomes difficult, because they’re using all sorts of rudimentary means to steal power’—Respondent 4

‘Most of those structures are illegal structures. And because they are illegal, they have not been built with any building permits, they are just illegal and substandard. The wiring is not done, and therefore the best they can do is to do illegal connections’—Respondent 5

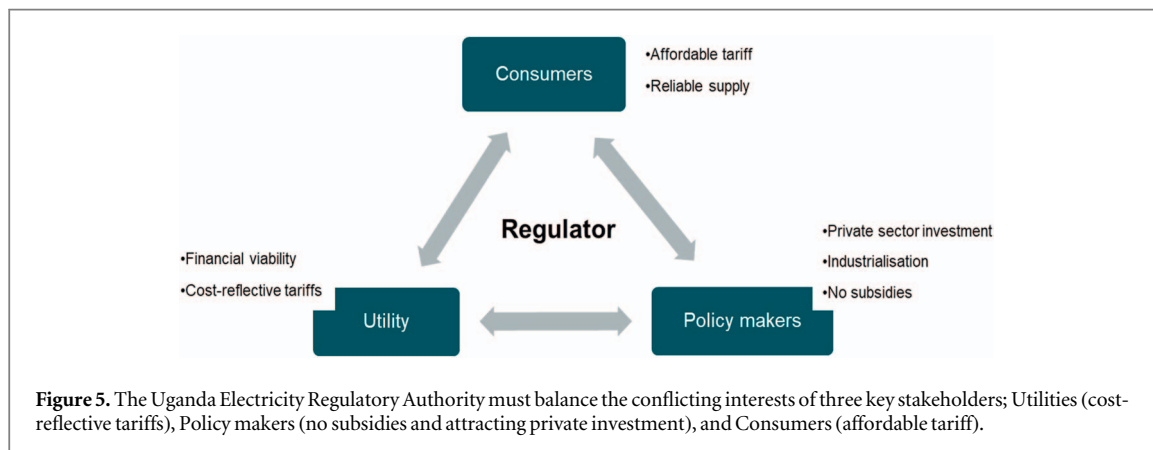
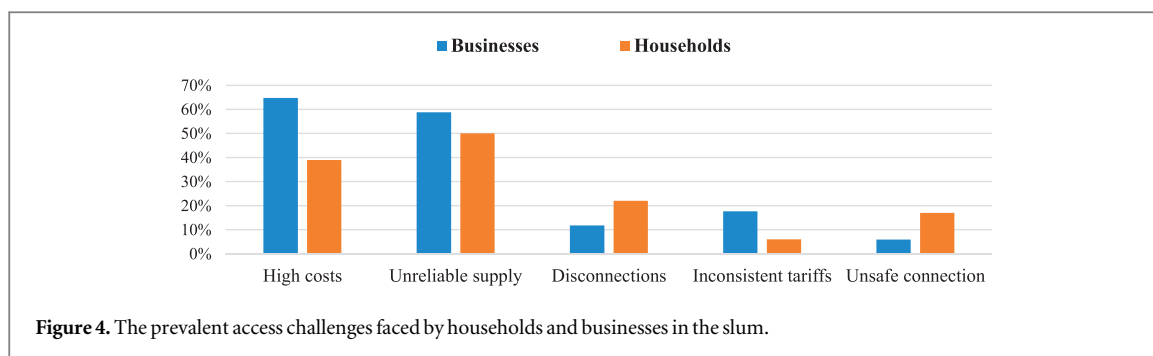
5.1.3. Electricity usage and consumption

All households used electricity for lighting and phone charging, 83% used it for entertainment (TV and radio), and 78% for ironing clothes - see figure 3. Other uses of electricity in homes included cooling i.e., fridge or fan (33%), boiling water i.e., electric kettle (17%), and cooking i.e., hot plate (11%). All the businesses used electricity for lighting, while a significant proportion used electricity for phone charging (47%), cooling i.e., fridge or fan (41%), and entertainment i.e., TV or radio (35%). Some uses for electricity in businesses were specific to the type of business; for example: ironing clothes, cooking, boiling water, carpentry, sewing, hairdressing, grinding nuts, and slot machines in a casino.

Despite these different applications of electricity in the slum, consumption loads are still limited, which deters service provision or infrastructure extension by the private utility as observed by Respondent 4:

‘In Uganda we have about 1.5 million customers and about 2000 commercial and large industry manufacturing plants. But this is where most of the money for the utility and the sector comes from. Majority of the consumers in domestic homes, there is no load, they don’t consume a lot.’—Respondent 4

⁵ Uncertified electricians operating in the slum, who informally connect households to the grid



5.1.4. Access challenges and barriers

The most prevalent challenges were high costs i.e., tariffs and connection fees; unreliable supply i.e., power cuts or disconnections due to non-payment or informal connections; unsafe electricity connections i.e., voltage fluctuations; and inconsistent charges for electricity consumed i.e., information gaps on billing processes - see figure 4.

These challenges were also echoed in the stakeholder interviews, where high costs and tariffs were linked to the cost-reflective tariffs for the private utility and the absence of government support in the form of subsidies.

‘Of course, they [the utility] are providing the service at a profit. And the government is not giving a subsidy. So, at the end of the day, all their costs whether operational costs, recurrent costs, overhead costs, all of them are passed over to the final consumer. So that explains why the tariffs are so high’.—**Respondent 5**

Respondent 4 similarly observed for connection costs: *‘The initial connection cost is a big barrier, and that’s a challenge with Uganda because for a long time Uganda did not have a policy that guided connection, like connection policies for such groups or low-income groups of people’.*

Limited infrastructure inside the settlements exacerbates the cost burden, and most slum dwellers earn low and irregular incomes and cannot consistently pay their electricity bills.

‘Some of those slums there is no network moving inside the slums in terms of the grid being put up... If you are inside the slum and you apply for a connection, then you need three or four poles to reach that house and then the cost will shoot up.’—**Respondent 1**

5.1.5. Reliability and quality of supply

Nearly all the households (89%) reported experiencing at least one power cut once a week, while the businesses experienced fewer power interruptions—mostly once or twice a month. The highlighted impacts of unreliable supply on businesses included: reduced productivity (35%), reduced sales particularly the hairdressers and beverages in grocery kiosks (24%), loss of perishable goods such as dairy products and fresh produce (18%), increased expenditure on alternative sources (12%), and increased insecurity in the community at night (6%). In some instances, power outages occur without notice or because of overloaded transformers which causes voltage spikes that damage electrical appliances. The alternative sources of lighting used during power cuts included candles, flashlights (battery and mobile phone), solar lamps and torches, and kerosene lamps (*‘tadooba’*).

Alternatives used for cooking included charcoal, firewood, and LPG. Other improvisations for which no alternatives can be found are captured as the responses in Box 2.

5.2. Contextualizing electricity access in slums: the local socio-economic environment

The energy access experiences in each of the 60 + slums in Kampala may be different, and this may also hold for different sections and households within each slum. Different sections in a given settlement may face different barriers or challenges to accessing electricity or have different experiences with access, depending, for instance on that section's proximity to the grid network, the population density, the demographic makeup of households and businesses or the socio-economic characteristics. These differences have implications for solution-finding efforts, and for informing what solutions or combination of solutions are appropriate. Contextualising access in slums must also involve a recognition of the structural barriers of land tenure and housing that directly impact access. In this respect, electricity access dynamics in poor urban communities differ significantly from access in rural communities which are often sparsely populated, and land tenure is not as contested as it is in urban informal settlements. Respondent 2, who worked extensively on community solar projects in the slums of Accra, Ghana and Cape Town, South Africa, observed:

'What we found is that the type of settlement in which solar home systems can be overlaid or can be applied is quite limited. They tended to be slightly outside of the city or outside of the town and not connected in any significant way to the grid. The density of the housing was also an issue because we found that settlements that weren't connected to the grid tended to be less dense.'—Respondent 2

This observation underscores the importance of considering the local context, such as the relationship between settlement density, distance from the city centre and service provision; and how these factors could inform appropriate technology offerings. Another energy justice theme considers the distribution of costs and externalities of energy systems, and this could be applied to the introduction of novel energy solutions to slums. Respondent 2 highlighted this as the need to consider the indirect negative consequences of novel socio-technical interventions to low-income communities, even when these interventions may be 'progressive' or 'clean' by other measures:

'So you can provide people with clean, reliable, safe energy and you can provide your donors or your financiers with the best shiny reports, and impact indicators that you've improved people's lives, but what about those people, if any, that have been pushed out because of that? And you could extend that to the clean cooking sector as well, what about the charcoal value chain, what happens to that? What happens to the informal electricity sector? What happens to those people?'—Respondent 2

These local contextual considerations limit the flexibility that the utility or electricity regulatory body has in devising innovative solutions that promise equitable access but may be complicated. Apart from the subsidised lifeline tariff and cooking tariffs (Umeme Limited 2022), and other special category tariffs for industry and streetlighting, Uganda's electricity tariff structure is simple and basic; with different tariff bands applied to different consumer groups and a flat service fee and tax charge. When asked why more equitable tariff structures had not been implemented, Respondent 1 expressed caution about introducing new tariff structures that are often complicated and therefore negatively perceived by consumers:

'...when you're doing a tariff structure you have to balance between simplicity of the tariff structure, making sure customers understand and of course recovery of the revenue. So, if you put up a very complicated tariff structure people will tend to think that something is wrong somewhere and they are being cheated even when they are not being cheated.'—Respondent 1

Indeed, 11% of households in the survey noted inconsistent tariffs as one of the challenges they faced in accessing and using electricity—see Box 3.

Ultimately, all these contextual differences will inform/determine the lived experiences of energy access and usage in households, for example the choice of electricity sources or cooking fuels and fuel stacking mechanisms across different social groups in slums. Respondent 3 made this observation on fuel stacking in different households and social groups in Kigali, Rwanda:

'We are seeing the stacking both in terms of people using generators and the grid, and also where people use off-grid connections through a mini-grid or a solar home system and the grid connection...they seek alternatives depending on what their motivations are'—Respondent 3

5.3. History, politics, and external influences

5.3.1. Socio-political history, policy environment and public service delivery

Fox (2014) and Raleigh (2014) have observed the influence of socio-political history on urbanisation trajectory, slum incidence and urban inequality, the quality of service that citizens feel entitled to, and consequently their lobbying efforts for better services. In post-apartheid South Africa, most townships consider electricity access a basic right and make demands of municipalities to that end (Alexander 2010, Mashamaite 2014, Morudu 2017,

Table 3. Interview excerpts demonstrating some instances of influence of different approaches, socio-political and policy regimes on electricity provision in Uganda, Kenya, Rwanda, South Africa, and Tanzania.

Country	Interview excerpt
Uganda	<i>'The standard reform model that was followed and applied in Uganda did not adequately address energy access challenges. Usually people misconstrue this to be a failure of the reforms, or a weakness in the governance arrangements, but I think it was a deliberate move that was intended to first stimulate and increase investments in the energy sector, specifically in the generation segment, as well as the distribution segment. So priority was on how to create a financially viable distribution company that would later allow investments into the generation side.'</i> —Respondent 4 on the energy sector reforms prioritizing energy generation and financial viability for the utility
Kenya	<i>'I think it was when Kibaki was campaigning to become president, he promised the Northeast would get electrified. And so pressure from the president's office once he was elected, pressure from the Ministry of Energy to do something about the North East. So it turned into this public program I think they started electrifying schools and then the plan was to go on to community centres and health centres. And within five or six years they electrified thousands of schools and whatever else. And it was all government money, there wasn't a private sector'</i> —Respondent 6 on political pressures to secure public funding for access programs
Rwanda	<i>'In Kigali itself, of course, there are informal settlements but because of the standards imposed by the government, frequently even the buildings in informal settlements do qualify so people can still get access to electricity...'</i> —Respondent 3 on the government's imposition of strict standards that enable access to electricity in all urban neighbourhoods
Tanzania	<i>'Certainly, at that time we probably still saw the legacy of the socialist experiment in Tanzania under Nyerere; was this very, lots of tiers of government right down to the village. And that, together with what would have been anyway a traditional practice is, if you were working in a village [on an energy project], you were supposed to go to the local district and introduce yourself and there's that level of very formalized courtesy.'</i> —Respondent 6 on support received from local leaders during work on a mini-grid project in rural Tanzania
South Africa	<i>'It's pretty much a natural sentiment where citizens feel like this is a right that they have to electricity... the history of South Africa is apartheid and those divisions. Now it's very much that drive for complete equality which you obviously still don't get; there's still marginalization, discrimination based on all different factors, including race. But there is this expectation that now that we're one, the government should provide for everyone... So it's a very complex history of how these sentiments arose and how they've been shaped by events in the history of the country'</i> —Respondent 3 on South Africa's socio-political history influences over service delivery in townships today

Box 1. Experiences of acquiring an electricity connection.

Survey question: How would you describe your overall experience of applying for a connection and getting connected?

'It was frustrating. I had little knowledge of electricity connections. Initially, I used middlemen to do the job, which was expensive for me because I incurred extra costs.' – **Household**

'It was a happy moment because we needed a good electricity service.' – **Household**

'It is expensive, and the process takes a long time.' – **Household**

'It is a bit challenging because at every stage one has to pay some money' – **Business**

Ngcamu 2019). Meanwhile, in Uganda where the energy sector is private sector-driven and electricity generation and distribution is in the hands of private utilities, the urban poor mostly devise improvisations to fill the service gaps left by the utility (Buyana et al 2019, Keefe et al 2015, Munro 2020, Sims 2012, Sseviiri et al 2020).

Furthermore, while insecure land tenure places some slums at risk of eviction, for others, evictions and demolitions have become a highly political issue as slum settlements hold significant political leverage and influence for politicians, given their large size and dense populations. Commenting on this, Respondent 5 said:

'In 2000 that hill of Kasokoso [slum] and Kinawataka [slum] had nobody. But because of the displacement in Naguru, Nakawa, because of the displacements in the north, people started coming in and gradually settling and settling. Today, you're now talking about a population of 20,000 people who are living in that place. So that place has LCs [local council leaders], it has polling stations and then, can you go there and say I'm going to evict you because you are illegal squatters? It's now a political issue.'—**Respondent 5**

In Tanzania, traces of the controversial *Ujamaa*—former president Julius Nyerere's socialist ideology towards social and economic development policies—remain in public service delivery and local leadership models, albeit as reconfigured versions (Fouéré 2014, Ibhawoh & Dibua 2003). Respondent 6, who piloted off-grid energy solutions for a rural pastoralist community in Tanzania in the early 2000's spoke of the supportive political environment and local leadership that eased project execution. In Kenya, Respondent 7 recalled how political pressure willed a past political regime of the Kenyan government to electrify remote, off-grid regions of the country. These views are presented in table 3.

Box 2. Experiences with unreliable electricity supply: impacts and coping mechanisms.

Survey question: How do power cuts affect the quality of life in your home or business?

A: 'My children feel bad staying in the dark. They move a lot because the TV is what keeps them at home and prevents them from unnecessary movements now that they are at home in this Covid period.' – **Household**

A: 'It becomes dark and given the insecurity in our settlement, people tend to fear to come to buy groceries at night when power is off' – **Business (Grocery kiosk)**

A: 'They curtail my production. I can't use my electric machines that are more effective so I switch to the manual machines which are less effective.' – **Business (Tailoring)**

A: 'My soft drinks do not go cold so people do not buy them, and sometimes the milk goes bad' – **Business (Grocery kiosk)**

Survey question: What do you use when there is a power cut?

A: 'We resort to buying paraffin for the lamps, yet the expenses were not planned for hence increasing our expenditure' – **Household**

A: 'For things like the fridge, there is no other option but to wait for power to be restored.' – **Business (Grocery kiosk)**

A: 'I usually encourage my customers to go and sit under the sun to dry their hair. Customers complain and the next time they don't come back. It's also a risk because it can cause disorders from prolonged exposure to direct sunlight.' – **Business (Hair salon)**

Box 3. Information gaps on the consumer tariff structure and energy billing process.

Survey question: What other challenges do you face when using electricity in your home?

A: 'Unit [kWh] variations. Today you buy units at a certain price, like 2000 shillings. The next day you pay the same amount but receive different units. Sometimes we feel like we are cheated.' – **Business**

A: 'Sometimes the Yaka meter [pre-paid meter] shows you zero units, an indication that you need to pay. But when you pay, they chop off extra costs. I don't know if this is the service fee they charge or not, but it is a challenge for me because I incur extra costs.' – **Business**

5.3.2. External influences: events, funding, and development partnerships

A linkage was made between external events, processes, actors and slum expansions, energy access as well as access to other infrastructure and services. In addition to rural-urban migrations and natural growth, slum expansion can also be attributed to socio-political events happening inside and outside Uganda's cities. For instance, spillover effects from the 20-year long civil war in the north continue to drive internally displaced persons into cities (Twinomuhangi and Sseviiri 2020); as does the influx of refugees from South Sudan, the Congo, Eritrea, Somalia, and Burundi, many of whom end up in slums in Kampala, Jinja and other major cities (IMPACT Initiatives, & ACTED 2018).

Similarly, the type and source of funding for slum upgrading initiatives or energy access programs also informs what solution is implemented, and different funding agencies may afford varying degrees of freedom for what technology is implemented. Drawing on his experiences of working on a grant-funded solar streetlighting project in the slums of Jinja city, Uganda, one respondent observed:

'I think it's important to make the distinction what is meant by investment or what is meant by finance. For us it was a grant, therefore, we had the ability and luxury of being able to pilot stuff showing the potential for innovation or for scaling particular innovations. Whereas other initiatives in the sector are increasingly driven by money which is classified as impact investment or as some type of a loan rather than grants. And in there I think is a lot more conditionality around what type of technology, what size it is...' — **Respondent 2**

On the other hand, funders and development partners may stipulate terms and conditions that safeguard vulnerable groups and their interests. For instance, on the ongoing Kampala-Jinja expressway project (Cities Alliance and European Union 2019) for which an informal settlement sits in the right of way, the project funders have taken steps to ensure that the slum community will not be illegitimately displaced or made worse off by the construction project:

'One of the funding partners in that project is the IFC. There is African Development Bank, there is the European Union, there is the French agency for development. Those are the kind of partners who make sure that if government [of Uganda] wants them to participate then there must be commitment that all the people who are resettled are better off than before the project.' — **Respondent 5**

The influence of external actors and processes can also be seen in the changing role of solar home system companies which, over the last decade have disrupted energy access ecosystem for low-income households in Uganda and across sub-Saharan Africa (Aarakit et al 2021, Conway et al 2019, Kizilcec and Parikh 2020), by purposely targeting basic electricity provision for poor households. However, some of the most successful and largest solar home system providers (most of which started off as social enterprises) have now evolved into private entities, some of which are being acquired by large multinational corporations. In 2017, Fenix International Uganda, the leading solar home system (SHS) startup in Uganda was acquired by the French

energy multinational ENGIE Access (ENGIE 2017). Fenix started operations in Uganda as early as 2009, and by 2020, it had over half a million Ugandan households benefitting from their SHSs, and they had expanded to other African markets in Zambia, Mozambique, Cote d'Ivoire, Nigeria, and Benin. It remains to be seen how Fenix's acquisition by a multinational private entity will affect affordability and access to SHSs for the poor. Commenting on these developments, Respondent 6 said:

'If it really is happening that pay-go-solar firms are moving upmarket as this gap becomes more fully private sector, then what happens to the people who are on low incomes? They have to wait until this stuff gets so cheap that they can finally get it; how long exactly? Or can we do something else?'—**Respondent 6**

5.4. Financial viability versus affordability

Affordability remains one of the most significant barriers to electricity access for low-income households in rural and urban households alike, however, in Uganda, the need to achieve financial viability for the utility has exacerbated the cost barrier. The private utility company (Umeme) implements cost-reflective tariffs the burden of which is fully borne by consumers since government subsidies were discontinued in 2012. This creates supply-side bottlenecks as well, since the utility is not incentivized to provide electricity to poor urban neighbourhoods.

'The logic of not connecting slums is all an issue of affordability for the slum dwellers. It doesn't make any economic sense for a utility that is trying to be financially viable and implement cost-reflective tariffs, to implement access projects for people in slums who will ultimately not be able to pay their bills'—**Respondent 7 (Utility)**

'You see, the utility is not in charity. It is an investment, it has shareholders, people who have actually bought those shares on the stock exchange and are expecting a return'—**Respondent 1 (Policymaker)**

As illustrated in figure 5, the tension between affordability for consumers and financial viability for the utility has meant that the regulator must balance the pecuniary interests of consumers, the utility, and policymakers; but this balance is likely to further disadvantage the urban poor who are vulnerable and hold no real lobbying power for their electricity access needs and interests.

'As a regulator, everyone is pulling. The consumer wants a low tariff at a reliable supply, the utility is saying I can give you a reliable supply, but I need to invest 'abcd' you need to give me my returns, government is telling you [to] attract that investor to invest but don't increase the tariff and I don't have subsidy. So, as a regulator you are held between a rock and a hard place'—**Respondent 1 (Policy maker)**

Affordability and low incomes have implications on slum dwellers' energy choices which include fuel stacking mechanisms and informal electricity access. Informal electricity access causes energy and revenue losses for the utility, compromises grid infrastructure, and poses grave risk of electrocutions and fires. Respondents commented on the issue of informal access in Kampala's slums:

'These [slum dwellers] are the poor, it's not that they don't want to pay the bills, but they are kind of disadvantaged. So, as a result, they end up stealing electricity. So, they're using other forms of energy - charcoal and firewood and all that, but most of them are stealing power. Containing power theft in slums is a risky business because enforcement becomes difficult, because they're using all sorts of rudimentary means to steal power...'—**Respondent 4 (Academic researcher)**

The losses incurred through informal connections have prompted the utility to implement mostly technical measures to deter informal connections, but these have proved insufficient in the short term:

'There have been dedicated investments done; converting bare conductor wires to aerial bundled conductors that are insulated, trying to remove certain power lines, isolate them from the slums and put them in places that are more secure and that can be monitored easily, routine power theft investigations to regularise connections but also uproot the illegal wires that are planted or buried in the soil. So those efforts are multiple, and they are ongoing. But despite that, people still steal. So, you realise that it becomes more of a socio-economic issue than a utility failure to do something.'—**Respondent 7 (Utility)**

Technical solutions alone are not enough to address the informal electricity access challenge in slums, as they are also often implemented without a good understanding of the motivations behind informal access or the context within which these connections are accessed and used. There is a need to better understand the lived experiences of accessing energy by households in slums to devise appropriate solutions. And as Respondent 2 noted:

'It's not about having the best engineering solution, it's about dealing with a number of complex and dynamic issues which people from outside just do not understand until they are in the slum. You can complain about the informal sector stealing electricity and how that impacts your business model, but when you go to like a woman living in a slum and she says, 'Well, my son will bring home some money by working for these guys [informal electricity resellers]', those kinds of dynamics.'—**Respondent 2 (NGO)**

6. Conclusions

This study investigated electricity access dynamics in Uganda's slums and the policy and socio-political issues that shape access for poor urban communities, from the perspective of multiple stakeholders. The slum dwellers provided insight into their lived experiences of accessing and using electricity in their homes and businesses. The local NGO demonstrated close involvement and granular understanding of the access challenges faced at household and community level, they raised context-specific equity considerations, and provided insights into the feasibility and justice implications of novel interventions introduced to slum communities. On the other hand, respondents in research and academia provided less localised but broader experiences and expertise from different African cities and low-income settings in which they had worked. Responses from policy makers, the utility and development partners reflected knowledge of the external and national policies and politics surrounding service provision in cities, like the tariff structures, energy sector planning and funding, development programs and large-scale slum upgrading initiatives.

- (a) *Supply-side barriers* identified were low consumption loads in households which makes service delivery financially unviable for the private utility, insecure land tenure and shanty housing which presents practical and safety barriers. High costs and tariffs were the biggest barriers to access for households, and other challenges faced include poor quality and unreliable supply and inadequate infrastructure. Regardless, households use electricity beyond simply lighting and phone charging, and there is a wide range of businesses operating in slums, all of which rely on energy and electricity.
- (b) *The injustices inherent in electricity access* in slums were acknowledged by all respondents and the barriers to access indicate distributional injustices. The benefits derived from the current electricity provision model are not equitably distributed and the utility prioritizes service provision to consumer groups who have substantial consumption loads and can afford to pay for the service. Other energy justice issues emerged regarding the costs and externalities of different energy systems as well as representation in decision making. This was broached as the effects of solar home system start-ups transitioning into private entities after being acquired by large multinationals, and the inadvertent impacts of novel interventions introduced to communities (e.g., to curb informal electricity access) on existing value chains and social networks. Questions and concerns emerged regarding such interventions disrupting or displacing existing arrangements to the detriment of those whose livelihoods depend on them, and the resource flows out of communities if the business models of new interventions did not provide for involving community members (e.g., if the sale, distribution, maintenance, and repair of novel energy technologies introduced is done outside the local community).
- (c) *There are tensions in the priorities and interests of different stakeholder groups*, with the regulator striving to balance the interests of the government, utility, and consumers. While the priorities of policy makers and the utility lay in achieving financial viability, the slum dwellers, NGOs, development partners and researchers advocated for affordable and equitable electricity access options. Furthermore, although the consensus among all the stakeholder groups interviewed was that electricity access in slums is a challenge, there were differences in opinion regarding its root causes, which could have implications for solution finding efforts.
- (d) Regardless, it remained clear that *stakeholder engagement with slum communities and development partners to co-develop solutions, and cooperation between different government agencies* will be essential to devising equitable solutions. Beyond the utility and Ministry of Energy who are directly charged with planning for and providing electricity services, other sectors have crucial roles to play too—in filling data and information gaps to support electrification planning, creating a conducive environment that fosters productive uses of electricity to increase consumption, improving socio-economic welfare for urban poor households to enable affordability of energy services, promoting equitable urban planning, land and housing ownership in cities, etc Therefore, the Ministry of Finance, Planning and Economic Development, the Ministry of Gender, Labour and Social development, the Ministry of Lands, Housing and Urban Development, all have a critical role to play, supported by other key stakeholders.
- (e) Finally, the importance of *local context and political economy considerations* in understanding the challenges and devising appropriate solutions was emphasized. The Ugandan government has demonstrated its commitment to transforming the energy sector, but access rates have remained low among the poor and vulnerable. Most of the policies focus on increasing generation capacity and grid extension, and rural electrification, leaving last mile supply to private utilities. As a result, slum households that face access challenges live without electricity, ration it, or improvise with alternative sources, but the extent to which these alternatives are relied upon or what inspires them is not known.

There is a need to explore these aspects further by examining the lived experiences of electricity access in Uganda's slums while also acknowledging the socio-political and policy environment that shapes access. The divergent interests of different stakeholder groups ultimately affects electricity service delivery and access in low-income communities and future work should investigate these issues, in a bid to identify opportunities for co-developing interventions that meet the interests and needs of key stakeholders. Adequate electricity access in slums will be key to harnessing the full potential of Uganda's urbanisation; by improving living conditions in slums, enabling slum dwellers participation in gainful socio-economic activities, and reducing urban inequality. This is in line with SDG7, SDG11, and the New Urban Agenda (United Nations 2017) which ratifies the 'right to the city' objective that underpins the social value of urbanisation, and maintains that all urban citizens, including vulnerable and marginalised groups, should have equal opportunities to urban resources, goods and services, and infrastructure.

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Data availability statement

The data generated and/or analysed during the current study are not publicly available for legal/ethical reasons but are available from the corresponding author on reasonable request.

Ethical statement

The research study was conducted in accordance with the principles embodied in the Declaration of Helsinki and in accordance with local statutory requirements. Ethics approvals and permissions were obtained from Uganda (Uganda National Council for Science and Technology, Ethics ID number: SS1036ES and Mbarara University of Science and Technology, Ethics ID number: MUST-2021-98) and the UK (University College London, Ethics ID number: 20673/001). All participants gave written or verbal informed consent to participate in the study.

Declaration of competing interests

The authors declare that they have no known competing financial interests or personal relationships that could have appeared to influence the work reported in this paper.

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