

Spatializing women's everyday access to energy: an intra-urban comparison of the gender-energy nexus in Lahore, Pakistan

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Key words

comparative urbanism; peripheral urbanization; women's empowerment; intersectionality; gender equity; infrastructure; energy access; spatial justice

Abstract

The disparate distribution of energy and housing infrastructures in many megacities of the Global South raise issues of equity and spatial justice, particularly for women. An intra-urban comparison helps unpack the specific socio-spatial characteristics of the gender-energy nexus, particularly in low-income neighbourhoods that represent one form of peripheral urbanization. This paper contributes to the limited literature on low-income urban women's lived experiences and everyday energy practices. Using a mixed-methods approach that combines 424 questionnaire surveys and 21 semi-structured interviews with low-income women across five case-study sites in Lahore, it investigates women's energy access and use in domestic and open/public spaces, and workplaces. The study reveals significant infrastructural variations and gendered inequities within and across peripheries, and in their relation to urban cores. It demonstrates how women's peripheralized energy access is both spatially defined (e.g., in the heterogeneity of infrastructure available in peripheral neighbourhoods and in relation to their spatial proximity to urban cores) and socially contingent on their intersectional identities. The intra-urban comparison reveals the complex gendered energy practices and women's subjective experiences of socio-material exclusion, underscoring the importance of moving beyond simplistic private/public dichotomies and instead adopting an intersectional lens in spatializing the gender-energy nexus when studying urban peripheries.

<H1> Introduction

The intersections of energy access and gender equity have significant implications for future urban development but have yet received limited scholarly attention in urban theory. Insofar as cities and gender are intertwined (Chant, 2013; Peake, 2013), urbanization processes can play a critical role in reproducing or transforming gender relations that impact women's lived experiences and everyday practices, especially for those in the peripheries. This paper seeks to extend current understandings of the gender-energy nexus by focusing on peripheral urbanization in Lahore and its specific impacts on women's access to energy infrastructures.

Gender is structured both socially (West and Zimmerman, 1987) and spatially (Low and Lawrence-Zúñiga, 2003) and requires analysis of both everyday interactions and the socio-material institutions and infrastructures that condition its production. Yet, spatial analyses of the gender-energy nexus remain limited in cities of the South which are often shaped by 'gender-blind' policies (Khalid and Foulds, 2021) and 'gender-neutral' planning practices (Khalid and Razem, 2022). To date, gender equality and women's access to infrastructure have traditionally been addressed as development issues, with much of the Southern discourse on the gender-energy nexus focused on rural and off-grid contexts (Samarakoon, 2019; UNDP, 2018). In urban development, studies of women's access to energy have mostly remained confined to the domestic sphere (e.g., Winther et al., 2017), under prevailing conceptions of female domesticity and the gendered division of labour between private (home) and public (political, economic and business) spaces. Such traditional public/private dichotomies obscure the complex realities faced by women, and are increasingly challenged in feminist scholarship and critical urban discourse (Anwar et al., 2018; Datta and Ahmed, 2020; Khalid and Razem, 2022; Sawas et al., 2020). This paper extends these arguments by investigating women's access to infrastructures of electricity in their domestic and employment spaces, as well as in the broader public sphere, by investigating their spatial access to public amenities. It contributes to the discourse on gender equity and energy access, offering new insights into women's empowerment through electricity access from the home to the city.

A spatialized understanding of the gender-energy nexus entails examining how women's energy access is shaped by both social *and* spatial characteristics of the places they inhabit within the city, and how this varies across the city. This requires an intersectional and comparative lens to analyse the complex links between urban spaces and gendered energy access to overcome homogenous representations of both women and urban contexts. An intersectional lens (Crenshaw, 1989) helps us unpack the differential gendered inequities that are compounded by social boundaries of income, class, ethnicity, education, and occupation, creating multiple layers of marginalization and exclusion. The significance of adopting an intra-urban comparative approach (McFarlane et al., 2017) is highlighted in its capacity to illuminate these blurred boundaries and their heterogenous intersections through a spatial and geographical lens. We further illustrate how these socio-spatial characteristics intersect with energy infrastructures in the everyday experiences of low-income women in peripheral neighbourhoods.

Differential distributions of energy infrastructures, housing, and institutional policies, reflecting a heterogeneity of urbanization processes (Robinson, 2002; Mbembe and Nuttall, 2004; McFarlane, 2008; Roy, 2009; Watson, 2009), have not only prompted critical debates on conceptualising 'the urban', its cores and peripheries, but also raise concerns of equity and spatial justice, including gender justice. In rapidly growing cities of the South, 'core' areas of formal upper-class development often coexist alongside expanding slums and low-income settlements that constitute varying forms of peripheral urbanization (Caldeira, 2017; Ren, 2021). Although much of the urban development in the South can be understood as *peripheral* (Simone, 2010), in this article, we draw on Caldeira's (2017) and Simone's (2014, 2010) conception of peripheral urbanization as a socio-spatial phenomenon that follows transversal logics of rights and access, entangling citizens and states in the dynamic and heterogeneous production of cities. We demonstrate how peripheral urbanization in Lahore is heterogeneous and diverse, and shapes women's access to energy infrastructures in complex ways that are characterized by multiple layers of socio-spatial exclusion, where class, income, occupation, religion, social norms, spatial specificities and geographical distributions intersect to shape women's experiences.

Simone (2010) contends that peripheries act as a 'hybrid space' or 'space in-between' where different alternative ways of doing, thinking, and living urban life come together. This conception offers a useful relational analytical tool that reflects diverse and evolving patterns of occupancy, space production, and infrastructural access that constitute some form of socio-spatial marginality, and that contrast with state-led formal urban planning in the 'core'. In this study, we use peripheral urbanization to denote the overcrowded, incremental, and unplanned settlements in low-income areas within the city of Lahore that are characterized by varying forms of (in)formality, (il)legality, and inequities in infrastructural access. Using empirical case-study analysis, we unpack the gendered distributions of infrastructural access within and across such peripheries. By drawing on an intra-urban comparison, we further unveil the inter-relational nature of urban cores and peripheries and provide insight into women's critical role in mediating flows of energy and resources between them.

We ask: how is the gender-energy nexus shaped by peripheral urbanization? Specifically, how do women's everyday encounters with energy infrastructures across various (inter-related) spatial scales contribute to their peripheralization? Our analysis shows that the interplay between cores and peripheries is critical for enabling women's access to energy resources, skills, security, and agency, thereby enhancing their empowerment. Whilst recognizing that energy access alone cannot guarantee the end of structural gendered inequalities (Listo, 2018), limited access and precarious infrastructure in peripheries is shown to have significant gendered implications, such as gendered violence (Datta and Ahmed, 2020). This violence manifests in physical abuse, increased health risks

and domestic burdens, and exacerbates women's socio-economic marginality across multiple scales - from private to public, and from household to neighbourhood, city, and region. However, in Pakistan, limited attention has been given to urban women's everyday lived experiences (exceptions include Ali, 2012; Anwar et al., 2018) or encounters with infrastructures of energy (Khalid and Razem, 2022). Further, although some studies have identified significant gender inequalities among marginalized urban women (Sayeed et al., 2003; Najam-us-Saqib and Arif, 2012; Akram, 2018), these are often linearly attributed to simple socio-economic descriptors such as income and employment, overlooking the critical complexities introduced by household dynamics and spatial specificities that warrant a comparative and intersectional lens.

In this paper, we explore how varying forms of infrastructural access and socio-spatial marginality contribute to diverse peripheral experiences for low-income women in Lahore. Specifically, we investigate: 1) how women's access to energy varies across different urban peripheries - shaped by their distinct socio-material characteristics and interactions with urban cores, and 2) how this access is mediated by women's intersectional identities, such as religion/ethnicity, income, class, occupation, and education.

<H1> Gendered energy practices and the intra-urban peripheries

Although scholarly focus on the gender-energy nexus is not new, especially within the development literature, it is only recently that energy scholars and feminist theorists have begun exploring the gendered nature of energy practices and the impacts of gendered norms and relations on women's differential access to energy (ENERGIA, 2019; Listo, 2018). Recent work in energy studies highlight how gender is 'performed' in everyday practices (Mechlenborg and Gram-Hanssen, 2020), reproduced through gendered energy technologies (Strengers et al., 2022), and structured through power differentials and energy inequalities (Bell et al., 2020; Wilson, 2018). It shows how gender is reconstituted through the routinized recurrence of everyday practice performances, i.e. 'doing' gender in the actual carrying out of the practice (Mechlenborg and Gram-Hanssen, 2020). Energy, and its related infrastructures, both material and social, constitute the sites and spaces of everyday gendered practices and even in their absence, can maintain, produce, and reproduce multiscalar forms of gendered exclusion and marginalization. As Datta (2020) notes, both domestic and urban infrastructures organise and mediate gendered time and space in complex and unpredictable ways. As such, depleted infrastructures become critical conduits for gender inequities through their contextualisation of men and women's differential lived experiences of everyday practices (Anwar et al., 2018).

Expanding on this, feminist energy scholarship has also recognised the need for diversity in expressions of gendered identities and gendered experiences (Listo, 2018). Moving beyond binaries of men versus women, private versus public, and victimhood versus empowerment, these studies call for unravelling the complexities and nuances of women's diverse experiences that account for historically contingent and geographically situated understandings of access and equity. For example, urban energy poverty has been closely linked with factors like household income, infrastructure accessibility, ethnicity, and race, in addition to gendered considerations (Petrova and Simcock, 2019; Ngarava et al., 2022). Previous research on middleclass women's domestic energy practices in Lahore reveals the gendering of domestic spaces and technologies while also unveiling intersectional differences in practice performance (Khalid and Razem, 2022). Although limited to the domestic sphere, the study shows that women's energy consumption, access, and decision-making are

contingent on household composition and dynamics that result in a plurality of women's lived experiences and interactions with energy.

Women's access to urban energy infrastructures is particularly constrained in countries like Pakistan where a failure of the state to deliver basic urban utilities engenders its cities to an 'everyday violence' (Anwar et al., 2018, p. 16). Compounding socio-spatial vulnerabilities are cultural norms that dictate female domesticity and segregation in the gendered division of labour. In Pakistan, in addition to women's secondary labour market status, on average, women shoulder 16 times the workload of men vis-a-vis care work, which is often independent of women's working status (Majid and Siegmann, 2021; Najam-us-Saqib and Arif, 2012). Previous research shows that gendered energy imaginaries in Pakistan are based on constructions of energy infrastructure as 'gender-neutral' that limited engagement with issues of gender inequalities (often seen as a rural issue) in infrastructure policies and programmes (Alda-Vidal et al., 2023). In such imaginaries, the household is often taken as the indivisible end-unit, whereby intra-household power dynamics and asymmetries in individual energy access are rendered invisible, presenting a depoliticized and binary narrative of women's and men's uses of domestic energy. In such narratives, the daily practices, challenges, and lived experiences of women with energy infrastructures remain obscured. Further, gendered roles are often co-constituted by spatial planning that accentuates women's segregation in the gendered division of public/private spaces (Khalid and Razem, 2022), further limiting women's mobility, access to energy, and socio-economic opportunities. At the same time, these studies also show that despite the gender oversights in energy and housing policies, women play an active role in household energy demand management and (to different extents) contest masculine framings of house design by appropriating space to their differing needs. Whilst such studies shed light on the intersections of gender and energy in the home, women's use of energy beyond housework, such as in home-based work or in domestic service, and outside the domestic sphere, remains particularly under-explored, especially in urban contexts (Sohane and Bhan, 2023).

Although women's right to the city has long been debated in the field of feminist geography (Fenster, 2005; Whitzman et al., 2012; Chant, 2013), far less attention is given to women's differential access and spatial inequities *within* urban areas, for example between formal and informal settlements (Miraftab, 2010). Since the inequities generated by urbanization have differential impacts on men and women, the implications remain similarly distributional when the process of urbanization itself remains peripheral. As Caldeira (2017) suggests, 'peripheries are, undoubtedly, about inequality' (2017, p. 9). Our study shows that an exploration of peripheral urbanization remains incomplete without understanding its interlinks with the gender-energy nexus. Previous studies (e.g., Anwar et al., 2020; Datta and Ahmed, 2020) show how disconnections or the absence of infrastructure, including that of energy, 'fracture peripheries and low-income neighbourhoods from resources, rights and mobility within the city, and in everyday life' (ibid, p.67) and end up further burdening women by adding to their unpaid reproductive work. By tracing women's access to basic utilities and services through various scales from the home to the city, these studies demonstrate how infrastructures become mutually constitutive of gender relations and power imbalances. As such, infrastructure failures are not only gendered but result in intimate, corporeal, and structural forms of violence that are particularly accentuated for women situated in urban peripheries with precarious household and state support. Studies also show that the production of cities in relatively underdeveloped societies puts additional pressures on women's resources and social reproductive work, particularly in peripheral spaces where access to basic services is more limited than in cores (Pajvancic-Cizelj and Hjuson, 2018). Despite such constraints, some studies have also illustrated women's political role and agency within urban peripheries in their negotiations for space, for example, in eliciting a platform for cooperative work in the commons (Tonucci and Castriota, 2022) or securing legitimacy and improved

access to infrastructure (Narayan, 2023), necessitating a better understanding of how gendered practices occur, interact with, and (re)produce urban peripheries. Further, these interactions also produce what can be termed 'relational infrastructure networks' (Lemanski and Massey, 2022)—relationships between people-state-infrastructure that result in social and material exchanges that transcend conventional urban divisions and are shaped by human networks, including the everyday energy needs and strategies of women. By linking peripheral urbanization with the gender-energy nexus, we explore how women negotiate their socio-spatial access to energy infrastructures, through an intra-urban comparison.

<H1> Everyday access in urban peripheries: case-studies and methodological approach

Lahore, with a population of approx. 14 million and a rich pre-colonial, colonial, and post-colonial history, presents an exemplary case for intra-urban comparison. Its rapidly expanding population and rural-to-urban migration have led to almost doubling of its geographical size in the last 14 years (UN DESA, 2019). The city's housing market, dominated by formal, low-density development for the upper classes, has led to overcrowding in low-income areas. With only 1% of formal housing affordable to 68% of the population (Shaikh, 2016), this housing gap has resulted in a proliferation of illegal slums and unplanned low-income neighbourhoods at the peripheries of planned upscale cores.

We selected five case-study sites across Lahore that represent varying forms of peripheral urbanization for an intra-urban comparison. These sites (shown in Figure 1) represent low-income housing settlements that exhibit some degree of permanence, legality, and durability (although shaped by incremental and often encroached development under porous forms of urban governance), with predominantly *pukka* (brick, concrete and cement) housing, as opposed to temporary slums (*katchi abadis*)¹, along with grid-connected access to electricity, gas, and water. Further details are given in Table 1.

< INSERT Figure 1: Case-study sites shown on the map of Lahore District (Source: the Urban Unit, Government of Pakistan)>

Table 1: Case-study site details

Site Name	Total population (2017 Census)	Sample size	Average household size (persons)	Average household income (PKR)	Religion (%age of households)	Key characteristic in relation to core areas
Bahar colony	39,000	Surveys: 66 Interviews: 2	4.4	41,151.52 (18000-80000)	Islam: 27.3 Christianity: 72.7	Proximity to Model Town-core upper-class residential area
Liaquat-abad	50,000	Surveys: 40 Interviews: 3	7.2	26,150.00 (4000-80000)	Islam: 67.5 Christianity: 32.5	Proximity to Moden Town and Kot Lakhpat-major industrial district
Peer colony	29,000	Surveys: 120 Interviews: 6	6.3	28,625.00 (10000-80000)	Islam: 94.2 Christianity: 5.83	Proximity to DHA-core upper-class residential development

¹ Charar Pind and Gajju Matta were originally rural squatter settlements that gradually developed and became legalized by the local authorities under the Katchi Abadis Regularisation/Development Programme of the late 1970s. Although all selected sites are now recognized and regularized by the local authorities, a degree of informality prevails as evident in their continued incremental development, encroachment of public spaces and the lack of stringent enforcement of byelaws.

Charar Pind	23,000	Surveys: 100 Interviews: 5	6.3	23,365.00 (7000-70000)	Islam: 98.0 Christianity: 2.0	Enclosed within DHA phase 1 and 2
Gajju Matta	68,000	Surveys: 98 Interviews: 5	6.8	21,326.53 (5000-60000)	Islam: 100.0 Christianity: 0.0	Control case: no proximal core area

The selected sites represent wide spatial and infrastructural diversity, reflected in variations in utility services, public amenities, and proximity to core residential/commercial districts. Gajju Matta serves as a control case due to its spatially peripheral location but lack of proximity to a core area. The emergence and development of these sites is typically closely linked to nearby core areas, which include the upper-class residential developments of Model Town and Defence Housing Authority (DHA), and the industrial district of Kot Lakhpat. Whilst the present study examines urbanization at the peripheries, we also draw on our previous work on energy demand in core developments (Khalid and Razem, 2022; Khalid and Sunikka-Blank, 2018, 2017). Further, we summarize below the development of the selected peripheral sites in relation to their proximal core areas.

Liaqatabad and Bahar colony emerged in the 1950s as lower-class housing developments, south of Model Town (Figure 1). This region, once comprising the Rakh Kot Lakhpat forest and the rural Kot Lakhpat settlement, was partially developed into Model Town in the 1920s by the Model Town Cooperative Society. A self-sufficient, modern, co-operative housing development, Model Town catered to affluent multi-ethnic locals (including Hindus, Muslims, and Christians) and featured its own electricity and water supply systems (Glover, 2008). The areas currently occupied by Bahar colony and Liaqatabad were initially nearby open spaces, used for service quarters and cemeteries (Glover, 2008).

In 1938-39, the Punjab government's urban planning development aimed to clear slums and provide housing, proposing new residential areas between the existing city and Model Town, with suburban regions designated for agricultural purposes (Rehman, 2013). Early housing developments set the precedence for spatial segregation by social class and the emergence of urban sprawl (Qadeer, 2006). Low- and moderate-income housing, often for rural migrants and refugees, generally took two forms: unauthorized squatter settlements and informal 'colonies' (Qadeer, 2006). Property transactions in these areas were heavily influenced by social and ethnic ties among residents (Vandal, 1983).

By 1947, Kot Lakhpat fell under the Lahore Improvement Trust, which introduced new housing schemes to accommodate the growing population and industrial expansion. This led to Kot Lakhpat becoming a major industrial district, attracting rural migrants to emerging labour colonies like Liaqatabad along Ferozepur Road, a major trade route. In the late 1960s, Kot Lakhpat's urban planning, designed for low-income groups, met with cultural resistance (Vandal, 1983) due to its grid-iron layout separating residential and commercial spaces. Gradually, the residential areas were encroached into commercial zones, establishing an enduring pattern of (semi-)planned suburban growth with minimal government oversight (Glover, 2008; Rehman, 2013). By the 1960s, Bahar colony and Liaqatabad had emerged as two such low-income medium-density residential areas. Their significant Christian population mirrored the multi-ethnic diversity of Model Town and the broader trend in Pakistan's urban planning of clustering of ethnic and social groups (Qadeer, 2006).

Eastwards, Peer Colony and Charar Pind gradually developed into bustling low-income settlements as service opportunities and blue-collar jobs emerged in the nearby upscale DHA (referred to as Cantonment in Figure 1). Established in 1975 as an exclusive residential area for defence personnel, DHA was the first housing development to provide socio-cultural facilities (e.g., libraries, clubs,

hospitals, parks and playgrounds) and well-maintained services, becoming one of Lahore's premier housing developments (Rehman, 2013). The area, predominantly agricultural land with villages like Charar Pind, saw many rural settlements displaced by DHA's expansion. However, Charar Pind gradually became enclosed within the affluent DHA neighbourhood, and was walled in and barricaded, creating its unique characteristic of a low-income *peripheral* area enclosed within a wealthier core. Formerly agricultural communities, these villages adapted to provide labour and services to DHA, particularly in domestic roles (Qadeer, 2006). Despite their proximity and economic ties to DHA, these lower-income areas continue to face stark disparities in infrastructure and amenities, a consequence of the differentiated planning and development strategies between Lahore's affluent cores and peripheries (Qadeer, 2006).

Gajju Matta, the control case, was initially a rural agricultural settlement predating its integration into Lahore. Its growth accelerated from the 1960s due to industrialization along major highways like Ferozpur Road. Since 2013, Gajju Matta serves as the terminus for the Lahore Metrobus service. Its strategic location adjacent to the road network and industrial zones attracts rural migrants from nearby villages.

Both the Model Town Cooperative Society and DHA function independently of the Lahore Development Authority (LDA), Lahore's primary urban planning body. These private and military developments focus on upper-class housing and are better regulated than areas under LDA's purview, which often suffer from bureaucratic delays, lax regulations, and inadequate resource distribution. This dichotomy has led to a city divided into well-serviced and underserved neighbourhoods (Qadeer, 2006). Despite these differences, the city's core and peripheral areas maintain a vital symbiotic relationship through shared infrastructure and services. We primarily focus on this inter-relationship in our paper, while also highlighting key comparative factors of significance across and within neighbourhoods.

Using a mixed-methods approach, data was collected through 424 household surveys across the five sites from Nov 2021- Jan2022. The survey, based on Winther et al.'s (2017) framework, assessed women's empowerment in energy access, focusing on **rights**, **agency** and **resources**. Maiorano et al.'s (2021) **choice-value-norm index** was employed to examine women's decision-making. The questionnaire, lasting approx. 30 minutes, included over 90 questions covering demographic details, utility and appliance ownership, gendered access in domestic, open/public spaces, and workplaces (*resources*), women's energy-related preferences, aspirations, decision-making (*agency*), and perceptions of rights (*rights*). A systematic sampling strategy ensured uniform distribution of survey samples across sites, starting with a randomly selected household, and continuing along a predefined route.

Additionally, 21 semi-structured interviews were conducted with strategically selected women from the case-study sites to gain in-depth understanding of women's energy-related routines and decision-making. Participants were recruited through the surveys² to ensure diverse representation in employment status and types. Where possible, transect walks were conducted alongside interviews to gain an ethnographic perspective on women's everyday commutes and journeys, offering valuable insights into their interactions with community spaces and public infrastructures, here understood as infrastructures of energy designed to service public and/or open spaces.

² At the end of the survey, respondents were provided the option of agreeing to participate in a longer interview with provision of financial compensation for their time.

Quantitative data analysis was preceded by data cleaning, ensuring data integrity and consistency³. The survey, administered exclusively to women, gathered data on education and employment for all working-age household members. Significance tests were performed on socio-demographic variables such as household income, housing ownership (owned versus rented), employment status, and religion. Households were categorized based on income (below or above the median) and a dummy variable was created to distinguish family dynamics between households with employed women and those without.

For the qualitative data analysis, interviews were recorded, translated from Urdu to English, and transcribed. Pseudonyms were assigned to participants, and their narratives underwent detailed thematic first and second cycle coding using NVivo 12, a Computer Assisted Qualitative Data Analysis software, following established qualitative analysis methods (Bazeley and Jackson, 2013; Miles et al., 2014). The analysis was triangulated with fieldnotes and observation from the transect walks and resulted in the emergence of key themes, as discussed in the subsequent sections.

<H1> Peripheral heterogeneity: women's differential access to energy

Our chosen peripheral sites represented significant heterogeneity and diversity. Compared to core areas and their homogenous development with stringent zoning and uniform plot sizes (Khalid and Sunikka-Blank, 2018), peripheral sites showed greater variations in plot sizes and building typologies due to a lack of formal planning and/or enforcement and limited occupancy regulations. Wide variations were also evident in the quality and availability of infrastructure and utilities across sites (Figure 2). This heterogeneity further translated into the wide variations in income. For example, household incomes in Liaqatabad varied by a 20-fold difference (Table 1). Nevertheless, Gajju Matta, the control case, was found to be the least developed in terms of basic infrastructure provision, such as roads, drainage, electricity, and lowest average household incomes (Table 1).

Variations within and between sites highlighted the challenge in classifying peripheral sites by income, as the sample encompassed a mix of very poor, lower-income, and lower-middle income households. Segregation by income and social status has been a pervasive characteristic of post-colonial formal urban development in Pakistan (Qadeer, 2006) and can be seen in the core upper-class residential developments. However, peripheral sites still follow the more informal and organic form of development that traces its roots to the historical neighbourhoods of Lahore (Rehman, 2013; Vandal, 1983), with housing of different sizes, households of different incomes and social status, tenants and homeowners living in close proximity.

< INSERT Figure 1: Street view of Liaqatabad on the left and Gajju Matta on the right. Source: Lead author's own photographs, 10/2021>

This then also leads to wide variations in women's lived experiences and access to energy. Table 2 provides a breakdown of electrical appliance ownership statistics for households across the case-study sites. Cross tabulation with socio-demographic characteristics revealed that ownership of electrical appliances was consistently lower in households with **lower income, tenancy residence** (as opposed to house ownership), **less educated women** (below grade 10 education) and for households in the **control case**. It further showed that women from poorer households had less access to time-saving

³ For example, verification of the number of male and female household members compared to the reported family size, and identification of discrepancies in employment data for respondents who reported not working. Variable construction largely involved creating dummy variables for households where a certain appliance was owned (at least one), or at least one woman in the household could access or use devices like mobile phones and internet.

electrical appliances, like microwave ovens and rice-cookers. This shows that whilst poorer women were found to be burdened by dual workloads of household chores and employment to make ends meet, they also spend more time completing domestic chores because of limited appliance ownership, compounding their time poverty. Previous studies have shown that women in Pakistan are found to be more time poor than men irrespective of their employment status, although working women are more time poor than those not working (Najam-us-Saqib and Arif, 2012). This often involves major trade-offs between time poverty and monetary poverty.

Table 2: Household electrical appliance ownership details

Housing colony/ Ownership of electrical appliances	Light ing and fans	Cooking appliances	Fidge/ Freezer	AC	Washing machine	Clothes iron	Sewing machine	Entertainment (TV/Radio)	Total average mobile phones owned by HH
Bahar colony	100	86.4	98.5	53	97	83.3	87.9	90.9	2.8
Liaqat Abad	100	57.5	82.5	17.5	90	90	82.5	90	2.75
Peer colony	100	60	82.5	25.8	85	83.3	62.5	82.5	2.4
Charar Pind	99	36	60	15	64	30	68	76	2.25
Gajju Matta (control case)	100	35.7	68.4	9.2	73.5	9.2	76.5	65.3	1.95

In further exploring women's differential access to Information and Communication Technology (ICT) (Table 3), analysis showed that whilst women had less access to mobile phones and internet/wifi compared to men across all sites, a significant difference in women's access was observed between the control case and the other peripheral sites. Households where at least one woman used a mobile phone and internet were higher in all treatment sites versus the control site and the differences were statistically significant. Interview analysis further showed that mobile phones were often shared between household members (as also evidenced in previous studies, e.g., Majid and Mustafa, 2022). In such cases, men usually had ownership of phones, while women used it occasionally to talk to family and relatives. Women's use of internet on mobile phones was also considerably less compared to men (Table 3). Interview data suggests that this was partly because of a lack of ownership, as highlighted by a woman participant from Charar Pind:

I: Do you use the internet?

CPH2: Yes, only occasionally, to watch a drama.

I: Whose phone do you use?

CPH2: My uncle's, only he has the internet.

I: Have you ever thought of buying your own phone?

CPH2: No, I'm not allowed. Besides, we can't afford to have so many phones.

Further evidence suggests that this was also due to women's greater illiteracy and lack of know-how to use smart phones compared to men. In many of our interviews, women indicated that it was usually their husbands and children who had access to smartphones. Even when smart phones were shared among household members, women had limited understanding of using the internet, as revealed by one participant from Bahar colony:

BCH2: All of us have mobile phones. I have this small button phone; I like it because I don't know how to use smart phones, but my kids have smart phones.

This provides some key insights: women in the surveyed sample generally had lower education levels than men, which, given the correlation between education and access to energy resources, suggests limited opportunities for women in education and public life, affecting their capacity to acquire necessary skills for accessing energy. Additionally, women's access to energy technologies, particularly those affecting mobility, is often restricted, monitored, and controlled, impacting their time poverty and socio-economic empowerment, particularly in an increasingly digitized world.

Table 3: Women's access to mobile phones and internet

Housing colony/ Percentage of mobile phone ownership (%)	Households with at least one phone	Households with at least one woman owning a mobile phone	Households with at least one woman using internet/wifi
Bahar colony	100	87.88	78.79
Liaqat Abad	100	57.50	32.50
Peer colony	100	75.83	47.50
Charar Pind	98	54.00	17.00
Gajju Matta (control case)	99	34.69	12.24

Further analysis showed that women working farther away from home (e.g., in core upper-class developments or city centres), generally had higher access to digital technology (mobile use: 73%; internet/wifi: 50%), compared to women working from home or inside their colonies (mobile use: 56%; internet/wifi: 40%). This points to how women's energy access is linked to their roles within the home and the wider city, and how gendered access to energy infrastructures blurs the distinct social and spatial divides of the public and private, explored further in the next sections. Previous research (Khalid and Razem, 2022) on women's differential access to domestic energy similarly highlights the shifting spatial bounds of private and public spheres in Pakistani households: women's energy access, while contextualized by socio-cultural notions of privacy and segregation, is also shaped by the (often blurred) public and private spatial affordances of domestic spaces. Our study shows similar findings and further highlights that women's access to energy infrastructures often forms a 'continuum' (Datta, 2016, p. 340), in which the public and private are continually (re)produced through the intersections between the home and the city. In exploring various peripheral sites, our analysis further hints at the interrelationship between cores and peripheries that shapes peripheral women's everyday lived experiences and access to energy, as discussed in the next section.

<H1> Energy flows between cores and peripheries

The interrelations between urban cores and peripheries manifested in their dynamic relational flows of energy and resources, characterised by their spatial proximity. In the following paragraphs, we outline some of these relational flows and their gendered characteristics. First, the survey analysis showed that women residing in proximal peripheral areas had better access to employment and mobility, with only 27% of women unemployed compared to 53% in the control case. These women also had better access to public amenities, either within their colonies or in the nearby core areas. Notably, access to religious facilities was found to be significantly higher in the proximal peripheral sites, with 52% of women indicating access compared to 28.5% in the control case. Similarly, women's

access to health-related facilities was better in the proximal peripheral sites, with 72.4% indicating access compared to 33.6% in the control case, and access to open and green spaces was also higher (36.6% versus 18.3%). These statistics highlight that women in the proximal case-study sites exhibited greater levels of access to public infrastructures of energy, compared to women in the spatial margins of Lahore.⁴ This access was either the result of better infrastructure provisions within their own colonies (e.g., in Bahar colony), or in many cases, because women were able to access amenities and facilities in the nearby core areas (e.g., in Charar Pind). We further found that this improved access was not just limited to material infrastructural provisions, but also mediated distinct social, economic, and political interactions in shaping women's production of space.

In the preceding section, we demonstrated that household ownership of electrical appliances was greater in proximal sites relative to the control case. However, beyond improved access to material energy resources, our analysis showed that proximity to core areas also influenced women's energy-related 'know-how' (Gram-Hanssen, 2014), aspirations, and understanding, especially for the poor women who worked in core areas. Many women, particularly those employed in domestic service in upper-class neighbourhoods, had - through these peripheral-core interactions - acquired the knowledge and skills to operate electrical appliances such as microwave ovens, electric kettles, and air conditioners, although they often did not own these electrical goods themselves. This exposure to, and familiarity with, electrical appliances from their workplaces enhanced women's capacity for electricity use. As one participant from Charar Pind, who worked as a kitchen maid in an upper-class household, reported when asked how she could operate different electrical appliances:

I: Did you know how to use a washing machine?

CPH3: No, they [employer in core area] taught me. No one in our area knows how to use these modern appliances. We learn from our workplaces.... I learnt to use iron. I've also learnt Urdu. ... I also learnt to be more careful about hygiene. I learnt how to make omelette, tender pops, noodles from them.

Another participant from Bahar colony, who worked as a nurse in a nearby hospital in a core area, revealed:

BCH1: Besides using hospital equipment, I've also learnt using microwave and other things like electrical kettle, AC which I don't have at home, but I know how to use.

Other examples revealed that some women were also able to access internet/wifi and mobile phones from their workplaces. These examples show that women in proximal peripheral sites developed an enhanced understanding of electrical appliance use in their everyday practices, which then also translated into greater aspirations for their ownership and use.

Our data further revealed that women employed as domestic workers in core upper-class neighbourhoods were more likely to benefit from cooling appliances (71.8%) and health products (4.23%) from their workplaces compared to women in other occupations (41.34% and 1.6% respectively). In addition to developing appliance-related proficiency, these women also had access to financial resources, either through loans or charity, provided by their employers in core areas, which

⁴ No statistically significant differences were found in access to educational facilities between the control case and the remaining case-study sites.

allowed them to purchase household goods and improve their living standard, as revealed by one participant from Charar Pind:

CPH1: I bought my employer's old fridge on instalments. We didn't have a fridge before, so we had to spend money every day on ice... I asked them (employer) to give it to me instead of selling it to someone once they decided to replace it. Now, they take a percentage of my salary as instalments.

These links were particularly apparent in the case of Charar Pind. Its idiosyncratic location as a periphery enclosed within the core area of DHA leads to certain lucrative work opportunities and latent benefits for women in Charar Pind, further strengthening the bonds between the two. Important to note here is that the relational flows exemplified earlier are by no means unilateral but shaped by the mutual dependencies between cores and peripheries. Our previous research (Khalid and Razem, 2022) illustrates that affluent homeowners in core areas necessarily rely on the domestic and commercial services of low-income women from the peripheries, resulting in gender-concentrated power dynamics between “housewives” and “housemaids”, in which energy infrastructures often play an intrinsic role. Without this workforce, the management of routine tasks in large houses would be disrupted and, in many cases, unachievable. Upper and lower-class households are therefore tied together in ‘human-relational infrastructure networks’ (Lemanski and Massey, 2022), where peripheral women benefit from the cores through informal and more-than-economic ways.

However, these interactions are by no means even, but rather, are formed of strong power differentials. Although wealthy neighbourhoods are reliant on low-income women's labour, they can easily replace it at short notice. In contrast, low-income women's livelihoods depend on this income. Further, peripheral women's access is often controlled and easily severed at the discretion of upper-class authorities. According to the DHA Security office, over 300 women enter DHA daily through the barricaded entrances of Charar Pind and Peer colony for income-generating purposes (Figure 3): their entrance closely surveyed and individually recorded. These close-knit networks exemplify Simone's (2010) portrayal of peripheries in that certain (peripheral) enclaves of poverty are strategically located within core urban systems to be exploited for their fluid labour and alternative services. In this case, the poverty-stricken enclaves of Charar Pind and Peer colony are intentionally left or located within urban centres to be exploited for their labour and services. Mason-Deese (2022) has also demonstrated how financially exploitative interrelations between intra-urban cores and peripheries are based on extracting value from women's (often informal) social reproductive work, in their roles as domestic workers, caretakers or home-based workers. Nevertheless, there are also trade-offs: whilst the spatial confinement of Charar Pind has limited women's employment opportunities in other sectors, compared to the other treatment sites, for many low-income women facing financial precarity, domestic work is often the only option available due to lack of education and formal skills. Access to core areas thus improves their access to appliances in addition to other public amenities like recreational facilities and green spaces (Figure 3), often not available in their own housing colonies, thereby improving their spatial access to energy.

INSERT < Figure 2: Barricaded entrance from Charar Pind into DHA on the left and residents of Peer colony visiting a nearby DHA park to celebrate Eid on the right. Source: Lead author's own photographs, 12/2021>

More importantly, our data shows that low-income women in proximal sites benefit from more than improved access to energy-related resources and skills. Their agency and understanding of their rights

are also significantly influenced by their exposure to core areas, ultimately impacting their socio-political empowerment. Survey evidence showed that women in the proximal case-study sites desired greater autonomy (*value*) over electrical appliance purchase decisions, while simultaneously placing more value on the normative understanding of women's right to such decision-making (*norms*). Table 4 presents a breakdown of women's perceived choices, values, and norms (Maiorano et al., 2021) across the case-study sites. As shown, women in the control case showed consistently less control, agency, and desire for autonomy over both finances and electricity-related decisions compared to the treatment sites. These findings underscore how women's socio-political expectations and experiences are tied to their access to everyday infrastructures of energy. Energy infrastructures, therefore function as a conduit for socio-spatial relations (Lemanski, 2020) between cores and peripheries.

Table 4: Women's perceived decision-making power across the choice-value-norm index for control over finances and electricity-related decisions.

Housing colony/ Decision-making power	Control over finances				Household electricity use and purchase			
	Choice		Value (% ascribing positive value)	Norm (% ascribing positive norms)	Choice		Value (% ascribing positive value)	Norm (% ascribing positive norms)
	% indicating self-autonomy	% indicating male decision making)			% indicating self-autonomy	% indicating male decision making)		
Bahar colony	13.64	10.61	15.15	21.21	22.73	18.18	45.45	66.67
Liaqat Abad	22.5	47.5	20	15	22.5	55	50	10
Peer colony	36.67	13.33	15.83	17.5	46.67	8.33	21.67	25
Charar Pind	38	40	16	15	39	42	60	54
Average of above	27.83	33.73	13.68	13.92	31.84	36.32	37.03	33.25
Gajju Matta (Control case)	18.37	62.24	5.1	3.06	16.33	69.39	21.43	17.35

<H1> Intersectional differences in women's access

Exclusions from public services and infrastructure, often due to weak governance and 'illegality', are exacerbated by gendered socio-cultural norms, such as women's restricted mobilities and limited access to public spaces, and further compounded by their intersectional identities. Sawas et al.'s (2020) highlight this in their study of infrastructure access in Pakistan, illustrating how overlapping vulnerabilities from these identities lead to significant exclusions in basic services. Their analysis of water access reveals that power differentials based on gender, religion, ethnicity, socio-economic status, or location, impact the water economy. In this, exclusions are notably pronounced for marginalized urban women who are thus subject to multiple layers of peripheralization. These result from the multiple compounding forms of social and spatial exclusions they face, as explained below.

Our analysis revealed that aside from income and tenancy differences mentioned previously, women's electricity access was intricately connected to their employment status, and this link was further complicated by paradoxical negotiations between women's household income, agency, and employment. To understand this, we must first examine the correlation between household income and women's employment status within the lower and middle classes. Our data showed that poorer households, i.e., households with income below the 25th percentile, had more women in employment

and contributing to the household income.⁵ Women's decision to work outside the home was largely driven by household economic insecurity and financial precarity, which acted as a key determinant between women choosing to work or staying at home (norms prioritizing women's place at home still prevailed across the sample). This concurs with previous evidence on Pakistan showing that women's work is highly responsive to changes in household income with women often taking up 'survival jobs' to meet household needs but still prioritising their reproductive roles (Majid and Siegmman, 2021). Qualitative data further revealed that the *type* of employment chosen was also subject to prevailing socio-cultural norms, as highlighted in the following interview quotes from participants in Charar Pind and Peer colony respectively:

CPH4: It's not considered good for women in our family to work. Only our husbands work.

PCH2: We couldn't go work in a factory because we honour our respect much more than money. We don't want our family members living in the village talking ill of us. That's why we try to find work in homes, closer to us.

Alternatively, low-income women from relatively financially stable households (particularly where men are earning more or are in more secure jobs or owned their homes) were often unemployed due to prevailing socio-cultural norms and expectations. This is consistent with previous literature on Pakistan, which highlights constraints on women's access to the public sphere under patriarchal forms and norms related to *purdah* (seclusion) (Grünenfelder and Siegmman, 2016; Kandiyoti, 1988).

Such negotiations between meeting basic household necessities and upholding social expectations have implications for women's energy use and spatial access. Our findings indicate that poorer women compelled to partake in employment practices outside their homes, by virtue of the nature of their jobs, have greater mobility, increased agency, and therefore better spatial access to energy (Table 5). Compared to this, low-income, unemployed women from financially better-off households have less spatial mobility and agency in energy-related decision-making, despite having more electrical appliances at home. This complex interplay between women's employment practices and energy access also suggests that women's autonomy and spatial access to energy is more strongly linked to their contribution to household income, rather than to the household's economic status per se. Moreover, for unemployed women, whilst they may have more access to energy in household practices in their domestic sphere, their access to public infrastructures of energy may be curtailed as a result. These findings suggest that the links between energy access and gender equity may not be linear. Previous studies (Alda-Vidal et al., 2023; Listo, 2018; Abdelnour and Saeed, 2014) have also hinted at the complexity of this intersection. Material interventions, these studies contend, though important, do not in themselves challenge the inherent gender ideologies that normalize or obscure socio-spatial injustices (Datta, 2016), whereby a closer investigation is necessitated into the underlying inequitable relations and entanglements of power. This suggests that gender equity through energy access can only be contextualized in relation to its socio-spatial intersections with the public and private spheres.

⁵ This was found to be 19% versus 12%- statistically significant. Also, 40% of households where only women were earning were below the 25th income percentile, whereas only 25.7% of the other households were below the 25th income percentile (statistically significant at 11%). Another important finding here was that 33.8% of the households where women's contribution to income was 50% or higher were below the 25th income percentile, while only 24.6% of the other households were below the 25th income percentile (statistically significant at 6% level).

Table 5: Women's electricity decision-making and freedom of movement against contribution to household income

Women's contribution to monthly income	Household electricity use and purchase (%age)			Freedom of movement and use of public space (%age)		
	Self-autonomy	Mutual decision-making power	Male decision-making only	Self-autonomy	Mutual decision-making power	Male decision-making only
Less than 50%	26.1	31.7	40.8	27.2	26.1	45.3
50% or more	60.6	23.9	14.1	66.2	22.5	9.9

Further, our data suggests that religion may also play a significant role and emerged as a key variable that impacted women's access to employment, mobility, and public space-use. In our sample, Christian women were found to have greater control, agency, and decision-making power, specifically over household electricity-use practices and purchase decisions, compared to Muslim women (Table 6).

Table 6: Women's perceived control and decision-making based on religion.

Religion	Women's perceived control and agency	Average score on the choice-value-norm frame (Between 1-3)
Christianity	Control over finances	1.91
	Decision-making over household electricity use and purchase	2.04
	Freedom of movement	2.06
Islam	Control over finances	1.34
	Decision-making over household electricity use and purchase	1.47
	Freedom of movement	1.47

In Pakistan, previous writings have highlighted how ethnicity and economic status operate in tandem with class hierarchy, in which class is determined at the intersection of economic status and social position alongside clan and cultural roots (Qadeer, 2006). Religious affiliations can therefore divide people within similar circuits and classes. This transpired in our study in the differences between women's freedom of movement and access to public spaces and workplaces based on religion. Norms around *purdah* and female segregation were more strongly adhered to in Muslim households, as one participant from Gajju Matta proclaimed:

GMH1: We are Syeds [referring to a particular Muslim lineage], we never go outside. My husband brings everything. You know it's very inconvenient for Syeds, specially because we don't have the permission to go outside.

Previous studies (Datta, 2016; Sawas et al., 2020) have also shown how certain religious ideologies and expectations to uphold family honour can restrict women's mobility, limiting their economic opportunities, and access to public infrastructures and services. Similarly, our data suggest that religion, here manifested in differences in autonomy and access between Christian and Muslim women, appeared as a significant factor. A case in point is that across our case-study sites, we found that no space was allocated for Muslim women in any of the community mosques, which curtailed their access to public religious facilities and contrasted with churches in the same communities. This limited Muslim women's access to alternative spaces, e.g. during domestic energy inaccessibility and for opportunities to be better informed and involved in community decision-making, unlike Christian women. Such material disparities in gendered access coincided with women's differential perceptions of agency and autonomy based on their religious affiliation (as shown in Table 5) and cannot be

overlooked. However, further research is required to unpack the nuanced interlinks between religion and gendered access to energy, especially as it relates to public-private divisions of space.

<H1> Conclusion

This study explores marginalized women's access to energy infrastructures in peripheral settlements in cities of the South that are themselves confined to the peripheries in more ways than one. In doing so, it unveils how low-income women from peripheral neighbourhoods are subject to multiple layers of peripheralization, in the multiple compounding forms of social and spatial exclusions they face, and that cut across the gender-energy nexus in Southern cities like Lahore. Using an intra-urban comparative approach (McFarlane et al., 2017), it demonstrates the heterogeneous and diverse nature of (peripheral) women's everyday encounters with energy infrastructures from the home to the city.

Peripheral urbanization in Lahore shapes low-income women's infrastructural access in multiple ways. Spatially, women remain 'peripheral' in urban policy and gender-blind urban planning processes that fail to capture their everyday experiences with infrastructures of energy (Khalid and Razem, 2022). This spatial exclusion from infrastructure, as Datta and Ahmed (2020) note, creates not only structural violence, but an intimate and corporeal experience of violence from the city to the household. Precarious and inadequate domestic energy infrastructures put additional burdens on women's everyday routines, in which their energy poverty further compounds their time poverty, monetary poverty or both. Women frequently encounter exclusions from access to and use of public infrastructures of energy. This exclusion is either due to the absence of adequate provisions, such as gender-inclusive educational, vocational, and healthcare facilities, or due to 'structural and social contexts of violence' (p.68) as observed in the masculinization of space (e.g., male-dominated neighbourhood streets, markets, and transportation) or the deliberate social exclusion of women from public areas, e.g., in the lack of provisions for women in community mosques.

Further, women experience peripheralization based on their intersectional identities, such as their religion, class, income, employment status and type, education, and geographical location, compounding their differential access to energy. For example, women in Bahar colony exhibit greater appliance ownership and positive gendered norms for decision-making, which is shown to correlate both with higher incomes and Christian religious affiliations. In contrast, Muslim women may face greater constraints in accessing public infrastructures of energy due to deeply embedded socio-cultural norms around public/private demarcations. Low-income women from geographically distant peripheries (in the case of Gajju Matta) may face further constraints in their access to mobile phones and ICT due to a lack of exposure, skills development, and know-how. Conversely, Charar Pind- a periphery enclosed within an urban core- faces certain development restrictions and limitations in women's selection of employment. Yet, women working in domestic service in nearby core areas often gain better access to energy-related resources and skills, enhancing their energy-related aspirations. Here, the study also highlights the gendered 'relational infrastructure networks' (Lemanski and Massey, 2022) that women, e.g., in Charar Pind and Peer colony, are able to produce through core-periphery interactions. Although women are less able to penetrate community networks due to constraints in their public access (e.g., to mosques), they create alternative core-periphery relational infrastructure networks based on their gendered roles and responsibilities of care work, enabling access to energy-related resources, skills, security, and agency. Insofar as peripheralization presents a dominant, intentional, integral and, as this study shows, inter-relational component of placemaking in urbanization processes, our analysis shows that (peripheral) women, in performing gendered everyday practices, play a mediating role in the flows of energy and resources between cores and

peripheries and so, are able to produce 'in-between spaces' (Simone, 2010) of infrastructural access. As Simone (2010) notes for relational infrastructure that 'people not pipes matter most' (p. xi), so we find here that *women not wires* matter more when it comes to infrastructural energy access in the peripheries of Lahore.

The way women access and use energy within the spaces of their homes, neighbourhoods, workplaces, and the wider city has important bearings on how we understand the urban, its cores and peripheries, and that requires a more detailed scrutiny of dichotomous articulations of public versus private, domestic versus work-based, productive versus reproductive and even of cores and peripheries themselves. Such distinctions are continuously blurred as women navigate these plural spheres in complex ways in negotiating their everyday energy practices under precarious public infrastructures and shifting household access. Our analysis builds on previous scholarship (Anwar et al., 2020; Datta, 2016; Khalid and Razem, 2022) that underscores how the operations of private/public spaces are often obscured in women's everyday encounters of water, sanitation and energy, as infrastructures form a continuum from the home to the city (Datta and Ahmed, 2020). Constitutive of gendered practices, bodies and spatialities, they become the site for multiple peripheralizations of women. An intra-urban comparison provides a crucial lens to understand this complex, heterogenous and conflicting nature of the gender-energy nexus across the various scales and sites of the city, as well as providing insights into its relational dimension, as gendered flows of energy and resources create symbiotic, yet power-bound interactions between urban cores and peripheries.

Moving beyond such dichotomies is also significant in interlinking energy equity with gender equity, specifically in conceptualizations of women's empowerment through electricity access (e.g., Kabeer, 1999; Winther et al., 2017). Our analysis shows that low-income women from better-off households may have better access to domestic electricity, but their limited agency and access beyond the domestic sphere can restrict their empowerment. Whereas poor women with limited access to domestic appliances may have better control of assets, decision-making power, and spatial access to energy because of their employment practices and the necessity of acquiring work outside the home. This shows that women's empowerment and consequently gender equity through electricity access cannot simply be determined through women's domestic use, nor solely improved through provision of more/better domestic appliances, as is the case in most gender and development policies (Clancy, 2016; UNDP, 2018). Rather, it must account for their access and agency beyond the domestic sphere and include an investigation of their electricity access and use in public spaces and workplaces, including for both productive and reproductive work. For this, the production of urban space needs to be undertaken as a feminist endeavour (e.g., Clancy, 2016; Peake et al., 2021), addressing inequities in gender relations due to patriarchal power imbalances and catering to the needs of women by empowering them socio-culturally and economically. Further, in oversimplifying the causal relationship between energy access and gender equity, the intricate complexities of intersectional gender inequalities are often ignored (Alda-Vidal et al., 2023; Listo, 2018; Sawas et al., 2020), including those influenced by factors such as religion, ethnic minority status, or migration. Socio-spatial justice entails that such differential distributions be considered in urban planning and development policies to address infrastructural exclusions.

This paper fills some of the gaps in spatial understandings of the gender-energy nexus in peripheral contexts of the South. It also raises important questions about the kind of urbanization processes needed that can scaffold the interlinks between energy equity and gender equity. Whilst energy policy is now incorporating more gender-responsive pathways (UN DESA, 2023; ENERGIA, 2019; Feenstra & Özerol, 2021) and recent gender and development scholarship (Cornwall and Rivas, 2015; Kabeer, 2015; Chant, 2016; Akram, 2018) is working towards a more sophisticated conceptualization of gender

empowerment, much more work is needed from critical urban scholars and feminist geographers on the complex ways in which urban spaces and infrastructures reify, shape, mediate, contextualize and reproduce gender-energy intersections, particularly for those vulnerable and marginalized in the urban peripheries.

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