



Evolving houses, demanding practices: A case of rising electricity consumption of the middle class in Pakistan

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ABSTRACT

This paper seeks to address the gap in current studies of domestic energy-use in countries in the Global South from a socio-technical perspective. It explores a trajectory of domestic spatial layouts and accompanying household practices over the last century in Lahore, Pakistan. The research identifies various nexuses of practice-spatial arrangements of urban housing that have emerged, persisted and transformed over time, giving rise to unsustainable levels of electricity consumption in middle-class households. A mixed-method approach was adopted for collecting data including a review of archival documents, building regulations, house plans, case-studies, oral history narratives and expert interviews. This analysis reveals three key themes as central to explaining increasing household electricity demand: a shift from outdoor to indoor activities, transformation from inward- to outward-oriented design and a spatial dispersion of practices. The study suggests that understanding longitudinal dynamics of practice-arrangements can help identify and prevent normalisation of unsustainable configurations that gradually become embedded in social structures and practices. Contemporary standards are likely to prefigure higher demands for electricity because of increased consumption and specification of spaces, culturally ill-suited indoor and outdoor configurations, unquestioned reliance on electricity and neglected use of outdoor space. Though confined to a single case, this study has broader methodological applicability and implications for other countries in the Global South.

1. Introduction

Energy consumed in the building sector accounts for just over 20% of total global consumption. In the Global South, this consumption is predicted to grow nearly three times the rate for developed nations by 2040 [1]. By 2030, more than 80% of the middle-class globally is projected to be from the Global South, accounting for 70% of total energy consumption [2]. Yet most energy policies in countries of the South, like Pakistan, tend to focus on energy generation while neglecting demand management [3]. This becomes more evident when reviewing national housing policies as they prove inadequate in dealing with the current housing shortage. In addition, they fail to consider the energy efficiency of existing housing [4], [5].

During the first decade of the 21st century in Pakistan, middle-class households, defined as having daily per capita expenditures of US\$2-US

\$10 (in 2005 purchasing power parity dollars²), grew from 32% to 55% of the total population. The middle-class is expected to contribute to 90% of the increase in national energy consumption [6]. Pakistan's housing shortage is approximately 10 million units and the deficit is growing, particularly in urban areas [7].

A socio-technical analysis of energy consumption can provide an in-depth and nuanced understanding of what this consumption is for and how it has come about, as has been proposed by practice theorists (see e.g. Refs. [8–13]). Growing energy demand and comfort standards of middle-class households in the Global South have been the subject of recent study [14–18]. However, there is limited research on housing spatial arrangements and how these interlink with everyday practices that can lead to energy-intensive configurations. Furthermore, a detailed analysis of how and why this consumption has changed over time requires a longer temporal dimension [19]. Instead of considering

Abbreviations: LDA, Lahore Development Authority; LIT, Lahore Improvement Trust; LMC, Lahore Municipal Corporation; NIC, New Indigenous Communities

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² The conversion rate for purchasing power parity (PPP) 2005 dollars was Rs. 17.60 in 2001–02, Rs. 41.50 in 2010–11, and Rs 50 in 2013–14. Hence, middle-class was defined to be monthly expenditures (for a 6-person household) of Rs. 6400–32,100 in 2002, and Rs. 15,100 to Rs. 75,700 in 2011. For further description of middle-class, see Ghani (2014).

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buildings simply as grounds for technological efficiency in construction and appliances, there is a need to view buildings as the material counterparts of competing social practices [20]. Unsustainable practice-arrangements need to be challenged instead of being reproduced [21]. Hence, this research adopts a socio-material approach to understanding energy demand in middle-class households in Lahore, the second-largest urban centre in Pakistan, with a population of 11.13 million. It analyses the coevolution of everyday practices of homeowners and the associated material and spatial arrangements to target both *efficiency* and *sufficiency* in urban households' energy consumption. By applying Schatzki's [22] conceptualisation of 'practice-arrangement bundles' to the emergence, persistence and transformation of urban housing, this paper seeks to unfold links between spatial layouts and household practices in middle class households in Lahore.

This paper is structured as follows: Section 2 presents the methodology and the review of spatial evolution of middle-class houses in Lahore. Key findings are presented in section 3. Conclusions are made in section 4.

2. Methodology

2.1. Social practices and spatial structures

Practice theorists have frequently focused on household practices in empirical energy-use studies ([23–28] among others); however, the position of materiality in practices has been much debated [29–32], especially with regards to buildings as infrastructure in practice formations. Adopting a socio-technical approach to interpret architecture, Gieryn [33] suggests that buildings are 'objects of (re)interpretation, narration and representation' (p. 35) that present a dualism of structure and agency that can only be understood by taking a combined account of Giddens' and Bourdieu's theorisations; both acknowledge the significance of the built environment in relation to social order. Giddens [34,35] emphasises the importance of material spaces not only in providing contextuality to activity time-spaces but also in constituting and reproducing them. Taking a step further, Bourdieu (e.g. Refs. [36–38]) acknowledges structuration of the built environment that mediates social practices and dictates cultural distinctions. For example, his spatial analysis of the Kabyle House as structuring and reproducing gendered practices in a Berber society [36].

Building on Giddens' and Bourdieu's theories, Schatzki [22] presents his theorisation of social order as a plenum of practices and material arrangement bundles. Material arrangements refer to the set of interconnected material entities including humans, artefacts, organisms and things of nature. The bundling of practices and material arrangements occurs in that (1) practices affect, alter, give meaning to, and are inseparable from arrangements; (2) arrangements channel, prefigure and facilitate practices [39]. Physical configuration of the house, therefore, presents an example of material spatial arrangements that structure and mediate various household practices. New bundles are formed by material innovations or intentional redesign of the built environment to accommodate ever-changing practices. The history of domestic architecture thus provides evidence of how homes can have emergent consequences for trajectories of practice nexuses and resulting electricity demand [30].

This paper applies Schatzki's theorisation of practice-arrangement nexuses to the unfolding trajectories of middle-class household practices and spatial layouts to better conceptualise electricity consumption. Two concepts from Schatzki's practice theorisation will be adopted: historicity and prefiguration. Historicity [[40], p. 201] refers to existence of the past in the present. For Schatzki [40], the past inhabits the present; what people do and how they react to things is circumscribed through practice memory, oriented by filling out past dimension of temporality and publicly manifested through bodily training and practical understandings, by or through the past. The second concept adopted is prefiguration [[22], p. 139]- a type of relation between

practices and arrangements. Material arrangements can prefigure practices through possible pathways of action on an indefinite set of registers, such as easy or difficult, obvious or obscure, expensive or cheap. According to Schatzki, past, present and future activities coexist so long as a person *acts*. In the present study, these two concepts of *past in the present* (historicity) and *present in the future* (prefiguration) will help configure coevolution of practice-arrangement bundles in this study's context.

2.2. Method

A mixed-method approach was adopted for collecting data. Archival data on urban planning and building regulations in Lahore were obtained from relevant authorities (e.g. Annual reports of the Lahore Improvement Trust (1936–1950) from the Punjab Archives, and building byelaws from Lahore Development Authority Head Office). Typical house plans from different architectural periods were obtained to develop a timeline of middle-class house spatial layouts.

Five case-study houses were selected to represent relevant housing typologies from different periods and were visited and photographed. They were deemed to be good representatives of a specific architectural period in terms of spatial configuration and location; also, they had been occupied by the same family for many generations (e.g. case-study 1 housed the family's seventh generation). This enabled enquiry on how spaces, and their use, have adapted to changing needs over time. The homeowners of each case-study house were questioned about daily household practices of their grandparents and parents who had lived in the same house, as well as asked to give information about their own current routines and practices. Homeowners were also questioned about how their electricity use had changed over time, which included listing their appliances. Some of the older interviewees (e.g. Interviewee H7 and H9) provided rich narratives on how electricity consumption had changed drastically during their lifetime. This was corroborated with statistical data on electric appliance availability and ownership in Pakistan (see Table 3).

In addition to case-studies, oral history interviews with older residents of Lahore and a focus group discussion with seven middle-aged housewives were conducted (see Table 1). Fourteen semi-structured interviews with field experts in architecture and town-planning, history and social-sciences were conducted to understand changes in overarching socio-cultural, political and environmental structures in Lahore.

Individual semi-structured interviews (conducted in 2016–2017) ranged from 60 to 140 min. All interviews were recorded, translated from Urdu to English, and transcribed. Interview findings were coded and analysed using NVivo 11 (a type of CAQDAS- Computer Aided Qualitative Data Analysis Software). Finally, major themes were identified within the context of practice-arrangement trajectories.

Data was collected on the coevolution of spatial layouts and household practices for the last century. Electricity was first introduced in Lahore in 1912 and became more widespread in the domestic sector by the late 1920s. Hence, analysis of the last century gives account of how changes in practice-arrangements were affected by the changing role of electricity in households. Homeowners were questioned about their practices related to housekeeping, comfort (cooling and ventilation)³, cleanliness (house cleaning, laundering, personal hygiene), cooking, lighting, sleeping, eating, recreation/entertainment and communication.

Historical trajectories of household practice-arrangements in Lahore presented in this paper are in no way comprehensive. As Schatzki [41]

³ Heating practices did not come up during the interviews in relation to electricity consumption, since gas is conventionally used for heating and is normally only required for a few months of the year, whereas the bulk of electricity consumption is needed for space cooling annually.

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