



Does compact urban forms relate to good quality of life in high density cities of India? Case of Kolkata



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ABSTRACT

The compact city paradigm claims to result in a better urban quality of life (UQoL). However, does it also resonate for cities that are already compact (i.e., highly dense)? This study empirically assesses the degree of association between the compact urban form (UF) and better UQoL at the neighbourhood scale in the case of Kolkata, an expanding, high-density city in India. Two UF metrics, the Compactness Index (COMPI) and the Mix-Use Index (MUI), which are based on the compact city model, are constructed to classify the city into UF prototypes of compact vs dispersed forms. A multivariate exploratory analysis followed by Cluster Enrichment (CE) was applied on decadal census, amenities and air quality data of 2001 to estimate the dimensions and patterns of the objective UQoL. Logistic regression adjusted by 'socio-economic cultural status' (SECS) was applied to assess the likelihood of associations between compact UF and derived UQoL. The results show that the compact UF does have a significant association with a higher UQoL but is sensitive to the growing strengths of a socio-economic and cultural status. Moreover, as the city grows, the relationship between a compact UF and a higher UQoL becomes skewed. This evidence suggests that a compact city policy for growing high-density cities like Kolkata does have the potential to achieve a better UQoL provided there is a sensitive and balanced growth policy.

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1. Introduction

Compact urban forms are currently acknowledged to be the most effective urban system that is positively associated with urban life (Fahy & Ó Cinnéide, 2008; Jenks & Jones, 2010; Milder, 2012; Yang, 2008). The success of the 'compact form' paradigm in developed nations has encouraged the policymakers of developing cities to envision plans under the aegis of a 'compact city' policy. Kolkata is one such megacity that aims to adopt the compact-polycentric urban form as its future spatial structure (as per the Kolkata VISION plan 2030, KMDA, 2006). Ironically, if urban density (a primary metric defining urban form) is considered, Kolkata is already considered compact—so much so that it greatly surpasses general standards of healthy living—at a population density of 25,000 persons/sq km (Hancock & Duhl, 1988). As a colonial city, Kolkata displays wealth disparity and the extreme contrast of 'wealth and poverty' (Downtown, 2000), which is associated with a

lack of social equity and a low quality of life. This juxtaposition questions the ramifications of adopting a compact form in an already 'compact' city.

The paradox of high-density compact development in Kolkata or a similar city often implies a compromise with quality of life (Sanyal, Nagrath, & Singla, 2009). Hence, the 'compact-urban form' may not offer the desired UQoL and may even prove detrimental towards a sustainable future (Bardhan, Kurisu, & Hanaki, 2011; Burton, 2000). While this argument may seem valid as a city with a high density tends to overload infrastructure delivery, the probability is that, in contextual settings, a compact urban form may be associated with an improved UQoL (Jenks & Burgess, 2000). The idea that the extremely high density of Kolkata may not represent overcrowding, even as a tolerance of different densities, is a function of cultural context. Arifwidodo and Perera (2010), in their study of Bandung, Indonesia, also emphasize the importance of context in deriving links between a compact city and UQoL. Kolkata is referred to as the 'city of joy' and has displayed a higher quality of life even under stressed conditions (Biswas-Diener & Diener, 2006). Arifwidodo (2012) and Lin and Yang (2006) empirically demonstrated that a compact urban form in populous Asian cities supports a higher UQoL when controlling for certain factors; however, negative effects were also persistently present.

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Very little research exists that directly links an urban form with UQoL (Milder, 2012; Yang, 2008). The debate on compact urban form is scant, which is especially true for cities in developing countries. In many studies, UQoL and UF are undefined, and the links between them lack sufficient empirical agreement. This is primarily because of the multiplicity of methods and definitions used in the literature to explain the spatial urban form and UQoL. Second, there is a strong counterargument against a compact city's effect on the general quality of life. Bramley and Power (2009) and Thomas and Cousins (1996) argue that a compact city completely overlooks the advantages of a decentralization policy and that people living in low density environments enjoy higher UQoL due to the higher availability of amenities like green space (Breheny, 1997). However, green space-derived UQoL greatly depends on its accessibility and quality. According to Fuller and Gaston (2009), dispersed development engenders geographical isolation of people from nature, diminishing opportunities to experience nature and hence reducing UQoL. Similar evidence was reported by empirical research on Taiwanese (Lin & Yang, 2006), Chinese (Chen, Jia, & Lau, 2008) and Indian cities (Vaidya & Ray, 2011).

Unlike developed nations, the major challenge for these developing cities is managing the density through equitable resource allocation, which in turn operates with the sustainability tripartite. A common connection between UQoL and sustainability pertains to people's relationship with resource capital (Beck & Stave, 2011). Thus, it makes more sense for these cities to concentrate their populations in small areas, thereby reducing the cost of per capita resource requirements and in turn increasing efficiency in service access and delivery, which will improve UQoL for residents. The idea that a certain spatial form has the capacity to improve UQoL renders that form more sustainable because an outcome that cannot implicate urban life positively cannot be considered sustainable (Fahy & Ó Cinnéide, 2008).

In light of this reasoning, this article advances the compact city-UQoL debate in three ways. First, we provide an objective framework for assessing the links between UF and UQoL for high-density cities in developing cities, using Kolkata as a case study. We emphasize that the objective UQoL is impacted by compactness in high-density cities. Second, by adapting the *cluster enrichment* method and hierarchical modelling for a composite UQoL index, we address the conceptual and methodological issues related to synthetic UQoL metrics with multiple variables. Third, we support the probabilistic association of urban forms to various cohorts of UQoL in high-density cities in developing countries.

A probabilistic classification model is conceptualized to assess the inherent association of compactness with urban quality of life in the megacity of Kolkata. It is hypothesized that if the existing compact UF has an association with higher UQoL, then adopting a 'compact-city' strategy as its future agenda would be beneficial.

1.1. Related literature

The search for a 'good city form' to enhance the vitality and quality of life has been a critical part of the urban planning research agenda over the past decade (Fahy & Ó Cinnéide, 2008; Jabareen, 2006; Jenks & Burgess, 2000; Lanzendorf, 2001; Marshall, 2009). In this area of study, the 'compact' urban form, characterized by indices such as high density, mixed land use, connected streets and walkability (Milder, 2012; Schwarz, 2010), gained momentum owing to its capacity to reduce environmental loading by limiting activities and people to a relatively small area. In developed countries, researchers have also stated that it has the potential to provide a better quality of urban life (Ewing & Hamidi, 2014). Jabareen (2006), Gaignéa, Rioux, and Thissee (2012) and Hege (2012) state that high-density spaces improve the quality of life through enhanced social interaction, walkability and

reduced greenhouse emissions by minimizing transport and travel. Lebel, Krittasudthacheewa, Salamanca, and Sriyasad (2012) notes 'compact and modular organization' of cities can promote liveability, provided there is an adequate starting density. According to Ewing and Hamidi (2014) and Neuman (2005), compact, connected areas offer 'longer, healthier and safer lives' and contribute to the economic well-being and health of cities. These essentially point to the complementarity of spatial 'compactness' with the ideal UQoL (Pacione, 2012).

Proponents of the systems' approach in sustainability propose that the compactness of urban spaces correlates with social equity and justice (Bramley, Dempsey, Power, Brown, & Watkins, 2009; Burton, 2000). Pendall and Carruthers (2003) (in OECD, 2012) exemplifies, how social equity increases as density rises. Because the social paradigm of sustainability has the closest association to human lives, its significance becomes critical in UQoL. However, whether the relationship is benign or not remains unresolved (Bramley & Power, 2009). Some of the key pathways in which the compact form is connected with improved quality of life include walkable, well-connected areas; mixed-land use; and the proximity of multiple services within a shorter travel distance. Hence, the result is more human and social interaction (Milder, 2012). On the other hand, the results of research by Bramley and Power (2009) and Li and Weng (2007) defend low-density living by correlating subjective satisfaction with well-being. Essentially, these studies used parameters that are termed 'subjective indicators' (individual satisfaction) in the UQoL literature (Marans & Stimson, 2011). They do not account for objective UQoL indices that increase competitiveness of high-density cities and thus UQoL. This evidence clearly suggests that there is no doubt that compact cities have immense benefits and have a strong relationship with quality of life, but the pathways to produce positive effects require closer examination.

Dempsey and Jenks (2010) and Richardson, Bae, and Baxamusa (2000) criticize the prescription of forming a compact city for better liveability in developing countries. They argue that 'living in crowded... is more social and convivial' in these countries, 'despite low living standards'. Hardoy et al. (Burgess, 2000, p. 15) question 'what is the sense ... of further densification given that densities are already high' and where there is already an array of congestion and crowding-related problems. Williams (2004) also infers that 'urban compaction achieved through a process of densification, is wholly inappropriate for cities in developing countries'.

Much of the debate around using the compact city model for high-density city arises from the way 'compactness' in the urban form is defined. A standard practice is to use metrics such as density, both in building and population; a diversity index of land use mix; and network connectivity to characterize urban forms as compact or dispersed. Jabareen (2006, 2009) defines compact urban forms based on the idea of 'containment' of urban functions in a smaller spatial range i.e. the intensity of land uses or human loading. Tsai (2005), Huang, Lu, and Sellers (2007), Schwarz (2010), and Sevtsuk and Amindarbari (2012) provide an array of metrics such as shape (the smallest circumscribed circle), contiguity (patch density and porosity), and expandability, but they stress that density is a universal measure for compactness. However, there is no consensus as to the amount of density that constitutes *high density*. Zhang (2000) notes that compactness and crowding are culturally determined. This is truer for cities like Kolkata, where density metrics are more relative than absolute (Dave, 2010). Density in these cities is more a function of spontaneous development than planned functional thresholds. Given that development here is mostly an outcome of historical organic growth, metrics such as land use mix to measure diversity is pertinent. Here, the co-existence of multiple urban land uses is a utility of market competition and historical growth coupled with a lack of

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