

Social Sustainability of High-Rise Living in Kolkata: An Empirical Study

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DOI: <https://doi.org/10.47772/IJRISS.2026.10200531>

Received: 23 February 2026; Accepted: 28 February 2026; Published: 18 March 2026

ABSTRACT

Urbanisation is a global trend with rapidly increasing city populations. While high-rise apartments aren't the only solution, developing countries are quickly adopting high-rise living due to socio-political and geographical factors. The sustainability of high-rise apartments has been studied across economic, environmental, and social dimensions. The review shows that social sustainability has been less researched than economic and environmental aspects, especially in the developing world. This research seeks to find how socially sustainable high-rise apartments are in the context of the developing world, especially in Kolkata, India.

This study uses qualitative and quantitative analysis to examine social issues of high-rise living in Kolkata, comparing 61 low-rise (G+4) and 59 high-rise (G+5+) apartments. It analyzes residents' experiences based on social sustainability theories from the literature.

The empirical findings reveal a significant income disparity between high-rise and low-rise residents. The analysis shows that, on average, 79.3% of high-rise residents belong to the High Income Group (HIG), and the remaining 20.7% belong to the Middle Income Group (MIG). For low-rise apartments, on average, 70% of residents belong to MIG, and the remaining 30% belong to the Low Income Group (LIG).

The sense of community is stronger in low-rise cooperative apartments than in high-rise ones, fostering more social cohesion and trust. Popular high-rise developments in Kolkata's newer suburbs are not socially sustainable because they are unaffordable and non-inclusive. Conversely, low-rise cooperative apartments are sustainable because they are affordable, equitable, inclusive, and cohesive. The study also shows that Kolkata's religious and regional diversity does not complement social cohesion across zones.

The study concludes that while high-rise apartments are rapidly increasing in eastern Kolkata, they are not socially sustainable, serving only 8% of the population. It shows that the cooperative model of low-rise apartments is more sustainable, suggesting policies should support consolidating these societies.

Key Words: Social Sustainability, High-Rise, Low-Rise, Developing countries, Trust, Social Cohesion

INTRODUCTION

The three basic necessities for a human being's survival are food, clothing, and shelter. This research is primarily about shelter, in the form of high-rise apartments. It examines the social sustainability of high-rise apartments. The term 'sustainability' became popular after it was formally used in the United Nations Brundtland Report in 1987. Over the past three decades, the concept of sustainability has evolved, offering three conceptual pillars: environmental, economic, and social. The environmental and economic pillars have dominated sustainability debates since their inception, while the social aspect has been neglected (McKenzie, 2004; Colantino, 2010). Similarly, most sustainability studies related to high-rise apartments have focused on environmental and economic sustainability. The social aspect of sustainability in high-rise apartment living has been less explored and under-researched than its environmental and economic aspects. This study examines and empirically tests the theoretical underpinnings of social sustainability in high-rise apartment living, juxtaposed with those of low-rise living.

LITERATURE REVIEW

Before delving into the reasons for constructing high-rise buildings, it is imperative to define what constitutes a high-rise building.

The Council of Tall Buildings and Urban Habitats (CTBUH), a Chicago-based organisation that is an authority in maintaining high-rise-building statistics, defines a high-rise building as a building that exhibits some element of “tallness” relative to the context; for example, a 14-story building will not be considered a high-rise building in a high-rise city such as Chicago or Hong Kong. In contrast, it will be regarded as a high-rise in a European provincial town or a suburb (Nobel, 2015). Thus, according to CTBUH, it is a building's height relative to its context that defines a high-rise. Figure 1 below illustrates the definition of a high-rise building based on its relative height and the context in which it stands.

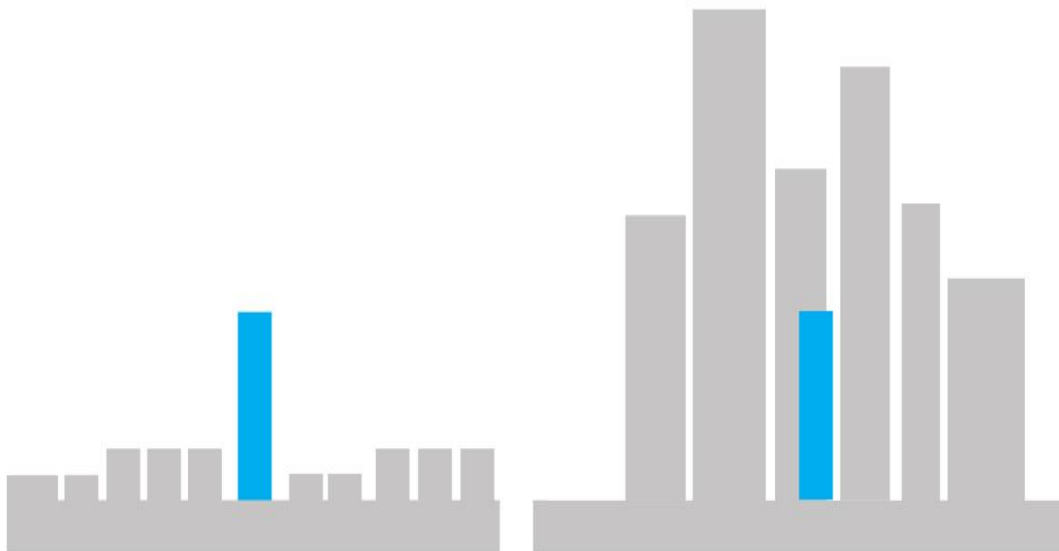


Figure 1. Illustrates high-rise Building definition of relative height to context

(Source: CTBUH 2015)

Thus, the height of a building is a relative term that depends on the context in which it is built (CTBUH 2015).

In Kolkata, a high-rise apartment is defined as a building with G+5 (Ground + 5) or more floors. The West Bengal Fire Services proposed this latest definition in June 2022. The Kolkata Municipal Corporation Building Rules also support this definition (KMC Building Rules 2022; The Times of India 2022).

Similarly, a residential apartment building with G+4 floors (Ground + 4) in Kolkata is considered a low-rise apartment. This definition is also endorsed by the West Bengal Fire Services and the Kolkata Municipal Corporation Building Rules in June 2022 (KMC Building Rules 2022; The Times of India 2022).

The term urbanisation is often used in this context. The concept of ‘Urbanisation’ refers to the process of the concentration of people in an urban unit and the social transformation from rural to urban. The term implies the growth of infrastructure, commercial activities, civic services, transportation networks and employment; thus, urbanisation brings regional prosperity (Mandal, 1989). The urbanisation process leads to a gradual change in land use and land ownership and usually raises land values (Das Gupta & Sivaramakrishnan, 2013).

Various driving forces promote high-rise building culture, with land value a key factor. Investment in high-rises is driven by high urban land prices offering lucrative returns, depending on interest rates (Al-Kodmany, 2016). Low land prices in small towns keep buildings low since tall structures are less attractive (Al-Kodmany, 2016). Carol Willis states “form follows finance,” emphasising that economic factors influence high-rise development

(Al-Kodmany, 2018). In large cities like Singapore, Shanghai, and Hong Kong, high land costs lead to predominantly high-rise living (Ali & Moon, 2007).

Table 1. Showing Urban & Rural Population Growth, selected years, and periods, 1950-2050 (projected)

Development group	Population (billions)						Average annual rate of change (per cent)				
	1950	1970	1990	2018	2030	2050	1950-1970	1970-1990	1990-2018	2018-2030	2030-2050
Total population											
World	2.54	3.70	5.33	7.63	8.55	9.77	1.89	1.83	1.28	0.95	0.67
More developed regions	0.81	1.01	1.15	1.26	1.29	1.30	1.07	0.64	0.34	0.17	0.03
Less developed regions	1.72	2.69	4.18	6.37	7.26	8.47	2.23	2.21	1.50	1.09	0.77
Urban population											
World	0.75	1.35	2.29	4.22	5.17	6.68	2.95	2.63	2.18	1.69	1.28
More developed regions	0.45	0.67	0.83	0.99	1.05	1.12	2.06	1.04	0.64	0.46	0.34
Less developed regions	0.30	0.68	1.46	3.23	4.12	5.56	4.02	3.82	2.83	2.03	1.50
Rural population											
World	1.79	2.35	3.04	3.41	3.38	3.09	1.37	1.30	0.41	-0.07	-0.45
More developed regions	0.37	0.33	0.32	0.27	0.24	0.17	-0.48	-0.27	-0.58	-0.95	-1.61
Less developed regions	1.42	2.01	2.72	3.14	3.14	2.92	1.75	1.52	0.51	0.00	-0.37

(Source: UN World Urbanization Prospects The 2018 Revision, 2019)

As shown in Table 1, between 1950 and 2018 the world’s urban population grew more than fourfold, from an estimated 0.8 billion to an estimated 4.2 billion. The urban population in the less developed or developing world increased from an estimated 0.30 billion in 1950 to an estimated 3.23 billion in 2018 (UN World Urbanisation Prospects, the 2018 Revision, 2019). The current data show that this rapid increase in urban population is highest in Asia. Europe and the USA are already primarily urban, whereas China and India are not, but they are moving in that direction much more rapidly than anywhere else in the world (United Nations, 2019).

With climate change a priority in the contemporary context, the quest for livable, sustainable high-rise development is paramount. Managing urban growth through high-rise construction isn’t just about scarcity, density, and height. It is also about agenda and planning policy, which facilitate the construction of high-rise apartments in achieving sustainability goals. For example, in Europe, most of the cities have high-rise zoning policies to manage the urban population, which restricts the spread of high-rise construction in a haphazard manner and controls the heights of the buildings per the region’s population density. In the Netherlands, most of the cities have high-rise zoning policies (Klerks, 2009). The history of high-rise zoning in Chicago and New York City shows that policies based on height, setbacks, and volume dictated urban planning paradigms (Klerks, 2009). In the book ‘Form Follows Finance’ (1995), Carol Wills illustrates that, over time, principles of urban planning and policies have shaped skyscrapers (Klerks, 2009).

Thus, it can be inferred that planning policy is a tool to facilitate high-rise development, thereby facilitating sustainable urban growth globally, especially in Asian cities, by restricting urban sprawl and limiting long-distance commuting. It also shows that high-rise urbanism is not a one-size-fits-all model; rather, it is tied to and relevant to a place’s socio-economic and political nuances as a policy response to sustainable urban growth.

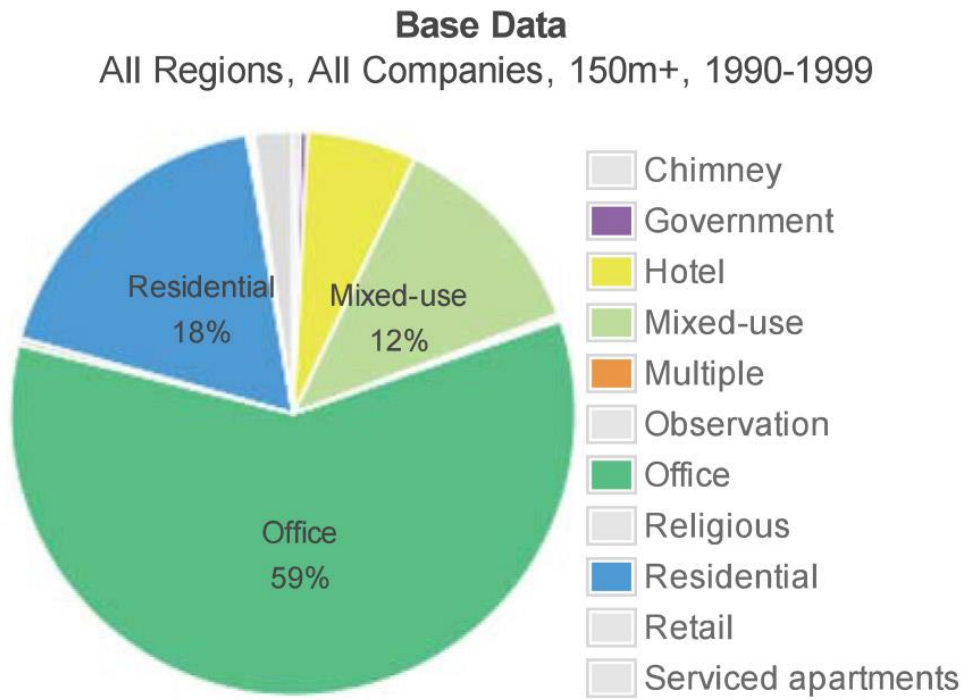


Figure 2. Pie Chart illustrates the Tall Building (150 meters plus) usage 1990-1999

(Source: ctbuh.org, 2015)

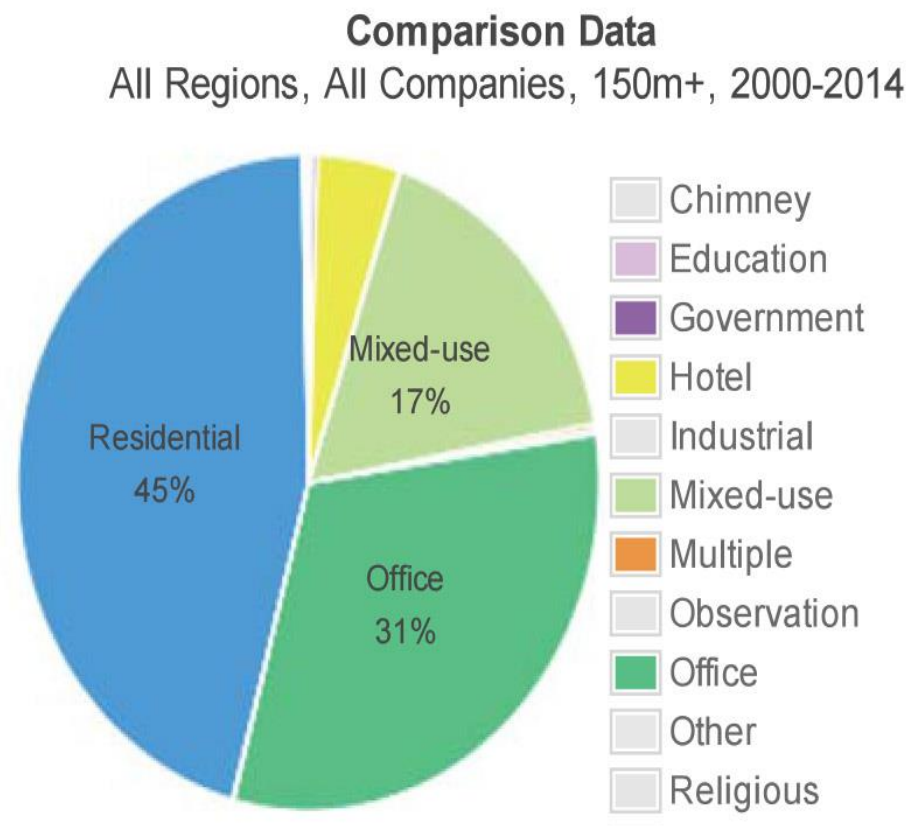


Figure 3. Pie Chart illustrates the Tall Building (150 meters plus) usage 2000-2014

(Source: ctbuh.org, 2015)

The above pie charts compare the use of high-rise buildings between 1990-1999 and 2000-2014. The data indicates that the residential use of high-rise buildings is growing faster than commercial use.

It is also evident that high-rise construction is rapidly increasing in Asia, especially in China and India. Asian cities like Hong Kong and Singapore have the world’s largest high-rise housing (Yuen & Yeh, 2011). Hong Kong's high-rise development results from its topography, historical development, and land policy. Over 75% of Hong Kong’s land consists of hill slopes. Most of the high-rise development is concentrated on Hong Kong Island, where the government obtains most of the flat land by levelling hills and land reclamation. The population density in Hong Kong increased significantly immediately after the Second World War due to rapid population growth within a very constrained area (Yuen & Yeh, 2011).

Following the establishment of the People’s Republic of China in 1949, Hong Kong experienced a large influx of refugees from Mainland China. Hong Kong’s population increased from 0.6 million in 1945 to over 2 million in 1951 (Yuen & Yeh, 2011). To solve this residential housing demand with the limited supply of flat land, high-rise living was, and still is, the only solution in Hong Kong (Yuen & Yeh, 2011).

In India, the rate of urbanisation increased from 27.7% in 2001 to 31.1% in 2011- an increase of 3.3 percentage points during 2001-2011 compared to an increase of 2.1 percentage points during 1991-2001, as indicated in Table 2 below. It may be noted that the Indian economy grew from 6% per annum during the 1990s to about 8% during the first decade of the 2000s (Ahluwalia, 2011). This reflects the trend that urbanisation and economic growth are interrelated.

Table 2. Trends in Urbanisation in India (1961-2011)

Census Year	Urban Population (in million)	Percentage Urban	Annual Exponential Urban Growth Rate (%)
1961	78.94	17.97	-
1971	109.11	19.91	3.23
*1981	159.46	23.34	3.79
*1991	217.18	25.72	3.09
2001	286.12	27.86	2.75
2011	377.10	31.16	2.76

* As the 1981 Census was not conducted in the state of Assam, and the 1991 Census was not held in the state of Jammu and Kashmir, the population of India includes projected figures for these states in those periods.

(Source: Census of India, various years)

In India, the rapid growth of residential high-rise building construction started after the National Housing Act of 1988. This housing policy aimed to encourage housing credit with reasonable interest rates and to regulate the activities of housing finance companies based on regulatory and supervisory authority derived under the Act. This policy aimed to serve the housing needs of all segments of the population with a focus on low- and moderate-income housing.

During the 1990s, liberalisation and globalisation of the economy were introduced in India (Hingorani, 2011). Liberalisation or globalisation of the economy is “...understood as the phenomenon by which markets and production in different countries are becoming increasingly interdependent due to the dynamics of trade in goods and services and the flows of capital and technology” (Brinkman & Brinkman, 2002, pp. 730-731).

The introduction of a liberal economy, along with the set-up of the Housing Development Finance Corporation (HDFC), encouraged several commercial banks in the private and public sectors to set up a housing finance

division with competitive interest rates on home loans (Sahu, Zachariah & Baksi 2009). The HDFC encouraged the finance sector by offering tax exemptions for small builders and property developers.

During this period, households became much more aware and comfortable with housing debt, as the sources of housing finance widened (Tiwari & Rao, 2016). All these economic factors served as an incentive to build residential high-rises in Indian cities.

Asia, which holds most of the world's land area and population, has seen residential high-rises outnumber commercial ones, as indicated in Figure 3.

Theoretical Framework Of The Research

The literature review indicates a dearth of research on the social sustainability of residential high-rise buildings (Burton, 2003; Bramley et al., 2006; Oldfield et al., 2014). This is probably because, before 2000, high-rises were generally used for commercial purposes and were primarily concentrated in North America, as noted in the literature review. After 2000, Asian countries began adopting high-rise living, and the concentration of high-rise apartments increased in Asian cities. As more people now reside in high-rise residential apartments in Asian cities, the concept of social sustainability has emerged to better understand the social needs and well-being of high-rise residents and to improve the future of high-rise living culture.

The research survey was conducted in Kolkata, India (refer to Figure 4 below). Kolkata has been chosen because it represents a typical “Majority World” or “Third World” urban environment, where high-rise living is becoming increasingly common among many households (Doyle, 2000). As Asia has become the epicentre of high-rise living culture, India is a typical Asian country where high-rise living is becoming common. So, Kolkata represents a typical Asian city where a part of its population lives in high-rise buildings or is transitioning to high-rise living (Chatterjee, 2009; Das Gupta & Sivaramakrishnan, 2013).

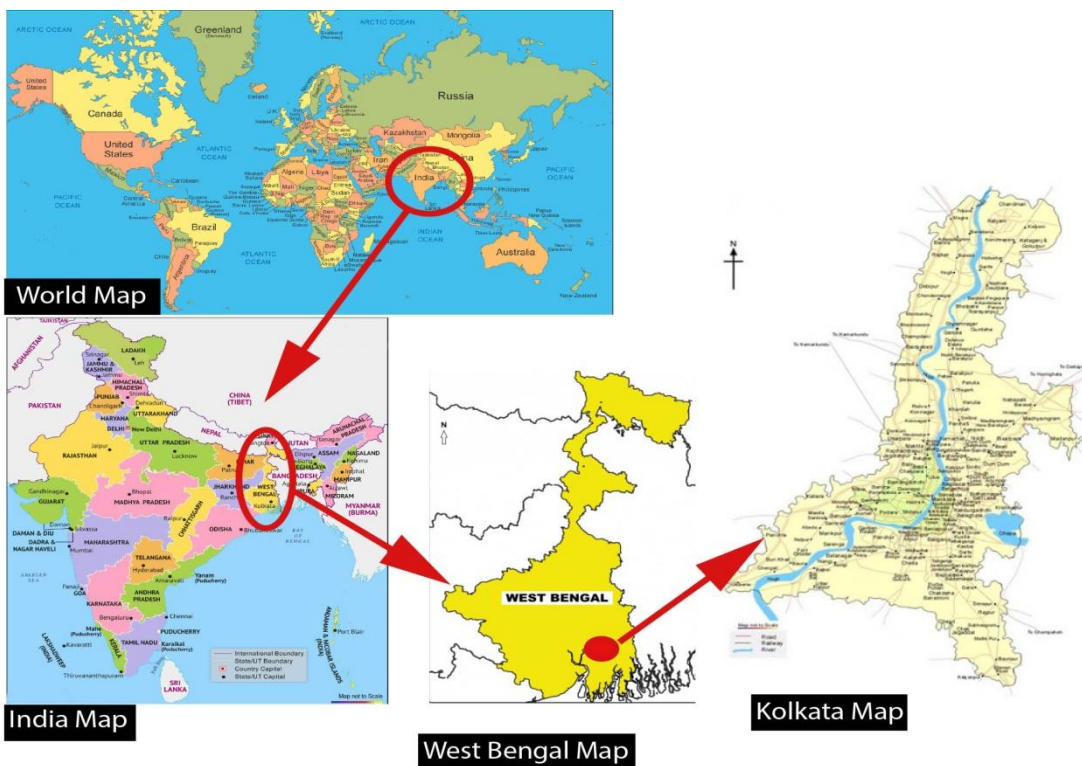


Figure 4. Location of India and Kolkata in the Global context (source: by the author)

The literature review identifies aspects of Social Sustainability, such as Trust, Diversity, Common Meaning and Social Cohesion, in the context of the built environment, which serve as indicators of Social Sustainability in the built environment (Missimer et al., 2017). Gifford (2007) suggests that personal characteristics, such as economic status (belonging to the High Income Group, Middle Income Group or Low Income Group), residents’

culture or religion, and the contexts or dwelling’s neighbourhood, affect Social Sustainability in the built environment, such as high-rise living (Gifford, 2007)

METHODOLOGY

This study applies Qualitative and Quantitative methods to examine the social issues associated with high-rise living in Kolkata. It examines the residents’ experiences of 61 low-rise (G+4 floors) and 59 high-rise (G+5 and above floors) apartments in Kolkata. It compares residents' experiences based on the concepts and theories of social sustainability identified in the literature review. The apartments were selected to represent social issues related to the locality, age of the apartments and mix of personal characteristics of the residents such as income, religion and life-cycle stage. Three zones or pockets in Kolkata were selected based on the above-stated categories: North Kolkata, South Kolkata I and South Kolkata II.

Area of Study

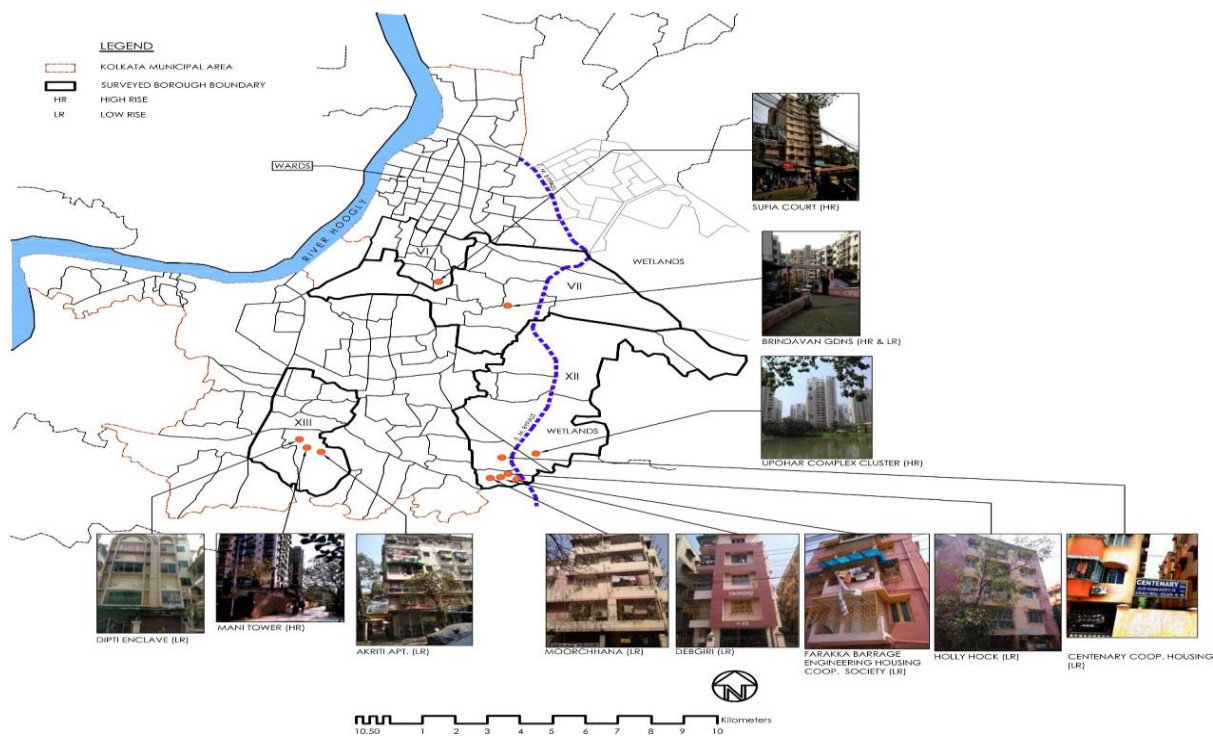


Figure 5. Map of Kolkata showing sampling locations (developed by the author)

The above Figure 5 shows the sampling locations based on the social factors of high-rise and low-rise residents, such as income, religion, and life-cycle stage.

Data Collection Procedures

Primary data was collected using a questionnaire. The questionnaire was developed in a manner to produce information aligned with the study objectives and administered to adult residents of high-rise and low-rise apartment buildings. The secondary data for this research were derived from various sources. These included government publications, reports from key governmental and non-governmental organisations, journals, websites, and periodicals. The use of both primary and secondary data helped produce comprehensive research results.

The locality and apartment buildings for the survey were strategically selected based on the Kolkata Municipal Corporation (KMC) Yearly Register of Building Plan Sanction Report (KMC, 2016), which reflects the distribution of high-rise and low-rise apartments within the KMC jurisdiction.

The ground floor was excluded in both high-rise and low-rise apartments because it is typically used for parking and administration. First, the administrations of the selected buildings were contacted by letter outlining the purpose of the survey. Households were informed about the survey by their respective building managers. 30% of the available (willing-to-participate) households in each building were sampled for both high-rise and low-rise apartments. There was a high number of refusals from residents to participate in the survey. Alternative plans were implemented to address the high refusal rates.

RESULTS AND FINDINGS

Table 3. Number of Sampled Households by Zone

No. of Residents Surveyed by Zone				
	North	South I	South II	Overall
High-rise	19	20	20	59
Low-rise	21	20	20	61
Total Sample	40	40	40	120

Source: Field Survey 2019-2020

Table 4. Distribution of Sampled Households by Income (MHI=Monthly Household Income)

Distribution of Sample by Income Group				
	LIG (MHI up to Rs 20000)	MIG (MHI up to Rs 20001-50000)	HIG (MHI Rs 50000+)	Overall
No. of Households	18	55	47	120

Source: Field Survey 2019-2020

The definitions of LIG, MIG and HIG are primarily based on residents' monthly household income, as outlined by the local state government's housing board (West Bengal Housing Board 2019-2020).

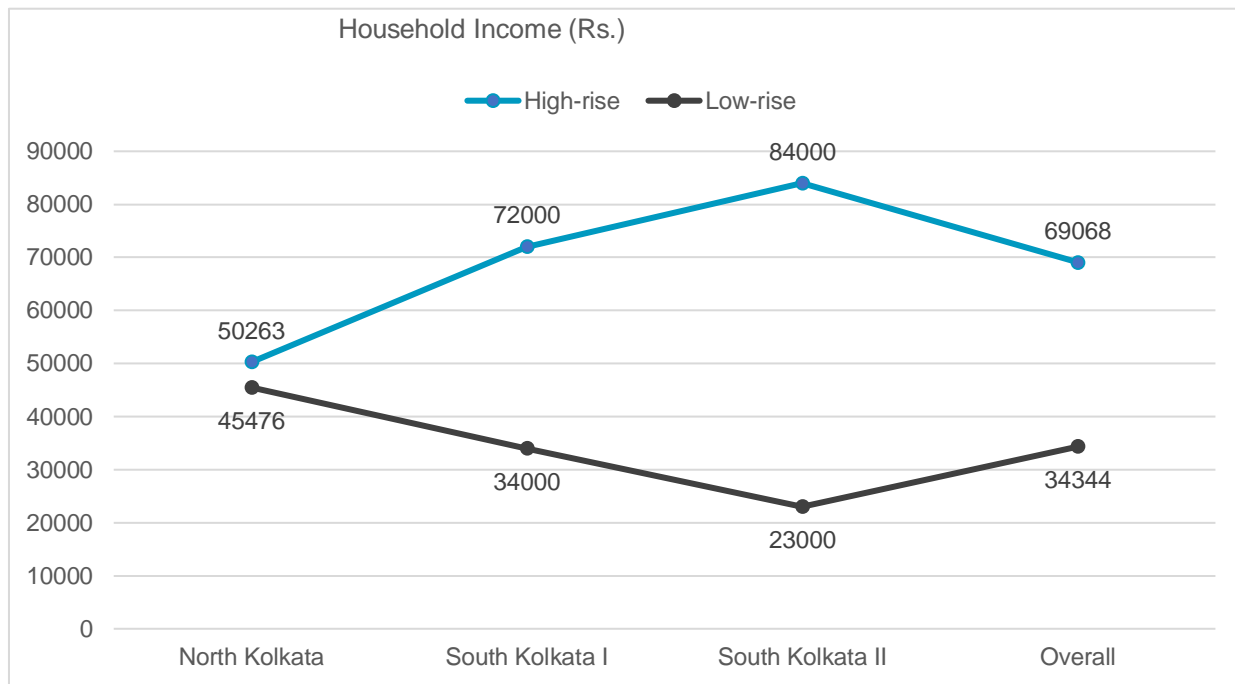
Table 5. Distribution of No. of Sampled Households by Zone and Income

Distribution of No. Of Residents Surveyed by Zone & Income Group				
	North	South I	South II	Overall
High-rise	12 HIG	20 HIG	15 HIG	59
	7 MIG		5 MIG	
Low-rise	21 MIG	14 MIG	8 MIG	61
		6 LIG	12 LIG	
Total Sample	40	40	40	120

Source: Field Survey 2019-2020

Table 6. Household Income of High-rise and Low-rise Residents By Zone

Household Income				
	North Kolkata	South Kolkata I	South Kolkata II	Overall
	Rs.	Rs.	Rs.	Rs.
High-rise	50,263	72,000	84,000	69,068
Low-rise	45,476	34,000	23,000	34,344
Total	47,750	53,000	53,500	51,417



Source: Field Survey 2019-2020

Table 7. Length of Stay in High-rise and Low-rise By Zone

No. of Years living in the Sampled Apartments				
	North Kolkata	South Kolkata I	South Kolkata II	Overall Avg.
	Avg No. of Yrs.	Avg No. of Yrs.	Avg No. of Yrs.	No. of Yrs.
High-rise	12.4	5.5	9.8	9.2
Low-rise	10.1	6.8	8.4	8.5
Overall Avg.	11.2	6.1	9.1	8.8

Source: Field Survey 2019-2020

Table 6 indicates that high-rise apartment residents have a higher income than low-rise apartments across all the zones. The average household income of a high-rise apartment resident is Rs 69,068/-, whereas a low-rise

resident's average monthly household income is Rs 34,344/- . This primary data shows the income disparity between high-rise and low-rise residents.

Table 7 shows that high-rise residents in the North Kolkata region have been staying in their apartments for a maximum of 12 years. In South Kolkata I and South Kolkata II, residents have lived in their apartments for approximately 6 and 9 years, respectively. For a low-rise overall average is 8.5 years. This survey reflects that the high-rise living culture was adopted in Kolkata nearly 12-13 years ago.

Table 8. Distribution of Sample Households by Religion

Distribution of Sample Households by Religion			
	North	South I	South II
High-rise	Muslim-42%	Hindu Bengali-50%	Hindu Non-Bengali- 90% (Marwari dominated)
	Hindu non-Bengali-39%	Hindu Non-Bengali- 48% (Marwari)	Hindu Bengali-2%
	Hindu Bengali-19%	Others-2%	
	Muslim- 8 out of 19	Hindu Bengali- 10 out of 20	Hindu Non-Bengali- 18 out of 20
	Hindu non-Bengali- 7 out of 19	Hindu Non-Bengali- 9 out of 20	Hindu Bengali – 2 out of 20
	Hindu Bengali- 4 out of 19	Others- 1 out of 20	
Total	19	20	20
Low-rise	Muslim-48%	Hindu Bengali-90%	Hindu Bengali-98%
	Hindu Non-Bengali-40%	Hindu Non-Bengali-5%	Others-2%
	Hindu Bengali-12%	Others-5%	
	Muslim- 10 out of 21	Hindu Bengali- 18 out of 20	Hindu Bengali- 19 out of 20
	Hindu Non-Bengali- 8 out of 21	Hindu Non-Bengali- 1 out of 20	Others – 1 out of 20
	Hindu Bengali – 3 out of 21	Others- 1 out of 20	
Total	21	20	20

Source: Field Survey 2019-2020

Table 8 shows that people of the same religion tend to live together, leading to social cohesion. For example low-rise apartments in North Kolkata have a 48% Muslim population, low-rise apartments in South Kolkata I have a 90% Hindu Bengali population; similarly, high-rise apartments in South Kolkata II have a 90% non-Bengali, Marwari population., whereas low-rise apartments of South Kolkata II have 98% Hindu-Bengali population.

The Constitution of India does not endorse any particular religion or faith, unlike Pakistan, Bangladesh, Indonesia, Malaysia, etc. (Mahmood, 2011). It emphasises the “liberty of thought, expression, belief, faith and worship” (Mahmood, 2011, p. 388). The chapter of the Indian Constitution on people’s fundamental rights guarantees the individual's freedom and right to ‘profess, practice and propagate religion’ (Mahmood, 2011, p.

388). The data in Table 8 above reflect residents' choice and natural tendency to live in a locality or an apartment. The government does not enforce or categorise any state or region on the basis of faith or religion.

Table 8 reveals that the greater the cultural diversity, the lower the social cohesion among residents. It also suggests that social cohesion is higher between residents of the same religion.

In order to establish a relationship between social cohesion and a sense of belonging to a community, it was asked if there is a problem (such as any untoward incident) on the building premises, how likely are the residents to discuss and share it with other building residents.

Score Value: Very Likely-5, Likely-4, Average-3, Very Unlikely, Not Likely at all-1

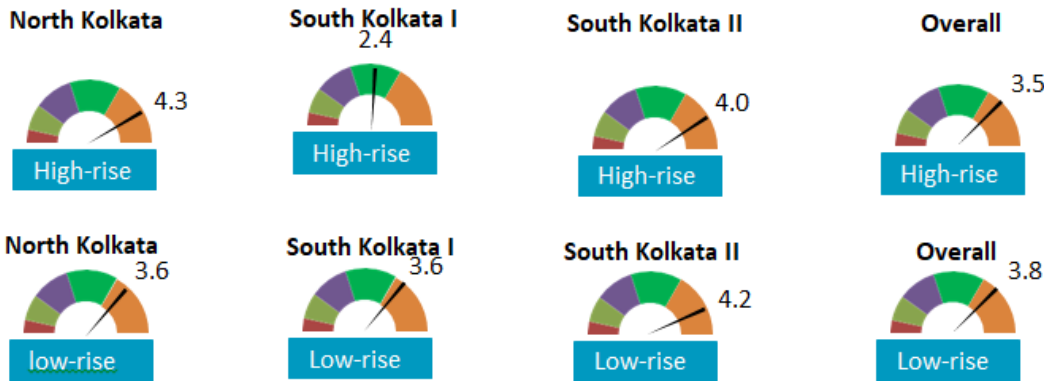


Figure 6 Residents’ measure of social cohesion and sense of belonging to a building Community

(Source: Survey 2019-2020)

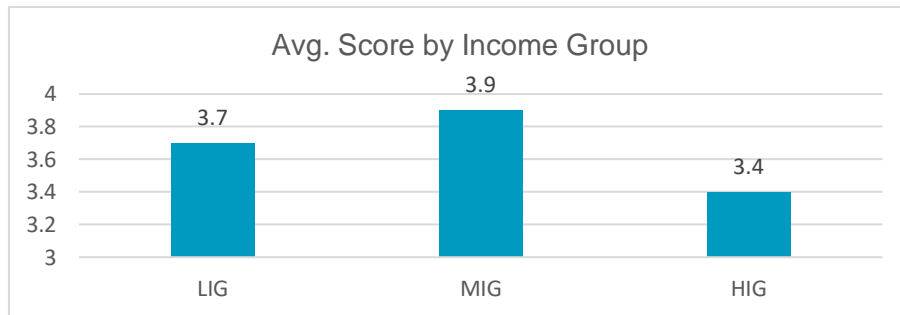


Figure 7 Residents’ measure of social cohesion and sense of belonging to a Community By Income Group

(Source: Survey 2019-2020)

FINDINGS

Trust

The survey, shows that most of the low-rise apartments of South Kolkata I are ‘co-operative society’ managed apartments, for example, Centenary Cooperative Housing and Farakka Barrage Engineering Housing Cooperative Society. The residents of these cooperative society-managed low-rise apartments have an inherent element of trust due to the cooperative society model, which is based on Trust. Cooperative Society housing entails collective ownership, so its members own the cooperative's resources. Members collectively pool their investment resources in the ‘cooperative’ to achieve common objectives- construction and maintenance of apartments. Collaborative management entails members' participation in monitoring the cooperative through a democratic decision-making process (Ganapati, 2007).

Figure 6 presents data intended to quantify social cohesion, including elements of trust and a sense of belonging to a community. It indicates that in high-rise apartments in North Kolkata and South Kolkata II, residents interact

frequently regarding problems (e.g., any untoward incident) on the building premises. However, the interaction level is low in South Kolkata I, where modern high-rise apartments have social amenities such as interaction space, a community hall, and a children's play area.

The survey also found that trust is more prevalent among MIG (Middle Income Group) residents than among HIG (High Income Group) residents in newer housing developments. It is observed that residents of the low-rise apartments of South Kolkata I & II, belonging to MIG, often rely on neighbours to look after each other's children when needed and often exchange food and delicacies during festivities and special occasions. One of the residents of the low-rise apartment in the South Kolkata I region explained, "During the Durga Puja festival, we exchange delicacies with our immediate neighbours and other families in the building. In the evening, we visit families in the building and greet each other on the auspicious occasion of Durga Puja." On the contrary, it is observed that residents of South Kolkata I, belonging to HIG in high-rise apartments, have a formal relationship and minimal interaction with the neighbours and lack the element of 'trust'. For example, one of the high-rise residents of Upohar Complex in South Kolkata I, who resides on the twelfth floor, expressed, "We have cordial relation with our immediate front door neighbour, but we hardly know anyone from other floors or other blocks."

Diversity

Based on survey data, diversity can be considered by gender, age, income level, religion, and culture among residents of high-rise and low-rise apartments in Kolkata. The primary data shows diversity in high-rise and low-rise apartment living (Table 8).

The literature review explains that the greater the diversity, the greater the options for resolving various situations in a high-rise living environment (Missimer et al., 2017). The survey demonstrates that gender and age-based diversity provides social support in high-rise and low-rise apartment living environments.

Residents of North Kolkata's high-rise apartments see diversity as a strength in solving everyday problems, such as maintenance and organising community events like festivals. Knowledgeable residents help during crises, while those with leadership skills assist in organising events. Elderly residents share experiences during emergencies. In low-rise settings, women coordinate community lunches and decorate venues for festivals like Pujo, with one woman from South Kolkata noting her involvement in preparing community kitchens, with her husband's help.

Children of similar ages in low-rise apartments tend to mingle well within their apartment setting. Parents often rely on neighbouring families with children of similar ages to look after each other when they need to attend late-night functions or funerals, where children are generally not allowed. Trust plays a vital role in maintaining the Social Sustainability of residents.

However, religious and cultural diversity does not always promote social sustainability, especially in India, where it is significant. In India, religious diversity profoundly affects society. Religion, along with caste and regional affiliation, influences social conduct, habits, customs, places of worship, rituals, and language in day-to-day life. In India, different states have distinct languages, foods, and social traditions.

A recent study in Australia regarding religious diversity also concluded that religious diversity does not vibe well with the concept of social cohesion (Ezzy et al., 2020). The paper demonstrates that religious diversity and social cohesion (one of the social factors of social sustainability) are conflicting in contemporary Australian society. On policy responses to religious diversity, social cohesion is problematic when used to enforce "sameness" rather than to acknowledge difference (Ezzy et al., 2020, p. 15). A German study by Schaeffer (2014) also concluded that ethnic diversity and social cohesion do not complement each other (Piekut, 2014).

Common Meaning (Social Capital)

In high-rise apartments, sharing a 'Common Meaning' fosters a sense of belonging (Kurzman, 2008). Social capital, such as Trust and common meaning, is crucial for residents' social well-being, including cleanliness,

respect for privacy, and adherence to security policies. Common Meaning is tested when residents assess how well their building is maintained. Residents' perceptions are key to social sustainability.

The data suggest that, on average, residents of high-rise apartments feel more confident and share a common meaning about their place of abode compared with low-rise residents.

Social Cohesion

Social cohesion is one of the core concepts of social sustainability in the built environment. This concept is tested by interviewing residents of high-rise and low-rise apartments about their likelihood of attending ceremonies, funerals, lectures, and meetings in their buildings. The survey data show that, overall, a sense of duty prevails among residents of high-rise and low-rise apartment buildings to attend funerals, lectures, and meetings in their buildings. The data show that these numbers are higher among residents of South Kolkata I (high-rise apartments) and South Kolkata II (low-rise apartments).

The primary data reflect that social cohesion is naturally high between people of the same religion or region. This data demonstrates that a high-rise or low-rise apartment community cannot be both diverse and socially cohesive. This also illustrates that diversity and social cohesion do not coexist in high-rise or low-rise living situations.

A study at Monash University in Australia compared social cohesion between regular churchgoers and the general population (Pepper et al., 2019). Around 20 Christian denominations account for 95% of weekly churchgoers in Australia, with the Catholic Church being the largest (Pepper et al., 2019). The study found that social cohesion is stronger among churchgoers than among the wider population across the domains of sense of belonging, civic participation, and sense of inclusion (Pepper et al., 2019). Another study in the Netherlands also demonstrated that social cohesion is high among religious groups (Schmeets & Te Riele, 2010). The study found that social cohesion is also high at the municipal level among people in the same region or municipality (Schmeets & Te Riele, 2010).

Furthermore, Figure 6 shows that, overall, low-rise apartment residents have higher levels of trust and social cohesion than high-rise apartment residents. Figure 7 shows that MIG category residents have a higher level of interaction. MIG residents primarily live in 'cooperative society' managed low-rise apartments where there is an underlying notion of trust and share a common meaning (refer to Table 5). By contrast, the primary data indicate that the HIG category interacts less than the LIG and MIG categories.

CONCLUSIONS

The key findings of this study are:

1. The research demonstrates that the sense of community is higher in low-rise apartment residents than in high-rise residents.
2. Personal situations, such as the income level of the residents, affect their ability to live in a high-rise or low-rise apartment in Kolkata. This study found a significant disparity in income levels between high-rise and low-rise apartment residents (Table 6). The HIG mainly occupies the high-rise apartments, and the LIG and MIG generally occupy the low-rise apartments.

Table 5 shows that LIG residents have never (0%) experienced living in a high-rise apartment, whereas 69.2% of HIG and 70% of MIG residents have experienced living in a low-rise apartment. This demonstrates that LIG residents, irrespective of the zones, have never experienced living in a high-rise apartment. Table 5 also shows that, on average, 79.3% of high-rise apartments are occupied by HIG, regardless of the zone in Kolkata.

3. Diversity of religion among the residents does not work as a cohesive force; instead, residents of the same religion tend to live together.

4. There is a general reluctance to accept the height factor of high-rise apartment living. The data demonstrates that 70% of high-rise apartment residents dislike the height factor of high-rise living, even though they enjoy the views from their high-rise apartments. Residents' vacillation about living at height may be because Kolkata is still transitioning from traditional villa-style to high-rise living.
5. This research finds that Kolkata's 'cooperative society' model low-rise apartments are socially sustainable because they fulfil most of the factors, such as social interaction, social inclusion, social equity, a feeling of security and social cohesion with an element of trust between the residents.

RECOMMENDATIONS

From a practical perspective, this study sheds light on the social issues associated with vertical living across three regions of Kolkata. The data reflects the practical, real-world experiences of residents of Kolkata's high-rise and low-rise apartments. Using survey data, this study demonstrates that high-rise apartments in Kolkata are generally not socially sustainable on affordability grounds (refer to Table 5 and Table 6). Low-rise cooperative model apartments are socially sustainable because they are affordable, socially inclusive, and socially cohesive, given the nature of the cooperative housing model.

The practical way forward for this research study will be to consolidate the by-laws and regulations governing the construction of low-rise cooperative society model apartments, as one solution to meet urban housing demands. The government and policymakers can make the formation of cooperative society apartments easier, more effective and more efficient in future. The study also recommends the construction of affordable low-rise apartments in established and newer suburbs of Kolkata, with social infrastructure such as communal space, a community hall, children's play areas, etc., to enhance their social sustainability.

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