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STAKEHOLDERS' PERCEPTION ON IMPLICATION OF PERMITTING HIGH-RISE BUILDINGS IN LAHORE

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ABSTRACT

Cities worldwide are transforming rapidly, driven by the need for sustainable development and competitiveness. As land becomes increasingly scarce, development authorities are revising building regulations to conserve land and address housing demands. This study investigates the impact of revised high-rise building regulations on Lahore's sustainability, employing Bossel's sustainability model. A mixed-methods approach was adopted, gathering insights from employees of the Lahore Development Authority and Metropolitan Corporation Lahore, professionals from various housing schemes, and residents. The findings reveal a dichotomy: while professionals perceive the regulations positively, citing economic benefits, residents express reluctance, preferring traditional double storey buildings. Residents' concerns include loss of natural light, ventilation, and green spaces. However, residents may accept high-rise buildings if they incorporate essential features such as adequate sunlight, air ventilation, and green spaces. The study suggests that well-planned high-rise development can alleviate urbanization pressures, preserve agricultural land, and promote sustainable growth. By balancing economic, social, and environmental considerations, Lahore can create a more sustainable and livable urban environment. Effective planning and stakeholder engagement are crucial to ensuring that revised regulations meet the needs of all stakeholders

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Introduction

The concept of high-rise buildings is multifaceted, with interchangeable terms like "vertical building" or "apartment unit" (High-Rise Buildings: A Guide for Property Managers., 2003). According to Section 202 of the 2015 International Building Code (IBC), a high-rise building is defined as one with an "occupied floor" exceeding 75 feet above the lowest level of fire department vehicle access. This definition specifically refers to the highest story's "occupied floor," distinguishing it from an occupied roof (Naveed et al., 2026). The code maintains a clear distinction between floors and roofs, with provisions for adequate egress from occupied roofs without reclassifying them as occupancies for other code purposes, such as height/area limitations, mixed uses, sprinklers, or construction type (Christopher R. Reeves, 2019).

As cities worldwide transform, high-rise development has become crucial for urban planning, offering benefits like increased density, reduced urban sprawl, and improved resource efficiency (Al-Rashid et al., 2021; Nadeem et al., 2022). . The Council of Tall Buildings and Urban Habitat defines high-rise buildings based on their design, use, or operation, emphasizing aspects of tallness (High-Rise Building, n.d.). As cities worldwide compete and transform, high-rise development has become a crucial aspect of urban planning, offering numerous benefits, such as increased density and reduced urban sprawl, improved resource efficiency, reduced infrastructure costs, Enhanced economic growth, job creation, Better quality of life, and urban amenities (Simon, 2015). However, high-rise development also poses challenges, such as Higher construction costs and technical complexities, Potential negative impacts on urban character and community cohesion, increased risk of social isolation and decreased community engagement, and higher maintenance and operation costs (Al-Rashid et al., 2023; Roy, 2021).

Lahore, Pakistan's second-largest city with a population of 13 million (PBS, 2023), faces unprecedented urbanization challenges (Asim et al., 2021).. Between 2010 and 2017, Lahore's population density increased significantly, rising from 4,883 persons per km^2 to 6,279 persons per km^2 (Nadeem et al., 2021). The built-up area has increased significantly in recent years, with a growth rate of 4.5% per annum (Lahore Development Authority, 2021).

The increase in urban population is increasing population densities through high-rise residential buildings (Ahmad et al., 2017). Research shows that high-rise buildings can reduce urban sprawl and promote more efficient land use (Bibri et al., 2020). The consequences of uncontrolled urbanization are far-reaching: Creating slums and squatter settlements on urban fringes and in city centers; Overlapping controls of concerned authorities, leading to confusion and inefficiency; Ineffective building control, compromising safety and sustainability (Afzal, 2019; Nadeem & Matsuyuki, 2025); and Absence of integrated urban development policies, hindering holistic growth (Asim et al., 2022; Rahmaan, 2017).

The urban housing situation in Pakistan is unprecedented (Nadeem et al., 2020). High-rise, high-density informal settlements quickly emerge from low-rise, low-income urban communities, with all the environmental, social, and physical issues of unplanned densification (Ali et al., 2026). This rapid

expansion has led to increased stress on development authorities due to inadequate infrastructure management, Housing shortages, exacerbated by urban migration and population growth, Rising land prices, affecting affordability, particularly for low-income groups, Loss of agricultural land due to urban sprawl (Begum, 2004). According to the census, the urban housing demand in Pakistan is 350,000 units, and the formal supply per year is 150,000 (A. Hasan & Arif, 2018). The Urban Unit in Punjab has assessed a 2.3-million-unit housing deficit. The scenario may deteriorate if household sizes decrease, increasing demand even with the same population.

Affordability is a key part of the housing gap. The rising inequality is particularly evident in Lahore. Households at the bottom 68% of the income distribution can only afford 1% of available housing, but households at the top 12% can afford 56% of available housing. More than 47% of urban households live in low-quality/substandard housing, often in informal settlements/slums known as Katchi Abadis, with no security of tenure, and many are forced to live on sidewalks and beneath bridges. (Sheikh, n.d.). A study by Nadeem et al. (Nadeem et al., 2021) concluded that the compact city model is appropriate for achieving sustainable urban development in Lahore.

The Metropolitan Corporation Lahore (MCL) and Lahore Development Authority (LDA) have introduced amended building and zoning regulations to address the challenges of urban sprawl, housing backlog, etc. These regulations aim to promote high-rise development in residential areas, increase density and reduce plot sizes, support the construction industry and sustainability, reduce the urban footprint and control urban sprawl, and preserve agricultural land, ensuring food security and environmental balance. The amended regulations permit high-rise buildings in designated areas, encouraging vertical growth and density (LDA, 2020) (Table 1).

Table 1: Amended Building Regulations 2019

Zones	Plot size	Permitted Height	Storey
Low Rise	Min. 10 Marla	Upto 48 ft	G+3
Medium Rise-1	Min. 1 Kanal	Upto 90 ft	G+6
Medium Rise-2	Min. 2 Kanal	Upto 120 ft	G+9
High Rise-1	Min. 4 Kanal	Upto 200 ft	G+14+ Service Floor
High-Rise-2	Min. 8 Kanal	Upto 300 ft	G+23+ Service Floor
Skyscraper	Min. 12 Kanal	Above 300 ft	(No restriction), NOC from CCA

Source: Amended Building Regulations 2019 LDA Official Website.

This shift towards high-rise development is expected to mitigate housing shortages, provide affordable options for low-income groups, reduce the pressure on urban infrastructure, improve service delivery and quality of life, and enhance the city's aesthetic appeal, creating a modern and sustainable urban landscape.

This research investigates stakeholders' perceptions of Lahore's amended high-rise building regulations, exploring their impact on sustainability and urban growth. The study examines vertical development aspects of residential buildings in developed and developing countries, assesses stakeholders' perceptions of new building regulations, and analyses the impact on urban transformation and sustainability. Reviewing the literature on high-rise buildings and consulting with professionals, this research aims to inform policy measures for vertical development, ultimately evaluating the importance of sustainable building practices for the city and its inhabitants.

Literature Review

The global population is increasing, posing a significant challenge in providing shelter for each household (United Nations, 2020). Both developed and developing countries face this issue, leading to a surge in vertical development (Daneshvar, 2022). Despite financial and development challenges, cities worldwide frequently construct high-rise buildings.

Global analysis reveals that most cities categorize multistorey residential buildings as high-rise or high-density (Scottish Water, 2020). North America developed high-rise buildings in the 20th century, but a geographic shift occurred in the 21st century. The data below shows the estimated number of buildings with their respective heights on each continent (Al-Kodmany, 2018).

Asia has seen the most significant growth, with China leading the way. "High-density vertical urban developments are shaping the longer-term characteristics of these cities by way of their strategic sites, massive scale, significant functional mix, and large social, economic, and environmental impact" (Design, 2016). China has built over 50% of Asia's high-rise buildings, focusing on multi-storey constructions (Al-Kodmany, 2018). This rapid development has shaped the characteristics of cities like Hong Kong, which exemplifies urbanization, overpopulation, and escalation (Zaman, 2003). In Europe, cities like Frankfurt, London, Amsterdam, Paris, and Moscow have started developing high-rise buildings despite initial restrictions to preserve their cultural heritage (Al-Kodmany, 2018). European cities have now constructed a significant number of multi-storey buildings with a focus on sustainability and energy efficiency (Energy Efficiency in Buildings, 2020).

North America has seen auto-dependent sprawl development in peripheral areas since the mid-20th century (Talen, 1997). However, Transit-Oriented Development (TOD) and Bus Rapid Transit (BRT) have enabled development in these areas, promoting walkable, mixed land use, and compact development (Cervero & Dai, 2014; Nadeem et al., 2023). South America has also seen significant growth, with cities like Cartagena, Santiago, and Sao Paulo leading the way (Borsdorf & Dattwyler, 2015). Central America has over 200 high-rise buildings, with Panama City, Monterrey, and Mexico City being notable examples. Africa has the smallest share of high-rise buildings, with limited city developments (Korah & Wimberly, 2024). However, this is changing, with some cities starting to construct taller buildings (Safarik et al., 2018).

The global trend towards vertical development is evident, with cities catering to growing populations (How Vertical Development Can Support Sustainable Growth of Cities?, n.d.). Before

construction, stakeholders must consider the development aspects, as high-rise buildings modify cities' spatial and physical patterns (Al-Kodmany, 2018). While there are benefits, research also shows potential adverse effects when maximum density is achieved (Kornakova & March, n.d.).

While considering our local circumstances, Pakistan is a developing country. It has minimal resources. People have to work hard as they mainly fall into a low-income group. The land is a limited resource—many low-lying city areas needed to be upgraded with time. Housing conditions have deteriorated in some areas. The population is growing vastly. People are continuously moving towards cities to avail themselves of opportunities. Many come in search of a job and plan to settle permanently there. These are burdening and pressuring the towns, mainly in big cities of Pakistan, such as Karachi, Faisalabad, Lahore, Multan, Rawalpindi, and Gujranwala. Other cities are also facing housing shortages and related problems. Each government launches housing projects in the public interest in its era. Some are successful, and others are not. However, the government is trying to recover from the housing backlog. Public self-own projects are very successful in some parts of cities such as Karachi, like the Orange Pilot Project (Habitat, 2001) and Ashiana Housing Schemes, where people engage in community engagement or develop houses on their behalf.

Lahore is Pakistan's second-largest metropolitan city after Karachi (A. Hasan, 2016). People are moving here to find a better livelihood. Most migrated people live in slums (Natalia Bokhari (CDPR), n.d.). The current government's vision is to control urbanization and be able to develop schemes in the public interest.

Under the NAPHDA and LDA, 35,000 apartment units have been constructed in LDA city. In the first phase, the target is to construct 4,000 apartment units. Residents will also get a subsidy of Rs. 3 lac. The current government aims to build upward and lead the cities towards vertical development. Prime green land can be preserved by building vertically and providing more affordable housing units to the people (NAPHDA, 2021).

Prime Minister Imran Khan also constructed shelter homes in Lahore to provide shelter for homeless people, where they can stay with basic facilities. They are built at prime locations such as Railway Station, Data Darbar, etc. Imran Khan also aims to start a poverty alleviation project (GOP, n.d.)

Methodology

Contextual Description of Lahore

Lahore, the capital city of Punjab, is the second-most populous city in Pakistan, with a population of over 11 million people. It is a culturally rich and historically significant city known for its Mughal-era architecture. Strategically located near the Ravi River, Lahore has become an important center of trade and commerce (Rana & Bhatti, 2018).

The city is experiencing rapid urbanization, with a growth rate of 3.7% per annum (Farhat et al., 2018). This has led to challenges in providing adequate housing and infrastructure (Rana & Bhatti,

2018). The Lahore Development Authority (LDA) has implemented policies to promote high-rise development (LDA, 2020), but concerns persist about the impact on infrastructure, environment, and cultural heritage (S. Hasan, 2021).

High-rise buildings are becoming increasingly popular in Lahore, particularly in the commercial hub of Gulberg. These structures offer modern amenities, luxurious living, and efficient use of space. However, concerns about the impact of high-rise buildings on the city's infrastructure have been raised, including strain on water and electricity supplies, increased traffic congestion, and potential risks to public safety (Abbas & Wakil, 2023).

Moreover, the construction of high-rise buildings also raises questions about affordability, accessibility, and social equity, as they often cater to the needs of the affluent, leaving lower-income populations behind. Despite these concerns, high-rise buildings can also offer benefits, such as reducing urban sprawl, promoting mixed-use development, and providing economic opportunities (Policy, 2024). To balance these competing interests, careful planning and community engagement are necessary to ensure that high-rise development aligns with the needs and values of Lahore's citizens (Better, 2020).

Literature Review and Aspect Identification

This research explores the effects of high-rise residential buildings on the building itself and its surroundings. The study adopts a mixed-methods approach, combining literature review, brainstorming sessions, detailed interviews, and survey questionnaires (Weyant, 2022). An extensive literature review is conducted to identify vertical building aspects, which are then categorized as issues and potentials (Lotfabadi, 2014). Brainstorming sessions and interviews with stakeholders (developers, authorities, professionals, and residents) help determine the impact of these aspects on human, support, and natural systems (Bossels, 2001)(Figure 1).

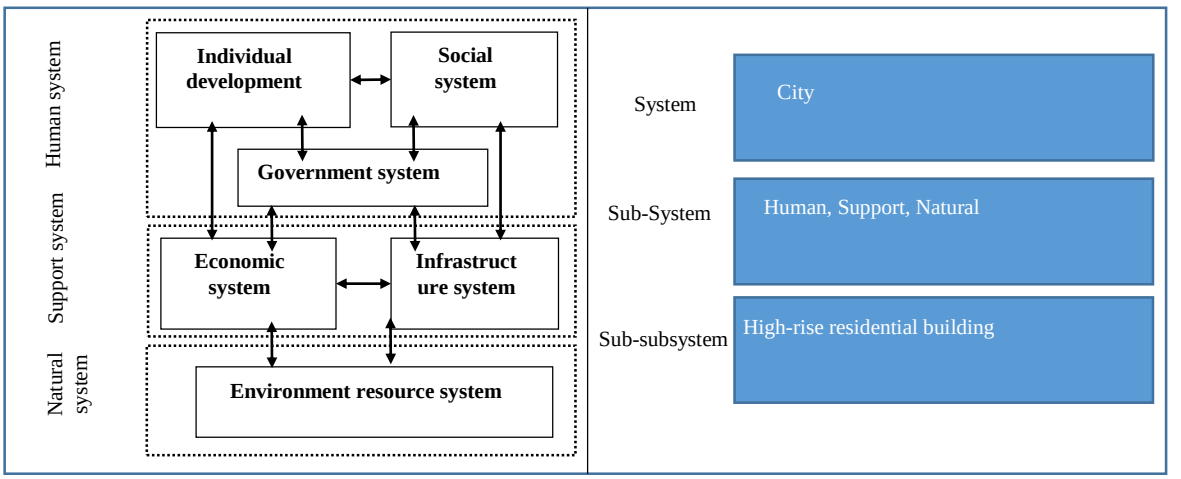


Figure 1: Bossel's Model of Sustainability

Survey Questionnaires and Indicators

The study area was divided into LDA and MCL residential zones using cluster sampling. Within these zones, areas were selected, and residents were randomly chosen to participate in the survey.

The survey aimed to assess:

- Appropriateness of high-rise buildings in the neighborhood
- Benefits and drawbacks compared to mid-rise/low-rise buildings
- Satisfaction with living conditions
- Accessibility of public facilities
- Reactions to the building's climatic conditions

Two survey questionnaires were designed:

1. One for developers, professionals, and authorities involved in high-rise development
2. Another for residents affected by amended regulations

These surveys captured the perceptions of stakeholders who implement high-rise development and those who used and were impacted by these facilities. The Questionnaires cover socio-demographic and socioeconomic categories, including indicators such as age, gender, income, tenure, preferences, and satisfaction levels (Kumar, 2011).

This comprehensive approach provides a clear understanding of the pros and cons of high-rise buildings from multiple perspectives. The first step is to calculate the total area of Lahore to determine the targeted sample size.

Spatial Boundaries and Sampling Frame

Lahore's total area is 1754 sq. km (PBS, 2020). Due to data unavailability, estimated areas for MCL (653 sq. km) and LDA (1002 sq. km) jurisdictions are used (LMA map).

A manual GIS map was created to demarcate estimated areas for zones, with the cantonment area marked separately due to its distinct regulations (ESRI, 2020). The resulting map displays the estimated areas under MCL (653 sq. km) and LDA (1002 sq. km) jurisdictions, covering approximately 40% and 60% of Lahore's area, respectively (Figure 2).

GIS Mapping and Zoning

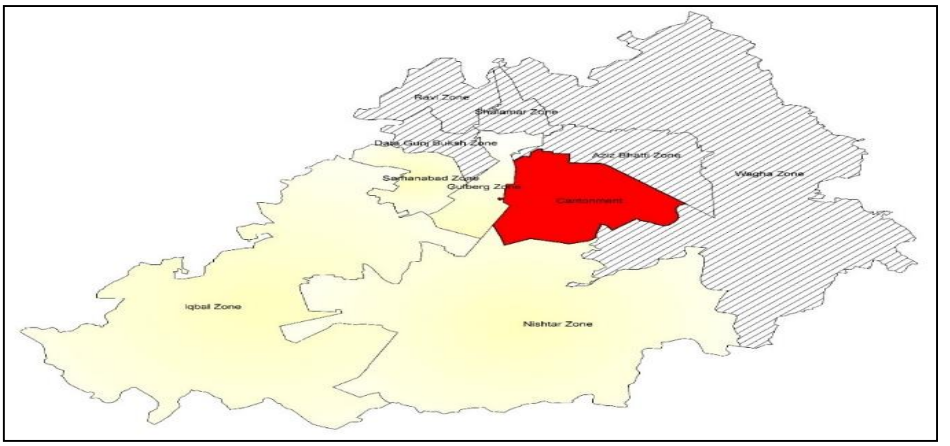


Figure 2: Prepared GIS map of Lahore Zones

Target Area Selection and Sampling

Following brainstorming sessions and professional interviews, four target areas were selected – two from LDA and two from MCL jurisdictions. Cluster sampling was employed to gather data, with respondents selected randomly (Kumar, 2011). The targeted areas and their projected populations are presented in the table below.

Table 2: Population of Targeted areas

Jurisdiction	Population	1998 (census)	2020 (projected)
LDA	Gulberg	54795	104992
	Iqbal Town	136418	261390
MCL	Dharampura	58767	112603
	Ghari Shahu	60295	115531
TOTAL		310275	594516

Source: Prepared By Researchers

Upon calculating all required populations, the sample size is calculated.

$n = N / (1+Ne^2)$

$= 594516 / (1+594516(0.05)2)$

$= 384$

So, the sample size is 384.

However, this is wholly based on data analysis to fulfill objectives 3 and 4. It helps to conclude our research work with some recommendations.

Analysis:

The research employs two types of questionnaires to gather data from distinct stakeholders.

Professional and Development Authorities

To solicit expert feedback, 10 in-depth interviews were conducted with professionals from renowned housing schemes and development authorities. Participating organizations include:

Housing Schemes:

- Bahria Town
- Dream Gardens
- Royal Residencia
- Al Hafeez Garden
- Lake City
- Al Rehman Garden
- Al-Kabir Town
- Bismillah Housing Society

Development Authorities:

- Lahore Development Authority (LDA)
- Metropolitan Corporation Lahore (MCL)

A five-point Likert scale was utilized in most questions to gauge the respondents' opinions and perceptions.

Data Analysis

The data collected from the interviews was analyzed using the Statistical Package for Social Sciences (SPSS) software. The reliability statistics yielded Cronbach's alpha value of 0.759, indicating an acceptable level of internal consistency (Table 3).

Table 3: Reliability Analysis

Cronbach's Alpha	N of Items

.759	16

Preference of high-rise buildings/apartments

When asked about their stance on the concept of high-rise buildings or apartments within residential areas of Lahore, the professionals exhibited a favorable inclination towards its implementation. The analysis revealed that most respondents from the development authorities and housing schemes favor incorporating high-rise buildings in Lahore.

70% of respondents were interviewed by the development authorities, including LDA and MCL, and developers from housing schemes expressed a positive opinion and strongly agreed about incorporating high-rise buildings in residential areas of Lahore. Twenty percent supported the idea. However, 10% negated the concept of implementing high-rise buildings in residential areas of Lahore. 100% of professionals interviewed by the development authorities, including LDA and MCL, and developers from housing schemes believe that regulations will positively impact development and see signs of progress, including efficient land use and economic growth. All developers are willing to construct high-rise buildings, citing economic benefits, and agree that the regulations will provide affordable shelter options.

Mixed Land Use Concept

80% of professionals (interviewed) agree that the mixed land use concept is beneficial, citing reduced travel time and increased convenience. 10% disagree, while 10% are neutral. The majority believe that allowing commercial activities on the ground floor of apartment buildings can generate additional income.

Addressing Housing Backlog

90% of professionals (those were interviewed) agree that mixed land use can help resolve the housing backlog in Lahore, while 10% disagree. The consensus is that mixed land use can optimize and preserve scarce resources.

Personal Preference for Apartment Living

60% of professionals (those were interviewed) would personally prefer to stay in an apartment building or high-rise building. & 40% are not inclined to stay in such buildings. A notable difference of opinion exists among professionals regarding personal preference for apartment living, indicating diverse individual priorities and lifestyles.

Location and Design Considerations

Location is a critical factor in designing apartment buildings, and it is increasingly important due to factors like Air circulation and ventilation, Adjacent building locations and neighboring impacts, and proximity to facilities and services.

Professionals emphasize the importance of location in designing apartment buildings. 8% consider it somewhat important, while 2% believe it is unimportant. According to the analysis, the preferred location for apartment buildings is near BRT (Bus Rapid Transit) routes and along main roads. This preference is driven by the convenience and affordability of daily commutes and easy access to facilities and services.

Plot Size

Most (80%) agree that apartment buildings must have a minimum plot size of 4 canals to ensure sufficient space and load-carrying capacity. The analysis reveals that developers perceive buildings positively impacting their surroundings, with increased land values and beneficial effects. Commercial or high-rise buildings increase adjacent land prices, indicating a desirable location.

Sustainability and Regulatory Objectives

Sustainability is crucial, with buildings designed to last longer and minimize their environmental footprint. The regulatory changes aim to provide more dwellings, generate income, and promote sustainability, aligning with the needs of a growing population.

Developer Insights

Developers advocate apartment buildings with a minimum height of 300 ft to accommodate multiple dwellings on limited plot sizes, highlighting the need for efficient land use.

Ripple Effects and Concerns

The analysis identifies varying ripple effects of new developments on surroundings and inhabitants, with privacy and congestion emerging as primary concerns. These concerns underscore the importance of thoughtful design and planning.

Affordability and Approval Process

The findings suggest that affordability is a critical aspect of housing, with most respondents agreeing it is possible. However, the approval process for high-rise buildings is perceived as difficult and time-consuming, hindering the rapid implementation of affordable housing options.

Maintenance Challenges

The analysis highlights the challenges of maintaining higher buildings, including increased costs and complexity. Factors such as staircases, lifts, ventilation, air rights, and security are critical considerations in building design and maintenance.

Resident Attitudes towards Apartment Buildings

A comprehensive analysis of 320 questionnaires from Lahore residents reveals a striking divide in opinions regarding apartment buildings.

Table 4: Preference marker

Valid	Frequency	Percent	Valid Percent	Cumulative Percent
Dis-likeness	217	67.8%	67.8%	67.8%
Likeness	103	32.2%	32.2%	100.0%

Source: Prepared by Researchers using SPSS

Only 32% of respondents expressed a favorable view, while 68% showed dis-likeness towards high-rise buildings or apartments (table 4).

Age and Perception

Table 5: Cross-tabulation between age and perception

		Do you like apartments in Lahore				Total
		Dis-likeness	Percentage	Likeness	Percentage	
Age	20-30 years	43	20%	64	62%	107
	30-40 years	50	23%	24	23%	74
	40-50 years	61	28%	8	8%	69
	50-60 years	63	29%	7	7%	70
Total		217	68%	103	32%	320

A closer examination of the data reveals a correlation between age and perception, with younger residents displaying a stronger affinity for apartment buildings. Specifically, 62% of respondents between 20-30 years old expressed a liking for apartment buildings, compared to just 20% who disagreed. In contrast, older age groups exhibited a growing dis-likeness, with only 8% of 40-50-year-olds and 7% of 50-60-year-olds showing a positive inclination (table 5). This trend suggests that as age increases, the preference for apartment buildings decreases, highlighting a generational divide in attitudes toward urban living.

Gender and Perception

Table 6: Cross-tabulation between gender and perception

Gender	Do you like apartments in Lahore				Total
	Dis-likeness	Percentage	Likeness	Percentage	
Male	93	43%	72	70%	165
Female	124	57%	31	30%	155
Total	217	68%	103	32%	320

Source: Prepared by Researchers using SPSS

A notable gender divide exists in the preference for apartment buildings. According to the cross-tabulation table, males are likelier to prefer apartment buildings, with a striking 70% expressing a favorable view. In contrast, females display a stronger dis-likeness, with 57% opposing the concept of apartment buildings (table 6). This suggests that males are more inclined to embrace apartment living, while females are reluctant.

Education and Perception

Table 7: Cross-tabulation between education and perception

Education	Do you like apartments in Lahore				Total
	Dis-likeness	Percentage	Likeness	Percentage	
Matric	11	5%	42	41%	53
Intermediate	47	22%	36	35%	83
Graduation	64	29%	18	17%	82
Above	95	44%	7	7%	102
Total	217	68%	103	32%	320

Source: Prepared by Researchers using SPSS

Table 7 reveals a fascinating relationship between education level and perception of apartment buildings. The data indicates that the less educated individuals (matric level) show the highest likelihood of preferring apartment buildings, with a significant 41% expressing a favorable view, compared to only 5% disagreeing. As education level increases, the likelihood of preferring apartment buildings decreases: Intermediate level: 35% likeness, 22% dis-likeness, Graduation level: 17% likeness, 29% dis-likeness & Higher education level: 7% likeness, 44% dis-likeness. This suggests that younger, less educated individuals are likelier to prefer apartment buildings, while those with higher education levels exhibit a stronger dislike. The data reveals a clear decreasing trend in apartment building preference as education level rises.

Income and Perception

Table 8: Cross-tabulation between income and perception

Do you like apartments in Lahore				Total
Dis-likeness	Percentage	Likeness	Percentage	
6	3%	6	6%	12
50	23%	19	18%	69
31	14%	11	11%	42
130	60%	67	65%	197
217	68%	103	32%	320

Source: Prepared by Researchers using SPSS

The cross-tabulation analysis reveals a fascinating relationship between income group and perception of apartment buildings. The data indicates that at lower income levels (below 20,000), there is a slight inclination towards dis-likeness (3%) over likeness (6%). In the middle-income range (20,000-40,000 and 40,000-60,000), the perception is almost equally divided between likeness and dis-likeness (table 8).

However, at higher income levels (above 60,000), there is a significant shift towards both strong likeness (65%) and strong dis-likeness (60%). This suggests that higher-income individuals have more polarized views on apartment buildings, with some embracing them and others rejecting them. The data indicates that income level alone is not a determining factor in perception, and other factors may influence individual attitudes toward apartment buildings.

Housing type preference and perception

Table 9: Cross-tabulation between housing type preference and perception

Housing type preferences	Do you like apartments in Lahore				Total
	Dis-likeness	Percentage	Likeness	Percentage	
Single storey	21	10%	14	14%	35
Double Storey	184	85%	82	80%	266
Tripple storey	12	6%	7	7%	19
Total	217	68%	103	32%	320

Source: Prepared by Researchers using SPSS

Table 9 reveals a significant relationship between housing type preferences and perception of apartment buildings. The data indicates that most respondents (80%-85%) prefer double-storey buildings, expressing a strong likeness for this type of housing. The perception of likeness and dis-likeness is most pronounced in double-storey housing types, suggesting that people prefer living in

buildings with a maximum of two storeys. This preference suggests that respondents value the comfort, privacy, and accessibility of double-storey buildings and are less inclined towards higher-rise apartment buildings. The analysis highlights a clear preference for double-storey housing types, indicating that this is the most acceptable and desirable option for most respondents.

Housing purchase preference and perception

Table 10: Cross-tabulation between housing purchase preference and perception

Housing purchase preference	Do you like apartments in Lahore				Total
	Dis-likeness	Percentage	Likeness	Percentage	
Owned	199	92%	94	91%	293
Rented	8	4%	3	3%	11
Installment	10	5%	6	6%	16
Total	217	68%	103	32%	320

Source: Prepared by Researchers using SPSS

The cross-tabulation analysis reveals a striking relationship between housing purchase preferences and perception of apartment buildings. The data indicates an overwhelming majority (92%) of respondents who prefer owning a house express a strong dislike of apartment buildings. In contrast, respondents who prefer to purchase a house through installments show a relatively low level of dislikness, ranging between 5% and 6% (table 10). This suggests that people who value homeownership and are willing to invest in their own houses are more likely to reject living in an apartment building. The analysis highlights a clear preference for owning a house over investing in an apartment building, indicating that respondents prioritize the benefits and security associated with homeownership.

Occupation and perception

Table 11: Cross-tabulation between occupation and perception

Occupation	Do you like apartments in Lahore				Total
	Dis-likeness	Percentage	Likeness	Percentage	
Semi-Government	38	18%	25	24%	63
Private	179	82%	78	76%	257
Total	217	68%	103	32%	320

Source: Prepared by Researchers using SPSS

The cross-tabulation analysis reveals a complex relationship between occupation and perception of apartment buildings. The data indicates that the Respondents with private occupations exhibit a

dual trend: 82% show dis-likeness towards apartment buildings, indicating a strong preference against them, 76% simultaneously express likeness towards apartments, suggesting a contradictory attitude (table 11). In contrast, respondents with semi-government occupations display a more uniform dis-likeness towards apartment buildings, with 18% expressing this sentiment. The analysis highlights a mixed trend in perception among privately occupied respondents, who seem to hold both positive and negative views towards apartment buildings. Various factors, such as personal experiences, lifestyle, or socioeconomic status, may influence this contradiction.

Plot size and perception

Table 12: Cross-tabulation between plot size and perception

Size of plot	Do you like apartments in Lahore				Total
	Dis-likeness	Percentage	Likeness	Percentage	
5 Marla	109	50%	4	4%	113
10 Marla	84	39%	4	4%	88
1 Kanal	10	5%	7	7%	17
2 Kanal	9	4%	40	39%	49
Above	5	2%	48	47%	53
	217	68%	103	32%	320

Source: Prepared by Researchers using SPSS

The analysis reveals a significant relationship between plot size and preference for apartment buildings. The data indicates that the likelihood of preferring apartment buildings increases as plot size increases. For smaller plot sizes (5 Marla and 10 Marla), there is a strong dis-likeness towards apartment buildings (50% and 39%, respectively), with only a slight likeness (4%). However, as plot size increases to 1 kanal, the dis-likeness decreases to 5%, while the likeness increases to 7%. The trend reverses at 2 kanal plot size, with a significant increase in likeness (39%) and a decrease in dis-likeness (4%). For plot sizes above 2 kanal, the preference for apartment buildings becomes even more pronounced, with a likeness of 47% and a dis-likeness of only 2% (table 12).

The analysis suggests that individuals with larger plot sizes are more likely to prefer living in apartment buildings, possibly due to the benefits of shared amenities, security, and community living.

Chi-Square Test and Phi & Cramer's V Test

The chi-square is the test of association between variables. It is used when we are interested in finding a relationship between two variables, whether they are independent or dependent on each other. The Phi & Cramer's V test is used to find the nature of the relationship between two variables. The above table shows the results of the strength of association between variables from statistical analysis of chi-square and Phi & Cramer test. The person's chi-square value is the "r" value and Asymp.Sig.

(2-sided) is the p-value. This p-value indicates the significance level of the relationship between variables. The df value is the degree of freedom at which the p-value can be calculated (table 13).

Table 13: Chi-square test and Phi & Cramer's V test

Perception Variables	Chi-Square Test			Systematic Measure	
	Pearson Chi-Square			Phi & Cramer's V	
	Value "R"	df	Asymp.Sig.(2-Sided)	Value	Approx.Sig
Age	66.608	3	.000	.456	.000
Gender	20.456	1	.000	.253	.000
Education	92.435	3	.000	.537	.000
Occupation	2.019	1	.155	.79	.155
Income	3.42	3	.331	.103	.331
Housing Type	1.393	2	.498	.66	.498
Housing purchase	0.33	2	.848	.032	.848
Plot size	211.59	4	.000	0.813	.000

Source: Prepared by Researchers using SPSS

Age and Perception

- Chi-square value: 66.608 (df=3, p-value=.000)
- Phi & Cramer's V value: 0.456 (strong relationship)
- Conclusion: Age significantly affects the perception of apartment buildings (p<0.001)

Pearson's chi-square value "r" is 66.608 at df=3, and the p-value is .000 for the association test between age and perception. In this case, p < 0.001 shows a very strong significant association between age and perception. Meanwhile, the Phi & Cramer's V test value of 0.456 shows a strong relationship between the two. This means that age affects the choice of perception (likeness/dis-likeness) of an apartment building.

Gender and Perception

- Chi-square value: 20.456 (df=1, p-value=.000)
- Phi & Cramer's V value: 0.253 (strong association)
- Conclusion: Gender significantly affects the perception of apartment buildings (p<0.001)

Pearson's chi-square value "r" is 20.456 at df=1, and the p-value is .000 for the association between gender and perception. In this case, p < .001 shows a strong significant association between gender and perception. The Phi & Cramer's V value=0.253 indicates a strong association between these variables.

Education and Perception

- Chi-square value: 92.435 (df=3, p-value=.000)
- Phi & Cramer's V value: 0.537 (very strong inference)
- Conclusion: Education significantly affects the perception of apartment buildings (p<0.001)

Pearson's chi-square value "r" is 92.435 with df=3, and the p-value is .000 for education and perception variables. The Phi & Cramer's V value is 0.537, showing a strong inference. This means that the association is significant, which means that education affects the choice of housing type.

Occupation and Perception

- Chi-square value: 2.019 (df=1, p-value=.155)
- Phi & Cramer's V value: 0.079 (strong association)
- Conclusion: No significant association between occupation and perception (p>0.05)

The Pearson's chi-square value for the occupation and perception variables is 2.019. The p-value is .155 at df=1. The Phi & Cramer's V value is 0.79 for these variables, showing a strong association.

Income and Perception

- Chi-square value: 3.42 (df=3, p-value>0.05)
- Phi & Cramer's V value: 0.103 (moderate relationship)
- Conclusion: No significant association between income and perception (p>0.05)

The association between income and perception is not significant as the chi-square value is 3.42 at df=3 and p>0.05, while Phi & Cramer's V value is 0.103, showing a moderate relationship.

Housing Type and Perception

- Chi-square value: 1.393 (df=2, p-value=.498)
- Phi & Cramer's V value: 0.066 (strong inference)
- Conclusion: No significant association between housing type and perception (p>0.05)

Similarly, the association between housing type and perception is not significant, as the chi-square value is 1.393, the p-value is .498, and df=2. Phi & Cramer's V value is .66, which shows a strong inference.

Housing Purchase Preference and Perception

- Chi-square value: 0.33 (df=2, p-value=.848)

- Phi & Cramer's V value: 0.032 (very weak relationship)
- Conclusion: No significant association between housing purchase preference and perception ($p>0.05$)

The association between housing purchase preference and perception is not significant because $p>0.05$ is .848 at df=2 and the chi-square value is 0.33. However, Phi & Cramer's V value is 0.032 shows a very weak relationship between these two variables of housing purchase preferences and perception.

Plot Size and Perception

- Chi-square value: 211.559 (df=4, p-value=.000)
- Phi & Cramer's V value: 0.813 (strong relationship)
- Conclusion: Plot size significantly affects the perception of apartment buildings ($p<0.05$)

The association between plot size and perception is significant because the chi-square "r" value is 211.559 at df=4 and $p<0.05$, which is $0.00<0.05$, while Phi & Cramer's V value is .813, which is $.813>.25$, shows a strong relationship between plot size and perception.

Conclusion

This research investigated stakeholders' and residents' perceptions on the implications of permitting high-rise residential buildings in Lahore using Chi-Square Test and Phi & Cramer's V Test. Key factors influencing residents' preferences include age, gender, education, plot size, and location.

Research on stakeholders' perceptions regarding the implications of permitting high-rise residential buildings in Lahore has yielded valuable insights. Professionals in the field view high-rise buildings as a panacea for the city's housing shortages, urbanization, and environmental degradation. They advocate for mixed land use concepts, proximity to public transportation, and streamlined approval processes to facilitate the development of high-rise buildings.

On the other hand, residents are hesitant about embracing high-rise buildings, citing concerns about height, privacy, parking, and environmental issues. Younger, educated individuals are more likely to favor high-rise buildings, while older residents and females' express concerns about height and safety. They prefer low-rise buildings with ample parking and accessible facilities. However, they will consider apartment buildings if they are economical, affordable, and well-planned. This dichotomy highlights the need for balanced planning, considering both the benefits of high-rise buildings and residents' concerns.

The study emphasizes the importance of proper management, facilities, and services to ensure sustainability and positive impacts on the city and its surroundings. The approval process for high-rise buildings should be streamlined, and maintenance costs should be considered. Addressing

residents' concerns while harnessing the benefits of high-rise buildings is crucial. By doing so, Lahore can mitigate its housing shortages, reduce urban sprawl, and promote sustainable development. This research contributes to understanding high-rise building implications in Lahore, emphasizing the importance of sustainable urban planning and stakeholder engagement. The findings provide valuable insights for policymakers, developers, and stakeholders shaping the city's future.

Recommendations:

To achieve a balance between the benefits of high-rise buildings and the concerns of residents, the following recommendations are made:

1. Mixed land use concepts: Encourage mixed land use development to reduce the need for lengthy commutes, promote walkability, and enhance the quality of life.
2. Proximity to public transportation: Ensure that high-rise buildings are located near public transportation hubs to reduce reliance on personal vehicles and decrease congestion.
3. Streamlined approval processes: Implement efficient approval processes to reduce construction delays and encourage developers to invest in high-rise buildings.
4. Ample parking and accessible facilities: Ensure that high-rise buildings have sufficient parking and accessible facilities to address resident concerns.
5. Environmental considerations: Incorporate green building techniques and sustainable practices in high-rise development to minimize environmental impact.
6. Affordability and economical options: Provide affordable and economical options for residents to make high-rise living a viable choice.
7. Further research: Conduct further research on the quantitative impact of building height on sustainability to inform future development strategies.

By implementing these recommendations, Lahore can harness the benefits of high-rise buildings while addressing the concerns of its residents. This will ultimately promote sustainable development and improve the quality of life for its citizens.

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