

Can Vertical Housing Mitigate Urban Sprawl? Insights From Metropolitan Jakarta

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ABSTRACT

The transformation of Jakarta from a colonial administrative center into a modern megacity has pushed residential development outward, drove rapid conversion of green space and compounding urban problems such as traffic congestion and inefficient land use. This study evaluates vertical housing as a strategic response to mitigate urban sprawl and identifies factors influencing public interest in high-rise living across Greater Jakarta. Employing a qualitative grounded theory approach with case studies, data were collected via questionnaires distributed to Generation X, Y, and Z respondents between December 2025 and January 2026, supplemented by literature review and spatial observation using Jakarta Satu and other platforms. Findings indicate a generally positive public disposition toward vertical housing, with 58 percent of respondents expressing interest in apartment living. Primary motivators include accessibility to economic centers, proximity to public transportation, and comprehensive internal facilities, while principal barriers comprise privacy concerns, shortages of open space, and property costs. Preference clusters are concentrated in Jakarta and Greater Tangerang, where infrastructure and accessibility are strongest. The study concludes that realizing the potential of vertical housing to curb urban sprawl depends critically on coordinated action by developers and government to deliver housing that meets the United Nations' seven criteria for adequate housing, addressing both physical amenities and social needs to ensure equitable, sustainable high-density urban living.

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1. INTRODUCTION

Jakarta has undergone massive transformation since independence in 1945. The city initially served as the seat of government and a symbol of nationalism. Since then, Jakarta has rapidly developed into a major center for the economy, business, and government, attracting migrants from across Indonesia and prompting significant territorial expansion [1]. This transformation peaked in 1966 when Jakarta was designated as the "Special Capital Region," equal in status to a province, triggering exponential population growth from 500,000 people in 1930 to 6.5 million in 1980, and continuing to 8.2 million in 1990 within Jakarta itself, with an additional 9 million in the surrounding metropolitan area in the same year [2].

This population growth has continued to the present, roughly 10 million residents at night and reaching 12 million during the daytime. High commuter mobility into Jakarta has turned the capital into a megapolitan area that has developed in an unstructured way [3]. Residents are forced to seek housing on the outskirts. Development has expanded toward Bogor, Depok, Tangerang, and Bekasi. This phenomenon, known as urban

sprawl, has caused a substantial increase in built-up areas into Jakarta's peri-urban and rural regions, drastically changing land use [4], [5].

A similar pattern is not unique to Jakarta but is a global phenomenon experienced by major cities such as Singapore, Tokyo, Hong Kong, and Seoul, where land constraints and population growth have driven vertical housing solutions as a mitigation strategy [6]. This approach is used because high demand for housing and limited land availability forces these cities to adopt vertical development to accommodate their growing populations [6].

This study aims to examine the potential of vertical housing in relation to the spread of development (sprawl) into the suburban areas of the *Jabodetabekjur* metropolitan region, which is currently dominated by suburban residential development.

1.1 Urban Sprawl as Significant Challenge in Large Cities

Urban sprawl is an urban phenomenon commonly associated with the uncontrolled and unplanned spread of urban areas. There is no single, universally accepted definition of urban sprawl, and relatively little effort has been made to define urban sprawl in ways that help compare regions with higher or lower levels of sprawl [7].

Land affected by urban sprawl is usually defined as land that has lost its rural character but cannot be classified as urban land, creating a certain ambiguity that leads to problems such as unplanned urban growth and land use for non-agricultural purposes. Therefore, urban sprawl can be defined as the border area between rural and urban zones [8].

Irregular city development appears in scattered and diverse settlements and an uneven population distribution. Besides affecting the environment and communities in urban and rural areas, irregular urban growth also places a significant burden on government [9]. This phenomenon can create various social and economic issues, such as economic injustice and imbalances in local administration and public finances across communities. It also affects personal life. Several studies report that urban spread reduces open space and public facilities, raises the cost of public services and taxes, causes traffic congestion, leads to urban flooding, increases the area of natural habitats, and lowers water quality [10].

There are several main **characteristics of urban sprawl** identified by Kumar Sinha [11]. He states that urban sprawl is a form of urban development generally characterized by haphazard, uncontrolled, unplanned, or poorly planned expansion.

- Low Density Development
- Excessive Consumption of Land
- Automobile Dependence
- Haphazard and Uncoordinated Development
- Aesthetics
- Separation of Land-use
- Social Segregation

The causes of urbanization are very similar to the reasons behind urban sprawl. In many situations, these similarities are difficult to separate because urban growth and spread are closely related. However, it is important to note that urbanization can occur without urban sprawl, whereas sprawl will inevitably trigger growth in urban areas. Some factors, such as population increase, can produce organized, compact urban growth or irregular, dispersed growth [12]. That growth is considered positive or negative depending on its pattern, mechanisms, and consequences.

The phenomenon of urban sprawl is a significant challenge in many large cities of developing countries. A large share of the population is forced to live in informal settlements, both in city centers and on the urban fringe, which are characterized by poverty and environmental degradation. These high-density areas suffer heavy pollution due to inadequate basic infrastructure such as clean water, sanitation systems, waste management, and road accessibility [12].

Accelerated urban growth drives massive land conversion that increases traffic congestion, exploits local resources, and reduces green open space. This expansion fundamentally alters the spatial structure and physical organization of cities. Even in developed countries, poorly integrated development patterns threaten environmental sustainability, public health, and living standards [12]. The systemic impacts of such urban expansion have become a global issue requiring serious attention in spatial planning.

1.2 The Discourse of Vertical and Adequate Housing

Population growth in large cities has caused a surge in housing needs and demand that is disproportionate to the availability of housing and urban land. This has prompted many developers in major cities to build vertically to meet the demand. Vertical housing, or high-rise residential buildings, stacks a large

number of dwelling units on a limited land footprint, thereby increasing population density without expanding horizontally — a solution to uncontrolled urban sprawl that causes unplanned city dispersion [13], [14].

International human rights law recognizes every individual's right to an adequate standard of living, including access to adequate housing. The UN committee monitoring Economic, Social and Cultural Rights emphasizes that the right to adequate housing must not be understood narrowly. Instead, it should be seen as the right to live in security, peace and dignity [15].

Elements related to the right to adequate housing are elaborated in the Committee's General Comment No. 4 (1991) on the right to adequate housing and No. 7 (1997) on forced evictions. Good housing should be more than a structure with a roof and walls. Several criteria must be met for certain dwellings to be regarded as "adequate housing". For a dwelling to be considered adequate, it must at minimum satisfy the following requirements:

- 1) **Tenure security:** housing cannot be considered adequate if its occupants do not have secure tenure that protects them from forced eviction, intimidation, and other threats.
- 2) **Availability of services, materials, facilities, and infrastructure:** housing is not adequate if residents do not have access to clean water, proper sanitation, energy for cooking, heating, lighting, food storage, or waste disposal.
- 3) **Affordability:** living in a home cannot be considered adequate if its cost threatens or compromises the enjoyment of human rights by those who live in it.
- 4) **Habitability:** housing is inadequate if it does not ensure physical safety, provide sufficient space, and offer protection from cold, dampness, heat, rain, wind, other health threats, and structural hazards.
- 5) **Accessibility:** housing cannot be considered adequate if the needs of marginalized groups are not taken into account.
- 6) **Location:** housing is also inadequate if it is separated from employment opportunities, health services, schools, childcare centers, and other social facilities, or if it is located in dangerous or polluted areas.
- 7) **Cultural adequacy:** a dwelling is not considered adequate if it does not respect and take into account the cultural identity and cultural expression of its occupants.

2. METHOD

In conducting the research, For the study on the Paradigm of Vertical Housing in the Context of Urban Sprawling in *Jabodetabekjur*, a qualitative method with a Grounded Theory approach was chosen as an exploratory option to develop theory based on data collected systematically. According to John W. Creswell, qualitative research is an approach to understanding human and social phenomena through in-depth exploration of experiences and meanings [16].

The Grounded Theory approach is a research methodology that derives generalizations from participants' observations about one or more phenomena, focusing on exploration of the data to identify patterns and key concepts [17]. In the context of this study, Grounded Theory will be used to construct theory from events, procedures, and relationships among respondents related to vertical housing amid urban sprawl in the *Jabodetabekjur* agglomeration.

The research will focus on the *Jabodetabekjur Metropolitan* area as the study object. The scope includes Bogor, Depok, Tangerang, Bekasi, and Cianjur—Jakarta's surrounding buffer regions—where urban sprawl and the growth of vertical housing are especially significant. The observation period for this study lasted four months, from October 2024 to January 2025, during which the distribution of urban sprawl was analyzed for the years 2000–2022 and the current state of vertical housing in the *Jabodetabekjur* area. The author distributed questionnaires from 11 December 2025 to 7 January 2026 among the communities around *Jabodetabekjur*.

The questionnaire items referred to the UN Habitat housing adequacy standards. The researcher also explored respondents' interest, suggested locations, and essential aspects of vertical housing.

2.1 Data Collection Method

A total of 72 respondents participated, with varied geographic and demographic distribution. Respondents from Tangerang Raya made up 27% of the sample. Jakarta contributed 25% of respondents. Depok accounted for 18% and Bogor 15%. Bekasi recorded 6% and Cianjur 1%. Respondents from outside the *Jabodetabekjur* area numbered 8%. The data show a dominance of Gen Z at 74%, while Gen Y represented 26% of respondents. The study obtained no respondents from the Gen X category, which is suspected to reflect limited interest in vertical housing among that generation.

Table 1. List of questions used in the questionnaire (source: author, 2026)

SECTIONS	QUESTIONS
RESPONDENT PROFILE	Name
	Year of Birth
	City of Origin
REFLECTION ON CURRENT HOUSING	Tenure security
	Availability of services, materials, facilities, and infrastructure
	Affordability
	Habitability
	Inclusiveness
	Accessibilty
	Location
	Cultural adequacy
PERCEPTIONS OF VERTICAL HOUSING	Interest in Vertical Housing and Reasons
	Suitability of the Location and Reasons
	Key Considerations in Vertical Housing

The questionnaire also included instruments capturing respondent biodata, namely name, year of birth, and city of origin. Next were questions about respondents' current housing adequacy based on the seven adequate housing points agreed by the UN. These questions served as a reflection of respondents' current housing before they gave opinions on vertical housing.

Part 3 served as the main instrument of the questionnaire. It contained three questions about respondents' interest in vertical housing and their reasons, respondents' recommended locations for vertical housing and their reasons, and, finally, respondents' views on whether vertical housing would be suitable for them.

Secondary data were obtained indirectly through a literature study sourced from academic journals, previous research reports, and relevant official government documents.

2.2 Data Analysis Method

The data analysis method is the process of organizing, categorizing, and interpreting data to find patterns, themes, and significant relationships in order to answer the research questions [18]. In this study, two types of data were obtained: image data from satellite imagery and land cover maps of the *Jabodetabekjur* area, and textual data from the questionnaires. These data will then be analyzed qualitatively to identify the main categories and the relationships between categories that emerge from residents' perceptions and the dynamics of urban sprawl.

Table 2. Open coding table used (source: author, 2026)

NO	RESPONDENT ID	QUESTIONS	SEGMENT	CODE	CATEGORY	THEME
1	1	Answer	1
2			2
3	2	Answer	1
...

This approach iteratively involves open coding to identify key concepts from the data, followed by axial coding to connect those concepts into broader categories, and concludes with selective coding to develop a core theory that explains the studied phenomenon [19].

3. RESULTS AND DISCUSSION

On April 25, 2024, Law Number 2 of 2024 concerning the Special Capital Region Province of Jakarta was approved, stipulating an expansion of the agglomeration area. This regulation changes the nomenclature from *Jabodetabek* to *Jabodetabekjur*. The acronym, which initially comprised Jakarta, Bogor, Depok, Tangerang, and Bekasi, officially now includes Cianjur Regency within the scope of that strategic coordination.

Indonesia started pioneering vertical housing projects in the 1970s. However, only in the 1990s did this housing type begin to be built on a large scale, with a focus on luxury apartments targeted at financially well-off groups. Vertical housing for low-income residents in Indonesia began to be piloted in the mid-1990s in several locations in Jakarta, in the form of multi-storey apartment housing [20].

This housing development was driven by a population surge from the 1970s through 2000 in Jakarta. BPS data show Jakarta's population in 1971 was 4,579,303. By 2000—just three decades later—Jakarta's population had reached 9,588,194. This drastic increase directly correlates with the limited land available in Jakarta because of irregular, horizontal expansion. Built-up area in Jakarta covers about 85.29% of its total land, leaving only a small portion as green or undeveloped land [21]. Specifically, the built urban area increased from 483 km² in 2000 to 574 km² of the total 661 km² of Jakarta in 2020, representing a 19% increase, with remaining green open space less than 9% of Jakarta's total area (Sarker et al., 2024).

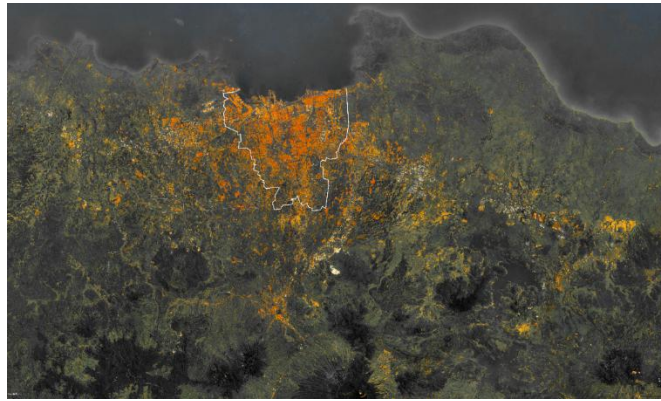


Figure 1. Satellite image of Jakarta in 2000 (source: Google Earth, 2026)

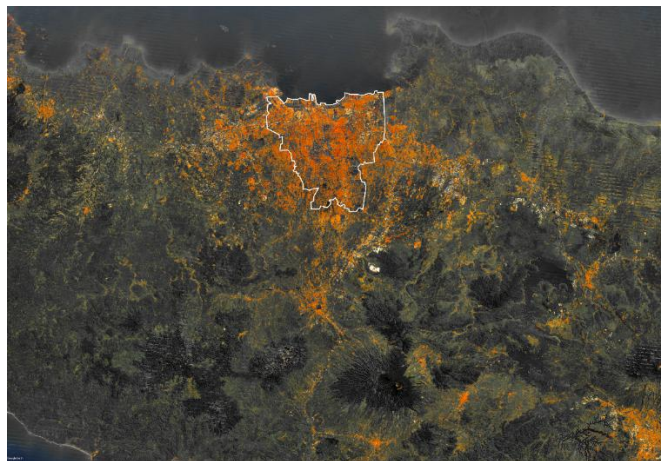


Figure 2. Satellite image of Jakarta in 2010 (source: Google Earth, 2026)



Figure 3. Satellite image of Jakarta in 2020 (source Google Earth, 2020)

This situation caused population growth trends to shift toward neighboring cities such as Bogor, Depok, Tangerang, and Bekasi. The population shift can be seen in BPS data: Jakarta's growth rate was 0.31 in 2024, compared with Bogor (1.23), Bogor City (0.89), Depok City (1.37), Tangerang (0.79), South Tangerang (1.05), Bekasi (1.35) and Bekasi City (1.04) in the same year.

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This comparison indicates an urban sprawl phenomenon in the *Jabodetabekjur* Metropolitan area, where population growth in the agglomeration cities is higher than in Jakarta.

Spatially, the distribution of vertical housing in *Jabodetabekjur* shows concentric and corridor patterns. Jakarta remains the highest concentration center, especially Central, South, and West Jakarta, which are close to economic, service, and government activity centers. The density of vertical housing in these areas correlates strongly with high land values and the availability of relatively mature urban infrastructure.

Outside Jakarta, *Bodetabek* areas—such as Bekasi, Tangerang, and Depok—have experienced rapid vertical housing growth, especially along major transport corridors like toll roads, commuter train lines, and transit-oriented development (TOD) zones. Vertical housing in these areas functions as a buffer for Jakarta, accommodating housing needs for people who work in the city center but seek more affordable living options.

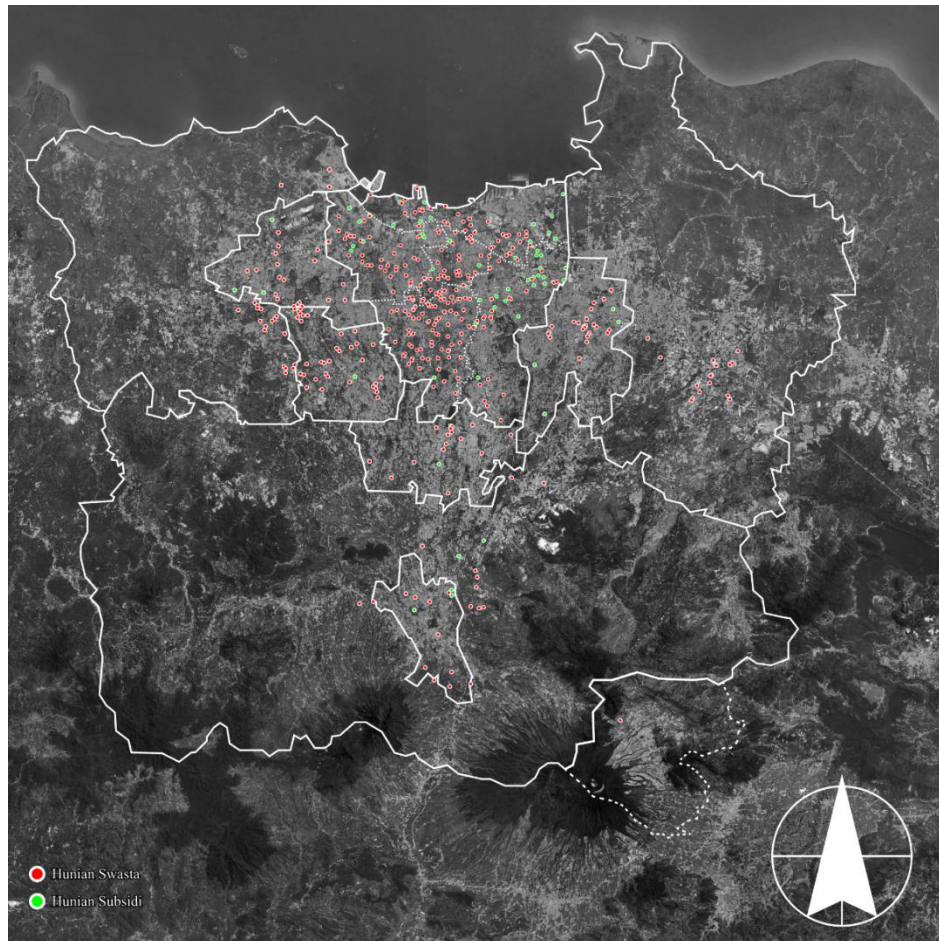


Figure 4. Distribution points of vertical housing in Jabodetabekjur (source: author, 2026)

Meanwhile, Cianjur, as the outermost part of *Jabodetabekjur*, still shows relatively low intensity of vertical housing. This distribution indicates that proximity to activity centers and connectivity to regional transport networks are primary factors determining the location and intensity of vertical housing development.

Table 3. The number of vertical housings in each city (source: author, 2026)

TYPE	JAKARTA	BOGOR	DEPOK	TANGERANG	BEKASI	CIANJUR
Private	217	21	16	73	40	1
Subsidy	44	5	1	4	4	-
TOTAL	261	26	17	77	44	1

3.1 Reflection of Housing Suitability Based on Respondents' Perceptions

As noted by the UN committee overseeing Economic, Social and Cultural Rights, there are seven main indicators of adequate housing: security of tenure, availability of services, affordability, physical adequacy, accessibility, location, and cultural appropriateness. In the questionnaire that was distributed, these indicators were used to capture respondents' reflections on their current housing. Based on the collected data,

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the resulting evaluation will provide a comprehensive picture of perceptions regarding the adequacy standards of their housing.

Table 4. Likert table of respondents' housing adequacy (source: author, 2026)

CATEGORY	AVERAGE PERCENTATION (%)	CRITERIA
Tenure security	80,69%	Baik
Availability of services, materials, facilities, and infrastructure	81,39%	Sangat Baik
Affordability	77,64%	Baik
Habitability	77,50%	Baik
Inclusiveness	68,33%	Baik
Accessibilty	77,36%	Baik
Location	76,11%	Baik

On the first indicator, security of tenure, respondents tended to feel reasonably secure in their homes, but some still reported problems with housing security. A similar pattern appeared for the availability of basic services: most respondents felt that public and social facilities around their homes were adequate, but a portion still felt their needs were unmet.

The affordability indicator shows that although rent or mortgage payments were perceived as fairly affordable by the majority, a substantial share of respondents still felt they were not fully affordable. Likewise, for physical adequacy, responses clustered around a score of eight, indicating that the physical condition of housing was generally considered adequate, but some aspects still require improvement.

The same pattern appears for the location and cultural appropriateness indicators: most respondents felt their housing locations were strategic and aligned with their social and cultural needs, yet a small portion still perceived mismatch.

Unlike the other indicators, inclusivity showed a diversification of perceptions: some respondents stated that their residential environment is welcoming to different groups, while others felt there remain challenges in accommodating the needs of diverse residents.

3.2 Interest in Living in Vertical Housing

Overall, respondents' interest in vertical housing is generally positive. Survey results show 58 percent of respondents are interested in living in vertical housing, with another 13 percent expressing conditional or mild interest. Meanwhile, 25 percent said they were not interested, and the remainder did not respond.

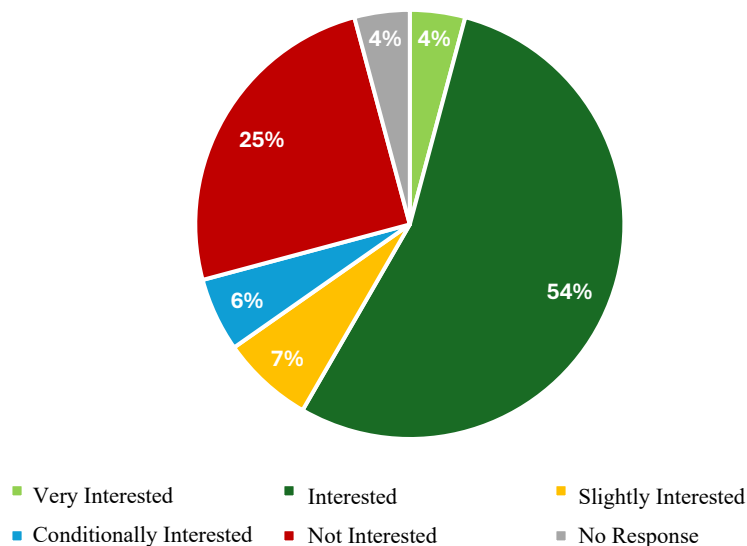


Figure 5. Pie chart of respondents' interest in vertical housing (source: author, 2026)

According to the survey data, interest in living in vertical housing does not appear to be strongly influenced by generational group. Instead, preference for vertical housing is more affected by factors such as accessibility, proximity to activity centers, privacy, and private open space. For example, only 3 of 19

Generation Y respondents expressed disinterest in vertical housing, whereas 15 respondents in Generation X were not interested.

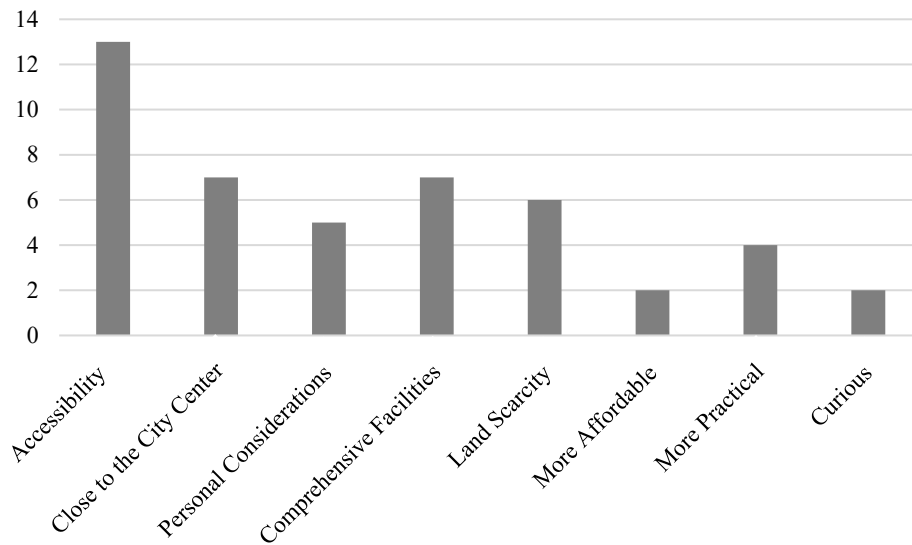


Figure 6. Reasons for interest in vertical housing (source: author, 2026)

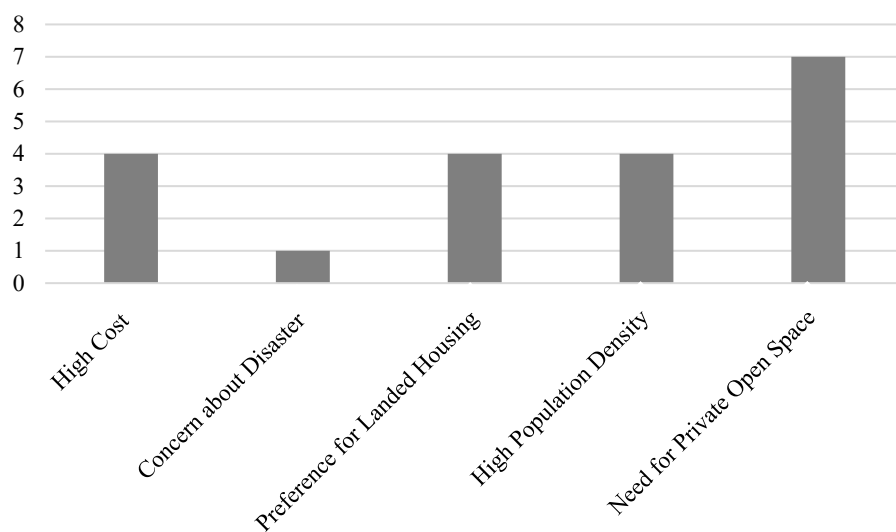


Figure 7. Reasons for not being interested in vertical housing (source: author, 2026)

This confirms that preferences for vertical housing are more complex than simple generational demographics and are influenced by pragmatic considerations like proximity to workplaces and public facilities, as well as the quality of the residential environment. These findings are also consistent with respondents’ current housing experiences, particularly their perceptions of accessibility, privacy and security, availability of services, and inclusivity.

3.3 Preference for vertical Residential Locations According to Respondents

Respondents’ location preferences for vertical housing show a strong tendency toward city-center areas close to public facilities, public transportation, and centers of socio-economic activity. This tendency is reflected in the survey results, which show that most respondents chose Jakarta as their preferred location for vertical living. The preference supports the idea that millennials and Gen Z want to live in downtown or metropolitan areas that offer easy access to workplaces and a range of urban amenities, although there is also a tendency among some to move to suburban areas.

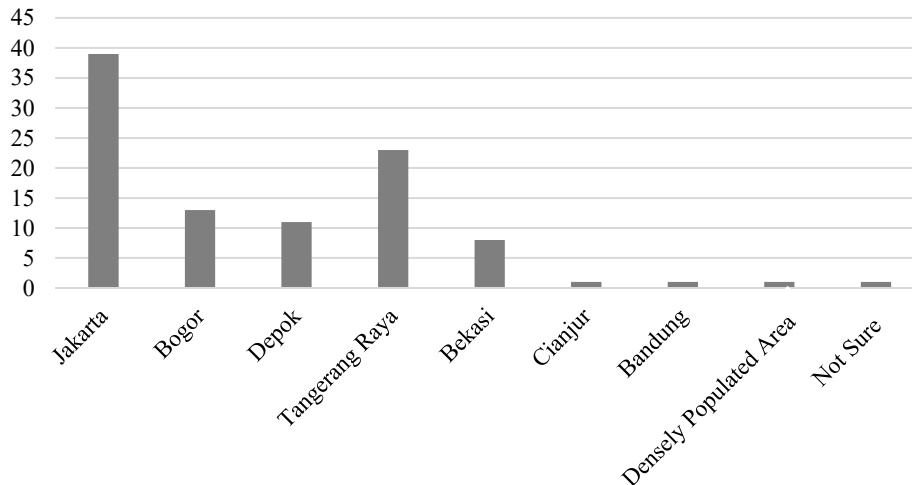


Figure 8. Respondents' location preferences for vertical housing (source: author, 2026)

Population density and limited land are also reasons behind respondents' location preferences for vertical housing, since vertical housing is often an efficient solution to land scarcity in densely populated urban areas.

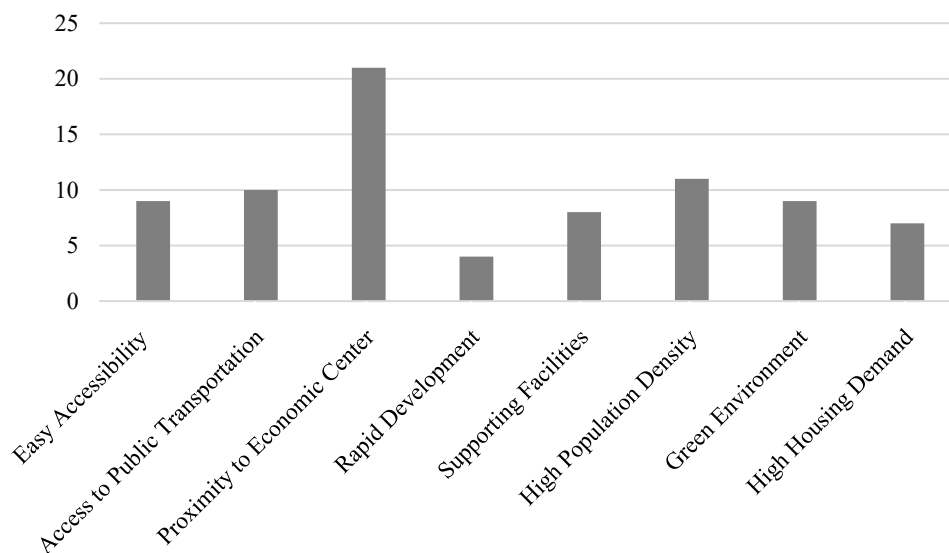


Figure 9. Reasons for location preference for vertical housing (source: author, 2026)

Furthermore, location preferences reflect the spatial distribution of vertical housing in the *Jabodetabekjur* area, which shows high concentrations in Jakarta and the greater Tangerang area. This indicates that the availability of infrastructure and ease of accessibility are the main drivers of vertical housing preferences in these two regions, in line with the economic prospects and quality of life they offer.

3.4 Factors that Influence Interest in living in Vertical Housing

The survey data show that accessibility is the single most important determinant of interest in living in vertical housing. This aligns with respondents stated reasons and location preferences: ease of access to economic centers and public facilities is the main consideration when deciding whether to live in vertical housing. Accessibility aspects include ease of reaching transport systems, proximity to major roads and tollways, and access to stations or other public transit.

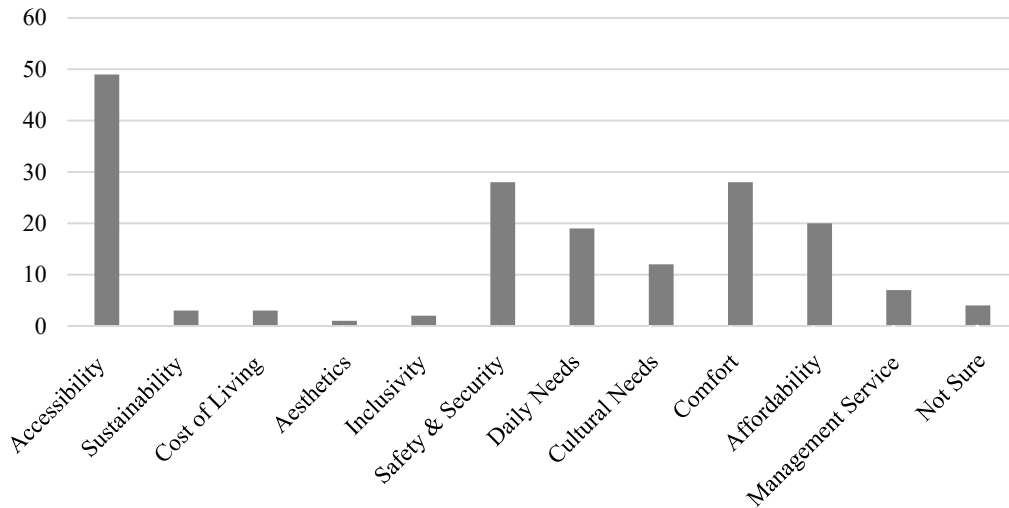


Figure 10. Key aspects in determining vertical housing (source: author, 2026)

Other important factors respondents identified for adequate vertical housing include security and comfort, which are the second most important considerations after accessibility. Housing security and comfort cover aspects such as privacy protection, tenure rights, safety from natural hazards, and the quality of the environment both inside and outside the dwelling. In addition, affordability and everyday cost of living are important considerations, since strategic locations close to city centers and public facilities often correlate with higher property values—highlighting the need to balance accessibility with affordability.

3.5 Synthesis of Analytical Findings

Based on the analysis, this study used spatial distribution and characteristics of vertical housing in the *Jabodetabekjur* area, together with patterns of sprawl identified via spatial analysis on the Jakarta Satu portal, Rukamen, and Google open data. Survey questionnaire data on public perceptions of the adequacy of vertical housing were also used to understand location preferences and factors influencing the desire to live in such housing.

When integrated, the findings indicate that sprawl in *Jabodetabekjur* occurs as a response to limited land and high property prices in city centers, which push people to seek landed housing in peripheral areas in hopes of getting more space at lower cost. Individually, many people also perceive vertical housing as offering limited privacy, higher density, and relatively high costs, which encourages a preference for suburban landed housing.

These findings align with key drivers of urban sprawl: demand for larger living spaces and more affordable housing in suburban areas. This continuity suggests that structural urban factors and individual preferences interact to shape settlement patterns across *Jabodetabekjur*.

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However, this phenomenon contradicts the high interest in living in vertical housing. That interest is driven by a desire for good accessibility to urban amenities and economic activity centers, and it corresponds to elements of adequate housing as defined by the UN.

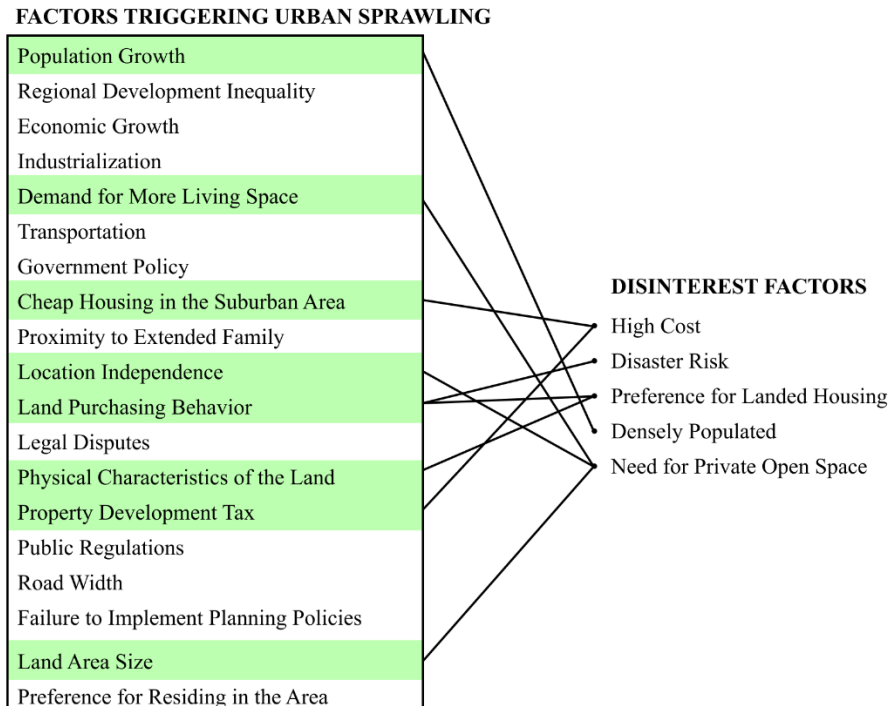


Figure 11. Data correspondence with urban sprawling (source: author, 2026)

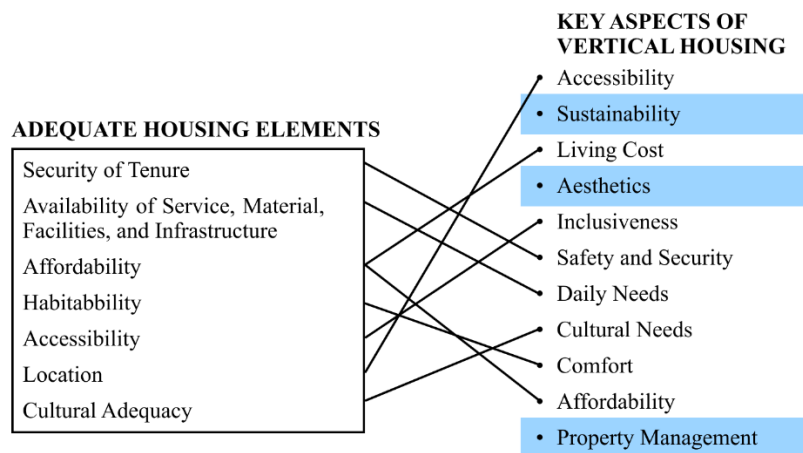


Figure 12. Data correspondence with elements of adequate housing (source: author, 2026)

The contradiction between sprawl drivers and interest in vertical living highlights a gap between an ideal preference for central accessibility and the economic reality that forces compromises toward affordable housing in the suburbs. This creates a complex dilemma for urban residents choosing an optimal place to live—balancing proximity and accessibility against financial capacity.

Therefore, the need for affordable housing in city centers becomes a crucial challenge that local governments must address to mitigate urban sprawl. Local authorities should design incentive policies and zoning regulations that encourage development of affordable vertical housing in transit-integrated areas. Still, housing planning cannot consider only the adequacy criteria agreed by the UN; public preferences for other factors—such as aesthetics, investment value, and neighborhood safety—must also be taken into account.

4. CONCLUSION

The development of urban sprawl in the peri-urban areas of *Jabodetabekjur* has created several challenges, including environmental degradation, increased traffic congestion, and high commuting costs. These issues affect people’s quality of life and have the potential to create socio-economic disparities between urban cores and their peripheries.

This urban sprawl phenomenon is not unique to *Jabodetabekjur* but is a global issue faced by many metropolitan areas in developing countries. Rapid population growth and uncontrolled urbanization are the triggers. Vertical housing development has been proposed as a solution to mitigate the impacts of urban sprawl and to meet the rising housing demand in urban areas.

Within *Jabodetabekjur* itself, the implementation and distribution of vertical housing are still uneven. Spatial distribution data obtained from analysis on the Jakarta Satu portal and Rukamen show that vertical housing remains concentrated in Jakarta city. However, the spread of vertical housing in supporting areas such as Depok, Tangerang, and Bekasi shows a significant upward trend. In practice, vertical housing development in these areas still tends to focus on upper-middle segments in the form of privately managed apartment units.

Nevertheless, survey data on public perceptions of the suitability of vertical housing—collected through questionnaires to understand location preferences and factors influencing interest in living in such housing—show positive responses. More than 50 percent of respondents expressed interest in living in vertical housing, especially if it is integrated with public transport and adequate public facilities, and offers competitive prices compared with detached housing.

These findings indicate that vertical housing has strategic potential to be a solution for addressing sprawl and limited urban land. With proper planning and supportive policies, vertical housing can be an effective instrument to optimize the use of limited land in metropolitan areas.

In the analysis of preferences for vertical housing, most respondents preferred housing in strategic locations, followed by other factors that correspond to elements of adequate housing as defined by the UN. However, these preferences represent respondents' ideal standards, which contradict the availability of affordably priced housing. Economic reality often forces people to compromise by choosing housing in less strategic locations.

This condition underscores the need for policy interventions that can bridge the gap between preferences for strategic locations and people's financial capabilities by providing affordable vertical housing in strategic areas. Synergy between government and the private sector is required to promote the development of affordable vertical housing integrated with supporting facilities such as public transport systems and economic activity centers. In addition, respondents also showed preferences for housing aesthetics, sustainability, and good investment value.

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