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Evolving Urban Form And Its Impact On Housing And Transportation Costs: A Case Study Of Hyderabad

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Abstract:

Rapid urbanization and economic growth have reshaped metropolitan landscapes across India, with cities like Hyderabad exemplifying the dual-edged nature of such transformation. The emergence of economic hub like HITEC City has attracted industries in finance, technology, and consultancy, and spurred unprecedented growth in the city's suburban regions, transforming once-rural areas into sprawling suburbs. But along with this success has come the issue of a housing supply and demand imbalance, which has created serious problems, especially with relation to housing affordability and transportation expenses. Lower-income citizens were forced to the outskirts of the city as once affordable suburbs became high-demand areas as urban expansion spread outward. This paper investigates the interplay between urban sprawl, transportation costs, housing location choices, and affordability in Hyderabad, emphasizing the combined effect of housing and transportation costs (H+T). This study examines how Hyderabad's urban form has changed over time using statistical and geospatial analysis, concentrating on regions that have changed from suburban enclaves to urban centres, such as HITEC City, Financial District, and Kokapet. Patterns of spatial affordability are found by analysing quantitative data on house prices, rental trends, and transit costs. The paper leverages GIS to visualize shifts in housing density, urban boundaries, and commuting patterns, offering a spatial perspective on the affordability challenges. Findings from the review of the existing literature reveal that compact urban forms generally exhibit lower combined housing and transportation costs due to shorter travel distances and greater availability of affordable transit options. On the other hand, Hyderabad's sprawl developments have made transport poverty worse by restricting working-class citizens' access to social opportunities and means of subsistence. As a result, social inequality has increased, and productivity may have decreased. In order to find gaps and opportunities for tackling these issues, the study assesses policy frameworks, with a focus on advancing sustainable mobility and affordable housing options. By highlighting the wider ramifications of urban sprawl on metropolitan affordability and equity, the study will further reveal the factors driving housing location decisions and the effect of urban sprawl on the general well-being of residents in Hyderabad. It highlights the need for integrated planning approaches that balance housing supply with sustainable transport development. The findings will have important policy implications for urban planners and policymakers, highlighting the need for strategies that promote more compact and transit-oriented development, improve public transportation infrastructure, and ensure equitable access to affordable housing options within the Indian cities.

Keywords: Urban Sprawl, Housing Affordability, Transportation Costs, Hyderabad, Urban Planning

Introduction:

India has undergone considerable urbanization over the past fifty years, with around 400 million people being added to urban regions in those years. This influx is primarily driven by better job prospects, improved access to healthcare and education, and overall enhanced living conditions that cities offer. A key example of this phenomenon is Hyderabad, which has experienced remarkable growth in recent years, primarily due to the expansion of the IT industry and numerous companies in technology and pharmaceuticals. This growth was predominantly concentrated in Hyderabad's western suburbs, which were later integrated into a business area known as HITEC City, resulting in extraordinary development in the city's outskirts, converting once-rural spaces into extensive suburban areas. The economic opportunities in this region prompted many individuals to move to the western suburbs of Hyderabad, leading to a significant rise in housing demand. Many of these suburbs have evolved into vibrant urban hubs that are densely populated and bustling with commercial activities. The aim of the study is to illustrate the growth and transformation of Hyderabad's urban landscape and to evaluate the effects of this change on housing costs and transportation in the city, specifically analyzing how the city's economic development has influenced overall living affordability and whether it has contributed to transportation inequality and poverty. In doing so, the research contributes to the growing body of literature on housing affordability and transportation poverty, aiming to investigate the paradox of wealth potentially worsening urban poverty rather than alleviating it. Additionally, it demonstrates how economic progress in developing countries can potentially elevate urban poverty levels and lead to transportation poverty. The study is divided into several sections, with the methodology section outlining the analysis process and the types of data employed in the research. The next section, focusing on changes in urban form, explores the factors prompting the rapid transformation of urban landscapes and highlights the urbanization of rural areas and suburbs in western Hyderabad using Google satellite imagery. The following section, which examines the rise in housing prices, centres on the increasing housing costs in Hyderabad and compares this growth with other tier-1 cities in India, supported by the Housing Price Index and data from property listing websites. The next part, addressing the lack of transportation access, analyses the coverage of all public transport networks and considers the implications of the findings within the context of Hyderabad. Subsequently, the research investigates the potential integration of an innovative housing affordability framework into the current housing planning and policy framework, alongside policy recommendations relevant to Hyderabad derived from the thorough study.

Methodology:

The research examines the increase in housing prices in Hyderabad in comparison to other Tier-1 cities by evaluating the fluctuations in the Housing Price Index over the past ten years, looking at both assessed and market prices. Additionally, the study employs Google Satellite imagery to depict the transformations in Hyderabad's urban landscape and extent, focusing on the western suburbs. The study further maps the locations of public transit facilities and illustrates their coverage through isochrones, which are created using public transit and network analysis tools in ArcGIS and QGIS, for a walking-time distance of 15 minutes. The data has its limitations; for instance, the locations of bus stops are not as frequently updated as those for the MMTS and Hyderabad Metro. Furthermore, the accuracy of the isochrones relies on the design of the road network and the availability of pedestrian facilities, which are not sufficiently detailed. After the geo-spatial analysis, a H + T affordability framework has been discussed based

on the existing literature and calls for its integration into designing better housing policy framework in India.

Change in Urban Form:

Hyderabad has significantly grown towards the west in past two decades, started with the establishment of HITEC City in 1998 by combining together parts of western suburbs of the city. HITEC-City is a financial business district that spans 200 acres and has evolved into a significant economic center, featuring various business and IT parks along with research and development campuses for multinational companies. Subsequently, the Financial District was developed in 2004 close to HITEC City, which now features campuses for major companies like Amazon and Microsoft, the US Consulate, and the largest workplace in Asia owned by ICICI Bank, along with several SEZs. HITEC City and Financial District encompasses parts of other suburbs such as Madhapur, Gachibowli, Kondapur, Nanakramguda, Manikonda, and others. All the surrounding suburbs now collectively create a technology township commonly referred to as Cyberabad, which covers an estimated area of 15000 acres. This clustering of corporate offices triggered a substantial demand for housing in the region, resulting in the swift transformation of these suburbs which were previously rural villages. Long-term urban growth is predominantly driven by fundamentals like education, industrial specialization, and housing supply elasticity (Ouazad, 2020). Currently, these villages have been converted into urban locales adorned with numerous upscale residential complexes, shopping centres, and large private hospitals. The transformation of these regions is evident through satellite images that highlight the remarkable changes over the past ten years.

Madhapur from 2014 to 2024

Madhapur was a small village pre 1990s which has now been transformed into an IT hub, having the highest concentration of IT/ITES firms in Hyderabad.

Gachibowli from 2014 to 2024

Gachibowli is home to multiple tech firms and luxurious residential apartments, while also being the entry/exit point of Nehru Outer Ring Road which encircles the city of Hyderabad.


Kondapur from 2014 to 2024

Kondapur has now developed into a major commercial and residential hub due to its close proximity to the HITEC City and is also home to Google Hyderabad.


Nanakramguda from 2014 to 2024

Nanakramguda is part of the Financial District and is a prominent residential location which also houses Amazon and Microsoft campuses and multiple SEZs.


Manikonda from 2014 to 2024

Manikonda was a small village which is now turned into a commercial and residential hub housing several software companies headquarters.

Rise in Housing Prices:

Hyderabad has experienced one of the sharpest increases in housing costs, as shown by the Housing Price Index compiled by the National Housing Bank's Residex. The city has outperformed nearly all other tier-1 cities, as demonstrated by the tables below that present HPI@Assessment Prices, which is calculated by collecting valuation data from banks and housing finance companies on existing properties, along with HPI@Market Prices, determined through surveys of unsold inventory in ongoing projects.

Table 1. Housing Price Index at Assessment Prices

HPI@Assessment Prices			
City	HPI in Sep-2014	HPI in Sep-2024	Change
Ahmedabad	88	210.03	138.67%
Hyderabad	**84**	**191.98**	**128.55%**
Bengaluru	81	151.64	87.21%
Pune	81	132.46	63.53%
Kolkata	90	143.3	59.22%
Chennai	84	131.79	56.89%
Mumbai	80	116.99	46.23%
Delhi	107	102.5	-4.21%

The sudden surge in housing demand allowed the private real-estate developers to only cater to the higher-income classes by constructing only the luxurious-category apartments and villas. Specific physical layouts in urban areas can attract higher-income residents, driving up housing prices (Venerandi et al., 2014), so was the case with Hyderabad, quickly rendering these suburbs unaffordable because of the lack of government intervention as the government was unable to match the increasing demand and provide sufficient housing for lower- or middle-income families, making the housing supply somewhat inelastic. Glaeser & Gyourko (2005) argue that in cities with inelastic housing supply, increases in productivity lead to higher housing prices rather than city expansion and that the city with elastic supply can accommodate growth without significant price increases.

Table 2. Housing Price Index at Market Prices

HPI@Market Prices			
City	HPI in Sep-2014	HPI in Sep-2024	Change
Hyderabad	**84**	**168.2**	**100.24%**
Bengaluru	95	184.55	94.26%
Kolkata	91	150.21	65.07%
Ahmedabad	81	133.26	64.52%
Pune	87	118.93	36.70%
Mumbai	85	113.5	33.53%
Delhi	103	134.06	30.16%
Chennai	86	102.27	19.50%

Table 3. Average per sq.ft. prices of western localities based on the market listings

Locality	**Price per sqft (2014)**	**Price per sqft (2024)**	**CAGR**
Kondapur	3693	9396	9.79%
HITEC City	4426	11002	9.53%
Gachibowli	4065	9884	9.29%
Madhapur	4526	9305	7.47%

Virtually all residential developments in the region fell into the luxury category, making them too costly for these lower and middle-income households, compelling them to move to rural areas on the outskirts of the city or into informal housing in the inner city.

The shift towards the periphery of Hyderabad is evident from satellite images, which clearly portray an expansion towards the west, while also highlighting growth in the eastern outskirts. The western suburbs, also mentioned in the study are largely characterized by the construction of luxurious housing projects, attracting the higher-income class and IT

professionals for the settlement. On the contrary, the eastern suburbs are primarily characterized by the construction of affordable housing complexes, attracting the settlement of lower- to middle-income families. The individuals or household having certain characteristics such as not owning an automobile, unemployed, low-income, immigrants or migrants, usually face a greater degree of transport related social exclusion (Litman, T., 2013) as the transit-dependent populations are predominantly composed of minorities and low-income individuals (Garret & Taylor, 1999).

Figure 1. Hyderabad in2014

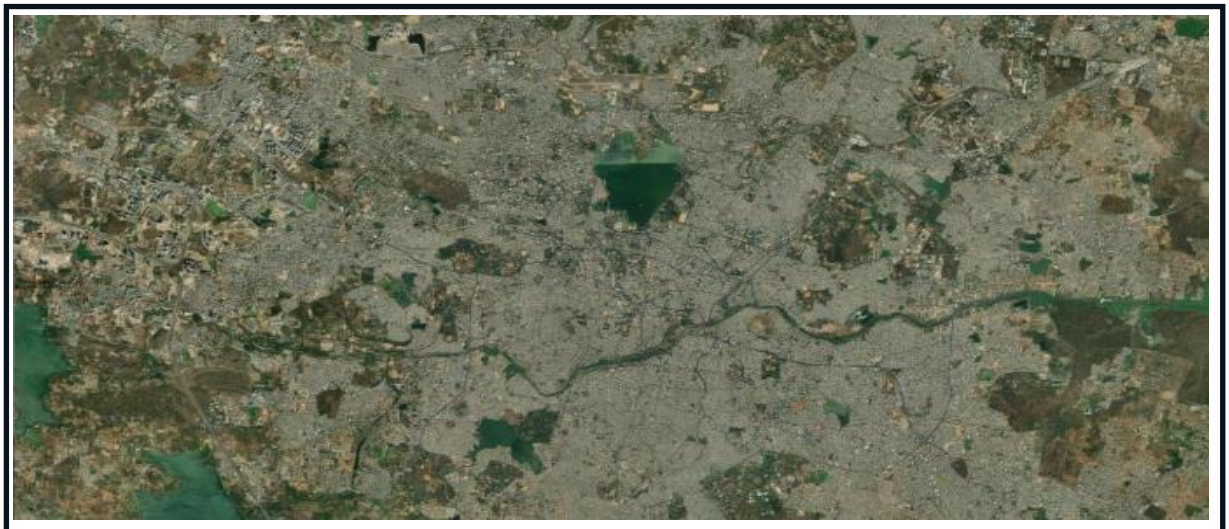

Figure 2. Hyderabad in 2024

The prices in the eastern outskirts of the city have also risen significantly, yet they remain generally lower than those in western localities; thus, the eastern suburbs can still be considered somewhat affordable compared to their western counterparts.

Locality	Price per sqft (2014)	Price per sqft (2024)	CAGR
Sainikpuri	2547	5521	8.04%
Nagole	2642	5748	8.08%
Uppal	2421	5649	8.84%

Furthermore, the increase in housing prices in the eastern suburbs is largely linked to their transportation options, with Uppal benefiting from numerous bus-stops and better access to the Metro network, while Nagole, despite having its own metro station, offers slightly less metro

accessibility. In contrast, Sainikpuri primarily relies on the bus system and the MMTS network, lacking any connection to the Hyderabad Metro system.

Transportation Accessibility & Socioeconomic Exclusion:

The lower-income residents are often displaced to city outskirts or inner-city informal housing which usually lacks the access to quality transportation (Liotta et al., 2021), constraining their ability to move freely, limiting their access to job and educational opportunities, further exacerbating housing insecurity (Iyer et al., 2023). Furthermore, the increased distance to workplaces and rising traffic congestion, resulting from the growing number of trips in and out of the city and the heightened volume of vehicles, leads to longer commute durations and higher transportation costs. This highlights a paradox indicating that growing urban wealth may actually diminish accessibility and the quality of transportation instead of improving it.

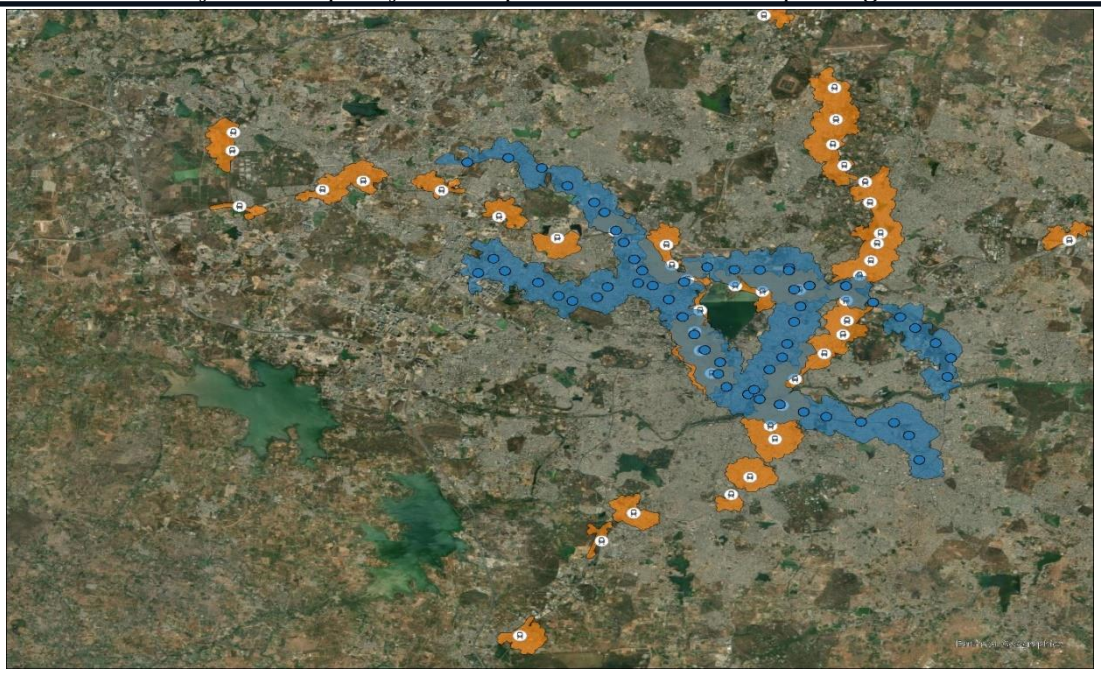

Figure 3. Hyderabad MMTS and Metro's combined Network Coverage map with 15 minutes of walking reachability

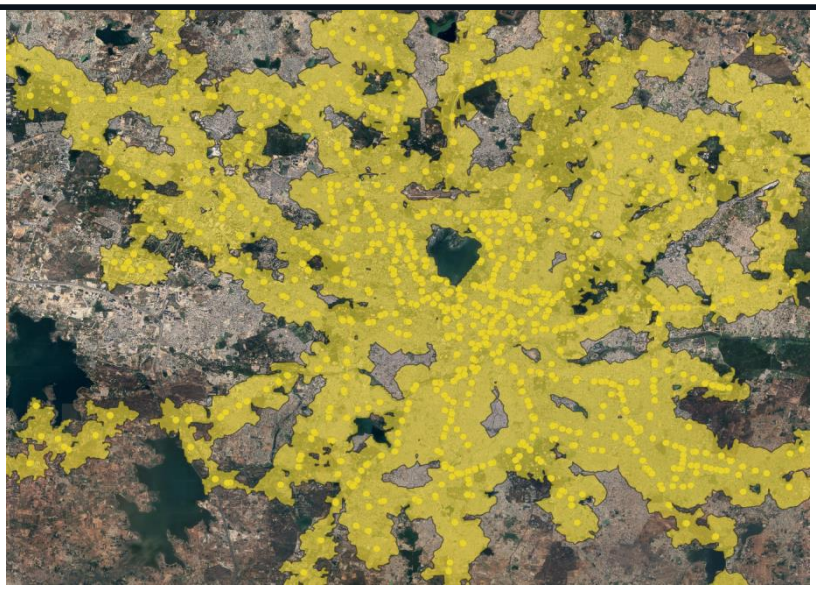

Figure 4. Network Coverage map of Hyderabad's bus network with 15 minutes of walking reachability

In the analysis of the coverage areas, it is clear that the eastern outskirts of Hyderabad rely solely on buses, which frequently become caught in traffic congestion, particularly during busy hours. This time lost is particularly significant given that most commuters head towards HITEC City and nearby areas, which are over 15 kms away from many eastern peripheral neighborhoods of Hyderabad, and in some cases, the distance exceeds 20 kms. In many cities, commuting from affordable housing areas to job-rich centres via public transit often exceeds 30 minutes, with some commutes over an hour (Iyer et al., 2023) . This situation implies that those using buses as their primary means of transportation are not only wasting time but are also incurring a greater opportunity cost for bus travel. As the distance increases, bus fares also rise, rendering the bus service a less efficient option for commuters and failing to compete effectively with private transportation methods. We also observed a significant lack of coverage in many western suburbs. However, it is essential to remember that, as previously mentioned, much of the residential development in the western area of Hyderabad consists of high-end apartments and gated communities. These developments often include all necessary amenities either within the community or just outside its gates, such as gyms, shopping centres, schools, and more. This situation tends to minimize the need for traveling at all, which can significantly lower transportation costs, potentially balancing out higher housing prices (Smart & Klein, 2020).

The Housing + Transportation (H+T) Affordability Framework:

In numerous research studies, spatial affordability is evaluated primarily through housing expenses, neglecting transportation costs. A significant part of household budgets is often directed toward transportation, as various studies have demonstrated. Thus, it makes sense to factor in transportation expenses when assessing the overall affordability of living in a specific area. Lipman (2006) developed the Affordability Index, a tool that combines housing and transportation costs to evaluate the genuine affordability of residential locations. Haas et al. (2006) found that many families opt for lower housing prices in suburban regions while incurring greater transportation costs. Subsequently, Guerra and Kirschen (2016) analysed different H+T affordability indices, emphasizing that these indices offer a more precise representation of affordability, especially in metropolitan regions where transportation expenses vary significantly by location. Recently, Barisonzi et al. (2025) advanced the H+T affordability concept by proposing that transportation affordability is closely associated with local transit systems, urban density, and commuting habits. Therefore, urban planning authorities should focus on integrating H+T affordability metrics into housing policy frameworks to foster equitable and sustainable urban growth.

Policy Recommendations for Equitable Urban Development:

Considering the disparities in transportation and housing within Hyderabad, urban planning authorities should incorporate the combined housing and transportation affordability measures (H+T) into their housing policy frameworks. The Greater Hyderabad Municipal Corporation (GHMC) and the Hyderabad Metropolitan Development Authority (HMDA) need to tackle the issues related to transportation poverty by:

- Improving Public Transit Integration: Expanding metro connectivity to areas that are currently underserved and enhancing last-mile connections through feeder services and improved pedestrian infrastructure.
- Fostering Affordable Housing Near Transit Corridors: Promoting transit-oriented development (TOD) strategies that support the building of affordable housing within a short walking distance from metro and bus routes.

- Introducing Subsidized Transit Programs: Implementing fare reductions or providing discounted public transport passes for low-income individuals to help lower commuting expenses.
- Enhancing Bus Network Efficiency: Streamlining routes, boosting service frequency, and establishing dedicated bus lanes to reduce delays caused by congestion.
- Encouraging Mixed-Use Zoning: Supporting mixed-income residential projects that include access to essential services in order to shorten travel distances for employment, education, and healthcare.

Conclusion:

The rapid westward expansion of Hyderabad, spurred by its growth in business and information technology, has significantly impacted transportation costs and housing prices. This research evaluates urban development trends, property price fluctuations, and public transport availability to assess the socio-economic effects. The affordability of housing has diminished in prime locations such as HITEC City, Gachibowli, and Madhapur, where soaring property prices have excluded many low- and middle-income families, forcing them to relocate to the outer suburbs, primarily eastward. This migration has resulted in increased travel durations, transportation costs, and inadequate last-mile connectivity. While Hyderabad's metro and MMTS systems have improved mobility, their growth has also heightened reliance on private vehicles and informal transport methods, worsening congestion and commuting expenses. The Housing + Transportation (H+T) affordability assessment from the study reveals that while suburban housing is cheaper, the overall financial burden remains high, especially for economically disadvantaged groups struggling to find access to transit-oriented housing. This situation further intensifies socio-spatial inequalities and exacerbates economic disparities. Addressing these challenges necessitates integrating transit-oriented development (TOD) with inclusive housing strategies. Policies like inclusionary zoning, rental housing initiatives, expansion of the metro and MMTS networks, better last-mile connectivity, and multimodal transport integration can alleviate congestion and improve accessibility. Mixed-use developments can shorten travel times and enhance urban liveability, while GIS and spatial analytics can support data-driven infrastructure planning. Hyderabad's rapid growth presents both challenges and opportunities. Sustainable and fair urbanization relies on finding a balance between affordable housing and efficient transit. This study lays the groundwork for additional research on urban growth, affordability, and mobility in Indian cities. Future investigations may explore private sector involvement, affordable housing initiatives, and comparisons with other swiftly developing South Asian cities, allowing Hyderabad to cultivate resilience, equity, and sustainability.

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