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A Descriptive Analysis of Human-Environment Interactions in the Suburban Area of Pune City

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The Baner-Balewadi was a rural area that transformed into a residential suburb and is now metamorphosing into a commercial and educational hub of Pune city. This area is now a part of Pune Municipal Corporation and is occupied by various schools, universities, and IT companies. The decadal population growth rate of the Baner-Balewadi area is 275%; it is much higher than the Pune district's and city's growth rate, which makes it a fascinating area for this study. A cross-sectional survey was conducted in this area covering three major regions: Balewadi Highstreet, Baner-Balewadi road, and NICMAR University. The data for 15 parameters were gathered, a total of 38 survey samples were collected using stratified random sampling, and land use was mapped to understand the grassroots reality. Thereafter, the parameters were analysed using a descriptive statistical technique, and spider mapping was used for data presentation. The strengths and challenges regarding infrastructural services, transportation, socio-economic factors, environment, and land use were identified. The results show that the waste collection is strong, but there are drinking water issues in the area. The recent development is causing stress on the infrastructural services and unregulated land-use change leading to environmental degradation. The metro construction is causing a lot of noise and air pollution, and people will still prefer buses as a transportation medium in the future because of good connectivity. The study is concluded with area-wise parametric recommendations made after examining the advancement, challenges, and gaps identified at the grassroots from both stakeholders' and experts' perspectives.

Keywords: suburban, urbanization, descriptive analysis, global south, spider mapping.

Introduction

Suburban, rurban, peri-urban, urban sprawl, outskirts, countryside, peripheral towns, and many more such synonyms describe the area just outside the city, which is used majorly as a residential area (Mansour, Alves, and Costa, 2023). However, all these areas have similar characteristics, but land use varies from region to region.

The population density of suburban areas lies between urban and rural areas. The context of suburban areas differs from country to country. There is no definition for suburban (NAAHQ, 2017), and in India, a suburban area signifies a low-density area within a metropolitan area that is primarily residential, though it may also include commercial and mixed-use spaces. Suburban neighborhoods are the impact of urbanisation, where agricultural land is getting converted for urban purposes because of the expansion of urban areas. The process of high rising is changing not only land use patterns but also the very structure of lifestyle and affecting the socioeconomic and environmental parameters of this area (Gogoi, 2022).

The phenomenon of urban expansion causing suburban development is happening globally (Shryock, 1957). It started in the 1800s when wealthy entrepreneurs started moving out to build large houses (Hall and Hay, 1980). The peak of suburban growth can be seen in the 1960s in Australia, North America, and Western and Northern Europe (Champion, 2001). The process was further accelerated with the advancement in communication, transportation, and income. In developing countries, urban and rural are becoming entangled both physically and functionally. If the trend continues, the urban population will rise from 4.4 billion (56% of the total population) in 2023 to 6.79 billion (70% of the world population) in 2050 (The World Bank, 2023). Most of this rural-to-urban migration is happening in developing countries, and on average, 5 million people per month (developing countries) are shifting to cities (UNPF, 2023). In India, suburbanisation is happening faster than expected, and most development is happening beyond the metropolitan area (Vishwanath, 2013). Though the growth is haphazard and unplanned, Gogoi (2022) argues that the rural areas adjacent to the metropolitan cities are proliferating, which signifies India's urbanisation, and it is good for overall economic growth (Gogoi, 2022). Urban agglomeration, fast-growing peripheral areas, and population concentration along urban corridors are essential to study for regional development. Industrial development is prevalent in this area due to the availability of land, less stringent policies, and access to the labour force, but this is having a harmful impact on the environment. In India, among others, information technology (IT) cluster development is most prominent in the development of suburban areas, especially cities like Bengaluru, Pune, Hyderabad, etc.

The suburban areas have become very complex as they have both urban and rural characteristics, yet they have amazing growth possibilities (Stanilov and Scheer, 2004). There is a significant demographic shift with a diverse population (Frey, 2021) and there is a gap in understanding the economic vibrancy (Florida, 2022). They are becoming more congested, and the complexity comes concerning multipurpose use (industrial, commercial, residential, etc.), contrasting political views (which local body should govern), and it is attracting elites, middle-class, and migrant workers who want to work both in agriculture and manufacturing. These areas are grappling with environmental challenges because of unregulated growth and limited green spaces (Kahn, 2020); it calls for research on effective strategies specifically in terms of land-use change and pollution (Seto, 2011). The lacunae also lie in the transportation sector in terms of equitable access, last-mile connectivity, and multimodal options to connect suburban areas to urban centres (Litman, 2024). A deeper understanding of urban transformation and development patterns is required (Shlomo Angel, 2005) to understand the gaps and opportunities in terms of infrastructure, transportation, and environment (OECD, 2019). Significant efforts are required to comprehend the socio-economic dynamics, such as employment opportunities, community development, etc. (Duranton and Puga, 2015). Evidence-based research is required to understand the above-mentioned points that bring out the stakeholders' perspective that will help policymakers and urban planners (UN-Habitat, 2022). Therefore, it becomes very important to study the socioeconomic, environmental, and infrastructure interactions with humans; and the Baner-Balewadi suburban area of Pune was selected for this study to produce the evidence-based research for the mentioned criteria.

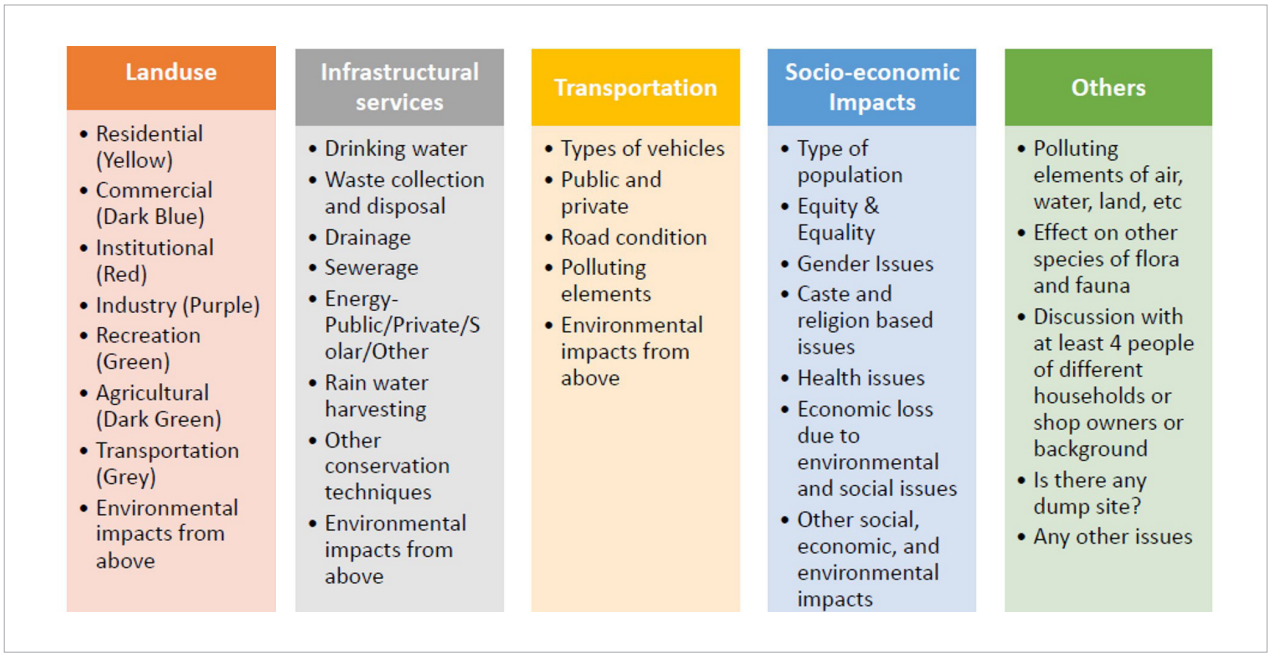
The study analyses the human-environmental interaction in the suburban area of Pune city. This study aims to comprehensively assess the transformation and current status of the Baner-Balewadi area in Pune City, which has evolved from a rural setting to a bustling residential suburb and is now transitioning into a commercial and educational hub. Specifically, the study seeks to examine various aspects such as infrastructural services, transportation, socio-economic factors, environment, and land use to understand the strengths, challenges, and opportunities in the area.

Methods

This area is investigated using a survey, and the questionnaire is broadly classified into land-use, infrastructure, transportation, socio-economic, and environmental sectors. It was essential for the study to have an adequate representation of the diverse population to understand the demographic. Stratified random sampling was used for conducting the survey. The strata for surveying were classified based on occupation, gender, residential status, users, employees in IT, and students in educational institutes. The data for 15 parameters were gathered, a total of 38 survey samples were collected, and land use was mapped to understand the grassroots reality. The 15 parameters are, namely, land use, drinking water facility and quality, waste collection and disposal, drainage, sewerage, energy, harvesting techniques, types of vehicles, public and private transport, road condition, polluting elements for air, water, and land, type of population, gender issues, health issues, and other environmental and social issues (caste, religion, class, equity, equality), as shown in *Fig. 1*. The data were collected using a Likert scale, and land-use mapping was done. Thereafter, the parameters were analysed using a descriptive statistical technique, and spider mapping technique was used for data presentation.

The spider mapping of the parameters is done for ease of understanding and comparison of the facilities. A spider map is a tool used for comparison to identify the gaps and areas needing attention. It is a collaborative tool to help decision-makers identify potential areas to work on and possible trade-offs. Three points making the spider map most valuable are the following: (i) to select the right axes, (ii) to provide substantial quantitative data, and (iii) to identify the valuable interactions. It is usually used in the field of marketing to analyse cost and departmental collaborations and trade-offs. However, here it was used to study development parameters for understanding the gaps and exploring the stakeholders' perspective of the suburban area of Pune. It is a graphic organiser that helps organise information logically, makes it easier to understand, and finds gaps and quick solutions. It not only helps identify the lacunae but also helps establish the relationships and interactions that will help recognise that area to be focused upon. Similarly, it can be used for studying other areas and comparing the quality of infrastructure facilities and services to check the area's livability, sustainability, and replicability. The scope, gaps, and challenges pertaining to each sector were identified using spider maps, and recommendations were made for the betterment and possible implementation. The findings and recommendations of the study are area specific. If

Fig. 1. *Observational variables for the study*



implemented, this will also lead to a more successful and holistic implementation of the smart city mission.

Site selection: Baner-Balewadi, Pune

The Baner-Balewadi region has evolved from its rural roots into a bustling residential suburb, and it is currently undergoing a transformation into a vibrant commercial and educational centre within Pune city. This area is now a part of Pune Municipal Corporation (PMC) and is occupied by various schools, universities, and IT companies; the location is presented in *Fig. 2*. The history of Baner Balewadi Road can be traced back to the early 20th century when it was a small village road connecting the neighbouring villages of Baner and Balewadi. At that time, the road was mainly used by farmers and traders to transport their goods to and from the nearby markets. In the 1990s, with the growth of the IT industry in Pune, many software companies started setting up their offices in the Baner and Balewadi areas. This led to an increase in the population of the area, which in turn led to the development of infrastructure such as roads, colleges, schools, hospitals, and shopping centres. The Pune District has a total area of 15 643 km^2, which is categorised into urban area (816 km^2) and rural area (14 827 km^2) (India Growing, 2023). The population of the Pune district in the year 2011 was 9 429 408 (Census of India, 2011) and increased to the estimated population of 10 466 643 in the year 2023 (India Growing, 2023). The population of Pune Municipal Corporation (PMC) in the year 2011 was 3 124 458 and is estimated to be increased to 4 061 000 (Census of India, 2011). As per the Census 2011, the population of Baner-Balewadi is 31 972 with 8142 households (Census of India, 2011), estimated to increase to approximately 120 000 (Geo IQ, 2023). The population comparison can be seen in *Fig. 3*, while *Fig. 4* suggests decadal growth rates of Pune District (11%), PMC (30%), and Baner-Balewadi area (275%).

Fig. 2. *Location of the study area: Baner-Balewadi*

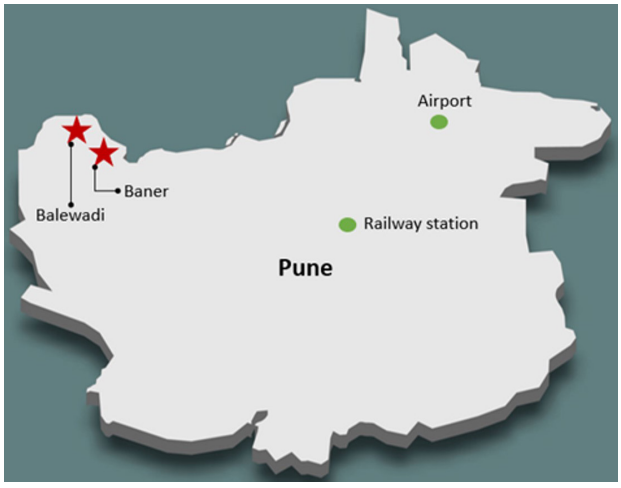


Fig. 3. *Population of Pune district, PMC, and Baner-Balewadi area*

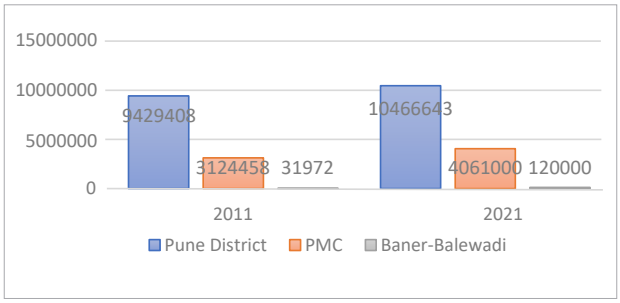
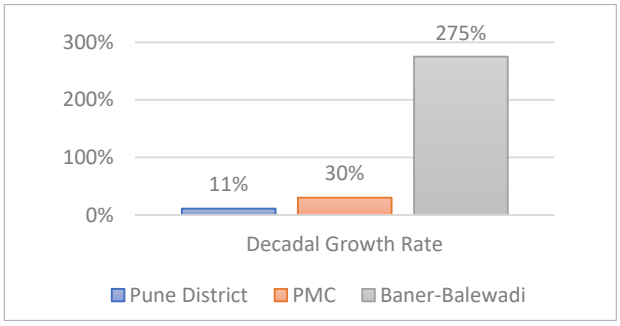


Fig. 4. *Population decadal growth rate*



Site selection criteria

The area has shown tremendous population and infrastructural growth in the previous decade. According to the Pune Smart City Report, the result of the citizen engagement exercise suggests that there is a high probability of selection of the Aundh-Baner-Balewadi (ABB) area because people want to live in this area, as presented in *Fig. 5* (Smart City Mission, 2015). The marked high parameters were replicability and ease of implementation of the Smart City project. A huge shift and migration are happening into the suburban areas leading to infrastructural development, and as a result of this, there is a massive investment in real estate, industries, and the commercial sector. This study establishes the human-environment relationship and studies the interactions as to how human activities impact the environment and vice-versa. This is one of the fastest-growing suburban areas of Pune and, therefore, was selected for this study.

Fig. 5. *Selection of Aundh-Baner-Balewadi area for smart city through citizen engagement*

Area important for identity of Pune		Area you would like to live in		Area you would like to invest		Favourite destination for youth of Pune		Which area will benefit a larger cross section of society		Recreational hub for Pune	
Area Name	%	Area Name	%	Area Name	%	Area Name	%	Area Name	%	Area Name	%
CC	26%	ABB	17%	ABB	17%	EZ	21%	CC	15%	ABB	16%
ABB	20%	CC	15%	CC	14%	ABB	15%	ABB	12%	CC	13%
KN	10%	KN	13%	KH	13%	CC	11%	RB	10%	RB	12%
EZ	9%	EZ	8%	HM	10%	KH	8%	DH	10%	SR	10%
KH	7%	KH	8%	DH	8%	SR	7%	HM	9%	EZ	8%

Source: (Smart City Mission, 2015)

Data collection

A cross-sectional survey was conducted in this area covering three major regions, namely NICMAR University, Baner-Balewadi Road, and Balewadi Highstreet, along with five traffic junctions, as shown in *Fig. 6*. This study was conducted to understand the growth pattern, human-environment interactions, and grassroots reality in the suburb of Pune city.

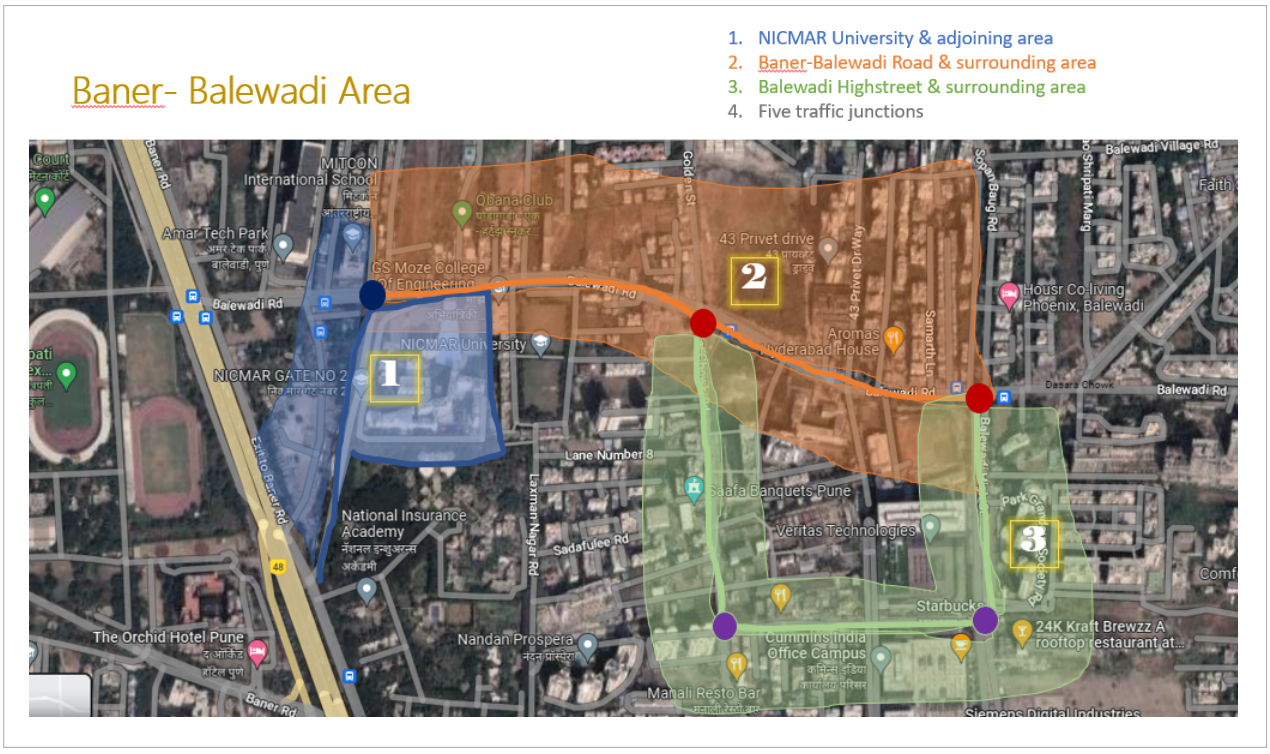
Area 1: NICMAR University

NICMAR (National Institute of Construction Management and Research) University is a premier educational institution in India. It was established in 1982 to promote excellence in construction management. The university offers various postgraduate programmes in construction management, project management, real estate management, and allied sectors. NICMAR has campuses in Pune and Hyderabad.

Area 2: Baner-Balewadi Road

Over the years, Baner-Balewadi Road has become a major commercial, institutional, and residential hub, with many high-rise buildings, malls, and multiplexes coming up along the road. The road has also become a vital transportation link, connecting the suburbs of

Fig. 6. *Site: Baner-Balewadi area*



Pune to the city centre. Today, Baner-Balewadi Road is a bustling area with a mix of commercial and residential properties. It is home to many IT companies, educational institutions, hospitals, and shopping centres, making it a sought-after location for both businesses and residents alike.

Area 3: Balewadi Highstreet

Balewadi Highstreet is a collaborative development of the Panchshil business park. It is owned by the Tremont group. Highstreet is one of the perfect examples of modern and collaborative workspaces. It has a modern contemporary design, well-designed recreational spaces to easily home another residential or commercial project. The entire street has a well-designed space for pedestrians' footpaths that they can walk easily. Balewadi Highstreet is a hub for multiple cafes, bars, and restaurants, due to which it has become one of Pune's entertainment and food hubs. In addition to all of this, it is also strategically located in the west of Pune such that it is connected feasibly to the Hinjewadi IT Park, the old Balewadi area where many residential projects are present, many schools and colleges are also near the Highstreet such as the NICMAR college, MIS, etc. from which students generally come to relax from their daily college schedule.

Results

There are fifteen parameters that were studied and surveyed to establish the human environment interaction in suburban areas. It is very important to understand the land use pattern, interaction between various parameters, and transportation system of the selected sites. The land use pattern defines the type of activities happening in the area and their interdependencies, while the other parameters explain the quality and availability of services in this area. The areas for improvement have been identified using the following information, and recommendations are made accordingly.

Land use mapping

The first parameter was land use, and the mapping was done; the land use map of all three areas can be seen in the figures below: (i) NICMAR University (*Fig. 7*), (ii) Baner-Balewadi Road (*Fig. 8*), and (iii) Balewadi Highstreet (*Fig. 9*). The present land use comprises institutional (red), residential (yellow), commercial (blue), under-construction (purple), recreational/ vacant (green), roads (grey), and major traffic junctions (brown circle).

Fig. 7. *Land use map of NICMAR University*

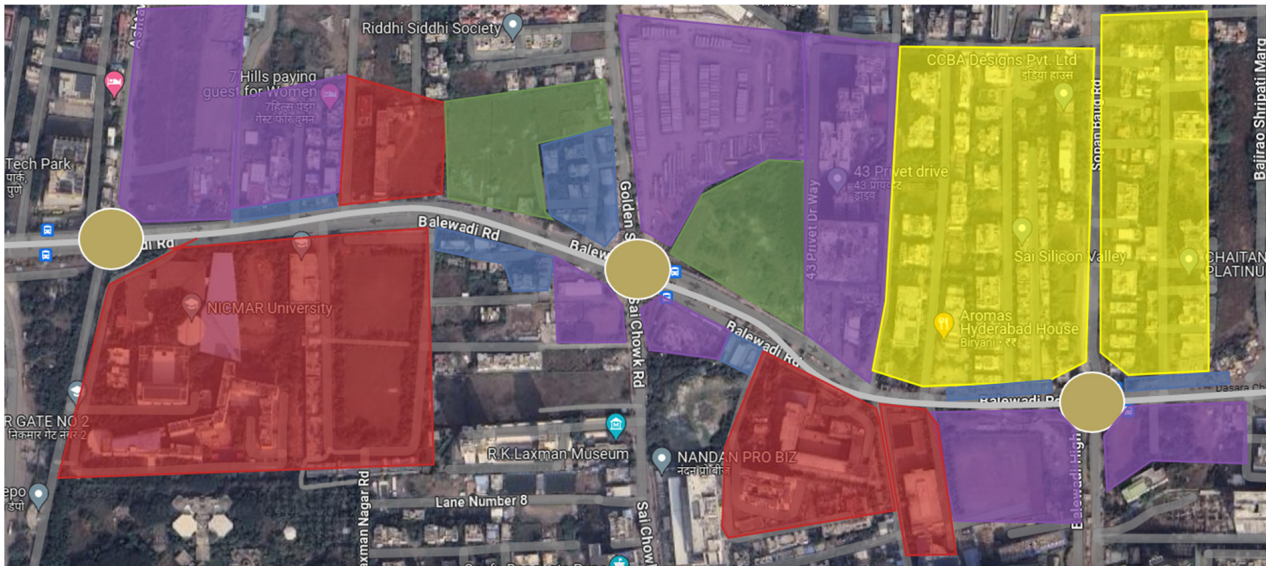
a NICMAR University land use

The NICMAR University has a well-planned land use which is a mix of residential hostels, institutional buildings, and recreational areas, as seen in *Fig. 7*. The area in front of NICMAR University is primarily commercial and caters as an eatery and recreational place for the students of all the universities in the Baner-Balewadi area.

b Baner-Balewadi Road land use

The land use around Baner-Balewadi Road is primarily institutional, residential, and commercial areas, as shown in *Fig. 8.* Interestingly, there are many big upcoming projects, mostly commercial and residential. Many multinational firms and offices are opening in large commercial complexes, which also pulls the workers of these offices to reside in this area. The demand for residential spaces in this area is rising because of the offices and universities, which in turn increases the rent of this area. The commercial area on this road is mostly small shops catering to the population's basic necessities. Most essentials are available within walking distance, like medical stores, eateries, grocery stores, utensil shops, small clinics,

Fig. 8. *Land use map of Baner-Balewadi Road*



laundry shops, bike repair shops, and more. This area lacks public toilets, bus stops, continuous footpaths, and well-designed traffic junctions. This causes lots of chaos on the roads, along with metro construction. This area has a vast potential for proper urban design, walkability, and road safety.

c Balewadi Highstreet land use

The Balewadi Highstreet area is primarily commercial and comprises offices, cafes, eateries, restaurants, commercial complexes, shopping complexes, and more, as shown in *Fig. 9*. This area caters as a recreational hub for students, employees of offices, and other Pune residents. This area has continuous footpaths, sufficient parking space, proper right of way, and broad roads that bestow a welcoming character. There is a metro construction at Balewadi Highstreet 1, which causes traffic issues, and particulate matter (dust problems), destroying the urban design vista of this place. Along with the metro, various other big commercial projects are upcoming in this area. The construction of such projects shows that it is a developing area which causes the price surge of the properties and land in this area. It also has a playing ground and residential projects, and residents often complain about loud noises from the clubs and bars. This is one of the most expensive areas to live in the Pune district in terms of rent as well as buying a property.

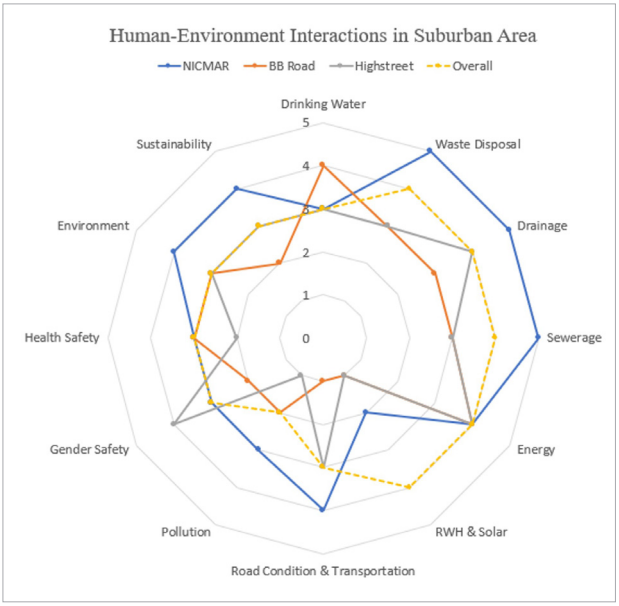
Fig. 9. *Land use map of Balewadi Highstreet*

Spider mapping of parameters

The data for given parameters were collected to understand the relationship and interaction between humans and the environment. It shows how human activities impact the environment and, in turn, how the changing environment impacts the population of the suburban areas. Spider mapping was done for twelve parameters, namely, drinking water facility and quality, waste collection and disposal, drainage, sewerage, energy, harvesting techniques (water and solar), road condition, polluting elements for air, water, and land, gender issues, health issues, environment (greenery, surrounding, social issues like caste, religion, class,

equity, equality), and sustainability (livability and sustainability), as shown in *Fig. 10*.

Fig. 10. *Spider mapping of human-environment interactions in the suburban area of Pune*



The survey schedule had closed-ended questions, and data were collected using the Likert scale. The values were from 1 to 5, depicting the quality of variables from very poor to very good, respectively. Overall, the Baner-Balewadi area falls in the average category in terms of services and infrastructure, except for pollution and harvesting techniques. There is almost next to no one in the area using rainwater harvesting or solar energy. Due to various construction activities (metro, real estate, and commercial projects) and private vehicle use, the area faces air, land, and water pollution. Comparatively, among the chosen regions of Baner-Balewadi, NICMAR University is performing the best, while the area adjacent to Baner-Balewadi Road ranks low in the parameters. *Table 1* presents each region's strengths and opportunities (potential parameters that need attention).

Table 1. *Strengths and opportunities in the Baner-Balewadi area*

S. No.	Area	Strength	Opportunities
1	*NICMAR University*	Waste disposal, drainage, sewerage, energy, and road conditions	Drinking water quality, rainwater harvesting, solar energy, gender safety, and health safety
2	*Baner-Balewadi Road*	Drinking water and energy	Gender Safety, Road conditions, traffic junctions, rainwater harvesting, solar energy, and environment
3	*Balewadi Highstreet*	Gender safety, road conditions and footpaths, drainage, and energy	Pollution, rainwater harvesting, solar energy, and health safety

Roads and intersections

Balewadi Road is a 4-lane collector road connecting the Mumbai- Pune bypass to Baner-Balewadi Road. The vehicle count was done at five junctions, as marked in *Figs. 7*, *8*, and *9*. The vehicle count for peak hours is given below in *Fig. 11*. The types of vehicles used are presented in *Fig. 12*; mostly, 2-wheelers (49%) and 4-wheelers (35%) are used in the Baner-Balewadi suburban area. The majority of people use private vehicles, and there is significantly less use of public transport. It is seen that the vehicle count in the Baner Balewadi suburban area is very high, but none of the intersections has been designed. This causes various issues like traffic congestion, jams, and chaos. The traffic intersection elements are missing, like traffic signals, conventional crosswalks, traffic signs, visibility distance, etc. During the survey, the population pointed out that minor accidents occur daily at these intersections. The metro construction is causing a lot of chaos, and when asked if people would use the metro, most people said 'no'. The other major issue is that this area does not have universal access as the pathways are not continuous. It is very difficult to cross roads for pedestrians as vehicles are haphazardly approaching from every side. The pedestrian pathways and cycle tracks are usually used for parking, most people run bikes on them, and waste collection from construction sites, households, and commercial activities happens on them. Baner-Balewadi Road is perilous for pedestrians and cyclists due to various construction activities, including the metro, lack of proper intersection design, and discontinuous and unsafe pathways.

Based on the above analysis of the fifteen parameters, the recommendations are made, which are area specific considering both stakeholders' and researcher's perspectives.

Fig. 11. *Vehicle count per hour in Baner-Balewadi area's intersections*

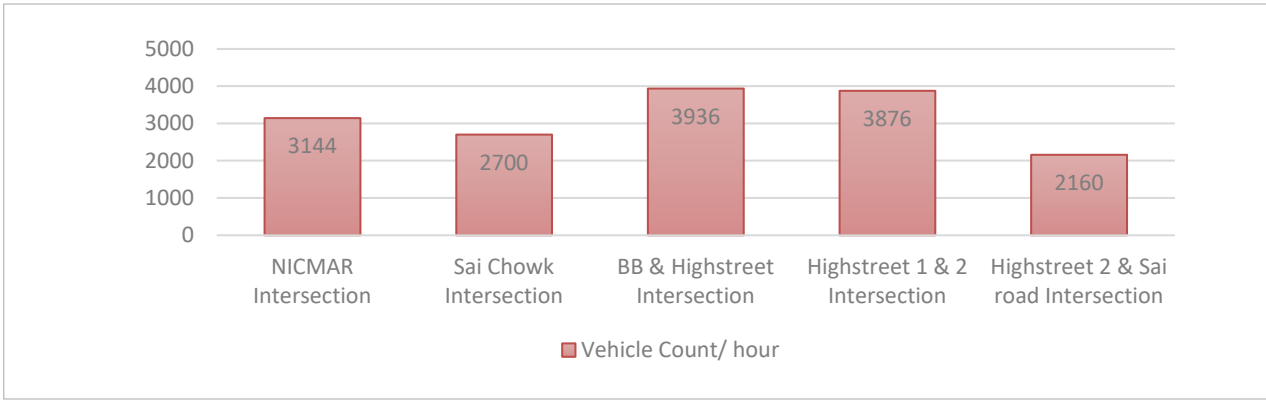
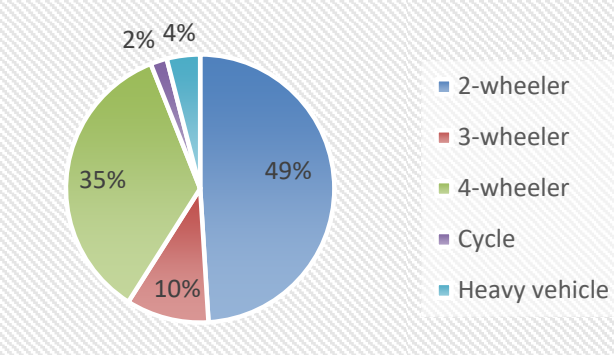


Fig. 12. *Types of vehicles used in the Baner-Balewadi suburban area*



Discussion

The major challenges for suburban areas are demographic shifts, economic dynamics, environmental sustainability, availability of infrastructure, multimodal transportation, and policy formulation. The Baner-Balewadi area is unique and compelling in terms of population growth of 275%, which is significantly higher than the Pune City growth rate. The novelty of the study is to employ the cross-sectional survey technique combined with land-use mapping, statistical analysis, and spider mapping to identify gaps. The integration of methodologies creates a unique way of understanding the area's dynamics in detail. Specifically, the study seeks to examine various aspects such as infrastructural services, transportation, socio-economic factors, environment, and land use to understand the strengths, challenges, and opportunities in the area. The recommendations are given based on the data analysis and areas that need more attention. The suggestions are derived from a survey of the stakeholders and experts' discussion. The best possible solution is recommended after examining various case studies and user experience. *Table 2* presents area-wise parametric recommendations.

Policies must be in place for the development happening in suburban areas like institutions, industries, transport corridors, commercial complexes, etc., especially concerning the environmental impact.

Conclusions

The study and investigation done in the upcoming suburban areas of India are rare and speculative but growing. This study gives an insight into the grassroots reality and proposes the recommendations from both researchers' and stakeholders' perspectives. The findings and recommendations of the study are area specific. The results show that the waste collection is strong, but the area has drinking water issues. The recent development is causing stress on the infrastructural services and unregulated land use change leading to environmental degradation. The metro construction is causing a lot of noise and air pollution, and people will still prefer buses as a transportation medium in the future because of good connectivity. The area has a vast scope for new development and growth due to its location and connectivity. The current development is unsustainable and haphazard. The resource utilisation should match the demand and supply, but it should not comprise the sustainability of the area. The study is concluded with recommendations made after examining the advancement, challenges, and gaps identified

Table 2. *Area-wise parametric recommendations*

S. No.	Parameter	Universities	Baner-Balewadi Road	Balewadi Highstreet
7	Health Safety	To improve health safety, it is essential to monitor water and food quality on campus, especially in hostels.	Parks and green spaces are recommended for the social and physical well-being of the residents of this area.	N.A.
8	Gender Safety	The areas must be well lit and awareness programmes to be promoted which are inclusive of all genders. It can also be done by participating in games, social services, writing articles, forming groups, and workshops.	Proper designing and lighting of walkways, intersections, and public spaces is required.	N.A.
9	Parking Issues	There is a parking issue in universities. To resolve this, the students should be allowed only to keep bicycles as most of the necessary facilities are available within a 2-3 km distance.	Dedicated parking spaces are provided for vehicles, so they do not have to park on footpaths.	Provision of proper parking places at the ends of the Highstreet, where people can park and then walk inside the Highstreet. Only non-motorised vehicles like cycles, etc., should be allowed to enter the area.
10	Construction Activities and waste	The universities in the Baner-Balewadi area should take care of their construction waste and see that it is not creating issues in the surrounding environment. They should be energy conscious and take care of their impact on the environment.	Metro construction must be sped up to avoid traffic issues and pollution. All the construction activities in the Balewadi area and nearby should have safety protocols, have a fixed timeline, take care of the disposal of construction debris, and properly enclose the site to avoidpollution.	Metro construction must be sped up to avoid traffic issues and pollution. All the construction activities in the Balewadi Highstreet area and nearby should have safety protocols, have a fixed timeline, take care of the disposal of construction debris, and properly enclose the site to avoid pollution.
11	Awareness	Everyone should be part of this initiative, including students, faculties, staff, and administration. Universities have the resources and should use them to conduct the seminar and initiate programmes in their surrounding areas for cleanliness, recycling, use of renewable energy, using non- motorised vehicles, proper waste disposal	This area has many schools along the road, and most people who drop off or pick up their children, park their cars on the road or walkway. It causes a lot of issues and discomfort for the pedestrian (they have to walk on the road) as well as for the traffic and causes traffic congestion. Schools should designate proper parking spaces and drop-off/pick-up points.	N.A.
12	Urban Design	N.A.	Major work needs to be done on the intersections in terms of design, traffic signals, crosswalks, pedestrian safety islands, signs, visibility designs, roundabouts, street lights, and other elements. It will lead to safety for all and make it less accident-prone.	The vista and right of way Balewadi Highstreet need to be re-designed to give the feel of being a welcoming and relaxing place where people can come after office and college hours to calm themselves. The Balewadi Highstreet should be made pedestrian-friendly as most people like to walk and browse through the cafes to gain experiences with different kinds of food and ambience.
13	Drainage	N.A.	More advanced drainage system to avoid collecting dirty water in the path beside the road, which becomes a mosquito breeding place in the rainy season and also to avoid foul smell.	Advanced drainage system to be required
14	Landuse	N.A.	This area can be proposed as an institutional area due to the availability of so many schools and universities, but safety on the street is imperative, so it is important to have mixed landuse with all the facilities available within walking distance. In such areas, students would receive subsidised rates for daily necessities. This would help boost the economy of this area. It would also contribute to acknowledging the critical role of the City's institutions and their contribution to community-based initiatives.	The maintenance fees of the Highstreet area should be collected from nearby offices to make the areas self-sustainable. If successful, the model can be replicated to make Pune a smart and resilient city.

at the grassroots. The study examines various social parameters like gender safety, health issues, and social issues like discrimination based on caste, religion, class, income, etc. The findings from the study present an understanding of the social fabric in the suburban areas, while the recommendations and suggestions from stakeholders look up to a more equitable society. The paper can be submitted to the municipality and local leaders who can help in the implementation of these suggestions to have sustainable, equitable, and inclusive development.

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References

Angel S, Stephen S.C, Daniel C.L. (2005) The Dynamics of Global Urban Expansion. Transportation Research Record 10-18.

Census of India (2011) Pune District Population, Maharashtra - Census India 2011. Retrieved from Census India. Available at: https://www.censusindia2011.com/maharashtra/pune-population.html#:~:text=Pune%20District%20Population%2C%20Maharashtra%20%2D%20Census,males%20and%204505303%20are%20females.

Champion T. (2001) Urbanization,Suburbanization, Counter-urbanization and Reurbanization. In R. Padison, Handbook of Urban Studies 143-161. London: Sage Publication. https://doi.org/10.4135/9781848608375.n9

Duranton G., Puga D. (2015) Urban Land Use. Handbook of Regional and Urban Economics 4:467-560. https://doi.org/10.1016/B978-0-444-59517-1.00008-8

Florida R. (2022) The Rise of the Global Suburb. Harvard Business Review.

Frey W. H. (2021). The New Urban and Suburban Demographics. Brookings Institution.

Geo IQ. (2023, May 29). Baner and Balewadi. Available at: https://geoiq.io/places/Baner/NuTD3rA5GJ.

Gogoi K. (2022) Suburban Development in India: An emerging area of concern. International Journal of Multidisciplinary Educational Research 11(8(5)): 51-56.

Hall P., Hay D. (1980) Growth Centres in the European Urban System. London: Heinemann.

India Growing (2023) Pune District Population. https://www.indiagrowing.com/Maharashtra/Pune_District#:~:text=Rural%20and%20Urban-,The%20district%20has%20an%20total%20area%20of%2015%2C643%20sq%20km,3%2C678%2C226%20are%20in%20rural%20area

Kahn M. E. (2020) Green Cities: Urban Growth and the Environment. Brookings Institution Press.

Litman T. (2024) Introduction to Multi-Modal Transportation Planning. Victoria Transport Policy Institute. Available at: chrome-extension://efaidnbmnnnibpcajpcglclefindmkaj/https://vtpi.org/multimodal_planning.pdf

Mansour H. M., Alves F. B., Costa A. R. (2023).The Challenges in Understanding Urban Identity. U. Porto Journal of Engineering 9(2):114-131. https://doi.org/10.24840/2183-6493_009-002_002207

NAAHQ (National Apartment Association) (2017) Cities And Suburbs And The Gray Areas In Between. Available at: https://www.naahq.org/cities-and-suburbs-and-gray-areas-between (accessed 16 August 2023)

OECD (The Organization for Economic Cooperation and Development) (2019).Urban Infrastructure. OECD Regional Development Working Papers, no. 03.

Seto K. C. (2011) A Meta-Analysis of Global Urban Land Expansion. PLOS ONE 6,(8): e23777. https://doi.org/10.1371/journal.pone.0023777

Shryock H. (1957) The natural history of standard metropolitan Areas. American Journal of Sociology 63(2):63-170. https://doi.org/10.1086/222173

Smart City Mission (2015) Reimagining Pune: Mission Smart City. Pune: Pune Smart City Development Authority.

Stanilov K., and Scheer B. C. (2004) Suburban Form: An International perspective. New York: Routledge. https://doi.org/10.4324/9780203561263

The World Bank (2023, June 16) Urban Development. Available at: https://www.worldbank.org/en/topic/urbandevelopment/overview#:~:text=Today%2C%20some%2056%25%20of%20the,people%20will%20live%20in%20cities.

UN-Habitat (2022) State of the World's Cities Report. Nairobi: UN-Habitat.

UNPF (United Nations Population Fund) (2023) State of World Population: Infinite Possibilities. New York: UN.

Vishwanath T. (2013) Urbanisation beyond Municipal Boundaries: Nurturing Metropolitan Economies and connecting peri-urban areas in India. Washington DC: The World Bank.