



# UNVEILING URBAN DEVELOPMENT DEPRIVATION: A WARD-LEVEL STUDY IN MUNICIPAL CORPORATIONS OF UTTAR PRADESH, INDIA

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## Abstract

*This paper examines and compares the deprivation of development across the Municipal Corporations of Uttar Pradesh, India. We attempted to consider an area-based approach to explore the socio-spatial differences in quality of life. The principal components analysis is used to develop a composite index for 1063 wards from 13 Municipal Corporations based on 2011 census data. This index is constructed based on 22 selected variables and categorised into three domains, i.e., the House Quality Index, the Basic Amenities Index, and the Physical Assets Index. The study used descriptive statistics and ANOVA analyses to understand Municipal Corporations' development trajectories. The result shows that the variation in development is highest in Saharanpur Municipal Corporation (Mean -0.40; SD = 2.09) and lowest in the wards of Agra Municipal Corporation (Mean = 0.14; SD = 1.03), and the ANOVA analysis reflects that there is a significant difference in the House Quality Index, the Basic Amenities Index, and Physical Assets Index across the Municipal Corporations. The study suggests that providing essential amenities and services to deprived wards can improve living and working conditions, ultimately leading to an enhanced standard of living for inhabitants.*

**Key Words:** Urban development, development deprivation, multivariate analysis, Municipal Corporation, Ward, Uttar Pradesh

## Introduction

Urban development deprivation can significantly impact the social and material outcomes of city dwellers. This is because socially valued resources are not evenly distributed across urban areas (Bhan & Jana, 2015). Development deprivation does not affect society as a whole uniformly; instead, it shows a specific concentration within particular segments of the population. The term "deprivation" refers to a state where individuals or groups experience a standard of living that falls below that of the majority within a given society, resulting in hardships and limited access to necessary resources (Herbert, 1975). In the discourse surrounding spatial inequalities and urban deprivations, concepts with some degree of overlap, including quality of life, living quality, and liveability, are frequently used synonymously (Lelo et al., 2019).

Urban deprivation is not easily empirically distinguishable within an urban setting. It can be detected by the census and census type data variable, which can provide information on geographical clusters of intra-urban development deprivation (Kirby, 1981). Scholars explore such data across geographical scales to analyse the distributional patterns of resources and answer the questions of "who gets what, where, and how" (Smith, 1979) as people's life prospects are influenced by their area of residence, which includes their access to clean drinking water, energy, healthcare, excellent education, decent jobs, and other goals included in the 2030 Agenda for Sustainable Development.

According to the insights gained from economic agglomeration effects, researchers have concluded that households in larger cities enjoy higher economic prosperity than those in smaller towns and rural areas (Mills & Mitra, 1997). However, it is essential to note that significant levels of material deprivation continue to exist, and it is evident when the living conditions at the ward level are examined. Numerous studies have consistently indicated that concerning household inequality, urban populations show more significant heterogeneity in terms of income, expenditure patterns, housing, and access to services, both within and across different regions. In their focus on Bangalore city in India, Balakrishnan and Anand (2015) discovered that peripheral wards display enhanced heterogeneity in multiple attributes compared to central regions, marked by a more significant proportion of scheduled caste population and lower levels of assets, housing quality, and female literacy. In his study, Kumar (2015) concluded a substantial annual decline rate in deprivation, prominently for electricity, followed by toilet facilities, drinking water, and drainage arrangements in urban India; however, an observed increase in disparity of access to basic amenities emerges between poor and non-poor households. Haque et al. (2020) observed that housing amenities and assets had diverse geographical dimensions, indicating a considerable variance in developmental factors.

Pacione (2003) argues that identifying the multiple deprivations makes identifying the quality of life in any area possible. Townsend (1993) defines deprivation as different from poverty as it encompasses physical, environmental, and social conditions rather than solely focusing on resources. He manifested two forms of deprivation: material and social. Material deprivation denotes the absence of commodities and amenities intrinsic to the contemporary quality of life. In contrast, social deprivation signifies the precariousness of interpersonal connections extending from the familial realm to broader communal networks.

The objective of this research paper is to investigate the many aspects of material deprivation at the ward level in all Uttar Pradesh Municipal Corporations, with an emphasis on housing quality, access to basic services, and asset ownership. It seeks to reveal and explain existing patterns of deprivation inside and across Uttar Pradesh's Municipal Corporations. This holds considerable importance as an insightful examination of these deprivation areas will lead to a comprehensive understanding, enabling the formulation of inclusive development strategies and targeted plans.

## Materials and Methods

### *Data Sources*

For this study, we used data from India's 2011 Census as the source for valuable information on specific key indicators disaggregated at the ward level. We gathered this comprehensive data from the Primary Census Abstract and the Household Amenities and Assets datasets. These datasets, in addition to basic demography, contain an array of key metrics such as the percentage of habitable households, deteriorated households, households without rooms, rented accommodations, water and lighting sources, cooking fuel types, toilet facilities, the prevalence of open defecation, and the lack of waste-water drainage system (Census, 2011). Additionally, the dataset provides ownership statistics for nine assets in each household, specifically computers, computers with internet, cars/Jeeps, bicycles, motorcycles, telephones, mobile phones, televisions, and radios. In this study, we focused on wards within Municipal Corporations as a core unit of analysis. We identified and examined 1065 wards from all Municipal Corporations in Uttar Pradesh.

### *Study variables*

We conducted a comprehensive analysis of 22 variables to assess the extent of development deprivation within and across the wards of Municipal Corporations. We categorised these variables into three domains: House Quality Index, Basic Amenities Index, and Physical Asset Index. The House Quality Index is used to estimate the relative level of housing access, considering specific characteristics. The Basic Amenities Index is created to assess the extent of access to essential household amenities. At the same time, the Physical Asset Index is used to approximate the relative purchasing power of households. All the selected domains are explained in Table 1.

### *Study area*

Indian Constitution, Article 243Q, provides an inclusive classification of urban local bodies, differentiating them into three specific types: Nagar Panchayats, responsible for coordinating the development and governance of areas transitioning from rural to urban; Municipal Councils, liable for the administration of relatively smaller urban areas; and Municipal Corporations which are responsible for the management of larger urban areas (Mohanty et al., 2007). According to the research done by the Praja organisation's Urban Governance Index 2020 report, Uttar Pradesh lags in the execution of tasks given to the Municipal Corporations.

As per the 2011 Census, the state of Uttar Pradesh is the most populous, accounting for 16.5 per cent of India's total population. The 2011 Census data reveals that the urban population in Uttar Pradesh accounted for 22.28 per cent of the total population, representing a significant increase from the 20.7 per cent recorded in 2001. As per the 2011 Census in India, Uttar Pradesh has the most extensive urban system in India, with 904 urban centres. These include 13 Municipal Corporations (Figure 1), 13 Cantonment boards, 193 Municipal Councils, 423 Nagar Panchayats, and 262 Census Towns. However,

Its level of urbanisation lags behind that of other states. The Municipal Corporation comprises 38 per cent of the total urban population in Uttar Pradesh. Among the 13 Municipal Corporations in Uttar Pradesh, seven are found in the western region, two in the central region, three in the eastern region, and only one in the Bundelkhand region. Seven Municipal Corporations, namely, Agra, Ghaziabad, Kanpur, Lucknow, Meerut, Prayagraj, and Varanasi, have a population exceeding one million. Additionally, ten Municipal Corporations (Agra, Aligarh, Prayagraj, Bareilly, Jhansi, Kanpur, Lucknow, Moradabad, Saharanpur, and Varanasi) are part of the government’s ambitious smart city mission program. The fundamental aim of this mission is to enhance the quality of life in urban areas by implementing sustainable and innovative solutions, known as “Smart” initiatives.

**Figure 1 Location Map of Municipal Corporations of Uttar Pradesh, India**

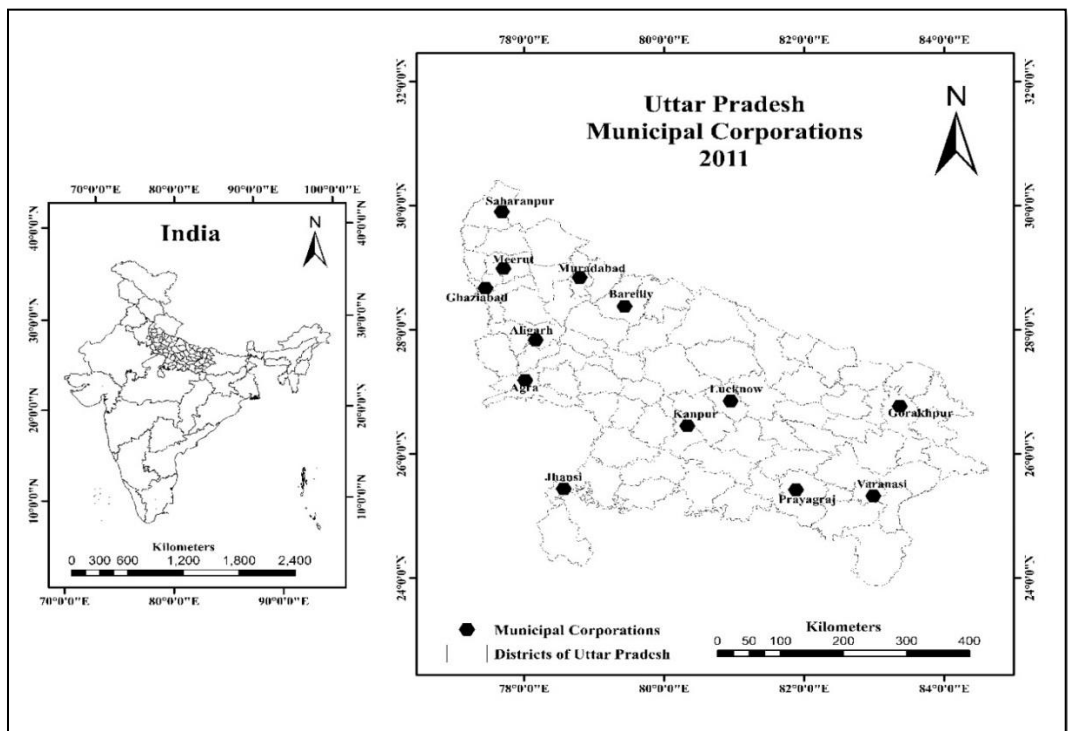


Table 2 presents the demographic profiles of the Municipal Corporations. Among Municipal Corporations, Lucknow stands out for having the largest population, whereas Aligarh demonstrates the highest population density, with around 21.6 thousand persons residing per square kilometre. Conversely, within the Prayagraj Municipal Corporation, there was a notable distortion in the sex ratio, with 852 females per 1000 males, indicating that the city accommodates a comparatively large number of male migrants.

Among the cities under consideration, Ghaziabad, part of the National Capital Region, shows the highest percentage share of inter-census migrants in its total population. This percentage is twice as high as the second highest observed in Lucknow, indicating that these cities serve as intermediate destinations for migrants.

**Table 1 Selection of major domains and indicators**

Domains	Variable ID	Name of the Variable	Variables Explanation	#Component Score Coefficient
House Quality Index	GCH	Good Condition of Census House	% of HHs having good condition	0.062
	PH	Permanent House	% of HHs living in a permanent house	0.801
	OH	Own House	% of HHs living in their own house	-0.438
	DR	Dwelling Room	% of HHs have at least two dwelling room	0.642
	RM	Roof Material	% of House having material with burnt bricks or cemented	0.335
	WM	Wall Material	% of House having wall material with burnt brick or cemented block	0.81
	FM	Floor Material	% of House having floor material with cemented	0.982
	GCCHOU	Good Condition of Census House cum other use	% of HHs having a good condition of residence cum other use	0.138
Basic Amenities Index	HK	Having Kitchen	% of HHs have a kitchen	0.407
	DWF	Drinking water facility	% of HHs have drinking facilities within the premises	0.294
	ISW	Improved source of water	% of HHs having improved sources of water	0.293
	EC	Electricity	% of HHs have electricity	0.362
	LF	Latrine	% of HHs having latrines within premises	0.353
	BF	Bathroom	% of HHs have a bathroom facility	0.423
	CDS	Close Drainage System	% of close drainage system	0.274
	CF	Clean source of fuel	% of HHs having LPG/PNG facility	0.39
Physical Assets Index	BS	Banking Service	% of HHs using banking service	0.395
	TV	Television	% of HHs have television	0.372
	TM	Telephone/Mobile	% of HHs have telephone or mobile	0.412
	CL	Computer/Laptop	% of HHs have a computer or laptop	0.419
	MC	Motorcycle	% of HHs have a motorcycle	0.422
	CJV	Car/Jeep/Van	% of HHs have a car/jeep/van	0.427

Source: Computed from Census of India 2011 data

#The component score coefficient has been derived from principal component analysis (PCA).

Agra Municipal Corporation has the highest percentage share of the scheduled caste population. In contrast, Varanasi Municipal Corporation, traditionally regarded as a site for inclusion and exclusion (Choudhary et al., 2020), possesses the lowest percentage share of the scheduled caste population. However, the share of the slum population in Meerut Municipal Corporation was the highest, implying a concentrated manifestation of urban poverty within the city (Bhan & Jana, 2015). The overall literacy rate in Municipal Corporations was higher than the average in Uttar Pradesh, indicating that these cities have a comparatively better-educated workforce than their counterparts.

**Table 2 Demographics setting of the Municipal Corporations**

Municipal Corporation	Population	Population Growth Rate (2001-20011)	Area (sq. km.)	Population Density (Census, 2011)	Sex Ratio	Literacy Rate	Schedule Caste Population (%)	Percentage of Inter-Census (2001-2011) Migrants to Total Population	Percentage of Slum Population to Total Population
Agra	1585704 (4)*	24.35 (7)*	120.57 (7)*	13151 (5)*	874 (11)*	73.10 (10)*	23.36 (1)*	6.90 (13)*	33.64 (2)*
Aligarh	874408 (10)	30.68 (4)	40.43 (13)	21628 (1)	893 (8)	68.51(12)	15.80 (4)	11.53 (4)	29.60 (3)
Bareilly	904797 (8)	25.61 (6)	106.43 (8)	8501 (9)	894 (7)	68.27(13)	7.87 (12)	7.21 (12)	15.92 (7)
Ghaziabad	1648643 (3)	70.26 (1)	220 (3)	7494 (11)	885 (10)	84.78(1)	13.67 (6)	29.96 (1)	20.25 (5)
Gorakhpur	673446 (12)	8.14 (13)	141.016 (6)	4775 (12)	902 (4)	83.91(3)	9.31 (11)	8.25 (9)	7.31 (13)
Jhansi	505693 (13)	18.65 (9)	150 (4)	3371 (13)	905 (3)	83.02(4)	21.81 (2)	8.09 (10)	19.67 (6)
Kanpur	2768057 (2)	8.30 (12)	266.74 (2)	10377 (7)	857 (12)	82.42(6)	12.33 (8)	8.26 (8)	15.35 (8)
Lucknow	2817105 (1)	28.87 (5)	348.8 (1)	8076 (10)	928 (1)	82.49(5)	10.75 (9)	15.35 (2)	12.95 (10)
Meerut	1305429 (5)	22.14 (8)	141.94 (5)	9197 (8)	897 (6)	75.65(9)	16.21 (3)	13.78 (3)	41.73 (1)
Moradabad	887871 (9)	38.38 (3)	75 (10)	11838 (6)	911 (2)	68.75(11)	10.44 (10)	7.74 (11)	13.48 (9)
Prayagraj	1168385 (7)	14.76 (10)	70.05 (11)	16679 (2)	852 (13)	84.66(2)	12.73 (7)	9.19 (6)	7.84 (12)
Saharanpur	705478 (11)	54.79 (2)	46.74 (12)	15093 (3)	897 (5)	76.32(8)	14.19 (5)	10.40 (5)	9.54 (11)
Varanasi	1198491 (6)	8.56 (11)	82.1 (9)	14597 (4)	886 (9)	79.27(7)	6.85 (13)	8.40 (7)	25.20 (4)

Source: Census of India 2011 \*Rank of the Municipal Corporation

### Methods

Descriptive statistics are applied to determine the magnitude of heterogeneity across all Municipal Corporations. Key statistical indicators such as the mean, standard deviation, minimum and maximum values, and rank are used to highlight the distinct evidence among Municipal Corporations.

We have constructed the area-based indices using the principal components approach. The data is first converted into a set of z-scores of 22 variables, achieved through the formula:  $Z = (x - \text{mean}) / \text{standard deviation}$  (Krishnan, 2010). The z-scores are free of measurement since they are ratios. The z-scores are also standardised scores since they all have zero means and one standard deviation. The Principal Component Analysis (PCA) technique is employed to diminish a substantial set of variables into a more concise and manageable dimensions. The principal components, which are derived from linear combinations of the standardised variables, are characterised by factor loadings that represent their respective weights.

In the current research, the Kaiser-Meyer-Olkin test (KMO), a measure of sample adequacy, was employed to discover multicollinearity in the data, allowing the suitability of factor analysis to be determined. KMO also compares the correlations and partial correlations of variables (Krishnan, 2010). The data's value is displayed in Table 3, indicating that principal component analysis can proceed. Another examination of the strength of the association between variables was performed using Bartlett's sphericity test. Bartlett's sphericity test evaluates the null hypothesis that the variables in the population correlation matrix are uncorrelated. The result of our analysis (Table 3) showed a

significance level of 0.00, a value that is small enough to reject the hypothesis (Krishnan, 2010). These diagnostics indicate that Principal components analysis is appropriate for data.

**Table 3 KMO and Bartlett’s test for house quality basic amenities and physical assets indices**

<b>KMO and Bartlett's Test for House Quality Index</b>		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.693
Bartlett’s Test of Sphericity	Approx. Chi-Square	1203.834
	df	28
	Sig.	0.00
<b>KMO and Bartlett's Test for Basic Amenities Index</b>		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.849
Bartlett’s Test of Sphericity	Approx. Chi-Square	6824.415
	df	28
	Sig.	0.00
<b>KMO and Bartlett's Test for Physical Assets Index</b>		
Kaiser-Meyer-Olkin Measure of Sampling Adequacy.		0.841
Bartlett’s Test of Sphericity	Approx. Chi-Square	7329.069
	df	15
	Sig.	0.00

Kaiser’s Latent Root Criteria, often known as the ‘eigenvalue larger than one’ criterion, was used to extract the number of components. This criterion is ideal for principal component analysis. Furthermore, the most often utilised rotation technique, the Varimax method, was applied. The weights assigned to each principal component are determined by the eigenvectors obtained from the correlation matrix. The value of the component score coefficient is shown in Table 1. In this manner, Principal Component P<sub>1</sub> is determined as

$$P_1 = a_1.Z_1 + a_2.Z_2 + \dots + a_n.Z_n$$

Where,

P<sub>1</sub> = The first principal component

a<sub>ji</sub> = Factor loading or weight of the first principal component vector relating to jth indicator and ith ward

Z<sub>i</sub> = z-score of the observed variable

The calculation follows separately for three indices, namely the House quality index, the Basic amenities index, and the Physical assets index, and an average of these provides the Development Deprivation Index. The result of the principal component analysis is shown in Table 4. The data for each index is categorised into three equal groups for mapping purposes based on the mean of the indices.

**Table 4 PCA analysis for house quality basic amenities and physical assets indices**

Component	Initial Eigenvalues			Extraction Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
<b>House Quality Index-total variance explained</b>						
1	1.938	24.223	24.223	1.938	24.223	24.223
2	1.524	19.045	43.268	1.524	19.045	43.268
3	1.238	15.48	58.748	1.238	15.48	58.748
4	0.963	12.038	70.786			
5	0.737	9.215	80.001			
6	0.691	8.635	88.636			
7	0.62	7.751	96.387			
8	0.289	3.613	100			
<b>Basic Amenities Index- total variance explained</b>						
1	5	62.496	62.496	5	62.496	62.496
2	0.945	11.807	74.303			
3	0.664	8.306	82.609			
4	0.518	6.471	89.08			
5	0.343	4.291	93.37			
6	0.308	3.849	97.219			
7	0.166	2.078	99.297			
8	0.056	0.703	100			
<b>Physical Assets Index-total variance explained</b>						
1	4.5	74.996	74.996	4.5	74.996	74.996
2	0.923	15.382	90.378			
3	0.231	3.858	94.236			
4	0.157	2.609	96.845			
5	0.143	2.378	99.223			
6	0.047	0.777	100			

In the present study, One-way analysis of variance (ANOVA) is applied to compare the selected indices across different wards within the Municipal Corporations of Uttar Pradesh. By analysing the variability within and between the wards, this statistical method helps to determine if there are significant variations in the indices under consideration. It allows for determining whether the observed differences are statistically significant or merely due to random variation. All the statistical analyses conducted in this study are carried out using SPSS software version 22. Additionally, for spatial mapping, ArcMap GIS software version 10.8 is used.

## Result and Discussions

### *Deprivation in House Quality Index*

Within the realm of improving the overall welfare of individuals, housing assumes a critical function as it fulfils the basic need for shelter, supports skill acquisition, facilitates social integration, and enables diverse engagement in educational and leisure activities



(Perera & Mensah, 2019). Apart from this, housing conditions greatly impact a wide range of outcomes. As housing expenses comprise a substantial segment of household budgets, individuals, particularly those with constrained incomes, encounter limitations on essential expenditures, such as healthcare, education, and nutrition (OECD, 2011). In this context, urban centres become particularly crucial, where the escalation of housing costs presents a substantial obstacle for low-income households. Moreover, Municipal Corporations function as gravitational centers, drawing a large population in pursuit of enhanced living standards.

According to the 2011 census, 62.3 per cent of households within the Municipal Corporation wards of Uttar Pradesh are categorised as residing in good-condition census houses. However, there are persisting disparities across the wards, with the lowest percentage of 13.2 per cent of individuals residing in good-condition census houses in a ward of Moradabad Municipal Corporation. The census classified households according to the type of structure of the census house, namely permanent, semi-permanent, and temporary, considering the primary materials used for roofs and walls (Das & Mistri, 2013; Mondal, 2020). The data reveals that the majority of households, 89.2 per cent, live in permanent houses, while the lowest proportion, 54.9 per cent, is recorded in a ward of Kanpur Municipal Corporation, where the rental accommodation is comparatively high. The ownership status indicates that, on average, 79.6 percent of households in the Municipal Corporation own their own houses.

Interestingly, within the Municipal Corporation of Uttar Pradesh, 30.6 percent of households have at least two dwelling rooms, indicative of relatively better living conditions. Conversely, in a ward of the Saharanpur Municipal Corporation, the percentage of households with at least two dwelling rooms is the lowest, referring to comparatively poor living conditions. The number of dwelling rooms is inversely proportional to the congestion level, i.e., an increase in dwelling rooms is associated with decreased congestion (Kundu, 2006). As per the Census of India (2011), a census house is categorised as a 'pucca' if its roof and the wall material predominantly consist of stones, machine-made tiles, cement tiles, burnt bricks, cement bricks, stones, slate, G.I./metal/asbestos sheets, or concrete. For this study, our analysis focused exclusively on census houses with burnt bricks and cemented materials, as other types categorised as 'Pucca' exhibit a relatively minor representation within the Municipal Corporation of Uttar Pradesh. On average, approximately 69.7 percent of houses exhibit a predominant roof material composed of burnt bricks or cemented materials. In contrast, about 85.3 percent of houses possess walls made from burnt or cemented blocks.

Furthermore, cement is the most common floor material in around 62.8 percent of dwellings. Many homes in metropolitan areas serve as residence-cum-other use businesses, such as stores, factories, hotels, and other commercial operations as well as residences (Kundu, 2012). Around 3.5% of dwellings in Uttar Pradesh Municipal Corporations have this multipurpose feature with decent conditions.

Surprisingly, 30.6 per cent of households in the Municipal Corporation of Uttar Pradesh have at least two dwelling rooms, indicating relatively better living conditions. In

contrast, the percentage of households with at least two dwelling rooms is the lowest in a Saharanpur Municipal Corporation ward, indicating comparatively poor living conditions. The number of dwelling rooms is inversely proportional to the level of congestion, implying that an increase in dwelling rooms is associated with less congestion.

Figure 2 shows that the Housing Quality Index rank is high in the Municipal Corporations of Moradabad, Bareilly, and Lucknow, whereas the Municipal Corporations of Jhansi, Varanasi, Saharanpur, and Gorakhpur demonstrate the lowest rank of housing quality. However, there is persistent heterogeneity across the wards of Municipal Corporations. The highest variation is seen in the Kanpur Municipal Corporations, while the lowest is in the Lucknow Municipal Corporations. The results of our investigation demonstrate discernible variations in house quality encompassing diverse levels of intra and inter-city disparities.

### *Deprivation in Basic Amenities Index*

Providing basic amenities, including drinking water, sanitation, electricity, and drainage, is pivotal in promoting well-being and establishing a reasonable quality of life for individuals. Nonetheless, accessing these facilities empowers households by freeing up the time that would otherwise be spent on procuring these indispensable resources (Kumar, 2015). In India, the accelerated pace of population growth and inadequate investment in urban development have led to a critical dearth of essential amenities within towns and cities (Kundu et al., 1999). However, considerable progress has been achieved in enhancing housing conditions and ensuring access to drinking water, sanitation, electricity, and similar resources in urban areas. The promotion of privatisation, partnership arrangements, and community-based initiatives as alternative solutions has not effectively addressed the shortfall caused by the state's reduced involvement under the new system of governance (Kumar, 2015).

Moreover, within Municipal Corporations, inequalities remain intact, which may exacerbate deprivation in some wards of the city, as the descriptive statistics provide evidence of notable variations in household amenities within Municipal Corporations. The analysis reveals that, on average, approximately 84.4 per cent of households enjoy access to drinking water facilities within their premises. This percentage highlights significant disparities, varying from 100 per cent to 16.7 per cent across different wards. Concerning improved water sources, an average of 58.9 per cent of households benefited, yet a 42.61 per cent coefficient of variation indicates diverse levels of access across wards.

Additionally, while electricity availability is nearly universal in some wards, there exists an 8.62 per cent coefficient of variation within Municipal Corporations. Considering sanitation, a critical determinant of community health and hygiene, two vital parameters are assessed: the availability of toilets within household premises and the connection of household wastewater outlets to closed drainage systems (Mondal, 2020). An average of 91.4 per cent of households possess latrines; however, concerns arise regarding the condition of closed drainage systems, with the highest coefficient of variation (64.01 per

cent) recorded within Uttar Pradesh’s Municipal Corporations. On average, 75.3 per cent of households use clean energy fuel in Municipal Corporations, and this proportion may have experienced enhancement following the implementation of the Pradhan Mantri Ujjwala Yojana. The National Family Health Survey (NFHS) 2019-20 reported that 88.6 per cent of urban households employ LPG or piped natural gas (PNG) as their primary cooking fuel. Furthermore, the presence of bathroom facilities within households indicates a safe, secure, and hygienic environment, and the data reveals that an average of 81.6 per cent of households in Municipal Corporations possess this facility.

**Figure 2: Spatial distribution of house quality, basic amenities, physical assets and development deprivation indices in Municipal Corporations of Uttar Pradesh**

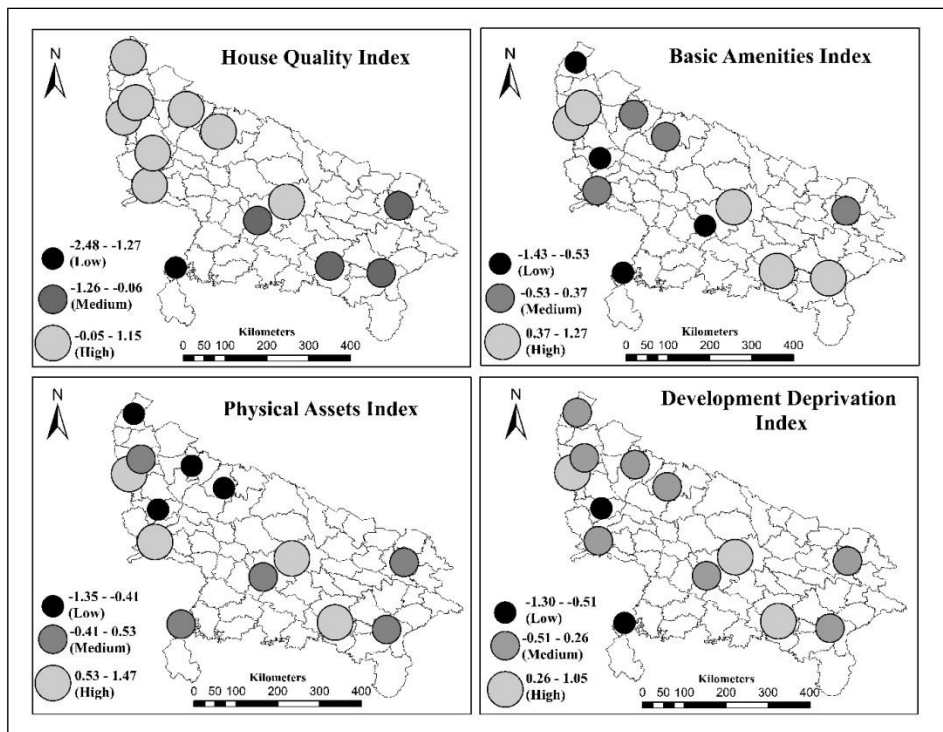


Table 5 elucidates the hierarchy of the availability of basic amenities, ranking Prayagraj, Ghaziabad, Varanasi, and Lucknow Municipal corporations as the top performers. At the same time, Aligarh and Jhansi reveal a significantly deprived status across all amenities. Notably, Jhansi’s wards show the highest range in the Basic Amenities Index. The comparison of variation in the Basic Amenities Index across Municipal Corporation wards reveals that the Municipal Corporations of Prayagraj, Agra, Ghaziabad, Varanasi, and Lucknow have the highest levels of heterogeneity. In contrast, the Municipal Corporations of Saharanpur, Jhansi, Aligarh, and Moradabad have the lowest levels of variation in the availability of basic amenities. The results emphasise the fairer distribution of basic facilities in Prayagraj wards while also highlighting the need to create infrastructure to address deprivation identified in Saharanpur, Jhansi, and Aligarh Municipal Corporation’s wards.

**Table 5: House quality, basic amenities and physical assets indices of Municipal Corporations of Uttar Pradesh**

Municipal Corporations	Number of Wards	House Quality Index		Basic Amenities Index		Physical Assets Index	
		Mean	Rank	Mean	Rank	Mean	Rank
Agra	90	0.01	8	-0.118	7	0.56	4
Aligarh	70	0.09	7	-1.439	13	-1.018	11
Bareilly	70	0.99	2	0.181	6	-0.783	10
Ghaziabad	80	0.55	4	1.142	2	1.474	1
Gorakhpur	70	-0.61	11	-0.498	9	0.378	5
Jhansi	60	-2.48	13	-1.299	12	-0.126	7
Kanpur	110	-0.27	10	-0.813	11	-0.251	8
Lucknow	110	0.56	3	0.552	4	1.009	3
Meerut	80	0.15	6	0.417	5	-0.114	6
Moradabad	70	1.15	1	-0.461	8	-1.357	13
Prayagraj	80	-0.16	9	1.277	1	1.013	2
Saharanpur	85	0.46	5	-0.611	10	-1.049	12
Varanasi	90	-0.87	12	1.083	3	-0.359	9

#### *Deprivation in Physical Assets Index*

Filmer and Scott (2008) assert that asset availability offers a perspective on a household's economic status, reflecting their material living conditions. Conversely, the other two indicators, household income and consumption, often experience fluctuations influenced by seasonality (Mondal, 2020), and it fails to capture the multiple economic deprivations. Thus, the ownership of assets by households emerges as a viable alternative, offering a reliable proxy for assessing relative wealth levels and impoverishment within the wards of Municipal Corporations in Uttar Pradesh.

The census data 2011 reveals that, on average, 70.9 per cent of households within the wards of Municipal Corporations in Uttar Pradesh have access to banking facilities. This significant proportion suggests a willingness to save and reflects a level of financial awareness prevalent in the urban areas of the state. However, a significant disparity becomes apparent in the Aligarh Municipal Corporation, where the lowest proportion (7.9 percent) reported in a ward highlighted a greater degree of marginalisation, limited savings opportunities, and diminished financial awareness.

Modern communication and transportation amenities in households also provide insights into media exposure and comparatively better connectivity and awareness of the surrounding world. On average, 79.8 percent of individuals possess televisions, indicating widespread media exposure. Moreover, 45.4 percent of individuals utilise motorcycles as a mode of transport, with the highest percentage (90.2 percent) recorded in a ward of Agra Municipal Corporation. Ownership of cars, jeeps, or vans indicates a relatively affluent

position in society, and an average of 11.2 percent of households possess such vehicles across Municipal Corporations—the highest value for this indicator is found in a ward of Ghaziabad Municipal Corporation. This shows that access to inner-city jobs has been facilitated by vehicle ownership as a result of the construction of highways and new mass transit systems in the periphery of the city. The insights derived from Figure 2 reveal the relative positions of Municipal Corporations based on the Assets Index, with Ghaziabad, Prayagraj, and Lucknow securing the top rank. In contrast, Moradabad, Saharanpur, and Aligarh Municipal Corporations rank lowest in terms of asset ownership. Notably, Ghaziabad Municipal Corporation shows the highest variation in asset ownership, indicating an unequal level of asset availability. The outcomes of the study elucidate the manner in which assets are distributed, bringing attention to the varying levels of wealth disparity evident across and within the Municipal Corporations of Uttar Pradesh.

### *Composite Development Deprivation Index*

Table 6 uncovers that Jhansi, Aligarh, and Kanpur Municipal Corporations show the highest levels of deprivation, while Ghaziabad, Prayagraj, and Lucknow Municipal Corporations demonstrate comparatively more favourable development positions. Specifically, Kanpur's wards display the most extensive range of development, illustrating a nuanced combination of better-developed and highly deprived wards. In addition, the variation in developmental conditions is most pronounced in the wards of Saharanpur, Meerut, Jhansi, and Aligarh Municipal Corporations, indicating a relatively higher degree of heterogeneity in the overall developmental trajectories. The research findings underscore significant divergences in the level of development across Municipal Corporations in Uttar Pradesh, with some embracing more inclusive development. In contrast, others tend to have a more exclusionary nature.

The ANOVA test (Table 7) shows meaningful results, showing a considerable difference in house quality, basic amenities, and asset ownership among the Uttar Pradesh Municipal Corporations. Moreover, a noticeable disparity in development deprivation was evident across these corporations. The statistical test was performed at a significance level of 0.05, with the calculated P-value being less than 0.0001. The results reveal that the F-statistic is the greater the variation between sample means relative to the variation within the samples and, thus, a significant difference in the developmental dynamics among Uttar Pradesh's Municipal Corporations.

### **Conclusion**

The present study used a composite index to assess the developmental trajectory across Municipal Corporations in Uttar Pradesh. The results revealed noteworthy deprivation in development among the Municipal Corporations. The level of development deprivation is related to the historical and spatial setting of the Municipal Corporations. Ghaziabad Municipal Corporation, situated within the national capital region, shows relatively higher levels of development despite experiencing relatively higher inter-ward

variations. The current study also uncovers that certain wards demonstrate more pronounced development across Municipal Corporations, although a substantial developmental gap persists. This gap represents a pathological situation where city stakeholders are unable to maintain public services due to persistent urban population growth and financial constraints at the ward level. The private investors in the city's infrastructural development are largely free to determine the investment location. It leads to disproportionate development across the city. Thus, the question of spatial justice in the planning and development of local areas is crucial. Providing essential amenities and services to underdeveloped wards can foster better living and working conditions, contributing to an enhanced standard of living for inhabitants.

**Table 6 Descriptive Statistics of the Development Deprivation Index for Municipal Corporations**

Municipal Corporations	Number of Wards	Mean	Rank	Range	Standard Deviation	Variance
Agra	90	0.149195	5	5.429855	1.03723	1.07585
Aligarh	70	-0.78923	12	9.145167	1.839135	3.38242
Bareilly	70	0.128605	6	8.269903	1.727934	2.98576
Ghaziabad	80	1.05498	1	6.073745	1.471475	2.16524
Gorakhpur	70	-0.24379	9	8.067373	1.56321	2.44363
Jhansi	60	-1.30293	13	9.603123	1.870053	3.4971
Kanpur	110	-0.44575	11	10.13424	1.660418	2.75699
Lucknow	110	0.705566	3	7.221994	1.341187	1.79878
Meerut	80	0.149785	4	7.805332	1.903401	3.62294
Moradabad	70	-0.22209	8	7.432603	1.836892	3.37417
Prayagraj	80	0.71105	2	6.139095	1.044935	1.09189
Saharanpur	85	-0.40016	10	9.566605	2.090887	4.37181
Varanasi	90	-0.04699	7	6.053482	1.310049	1.71623

**Table 7 ANOVA tests for house quality, basic amenities, physical assets and development deprivation indices in Municipal Corporations of Uttar Pradesh**

Domains		Sum of Squares	df	Mean Square	F	P value
HQI	Between Groups	79.276	12	6.606	14.567	<0.0001
	Within Groups	477.11	1052	0.454		
	Total	556.386	1064			
BAI	Between Groups	774.358	12	64.53	14.925	<0.0001
	Within Groups	4548.29	1052	4.323		
	Total	5322.64	1064			
PAI	Between Groups	764.726	12	63.727	16.65	<0.0001
	Within Groups	4026.55	1052	3.828		
	Total	4791.28	1064			
DDI	Between Groups	291.222	12	24.268	13.733	<0.0001
	Within Groups	1859.02	1052	1.767		
	Total	2150.24	1064			

To summarise, urban development deprivation is highly concentrated locally and varies significantly throughout urban spaces, and understanding its occurrence necessitates a micro-geographical analysis. However, as the Constitution states, strengthening local urban bodies at the ward level might promote better planning decisions and resource distribution. Area-based economic policies of social regeneration revival may help the underdevelopment wards. Moreover, there is a need to reinforce central and state initiatives through targeted intervention in the most disadvantaged wards, which could further reduce the development deprivation within the city.

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