RESIDENTIAL SEGREGATION IN CITIES OF SOUTH INDIA: PATTERNS AND CORRELATES

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1. Introduction

Everything happens somewhere; hence, all actions are affected by their placement (Logan, 2012). Where people live shape their social interactions and social networks, health outcomes and sense of self (Park 1925). Observing where people live – or are forced to live – make (or, encourage) us view segregation from a spatial perspective – labelled in literature as 'residential segregation'. Residential segregation creates a neighbourhood-based social identity which can lead to discrimination (Ismail, 2006). Many empirical studies across the world show that residential segregation can systematically undermine the social and economic well-being of the segregated, as well as lack access to social capital (Massey and Denton,1988; Ihanfeldt and Sjoquist, 1989; Fischer et al., 2004; Lehman- Frisch, 2011; Scarpa, 2015; Mehta, 1969; D'Souza, 1978; Dupont, 2004; Vanneman et al., 2006; Tienda and Wilson, 2000). Therefore, segregation of a group of individuals spatially in terms of location of their residences can have huge implications for their present and future standards of living.

Urban sociological theories, particularly from the Indian orientalist school considered caste as a traditional and religious invention (Dumont,1980; Cox,1948). They claimed that with increasing urbanisation and developing city life, existing social structures in India were supposed to erode (Park, 1937; Wirth, 1938; Rao 1974; Dumont,1980; Cox,1948). Ambedkar (1936) encouraged a movement of Dalits to cities to escape from the discrimination faced in the villages due to the caste where they were born in. However, caste does not seem to have eroded in the cities but remain to play a significant role in determining where people live. Literature identifies that caste and similar social structures continue to have an impact on schooling decisions, educational outcomes, likelihood of securing jobs and choice of residential locations in urban India (Munshi and Rosenzeveig, 2006; Thorat and Newman, 2010; Vithayathil and Singh, 2012; Jodhka,2015; Deshpande and Ramachandran, 2019).

Amalgamating these ideas of caste and residential segregation, the paper tries to look at how the ascribed identity of caste plays a role in creating residentially segregated spaces in India. Positioned in the context of an urban space, we try to look at the patterns of residential segregation due to caste in the cities of south India. It tries to study the nature and patterns of residential segregation by caste in 102 class-one[i] towns of south India. The paper also attempts to provide insights on how residential segregation varies with differing scales of urbanization across the cities under study. In addition to this, the paper explores to understand the impacts of residential segregation in these cities by analysing the quality of housing in these cities under study.

2. Review of Literature

The preferences of people for deciding the location of their residences are heterogeneous in nature (Petkar and Macwan, 2013). The decision of residential location not only determines the connection between the household with the rest of the urban environment, but also influences the household's perceived well-being (Guo and Bhat, 2007). Socio-economic conditions and identities play dominant roles in housing decision-making whereby the demand for types and neighbourhood of housing are made (De and Vupru, 2017).

Most of the literature on residential segregation and spatial inequalities in the West has been on segregation based on ethnicity or colour, especially the segregation in African American ghettos and its consequences on the socio-economic lives of the people living in these areas (Massey and Denton 1988, Woo 2012, Duncan and Duncan 1957). Similar studies in the Indian context - though scant - pointed out the spatial nature of segregation in cities, especially faced by the Scheduled Castes. Dupont (2004) and Mehta (1968, 1969) discusses the residential segregation in Delhi and Pune, with Mehta presenting a U-shaped pattern for the residential segregation index. The studies on people working in Faisalabad Stone Quarries in the outskirts of Delhi (Mendelsohn and Vicziany 1998) and the manual scavengers in Uttar Pradesh (Singh and Ziyauddin 2009) are two case studies indicating spatial segregation. Gupta et al. (2009) says that historically disadvantaged castes live disproportionately in the slums. Sapovadia (2007) talks about the ghettoization in Ahmedabad of the Harijan population. Clarke and Landes (2010) identified that Brahmins clustered around the same postal address in Kolkata, while Vanneman, Noon, Sen, Desai and Sheriff (2006) indicate the clustering of residences based on caste and naming of streets based on the occupations attached to each caste. Vithayathil and Singh (2012) analyzed the spatial nature of exclusion by analyzing residential patterns in seven major cities in India and found that caste-based segregation is quite severe. Manoj (2012) studies residential segregation by caste in Chennai, studying in detail a few wards in the city. She identifies that there is a persistence of caste-based segregation in the city for a long time and expects it to continue. She also notes that one comprehensive theoretical model that could answer the complex nature of residential segregation in Indian cities is non-existent. Studies on residential segregation in India beyond the dimension of caste is gaining attention in India recently. Bhan and Jana (2015), Sidhwani (2015), Mariganti and Mukhopadhyay (2015), and Balakrishnan and Anand (2015) looks at segregation on the basis of socio-economic status, housing qualities across cities and in detail in some cities. However, there is a dearth of literature on residential segregation in cities in the Indian context, and it becomes important to extend research in this area, beyond metros and larger cities.

3. Data and Method

Residential Segregation in South Indian cities is studied by taking into account the urban areas in five states of South India – Kerala, Tamil Nadu, Karnataka, Andhra Pradesh and Telangana[ii]. The towns in these states having a population of more than one lakh – categorised as class-one towns or cities – are used for the study (Census of India, 2011). Each city is either a Municipal Corporation, Municipality, Cantonment Board, City Municipal Council or Townships. Secondary data from Census of India 2011 is used for the study. The analysis is limited to quantitative treatment of data. Ward level data on population sizes of scheduled caste, scheduled tribe and others across wards in cities are compiled from the Primary Census Abstract (PCA), Census of India.

Two measures of segregation – Dissimilarity Index (DI) and Exposure Index (EI) (Massey and Denton, 1988) – are used to study the levels of residential segregation in cities. While DI measures evenness or unevenness between the minority and majority group in a city, EI measures the degree of interaction between the groups in a city. The paper considers Scheduled Caste (SC) as the minority group and non-SC as the majority group. Ranging from 0 to 1, the value of DI[iii] when multiplied by 100, gives the percentage of the scheduled caste population that should be shifting their residential location from one unit (ward, in this paper) to another, in order to attain an even spatial distribution inside a city. Larger values of DI denotes greater degree of residential segregation in a city.

Exposure Index[iv] also ranges from 0 to 1. It measure the extent to which minority and majority members potentially interact with one another by virtue of sharing a common residential area (Massey and Denton, 1988). Such indices attempt to measure the 'experience' or 'the sociological effects' of segregation as felt by the average minority or majority member (Fosset and Warren, 2005). Larger values of EI indicate greater exposure between SC and non-SC population – which implies lesser residential segregation in the city.

To understand the impacts of residential segregation in the cities under study, we use secondary data from the Houselisting and Housing Census Data, Census of India, 2011. Two indices are created for the purpose – housing quality index

(HQI) and asset availability index (AAI) using the variables available in the above dataset[v].

4. The cities of south India

Most studies on residential segregation in India were on larger metro and mega cities, usually focusing on a single city. Residential segregation within smaller and medium sized cities were often unnoticed, except in a recent study by Singh, Vithayathil and Pradhan (2019) . This paper looks at the levels of residential segregation in 102 class-1 cities of south India. While all cities fall under the class-I category having a population of more than one lakh, their population sizes, ranging from one lakh to more than a million (Table 1). This brings to light the stark diversity within class-1 towns and question many studies generalising their findings for this category of cities. With population being the main constituent of the census definition of urbanization, it is interesting to note that these cities are having varying degrees of urbanization. It also provokes the need to question the way our urban spaces are categorised and the need to look beyond. Majority of the cities in the class-1 category (around 47 per cent) are smaller cities. Only around 7 per cent are million-plus cities. This raises the question of generalising what we observe for the larger city, just because our studies focus on them and all these cities fall in one census classification.

Table 1. Population distribution among the 102 class one cities

population	no. of cities	Share of cities in each population size class (in per cent)
< 2 lakhs	48	47.06
2-4 lakhs	27	26.47
4-6 lakhs	11	10.78
6-8 lakhs	5	4.90
8-20 lakhs	4	3.92

million plus	7	6.86

Source: Calculated from Primary Census Abstract, Census of India 2011

Table 2 shows the distribution of cities among the states. Tamil Nadu has the largest number of class-1 cities. Most of the smaller class-1 cities are in Tamil Nadu and Andhra Pradesh. Karnataka has most of the middle-sized class-1 category of cities. While all states have at least one million plus city, it is interesting to note that Kerala does not have any millon-plus city within its territory. The number of class-1 cities in Kerala less than ten according to the 2011 census and most of them are below 4 lakhs population.

Table 2: State wise distribution of class-1 cities across their population size classes

States	< 2 lakhs	2-4 lakhs	4-6 lakhs	6-8 lakhs	8-10 lakhs	million plus	total
Andhra Pradesh	16	8	2	2	0	2	30
Karnataka	12	6	5	0	2	1	26
Kerala	2	3	1	1	1	0	8
Tamil Nadu	16	7	3	0	2	3	31
Telangana	2	3	0	1	0	1	7
Total	48	27	11	4	5	7	102

Source: Calculated from Primary Census Abstract, Census of India 2011

5. Residential Segregation in the cities of South India: Analysis and Observations

5.1 Unevenness in cities: Observations from the DI index

For the cities under study, DI values range from 0.2 to 0.5. This indicates that around 20-50 per cent of the SC population is unevenly segregated within these cities. A redistribution of residential locations of 20 per cent to 50 per cent of SCs across wards within the cities is required in order to attain an even distribution of groups in a city. The largest number of cities under study (around 38 per cent – 39 out of 102) fall in the DI level range of 30 to 40 per cent.

Table A1 in the appendix shows the DI values across the cities in south Indian states under study. 14 cities have their DI more than 50 per cent, demonstrating a higher level of residential segregation of SC population here. Rajapalayam in Tamil Nadu has the largest DI value, with 71 per cent of the SC population segregated to certain pockets in the city. The least segregation was found in Secunderabad in Telengana. Among the five states, Tamil Nadu has larger number of cities with greater levels of residential segregation – 17 of 31 cities (54.8 per cent) have more than the average level of unevenness in the distribution of its SC population. This is followed by Karnataka where 14 of its 30 cities have high levels of segregation. Andhra Pradesh, Tamil Nadu and Karnataka have most of their cities falling in a range of 30-40 per cent DI. A key point to note here is that it is only in these three states that there are cities where the value of DI has crossed above 50 per cent. This reveals a greater degree of unevenness and residential segregation in these three states. In Kerala and Telangana exhibit a lesser value of DI – in the range of 20 – 30 per cent – indicating lesser unevenness and residential segregation in its cities.

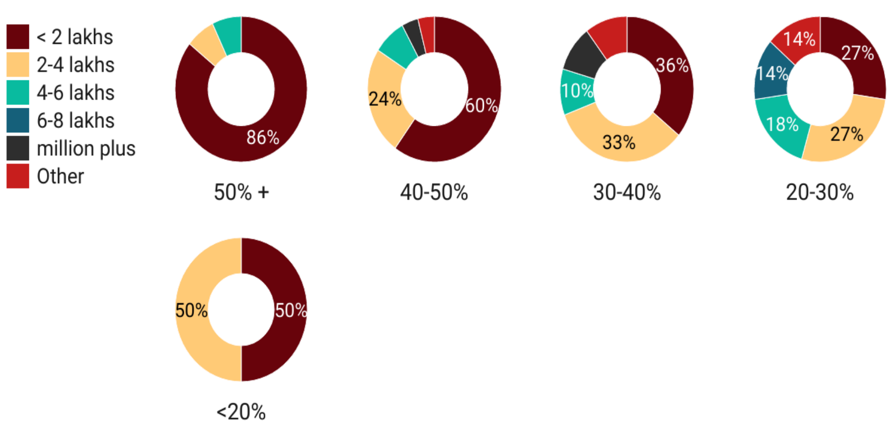
Comparing the DI in the cities and their population sizes (Table 3), we observe that most of the cities (12 out of 14) having high levels of unevenness (high scores of DI) and residential segregation among SC are having a population size of only 1 to 2 Lakhs. 86 per cent of the cities having more than 0.51 DI are smaller cities having a population less than 2 lakhs (Refer the doughnut chart on 'DI vs. population size in cities' below). As the population size of cities increase, the DI values in the cities decrease. Most of the cities of higher population sizes exhibit lower levels of unevenness and segregation, as indicated by lower levels of DI.

Table 3: Combining the levels of Dissimilarity Index levels and population size of the cities under study

		Population size						
number of cities in each population category	DI	< 2 lakhs	2-4 lakhs	4-6 lakhs	6-8 lakhs	8-10 lakhs	million plus	total number of cities under each DI value class
	50% +	12	1	1	0	0	0	14
	40-50%	15	6	2	1	0	1	25
	30-40%	14	13	4	1	3	4	39
	20-30%	6	6	4	3	1	2	22
	<20%	1	1	0	0	0	0	2
	total number of cities under each population class	48	27	1 1	5	4	7	102

Source: Calculated from Primary Census Abstract, Census of India 2011

DI vs. Population Size in cities

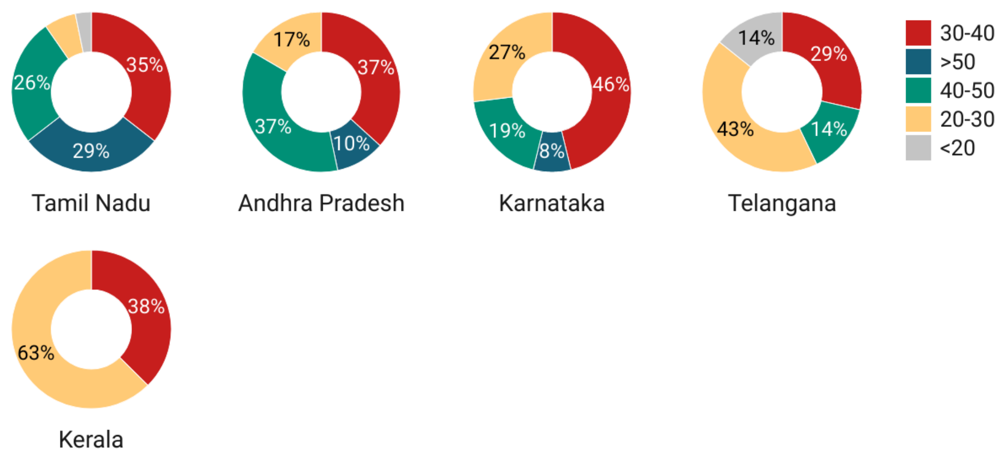


DI value in percentages are provided below each donut

Chart: Neeha Susan Jacob • Source: Using PCA, Census of India, 2011 • Created with Datawrapper

It is interesting to note that among all 14 cities having their DI value greater than 50 per cent, 12 cities have a population less than 2 lakhs. Only two cities with DI greater than 50 per cent has a population in the 2-4 lakh population size class and While Tamil Nadu has the largest number of its cities having DI greater than 50 per cent, most other states have a large number of their cities having DI values between 30 and 40 per cent.

Interstate glimpse of the DI values of its cities



Each donut shows the percentage of cities falling in various ranges of DI values in each of the states under study.

Chart: Neeha Susan Jacob • Source: Compiled from the Primary Census Abstract, Census of India, 2011 • Created with Datawrapper

5.2 ***Interaction between groups in cities : Observations from the EI***

The values of EI indicate that the interaction of SC to non-SC population varies from 32 per cent to 95 per cent in the cities under study. The patterns of EI indicate that most cities in the study have a 70-90 per cent exposure between SCs and Non-SC population groups. 85 class-1 towns among the total 102 cities under study – 83 per cent of the total cities – have an interaction index of more than 70 per cent. This is commendable for it shows greater interaction across diverse groups of population – and therefore, lesser segregation.

For the purpose of analysing the EI values across cities under study, we arrange the values of EI in descending order and rank the city with the highest value with rank 1. Table 4a shows the interstate distribution of EI values across the states and across population size classes. More than 90 per cent interaction is observed in 8 cities, among which 5 are from Kerala. The largest exposure is in Alappuzha (95.21 per cent). The least interaction is found in Robertsonpet in Karnataka (32.4 per cent) and Narasaraopet in Andhra Pradesh (45.2 per cent). All other cities have more than 50 per cent interaction among the two groups. All million plus cities except for Chennai in Tamil Nadu has higher EI values ranking between 1 to 45. Chennai is the only mega city ranked low at 78. However, the EI value is 73 per cent – which does not imply that there is a very low exposure between the groups in the city. The ranking intends to show that the interaction between SCs and non-SCs in Chennai is lesser than the usual in many other mega cities in south India where EI is around 80 per cent and above.

All cities in Kerala show greater interaction between the two groups with EI values above 80 per cent, falling in the first 20 ranks. Tamil Nadu has the largest number of cities with low EI scores.

To understand the correlation between EI values and population size, we compare EI-rank-classes with the population-size-classes as shown in Table 4 (Also refer table A4 in the appendix for details). Since the cities having population below 2 lakhs are larger in number among the 102 cities under study, we find that in all EI rank classes, there are more cities with less than 2 lakhs population. Most cities of lower EI ranks fall under the 2-lakh population class, with a larger share of smaller sized cities having lower EI ranks of 60-102. The cities of higher population size have better EI ranks.

Table 4: Distribution of Cities in terms of Interaction Index and range of Population size

Numb	Exposure Index ranks	< 2 lakhs	2-4 lakhs	4-6 lakhs	6-8 lakhs	8-10 lakhs	million plus
	1 to 20	8	5	3	2	0	2

	21 to 40	7	7	1	1	2	2
	41 to 60	5	5	5	2	1	2
	61 to 80	13	6	0	0	0	1
	81 to 102	15	4	2	0	1	0

Source: Calculated from Primary Census Abstract, Census of India 2011

6. Patterns of Residential Segregation in class- 1 towns of south India

Combining the two dimensions of segregation studied - evenness and exposure indices - we look at the patterns and levels of residential segregation based on caste in the cities under study. Table 5 shows a joint distribution table of the number of cities falling under each categories (or, classifications) of the indices. Corresponding to the class-intervals of values of DI in Table 3 and class-intervals of values of EI in table 4, Table 5 has verbal gradients instead of the values in trying to combine the two indices. While the highest DI and the least exposure imply greater residential segregation of SC group in the city, a high exposure combined with a least DI indicate more congregation and heterogeneity in the city.

Table 5: Combination of DI and EI Indices – the number of cities falling under each categories

		Dissimilarity Index (DI)				
		highest	high	medium	low	least
Exposure Index (EI)	High exposure	0	1	4	7	8
	More than average exposure	5	3	1	5	6
	Medium exposure	1	3	8	4	4
	Less exposure	4	4	5	4	3

	Least exposure	10	9	2	0	1

Source: Calculated from Primary Census Abstract, Census of India 2011

It is disquieting to find a greater number of cities under study having a combination of the least exposure and highest unevenness between SC and non-SC groups within. (bottom left corner with darker red shading). In 27 of the 102 cities under study show higher degrees of residential segregation based on caste. Among these cities, 10 have serious/dangerous levels of segregation - Ambur (Tamil Nadu), Erode (TN), Gulbarga (Karnataka), Kolar (Karnataka), Madavaram (TN), Prodattur (Andhra Pradesh), Pudukkottai (TN), Rajapalayam (TN), Tiruvannamalai (TN), Vellore (TN). It is alarming to find that many of these cities are in Tamil Nadu.

On the other hand a similar number of cities – around 25 – exhibit least levels of segregation. Eight of them experience more evenness and exposure between the two social groups, namely Hosur (Tamil Nadu), Kollam (Kerala), Kozhikode (Kerala), Malappuram (Kerala), Mangalore (Karnataka), Thiruvananthapuram (Kerala), Thrissur (Kerala), and Vishakhapatnam (Andhra Pradesh). It is interesting to find almost all the cities of Kerala having the least pattern of residential segregations.

Looking at the population size of the cities under study along with their DI and EI values, there seems to be a connection between population size and these measures. Since 48 of the 102 class-1 towns under study are below 2 lakhs population, the number of cities with larger DI and lower EI levels are mostly belonging to the least populated cities, with less than 2 lakhs population. Out of 10 cities that were found to be having greater unevenness and lesser exposure, and therefore larger residential segregation, 9 cities were those with less than 2 lakhs population. On the other hand, out of those 8 cities having lower levels of residential segregation, 6 had a population of more than 2 lakhs, with even one being a metropolitan city. Among the cities under study, we observe greater levels of residential segregation in those with lower population sizes, and those with higher population sizes experience lower levels of residential segregation by caste.

7. Impacts of Residential Segregation in the cities of South India

To observe the impacts of segregation by caste on the quality of housing and asset availability in the cities under study, we combine the ranks under the two indices – dissimilarity index based on caste and the housing quality index/asset availability index (Tables 6 and 7). For the dissimilarity index, the ranks from 1 to 20 indicates greater unevenness and therefore greater segregation in terms of caste, while the ranks from 1 to 20 of the housing quality index and asset availability index indicates better quality of housing and assets.

Table 6: Contrasting the Ranks of cities according to dissimilarity index by caste and Housing quality index.

	Dissimilarity Index by Caste					
HHI ranks	1-20	21-40	41-60	61-80	81-102	
1-20	5	1	4	7	3	20
21-40	2	3	4	6	5	20
41-60	4	6	4	2	4	20
61-80	6	2	4	3	5	20
81-102	3	8	4	2	5	22
	20	20	20	20	22	102

Source: Based on table A1,A2 and A3 in the appendix

Table 6 shows the distribution of cities based on the dissimilarity index by caste and the quality of housing in the 102 class-1 towns. It can be seen that most cities in the (1-20) ranks of dissimilarity index by caste have housing quality in the rank groups of (61-80) and (81-102). This implies that the greater the residential segregation by caste, the lower is the quality of housing facility in these cities under study. Similarly, most of the cities having low DI (of 61-80 or 81-102 ranks), have their quality of housing in the 1-20 or 21-40 rank groups, implying that cities with less segregation or unevenness on the basis of caste, have their households with better quality of housing.

Table 7: Contrasting the Ranks of cities according to dissimilarity index by caste and Asset availability index

	Dissimilarity Index by Caste					
Assets	1-20	21-40	41-60	61-80	81-102	
1-20	1	1	4	6	8	20
21-40	3	1	6	5	5	20
41-60	3	7	3	5	2	20
61-80	7	3	5	1	4	20
81-102	6	8	2	3	3	22
	20	20	20	20	22	102

Source: Based on table A1,A2 and A3 in the appendix

Similarly, Table 7 which shows a distribution of dissimilarity index by caste and asset availability index in the class-1 towns of south India. Similar patterns as in the above case are observed here, with most cities belonging to dissimilarity index rank groups (1-20) or (21-40) (greater unevenness) having asset availability ranks of 61- 80 or 81-102 (lesser asset availability). Thus, cities of higher residential segregation have most of their households with lower availability of assets, similar to that in the case of housing quality; while cities of lower segregation have households with greater availability of assets.

It was observed that those cities having greater levels of residential segregation by caste (being in rank groups of 1-20 or 21-40 for DI_CASTE) were found to have a lower quality of housing and lesser availability of assets (being in ranks of 61-80 or 81- 102 for the two indices). Similarly, cities of lower residential segregation by caste seem to have more evenness as regard to be having a better quality of housing and availability of assets. Thus, residential segregation by caste does result in the outcomes of those cities with more segregation to be of poor quality. This implies that there can be an impact of residential segregation by caste on socio-economic outcomes, in general; however, such a hypothesis needs further validation.

8. Conclusion

The study observes that most cities with the highest value of unevenness between SCs and non-SCs are those with the least levels of exposure; and most of the cities with greater level of evenness are those with the highest level of exposure between the SCs and non-SCs in the city. Thus, a greater level of residential segregation in a city does imply a greater level of unevenness along with least levels of exposure between SCs and non-SCs in the city (and vice versa). Among the 102 cities studied in the paper, larger size cities are observed to have lower levels of residential segregation. Greater segregation is found in those cities of lesser population sizes. Studying the impact of segregation in terms of caste, the segregated spaces are observed to be having poor housing quality and asset availability.

9. References

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10. Notes

[i] Class-one towns :

[ii] Telangana as a part of Andhra Pradesh in the 2011 Census – the major cities that are presently in Telangana, but in the 2011 census were in Andhra Pradesh are classified under the state of Telangana in this paper.

[iii] Calculation for DI - The index of dissimilarity, as proposed by Duncan and Duncan (1955) is calculated as:

$$DI = \frac{1}{2}\sum_{i=1}^{N} \left| \frac{S_i}{S} - \frac{U_i}{U} \right|$$

where, Si is the population of the minority group – the Scheduled Caste - in the i^{th} ward of a city; S is the total population of the minority group in the city; U_i is the population of the majority population (non-SC group) in the i^{th} ward of the city and U is the total population of the majority group in the city.

[iv] Exposure index can be calculated using the formula,

$$EI = \sum_{i=1}^{n}\left[\left(\frac{x_i}{X}\right)\left(\frac{y_i}{t_i}\right)\right] \quad \text{(Massey and Denton, 1988)}$$

where $\mathbf{x_i}$ refers to the minority population (here, SCs) in i^{th} ward, **X** is the total minority population in the city, $\mathbf{y_i}$ is the majority population in i^{th} ward, $\mathbf{t_i}$ is the total population in i^{th} ward [(y_i/t_i) implies the proportion of the majority population in i^{th} ward and (x_i/X) is the minority weight in the city that is considered.

[v] The Housing Quality Index uses the following variables:

1. Quality of Households
2. Material of Roof, Wall, and Floor
3. Basic Amenities – a) Main Source of Drinking water, b) Main source of lighting, c) Latrine facility, d) Bathroom facility, e) Type of fuel used for cooking f) Kitchen facility g) Banking services, and 4. Household by type of structure of census houses

The Asset Availability Index uses the following variables:

1. Ownership Status
2. Banking facilities

The author can be contacted directly for further details on the index, if necessary.

APPENDIX TABLES

Table A1. Total population, Dissimilarity Index and Exposure Index of the class-1 towns of South India (in descending order of their population size)

Sl. No.	Cities	Total Population	DI for SC	EI for SC
1	Bangalore	8495492	0.261732	0.837113
2	Chennai	4646732	0.335913	0.732879
3	GHMC	3718651	0.32206	0.905803
4	GVMC	1609237	0.243976	0.881054
5	Vijayawada	1143232	0.344101	0.80282
6	Coimbatore	1050721	0.377357	0.798106
7	Madurai	1017865	0.473099	0.837078
8	Hubli-Dharwad	943788	0.268813	0.857602
9	Mysore	920550	0.399165	0.723807
10	Tiruchirappalli	847387	0.339226	0.836281
11	Salem	829267	0.380136	0.774855
12	Thiruvananthapuram	762535	0.256102	0.869961
13	Warangal	704570	0.219685	0.814402
14	Guntur	670073	0.483281	0.845027
15	Kadapa	663345	0.277644	0.784565
16	Kochi	633553	0.303965	0.945282
17	Kozhikode	550440	0.249458	0.942989
18	Nellore	547621	0.294595	0.79335
19	Gulbarga	543147	0.519843	0.673524
20	Mangalore	499487	0.284481	0.936958
21	Belgaum	490045	0.343366	0.87082
22	Tirunelveli	473637	0.378063	0.784112
23	Ambattur	466205	0.36335	0.782931
24	Kurnool	457633	0.41285	0.687847
25	Tiruppur	444352	0.432823	0.862293

26	Davanagere	434971	0.351981	0.801053
27	Bellary	410445	0.292556	0.783544
28	Rajahmundry	376333	0.339648	0.750107
29	Kollam	350131	0.263892	0.933212
30	Avadi	345996	0.278193	0.773823
31	Bijapur	327427	0.305799	0.785554
32	Shimoga	322650	0.24583	0.834887
33	Thrissur	315957	0.233186	0.897186
34	Kakinada	312538	0.488898	0.767026
35	Tumkur	302143	0.271002	0.816692
36	Tirupati	293421	0.344499	0.851032
37	Karimnagar	283657	0.354211	0.865763
38	Anantapur	261004	0.318852	0.843942
39	Tiruvottiyur	249446	0.357881	0.776315
40	Alappuzha	240991	0.329884	0.952125
41	Thoothukkudi	237830	0.471915	0.826798
42	Ramagundam	237559	0.214156	0.752866
43	Raichur	234073	0.437135	0.627258
44	Vizianagaram	228720	0.389289	0.763185
45	Nagercoil	224849	0.373012	0.900739
46	Thanjavur	222943	0.393026	0.836553
47	Eluru	218020	0.464076	0.802292
48	Secunderabad	217910	0.137912	0.855149
49	Bidar	216020	0.350164	0.777885
50	Pallavaram	215417	0.436214	0.698102
51	Nandyal	211424	0.430559	0.688855
52	Dindigul	207327	0.521216	0.735794
53	Hospet	206167	0.359575	0.729179
54	Ongole	204746	0.387296	0.670868
55	Vellore	185803	0.580381	0.63987
56	Adoni	184625	0.44008	0.72695
57	Madanapalle	180180	0.37265	0.882241
58	Tambaram	174787	0.3349	0.755214

59	Gadag-Betigeri	172612	0.454958	0.796105
60	Machilipatnam	169892	0.348911	0.866262
61	Tenali	164937	0.351629	0.663759
62	Alandur	164430	0.492512	0.727615
63	Kancheepuram	164384	0.549731	0.817465
64	Prodattur	163970	0.574834	0.725572
65	Robertson Pet	162230	0.456412	0.324895
66	Chittoor	160722	0.303299	0.784426
67	Erode	157101	0.577283	0.668182
68	Hassan	155006	0.308983	0.867986
69	Nalgonda	154326	0.297068	0.814993
70	Hindupur	151677	0.405798	0.7811
71	Bhadravati	151102	0.279707	0.754475
72	Bhimavaram	146961	0.574834	0.744547
73	Chitradurga	145853	0.339194	0.75706
74	Tiruvannamalai	145278	0.612273	0.588322
75	Udupi	144960	0.379982	0.893783
76	Kumbakonam	140156	0.58271	0.773188
77	Kolar	138462	0.528169	0.709987
78	Srikakulam	137944	0.45607	0.87691
79	Mandya	137358	0.43213	0.720255
80	Palakkad	130955	0.330498	0.879737
81	Rajapalayam	130442	0.716732	0.527046
82	Guntakal	126270	0.362126	0.784511
83	Kurichi	123667	0.376234	0.738369
84	Dharmavaram	121874	0.561983	0.845733
85	Madavaram	119105	0.481407	0.690953
86	Chikmagalur	118401	0.368875	0.764789
87	Gudivada	118167	0.407675	0.767026
88	Pudukkottai	117630	0.552082	0.628478
89	Narasaraopet	117489	0.270668	0.452286
90	Hosur	116821	0.272007	0.863719
91	Gangawati	114642	0.454958	0.6896

92	Ambur	114608	0.546694	0.596603
93	Bagalkot	111933	0.325373	0.844674
94	Tadpatri	108171	0.467599	0.75412
95	Karaikkudi	106714	0.410958	0.844037
96	Ranibennur	106406	0.367234	0.771738
97	Neyveli	105731	0	0.736878
98	Tadepalligudem	104032	0.204476	0.84512
99	Miryalaguda	103817	0.401101	0.747117
100	Nagapattinam	102905	0.489988	0.818082
101	Chilakaluripet	101398	0.45347	0.745448
102	Malappuram	101386	0.266816	0.915375

Table A2. Total score and ranks of housing quality and asset availability across class-one towns in South India

	City	HH_total	HH_rank	ASSET_total	ASSET_rank
Telangana	Karimnagar	6.491333	16	1.512833	18
	Warangal	5.642567	101	1.356633	66
	GHMC	6.512083	10	1.401738	49
	Miryalaguda	5.640333	102	1.037167	101
	Nalgonda	5.722	99	1.1315	98
	Ramagundam	5.688	100	1.118	99
	Secunderabad	5.879167	95	1.060667	100
Tamil Nadu	Chennai	6.603833	5	1.495	23
	Coimbatore	6.496667	15	1.470667	28
	Erode	6.5015	14	1.401167	52
	Kancheepuram	6.4695	17	1.344333	74
	Madurai	6.507	12	1.352167	69
	Nagapattinam	6.091167	84	1.474	26
	Nagercoil	6.356333	41	1.526	16
	Neyveli	6.249833	65	1.457667	33
	Salem	6.3005	55	1.308333	81
	Thanjavur	6.007667	89	1.449833	37

	Tiruchirappalli	6.357	40	1.434833	41
	Tirunelveli	6.276833	61	1.4695	29
	Tiruppur	6.397833	34	1.2285	93
	Tiruvannamalai	6.346833	44	1.3875	54
	Vellore	6.260833	64	1.310833	80
	Avadi	6.42833	14	1.51	7
	Tiruvottiyur	6.439667	26	1.378167	57
	Madavaram	6.509	11	1.452167	35
	Ambattur	6.548667	8	1.550833	12
	Alandur	6.6535	2	1.623167	6
	Pallavaram	6.551667	7	1.553	11
	Tambaram	6.505	13	1.550167	13
	Ambur	6.184	75	1.316667	78
	Dindigul	6.310833	52	1.303333	84
	Kumbakonam	5.98	91	1.450833	36
	Pudukkottai	6.186167	74	1.404833	47
	Karaikkudi	6.2895	57	1.401667	50
	Rajapalayam	6.215	70	1.225833	95
	Thoothukkudi	6.438833	27	1.375167	58
	Hosur	6.523333	9	1.533167	15
	Kurichi	6.415667	29	0.802167	102
Karnataka	BBMP	6.583333	6	1.459167	32
	Belgaum	5.816167	97	1.5155	17
	Bellary	6.181667	77	1.316	79
	Chikmagalur	6.450333	23	1.5045	20
	Davanagere	6.278667	60	1.3435	75
	Hubli-Dharwad	6.3275	48	1.4735	27
	Kolar	6.2145	71	1.2085	96
	Mandya	6.308333	53	1.348833	72
	Mangalore	5.833333	96	1.7915	1
	Mysore	5.892333	94	1.424	43
	Tumkur	6.2015	73	1.368833	61
	Udupi	5.8145	98	1.788667	2
	Bagalkot	6.2355	67	1.486667	24

	Bijapur	6.182833	76	1.421333	45
	Gulbarga	6.2995	56	1.357167	65
	Bidar	6.091333	83	1.4015	51
	Raichur	6.046667	86	1.369167	60
	Gangawati	5.910833	92	1.348167	73
	Gadag-Betigeri	6.083167	85	1.374833	59
	Ranibennur	6.112	81	1.363833	64
	Hospet	6.236833	66	1.349167	71
	Chitradurga	6.316667	51	1.380333	56
	Shimoga	6.351167	43	1.447333	39
	Bhadravati	6.235	68	1.3935	53
	Hassan	6.456167	20	1.534833	14
	Robertson Pet	6.033667	87	1.187	97
Kerala	Thiruvananthapuram	6.459667	18	1.592833	7
	Thrissur	6.405167	30	1.637833	4
	Malappuram	6.1725	78	1.556833	10
	Kochi	6.620167	3	1.564833	9
	Kozhikode	6.370833	37	1.630833	5
	Alappuzha	8.544667	1	1.456667	34
	Kollam	6.321833	49	1.576333	8
	Palakkad	6.452333	21	1.675333	3
Andhra Pradesh	Adoni	5.910167	93	1.338333	76
	Anantapur	6.4035	32	1.496667	22
	Bhimavaram	6.373333	36	1.306	82
	Chilakaluripet	6.263167	63	1.2635	90
	Chittoor	6.131667	80	1.460833	30
	Dharmavaram	6.222833	69	1.301333	86
	Eluru	6.388333	35	1.243333	91
	Gudivada	6.320833	50	1.297	87
	Guntakal	6.2075	72	1.353	68
	Guntur	6.452333	22	1.338	77
	GVMC	6.403733	31	1.4335	42
	Hindupur	6.005833	90	1.2345	92
	Kadapa	6.111	82	1.460056	31

	Kakinada	6.031	88	1.2275	94
	Kurnool	6.280083	58	1.448167	38
	Machilipatnam	6.343667	46	1.365833	63
	Madanapalle	6.266833	62	1.502833	21
	Nandyal	6.279	59	1.404	48
	Narasaraopet	6.442	24	1.3675	62
	Nellore	6.366167	38	1.407333	46
	Ongole	6.4595	19	1.483	25
	Proddatur	6.353	42	1.353333	67
	Rajahmundry	6.419833	28	1.301333	85
	Srikakulam	6.300667	54	1.422833	44
	Tadepalligudem	6.3365	47	1.305333	83
	Tadpatri	6.142167	79	1.296333	88
	Tenali	6.4405	25	1.350667	70
	Tirupati	6.608333	4	1.505333	19
	Vijayawada	6.357125	39	1.274583	89
	Vizianagaram	6.344167	45	1.383667	55

Table A3. Total score and ranks of housing quality and asset availability across class-one towns in South India

	City	HH_total	HH_rank	ASSET_total	ASSET_rank
Telangana	Karimnagar	6.491333	16	1.512833	18
	Warangal	5.642567	101	1.356633	66
	GHMC	6.512083	10	1.401738	49
	Miryalaguda	5.640333	102	1.037167	101
	Nalgonda	5.722	99	1.1315	98
	Ramagundam	5.688	100	1.118	99
	Secunderabad	5.879167	95	1.060667	100
Tamil Nadu	Chennai	6.603833	5	1.495	23
	Coimbatore	6.496667	15	1.470667	28
	Erode	6.5015	14	1.401167	52
	Kancheepuram	6.4695	17	1.344333	74
	Madurai	6.507	12	1.352167	69
	Nagapattinam	6.091167	84	1.474	26
	Nagercoil	6.356333	41	1.526	16
	Neyveli	6.249833	65	1.457667	33
	Salem	6.3005	55	1.308333	81
	Thanjavur	6.007667	89	1.449833	37

	Tiruchirappalli	6.357	40	1.434833	41
	Tirunelveli	6.276833	61	1.4695	29
	Tiruppur	6.397833	34	1.2285	93
	Tiruvannamalai	6.346833	44	1.3875	54
	Vellore	6.260833	64	1.310833	80
	Avadi	6.42833	14	1.51	7
	Tiruvottiyur	6.439667	26	1.378167	57
	Madavaram	6.509	11	1.452167	35
	Ambattur	6.548667	8	1.550833	12
	Alandur	6.6535	2	1.623167	6
	Pallavaram	6.551667	7	1.553	11
	Tambaram	6.505	13	1.550167	13
	Ambur	6.184	75	1.316667	78
	Dindigul	6.310833	52	1.303333	84
	Kumbakonam	5.98	91	1.450833	36
	Pudukkottai	6.186167	74	1.404833	47
	Karaikkudi	6.2895	57	1.401667	50
	Rajapalayam	6.215	70	1.225833	95
	Thoothukkudi	6.438833	27	1.375167	58
	Hosur	6.523333	9	1.533167	15
	Kurichi	6.415667	29	0.802167	102
Karnataka	BBMP	6.583333	6	1.459167	32
	Belgaum	5.816167	97	1.5155	17
	Bellary	6.181667	77	1.316	79
	Chikmagalur	6.450333	23	1.5045	20
	Davanagere	6.278667	60	1.3435	75
	Hubli-Dharwad	6.3275	48	1.4735	27
	Kolar	6.2145	71	1.2085	96
	Mandya	6.308333	53	1.348833	72
	Mangalore	5.833333	96	1.7915	1
	Mysore	5.892333	94	1.424	43
	Tumkur	6.2015	73	1.368833	61
	Udupi	5.8145	98	1.788667	2
	Bagalkot	6.2355	67	1.486667	24
	Bijapur	6.182833	76	1.421333	45
	Gulbarga	6.2995	56	1.357167	65
	Bidar	6.091333	83	1.4015	51
	Raichur	6.046667	86	1.369167	60
	Gangawati	5.910833	92	1.348167	73
	Gadag-Betigeri	6.083167	85	1.374833	59
	Ranibennur	6.112	81	1.363833	64
	Hospet	6.236833	66	1.349167	71
	Chitradurga	6.316667	51	1.380333	56
	Shimoga	6.351167	43	1.447333	39
	Bhadravati	6.235	68	1.3935	53

	Hassan	6.456167	20	1.534833	14
	Robertson Pet	6.033667	87	1.187	97
Kerala	Thiruvananthapuram	6.459667	18	1.592833	7
	Thrissur	6.405167	30	1.637833	4
	Malappuram	6.1725	78	1.556833	10
	Kochi	6.620167	3	1.564833	9
	Kozhikode	6.370833	37	1.630833	5
	Alappuzha	8.544667	1	1.456667	34
	Kollam	6.321833	49	1.576333	8
	Palakkad	6.452333	21	1.675333	3
Andhra Pradesh	Adoni	5.910167	93	1.338333	76
	Anantapur	6.4035	32	1.496667	22
	Bhimavaram	6.373333	36	1.306	82
	Chilakaluripet	6.263167	63	1.2635	90
	Chittoor	6.131667	80	1.460833	30
	Dharmavaram	6.222833	69	1.301333	86
	Eluru	6.388333	35	1.243333	91
	Gudivada	6.320833	50	1.297	87
	Guntakal	6.2075	72	1.353	68
	Guntur	6.452333	22	1.338	77
	GVMC	6.403733	31	1.4335	42
	Hindupur	6.005833	90	1.2345	92
	Kadapa	6.111	82	1.460056	31
	Kakinada	6.031	88	1.2275	94
	Kurnool	6.280083	58	1.448167	38
	Machilipatnam	6.343667	46	1.365833	63
	Madanapalle	6.266833	62	1.502833	21
	Nandyal	6.279	59	1.404	48
	Narasaraopet	6.442	24	1.3675	62
	Nellore	6.366167	38	1.407333	46
	Ongole	6.4595	19	1.483	25
	Proddatur	6.353	42	1.353333	67
	Rajahmundry	6.419833	28	1.301333	85
	Srikakulam	6.300667	54	1.422833	44
	Tadepalligudem	6.3365	47	1.305333	83
	Tadpatri	6.142167	79	1.296333	88
	Tenali	6.4405	25	1.350667	70
	Tirupati	6.608333	4	1.505333	19
	Vijayawada	6.357125	39	1.274583	89
	Vizianagaram	6.344167	45	1.383667	55

Table 4a : Joint distribution of EI ranks and population size classes of cities – across states

	State	Andhra Pradesh						
	City size	< 2 lakhs	2-4 lakhs	4-6 lakhs	6-8 lakhs	8-10 lakhs	million plus	total
EI ranking classes	1 to 20	3					1	4
	21 to 40	2	2		1			5
	41 to 60	3	1	1	1		1	7
	61 to 80	4	3					7
	81 to 102	4	2	1				7
	total cities	16	8	2	2	0	2	30
	State	Karnataka						
	City size	< 2 lakhs	2-4 lakhs	4-6 lakhs	6-8 lakhs	8-10 lakhs	million plus	total
EI ranking classes	1 to 20	2		2				4
	21 to 40	1	2			1	1	5
	41 to 60	1	2	2				5
	61 to 80	4	1					5
	81 to 102	4	1	1		1		7
	total cities	12	6	5	0	2	1	26
	State	Kerala						
	City size	< 2 lakhs	2-4 lakhs	4-6 lakhs	6-8 lakhs	8-10 lakhs	million plus	total
EI ranking classes	1 to 20	2	3	1	2	0	0	8
	21 to 40	0	0	0	0	0	0	0
	41 to 60	0	0	0	0	0	0	0
	61 to 80	0	0	0	0	0	0	0
	81 to 102	0	0	0	0	0	0	0
	total cities	2	3	1	2	0	0	8
	State	Tamil Nadu						

	City size	< 2 lakhs	2-4 lakhs	4-6 lakhs	6-8 lakhs	8-10 lakhs	million plus	total
EI ranking classes	1 to 20	1	1					2
	21 to 40	3	2	1		1	1	8
	41 to 60	1	2	2		1	1	7
	61 to 80	4	1				1	6
	81 to 102	7	1					8
	total cities	16	7	3	0	2	3	31
	State	Telangana						
	City size	< 2 lakhs	2-4 lakhs	4-6 lakhs	6-8 lakhs	8-10 lakhs	million plus	total
EI ranking classes	1 to 20	0	1	0	0	0	1	2
	21 to 40	1	1	0	0	0	0	2
	41 to 60	0	0	0	1	0	0	1
	61 to 80	1	1	0	0	0	0	2
	81 to 102	0	0	0	0	0	0	0
	total cities	2	3	0	1	0	1	7

Source: Constructed by the author using data from the PCA, Census of India, 2011