Residential Isolation Patterns in Indian Cities

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Abstract **- This paper looks at residential Isolation in India's seven largest cities. We use ward level 2011 census data and the index of dissimilarity to examine the degree of residential Isolation by caste and socioeconomic status in the cities of Ahmadabad, Bangalore, Chennai, Delhi, Hyderabad, Kolkata, and Mumbai. We find high levels of residential Isolation by caste in each city, especially when compared against a baseline measure of residential Isolation by gender. Our analysis additionally suggests that in every city residential Isolation by caste surpasses the level of residential Isolation by socioeconomic status. We compare the level of residential Isolation by caste among cities that have a similar median ward size, because we find a correlation between median ward size and dissimilarity levels across a sample of Indian cities. We create two groups of comparison cities (1) Chennai and Kolkata; (2) Hyderabad, Mumbai, Delhi and Ahmadabad. We are unable to compare Bangalore with another city in our study given its median ward size. In the first comparison, we find that Kolkata (D=0.364) is approximately 19.5 percent more segregated by caste than Chennai (D=0.293). In the second comparison, we find that Ahmadabad (D=0.325) has the highest residential Isolation by caste, followed closely by Delhi (D=0.304), while Mumbai (D=.222) and Hyderabad (D=0.194) are considerably less**

Index Terms **- Caste Separation, Residential Separation, Indian National Census, Caste, Analytic Neighborhood**

INTRODUCTION

The study of residential Isolation by caste is important for several reasons. The caste system, though dynamic and evolving over several millennia. The outcastes in this social system were not only the most underprivileged and deprived of accumulating capabilities to enhance life-chances but also severely spatially segregated in their residential arrangements from the upper and middle castes. The social interactions between outcastes and others were strictly confined by relatively severe social and religious rules. While caste is often portrayed as nation-wide social system, the local nature of caste and the abundance of sub castes have created serious difficulties in colonial and post-colonial attempts to create a nation-wide system of classification and in the surfacing of national-level social movement along caste lines.

METHODOLOGY

This section discusses the source of data, the methods employed, quantity details and challenges in our examination of whether there is residential isolation by caste in India's mega cities as well as how it varies across cities.

DATA

This project utilizes data from the 2011 Census. The decennial Indian Census aims to compile information on every household in the country, through the use of more than 2 million enumerators who collect data in-person. The enumerators collect household level data and individual-level characteristics for each member of the household. The caste question inquires whether an individual is SC or ST; if an individual is not SC or ST they are marked as "other." The 2011 Indian Census classifies 24% of Indians as belonging to SC and ST. Figure 1 lists the percentage of SC and ST in India's seven largest cities. There is no specific question on income or consumption level in the Indian census.

In our analysis, we use aggregated individual level data provided at the ward level for each municipal corporation. Figure 2 lists the total population, number of wards, and median ward size for the seven largest Indian cities: Ahmadabad, Bangalore, Chennai, Delhi, Hyderabad, Kolkata and Mumbai.

METHODS

In order to explore whether there is residential Isolation by caste in India's mega-cities, we look at the

variation in residential Isolation across three measures for each city: gender, caste and socioeconomic status. Figure 3 provides the descriptive statistics for these three measures for the cities in our study. We find that Delhi has the highest percentage of SC/ST, close to 16 percent of its population, and Mumbai and Kolkata the lowest at approximately 6 percent. Hyderabad (8.3 percent), Bangalore (12.2 percent), Ahmadabad (13.1 percent) and Chennai (13.9 percent) fall in between with regards to their SC/ST population.

For our baseline measure in each city, we calculate the degree of residential Isolation by gender (Figure 4, column 1). We find that the degree of residential Isolation by gender is small across India's seven largest cities though it does vary from a dissimilarity of .006 (Hyderabad) to .065 (Kolkata). In Hyderabad and Ahmadabad we find that the residential Isolation by gender is negligible—less than 1percent of men would have to relocate to produce an even distribution of men across the city. The degree of residential Isolation by gender is also small in Bangalore, Chennai, Delhi and Mumbai, ranging from a dissimilarity of .016 to .035 across the four cities. Mumbai is highest among the four; 3.5 percent of men would have to relocate in Mumbai to produce an even distribution. In the case of Kolkata we find the highest degree of residential Isolation by gender, with a dissimilarity index of .065. Preliminary investigations find a spatial concentration of wards with a high proportion of the city's slum population. Kolkata's relatively higher dissimilarity value for gender could be due to the concentration of male migrants living in a cluster of wards with a high concentration of slums.

Next, we calculate residential Isolation by caste to see how it compares to our baseline of residential Isolation by gender in each city (Figure 4, column 2). Ahmadabad has the greatest jump; while only 0.8 percent of men would have to move—32.5 percent of SC/ST would have to move—to produce an even distribution across the city. Bangalore and Chennai have comparably low dissimilarity indexes for gender (.016 and .017, respectively); but both cities have much higher levels of residential Isolation by caste—.278 and .293, respectively. In the case of Kolkata, compared to 6.5 percent of men having to move to produce an even distribution by gender, 36.4 percent of SC/ST would have to move to produce an even distribution by caste. Hyderabad and Mumbai have the lowest relative increases in dissimilarity between gender and caste, but they are still sizable and substantively significant increases; while 0.6 percent and 3.5 percent of men would have to move in Hyderabad and Mumbai, respectively—19.4 percent and 22.2 percent of SC/ST would have to move in Hyderabad and Mumbai, respectively—to produce an even distribution across each city.

In order to compare the residential Isolation by caste and socioeconomic status for each city, we then calculate the dissimilarity index for socioeconomic status using male literacy as our proxy (Figure 4, column 3). We find that the degree of residential Isolation by SES across India's seven largest cities varies from a dissimilarity of .098 (Ahmadabad) to .021 (Kolkata). We find that for all seven cities the degree of residential Isolation by caste is greater than the degree of residential Isolation by socioeconomic status. We also find the level of residential Isolation by socioeconomic status is greater than the residential Isolation by gender. Ahmadabad has the greatest percentage difference between Isolation by socioeconomic status and caste—while 9.8 percent of literate men would have to move—32.5 percent of SC/ST would have to move—to produce an even distribution across the city. Within each city, the dissimilarity index for residential Isolation by caste is substantially greater than the dissimilarity index for Isolation by SES.

We now return to our calculation of dissimilarity for residential Isolation by caste, which as stated previously varies from .194 to .364 across the cities in our study (Figure 4, column 2). Given our previous findings that dissimilarity and median ward size are correlated, we compare the level of caste Isolation across mega cities with a similar median ward size (see Figure 2). Based on this criterion we are able to create two groups of comparison cities (1) Chennai and Kolkata (2) Hyderabad, Mumbai, Delhi and Ahmadabad. We are unable to compare Bangalore with any other mega city given its ward size3.

In the first comparison, we find that Kolkata (D=0.364) is approximately 19.5 percent more segregated by caste than Chennai (D=0.293). One potential explanation for the lower level of residential Isolation by caste in Chennai is the long history of successful lower caste social movements in Tamil Nadu.

Within our second comparison group, we find that Ahmadabad (D=0.325) has the highest residential

Isolation by caste, followed closely by Delhi (D=0.304), while Mumbai (D=.222) and Hyderabad (D=0.194) are considerably less segregated.

Considering the remaining two cities in this group, Hyderabad (D=0.194) appears to be the slightest segregated and Mumbai (D=0.222) follows close on its heels. In the case of Mumbai, a relatively low level of caste Isolation as compared to Delhi could be due to the even spatial allocation of slums within the urban municipality. Given that a majority of slum dwellers in Mumbai are Scheduled Castes and Scheduled Tribes, the integrated nature of slum locations is likely to contribute to the city's relatively lower dissimilarity index.

Unlike other cities discussed so far, Hyderabad's population of Muslims is approximately triple the country's average, and significantly larger than the comparison cities. In case of Hyderabad, as in the other cities in this study, it would be interesting to calculate residential Isolation by religion; we speculate that in the case of Hyderabad religion is a more important axis of residential separation to consider.

CONCLUSION

We find that caste is a real axis of urban residential Isolation in contemporary urban India. In each city in our study, residential Isolation by caste is sizably larger than the level of Isolation by socioeconomic status; both of these measures are notably larger than our baseline measure of residential Isolation by gender.

Some limitations of this study are worth highlighting. First our measure of socioeconomic status is extremely blunt. By using a dichotomous measure, we are dividing the urban population into the very poor and everyone else. Within the category of men who are literate, especially in India's mega cities where literacy is much higher than the national average, other measures of socio-economic status (i.e. income, consumption, etc) may vary considerably. We are dissatisfied with our operationalization of socioeconomic status, but we believe it is the best available measure among the individual-level data available at the ward level in the Indian Census.

Second, we compare the level of residential Isolation across three social categories within cities to control for the unique nature of each city. Ideally, we would have liked to compare the change in residential Isolation by caste over time for each city.

Third, the ward sizes in India's largest cities are quite large. Although the median ward size across India's seven largest cities varies.

Fourth, while much of the urban story of residential Isolation by SC/ST seems to overlap with the spatial configuration of slums in India's largest cities, we have not analyzed data on slums in this paper.

FIGURES

Figure 1: Percentage of Scheduled Caste and Scheduled Tribes in India's seven largest cities in 2011. (2011 Indian Census)

City	% SC	% ST	% SC/ST
Ahmadabad	12.1	.97	13.09
Bangalore	11.11	1.06	12.17
Chennai	13.76	.15	13.92
Hyderabad	7.38	0.88	8.26
Mumbai	4.88	0.76	5.64
Delhi	15.87	-	15.87
Kolkata	6.01	0.21	6.22

Figure 2: Total Population, number of ward and median ward size in India's seven largest cities in 2011. (2011 Indian Census)

City	Total Population	No. of wards	Median ward size
Ahmadabad	3520085	43	74957
Bangalore	4301326	100	39729.5
Chennai	4343645	155	24145
Hyderabad	3637483	24	64419
Mumbai	11978450	100	77667
Delhi	10091855	128	76691
Kolkata	4572876	141	29647

Figure 3: Percentage male, SC/ST and, literate males

in India's seven largest cities in 2011. (2011 Indian Census)

City	% Male	% SC/ST	% literate, male
Ahmadabad	0.530	0.131	0.776
Bangalore	0.521	0.122	0.797
Chennai	0.511	0.139	0.811
Hyderabad	0.518	0.083	0.730
Mumbai	0.553	0.056	0.814
Delhi	0.548	0.159	0.760
Kolkata	0.547	0.062	0.770

Figure 4: Dissimilarity by gender, caste and socioeconomic status in India's seven largest cities (2011 Indian Census)

City	(1) D_Gender	(2) D_Caste	(3) D_SES
Ahmadabad	0.008	0.325	0.098
Bangalore	0.016	0.278	0.138
Chennai	0.017	0.293	0.126
Hyderabad	0.006	0.194	0.110
Mumbai	0.035	0.222	0.104
Delhi	0.029	0.319	0.137
Kolkata	0.065	0.364	0.211

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