
Rank Size Distribution of Cities and Towns in West Bengal

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Abstract: Human settlements are divided into two categories like; rural settlements and urban settlements. Both types of settlements are functionally inter-related with each other. Growth of urban settlements is higher than the rural settlements because of more pulling capacity. Larger the settlement size greater the area of hinterland. All the urban settlements are also related functionally with each other and make a settlement system of urban centres. Systematic growth of urban settlements leads to the balance growth of settlements. This systematic growth is known as rank-size distribution of cities and towns. Through this paper it has represented that whether cities and towns of West Bengal are distributed according to their rank and size or not.

Keywords: Rank-size, Primate City, Urban Agglomeration

It is found that in any region settlement emerge and grow in a systematic manners. That means larger settlements such as cities are much fewer in number than smaller settlements such as villages. Such observation led to the formulation of the rank-size rule. This phenomenon was represented by a statistical method by Zipf (1949); and Berry and Garrison (1958). According to them if all settlements are ranked according to size with the largest city having the first rank, then the population of a town multiplied by its rank will equal the population of the largest city. Statistically rank-size rule is expressed in a following manner:

$$P_r = P_1 r^{-q}$$

where P_r = Population of a city of rank 'r'
 r = Rank of a city

P_1 = Population of the largest city
 q = An exponent which generally has a value close to 1

When the population size is plotted against the rank every urban settlements the relationship (on a Logarithmic scale) is expressed by a downward sloping line whose slope is defined by 'q'. This simply means that the size of an urban settlement is inversely proportional to its rank. In a log-log graph paper theoretical rank-size pattern is represented by straight line and where $q = 1$. It is observed from graph as well as computation table that there are two types of deviation from the theoretical rank-size pattern. These are primate pattern and binary pattern. In primate pattern the size of the second largest city is less than half the size of the largest city, where 'q' is greater than one ($q > 1$); metropolitan dominance. Binary pattern of rank-size distribution means the second largest city is more than half the size of the largest. These are found in areas where several large cities that are roughly equal in size and a trail of smaller cities. In binary pattern, value of 'q' is less than one ($q < 1$) (cited in the books of Ramachandran, 1989; Ghosh, 1998 and Sarkar, 2009).

West Bengal has a long history of urbanization. Large scale urban development is a product of colonialism (Sarkar, 1998). During colonial period Kolkata was the Capital of British colonial India and principal urban centre through which trade was channelized. Due to its locational and infrastructural advantages many industries were developed nearer to Kolkata along the Hugli River. After independence Kolkata become a Capital of West Bengal and again act as a centre of administration, politics, economy and culture. Thus very rapid growths of the city and its surrounding urban centres have taken place and formed Kolkata urban agglomeration. In regional level (eastern India) Kolkata become a primate city (Jefferson, 1939; Misra 2015) with metropolitan dominance in economy and culture. Kolkata Urban Agglomeration alone possesses about 48.44 percent urban population to total urban population of the state. Apart from Kolkata urban agglomeration there is

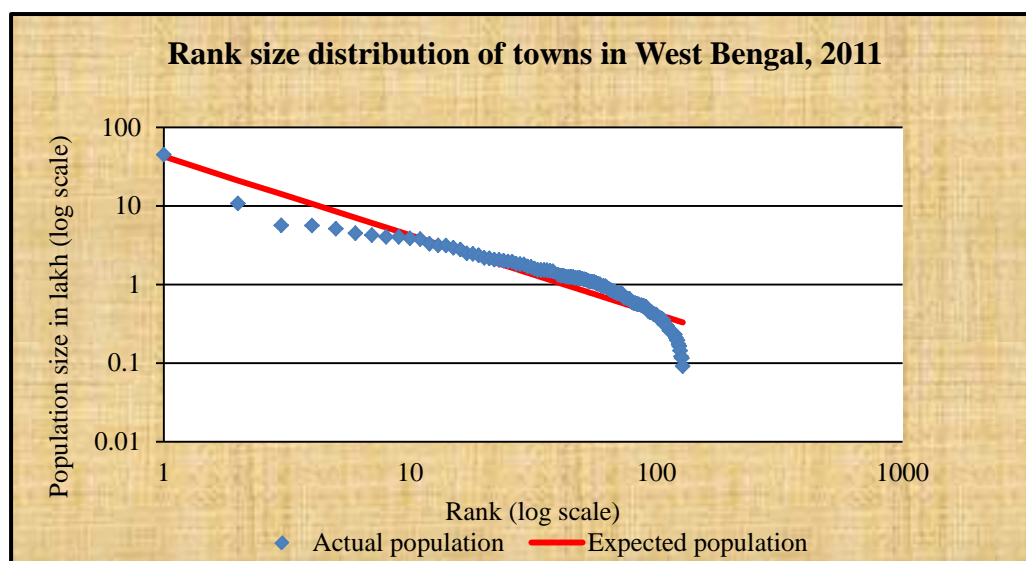


Figure 1 Rank-size distribution of towns in West Bengal, 2011

another highly urbanized region located in the western part of Bardhaman district i.e. Asansol-Durgapur region, based on coal mining and industrial development and these two urban agglomerations hold 4.27 percent and 2 percent urban population of the state respectively. In north Bengal Another significant urban agglomeration has emerged around Siliguri Municipal Corporation which is growing with 2.41 percent of state urban population. Most of the district head-quarters have emerged as a class-I or class-II towns. Many small urban centres have developed throughout the Bengal to meet the local needs.

From the figure no.1 it is being found that the Kolkata represents a metropolitan dominance in the urbanization of West Bengal. Population of second ranking city is about one fifth of first ranking city. After second ranking city there are multiple cities within each ranking and thus binary pattern of deviation has represented. Binary pattern of rank size distribution of urban centres also depict that West Bengal has a rich and dispersed distribution of cities. Therefore, urban system in West Bengal does not follow the theoretical rule of rank-size distribution.

In the Kolkata urban agglomeration area growth rate of population has decreased in respect of previous Census. Even negative growth has found in Kolkata Municipal Corporation itself and Bhatpara municipality, Kancrapara municipality, Halisahar municipality, Barrackpur Cantonment board, Titagarh municipality, Khardah municipality etc. But overall growth rate of the total agglomeration

area is high in compare with the other urban area of West Bengal. Actually growth is taking place in some pockets like; Rajarhat municipality, Mahestala municipality, Barasat municipality, Madhyamgram municipality, Bidhannagar Municipal Corporation, Rajpur-Sonarpur municipality etc.

Table 2. Share of urban population in selective urban agglomerations

Urban Agglomeration	Population	Percentage of population to total urban population
Kolkata Urban Agglomeration	14112536	48.44
Asansol Urban Agglomeration	1243008	4.27
Siliguri Urban Agglomeration	701489	2.41
Durgapur Urban Agglomeration	581409	2.00
Urban Agglomerations other than Kolkata, Asansol, Durgapur and Siliguri	4644878	15.94
Cities and Towns other than Urban Agglomerations	7850740	26.95
Total	29134060	100.00

Source: Census of India and calculated by scholar

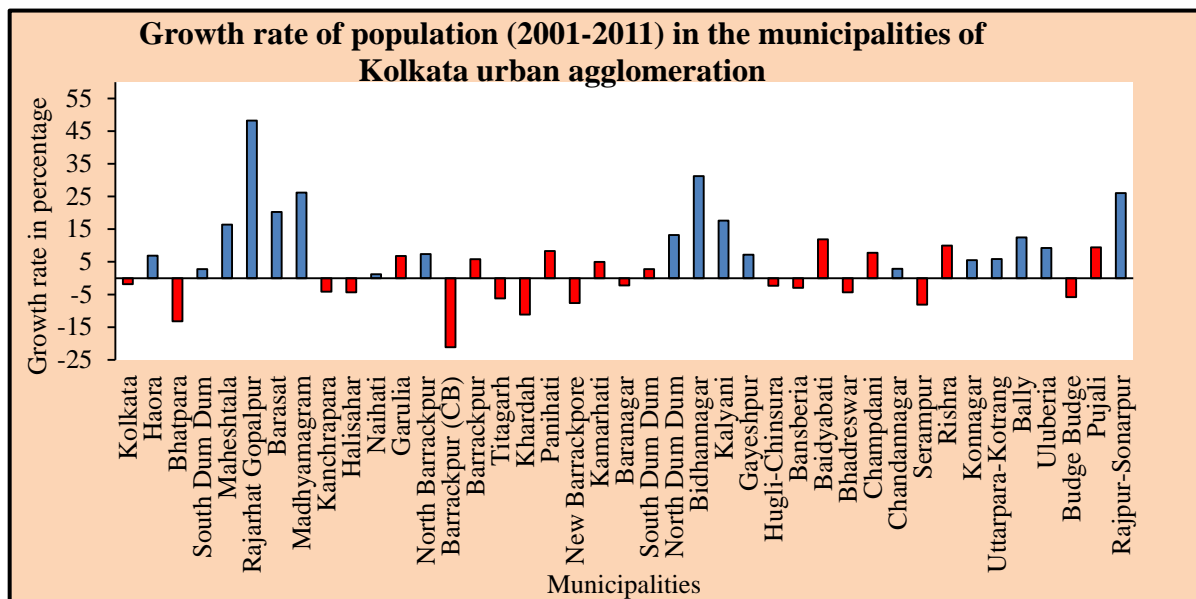


Figure 2 Growth rate of population (2001-2011) in the municipality of Kolkata urban agglomeration

Among the municipalities of Kolkata Urban Agglomeration (KUA) Maximum growth is found in Rajarhat municipality (48.21 percent) and minimum growth has observed in Barrackpur Cantonment board (-21.15 percent).

Beyond the KUA most of the municipalities are associated with positive growth except Alipurduar, Ranaghat and Mekhliganj municipalities. Highest growth is found in Dalkhola municipality (165.78) due to extension of municipal boundary and lowest growth is seen in Mekhliganj municipality (-15.76) in Koch Bihar. Throughout the Bengal municipalities are growing according to their pulling capacity, locational advantages, socio-economic conditions of hinterland, impact of total urban agglomeration in the individual town and city etc. As the total process of urbanization is a continuous process, population of the municipalities' changes with time as well as rank of cities and towns also change.

Thus, urbanization of West Bengal can be explained by representing the three different regions viz; Kolkata Urban Agglomeration area and the surrounding region, Urban Agglomerations distributed all over West Bengal beyond KUA and individual towns and cities other than Urban Agglomerations. Characters of these three regions are different from each other and their growth and

development processes are also different in different regions.

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Table 1. Rank-size distribution of towns in West Bengal

Rank	Name of the town	Population (Pr)	Log (Pr)	Log (r)	Sq of Log (r)	Log (r) x Log (Pr)	Expected population $P_r = P_1 (r)^b$	Deviation of actual population from the expected population	Percentage of population to total population	Growth rate of population (2001-2011)
1	Kolkata	4496694	6.653	0.000	0.000	0.000	4271254	225440	21.26	-1.83
2	Haora	1077075	6.032	0.301	0.091	1.816	2098622	-1021547	5.09	6.90
3	Durgapur	566517	5.753	0.477	0.228	2.745	1419843	-853326	2.68	14.82
4	Asansol	563917	5.751	0.602	0.362	3.463	1064115	-500198	2.67	18.61
5	Siliguri	513264	5.710	0.699	0.489	3.991	850791	-337527	2.43	8.66
6	Maheshtala	448317	5.652	0.778	0.606	4.398	708691	-260374	2.12	16.37
7	Rajpur-Sonarpur	424368	5.628	0.845	0.714	4.756	607216	-182848	2.01	26.03
8	South Dum Dum	403316	5.606	0.903	0.816	5.062	531135	-127819	1.91	2.77
9	Rajarhat Gopalpur	402844	5.605	0.954	0.911	5.349	471982	-69138	1.90	48.21
10	Bhatpara	386019	5.587	1.000	1.000	5.587	424672	-38653	1.83	-13.19
11	Panihati	377347	5.577	1.041	1.084	5.808	385972	-8625	1.78	8.30
12	Kamarhati	330211	5.519	1.079	1.165	5.956	353732	-23521	1.56	4.99
13	Bardhaman	314265	5.497	1.114	1.241	6.124	326456	-12191	1.49	10.04
14	Kulti	313809	5.497	1.146	1.314	6.300	303080	10729	1.48	8.25
15	Bally	293373	5.467	1.176	1.383	6.430	282825	10548	1.39	12.44
16	Barasat	278435	5.445	1.204	1.450	6.556	265108	13327	1.32	20.26
17	North Dum Dum	249142	5.396	1.230	1.514	6.640	249475	-333	1.18	13.22
18	Baranagar	245213	5.390	1.255	1.576	6.765	235581	9632	1.16	-2.22
19	Uluberia	235345	5.372	1.279	1.635	6.869	223152	12193	1.11	9.26
20	Naihati	217900	5.338	1.301	1.693	6.945	211970	5930	1.03	1.21
21	Bidhannagar	215514	5.333	1.322	1.748	7.052	201850	13664	1.02	31.23
22	Kharagpur	207604	5.317	1.342	1.802	7.138	192651	14953	0.98	9.98
23	English Bazar	205521	5.313	1.362	1.854	7.235	184258	21263	0.97	27.29
24	Haldia	200827	5.303	1.380	1.905	7.319	176561	24266	0.95	17.67
25	Madhyagram	196127	5.293	1.398	1.954	7.399	169483	26644	0.93	26.17
26	Behrampore	195223	5.291	1.415	2.002	7.486	162944	32279	0.92	21.91
27	Raiganj	183612	5.264	1.431	2.049	7.535	156896	26716	0.87	11.14
28	Serampur	181842	5.260	1.447	2.094	7.612	151279	30563	0.86	-8.09
29	Hugli-Chinsura	179931	5.255	1.462	2.139	7.685	146047	33884	0.85	-2.30
30	Medinipur	169264	5.229	1.477	2.182	7.723	141169	28095	0.80	13.02
31	Chandannagar	166867	5.222	1.491	2.224	7.788	136603	30264	0.79	2.89
32	Uttarpara-Kotrang	159147	5.202	1.505	2.265	7.829	132323	26824	0.75	5.84
33	Balurghat	153279	5.185	1.519	2.306	7.874	128304	24975	0.72	6.95

34	Krishnanagar	153062	5.185	1.531	2.345	7.941	124520	28542	0.72	10.03
35	Barrackpore	152783	5.184	1.544	2.384	8.005	120953	31830	0.72	5.81
36	Santipur	151777	5.181	1.556	2.422	8.064	117588	34189	0.72	9.80
37	Jamuria	149220	5.174	1.568	2.459	8.114	114401	34819	0.71	12.38
38	Habra	147221	5.168	1.580	2.496	8.164	111381	35840	0.70	15.38
39	Bankura	137386	5.138	1.591	2.531	8.175	108520	28866	0.65	6.68
40	North Barrackpur	132806	5.123	1.602	2.567	8.208	105799	27007	0.63	7.39
41	Kanchrapara	129576	5.113	1.613	2.601	8.245	103213	26363	0.61	-4.16
42	Raniganj	129441	5.112	1.623	2.635	8.298	100750	28691	0.61	5.42
43	Nabadwip	125543	5.099	1.633	2.668	8.329	98401	27142	0.59	9.15
44	Basirhat	125254	5.098	1.643	2.701	8.378	96159	29095	0.59	10.69
45	Halisahar	124939	5.097	1.653	2.733	8.426	94015	30924	0.59	-4.35
46	Rishra	124577	5.095	1.663	2.765	8.472	91969	32608	0.59	9.95
47	Ashoknagar	121592	5.085	1.672	2.796	8.502	90008	31584	0.57	8.95
48	Baidyabati	121110	5.083	1.681	2.827	8.546	88129	32981	0.57	11.90
49	Puruliya	121067	5.083	1.690	2.857	8.591	86322	34745	0.57	6.38
50	Darjiling	118805	5.075	1.699	2.886	8.622	84592	34213	0.56	10.83
51	Titagarh	116541	5.066	1.708	2.916	8.651	82931	33610	0.55	-6.18
52	Dum Dum	114786	5.060	1.716	2.945	8.683	81333	33453	0.54	13.32
53	Champdani	111251	5.046	1.724	2.973	8.701	79791	31460	0.53	7.75
54	Bongaon	108864	5.037	1.732	3.001	8.726	78313	30551	0.51	6.56
55	Khurdah	108496	5.035	1.740	3.029	8.763	76883	31613	0.51	-11.17
56	Jalpaiguri (M)	107341	5.031	1.748	3.056	8.795	75507	31834	0.51	6.97
57	Bansberia	103920	5.017	1.756	3.083	8.809	74179	29741	0.49	-2.95
58	Bhadreswar	101477	5.006	1.763	3.110	8.828	72897	28580	0.48	-4.33
59	Kalyani	100575	5.002	1.771	3.136	8.859	71659	28916	0.48	17.63
60	Dhulian	95706	4.981	1.778	3.162	8.857	70463	25243	0.45	31.37
61	Chakdah	95203	4.979	1.785	3.187	8.889	69322	25881	0.45	9.43
62	Dankuni	94936	4.977	1.792	3.213	8.922	68182	26754	0.45	
63	Contai	92226	4.965	1.799	3.238	8.933	67097	25129	0.44	18.98
64	Jangipur	88165	4.945	1.806	3.262	8.932	66046	22119	0.42	18.41
65	Garulia	85336	4.931	1.813	3.287	8.940	65030	20306	0.40	6.77
66	Old Maldah	84012	4.924	1.820	3.311	8.960	64043	19969	0.40	33.44
67	Katwa	81615	4.912	1.826	3.335	8.969	63086	18529	0.39	14.00
68	Bolpur	80210	4.904	1.833	3.358	8.987	62151	18059	0.38	22.10
69	Kochbihar	77935	4.892	1.839	3.381	8.995	61250	16685	0.37	1.38
70	New Barrackpore	76846	4.886	1.845	3.404	9.014	60374	16472	0.36	-7.63
71	Budge Budge	76837	4.886	1.851	3.427	9.044	59520	17317	0.36	-5.78
72	Konnagar	76172	4.882	1.857	3.450	9.067	58691	17481	0.36	5.54
73	Ranaghat	75365	4.877	1.863	3.472	9.088	57884	17481	0.36	-11.67
74	Suri	67864	4.832	1.869	3.494	9.031	57102	10762	0.32	9.80

75	Bishnupur	67783	4.831	1.875	3.516	9.059	56338	11445	0.32	9.42
76	Arambag	66175	4.821	1.881	3.537	9.067	55595	10580	0.31	17.87
77	Tamluk	65306	4.815	1.886	3.559	9.083	54869	10437	0.31	42.50
78	Alipurduar	65232	4.814	1.892	3.580	9.109	54168	11064	0.31	-10.64
79	Jhargram	61712	4.790	1.898	3.601	9.090	53480	8232	0.29	16.12
80	Gayeshpur	58998	4.771	1.903	3.622	9.079	52809	6189	0.28	7.18
81	Panskura	57932	4.763	1.908	3.642	9.090	52155	5777	0.27	
82	Rampurhat	57833	4.762	1.914	3.663	9.114	51517	6316	0.27	14.27
83	Kalna	56722	4.754	1.919	3.683	9.123	50896	5826	0.27	8.70
84	Gangarampur	56217	4.750	1.924	3.703	9.140	50290	5927	0.27	5.01
85	Kandi	55632	4.745	1.929	3.723	9.156	49695	5937	0.26	10.49
86	Ghatal	54591	4.737	1.934	3.762	9.188	48551	6040	0.26	5.83
87	Islampur	54340	4.735	1.940	3.781	9.207	47996	6344	0.26	3.04
88	Kaliaganj	53530	4.729	1.944	3.800	9.218	47454	6076	0.25	12.34
89	Baruipur	53128	4.725	1.949	3.819	9.234	46928	6200	0.25	18.29
90	Baduria	52493	4.720	1.954	3.838	9.247	46411	6082	0.25	10.71
91	Jiaganj Azimganj	51790	4.714	1.959	3.856	9.258	45903	5887	0.24	9.70
92	Kalimpong	49403	4.694	1.964	3.875	9.240	45409	3994	0.23	14.90
93	Gobordanga	45377	4.657	1.968	3.893	9.189	44934	443	0.21	9.01
94	Dhupguri	44719	4.650	1.973	3.911	9.197	44464	255	0.21	17.28
95	Sainthia	44601	4.649	1.978	3.929	9.216	43985	616	0.21	13.94
96	Murshidabad	44019	4.644	1.982	3.947	9.226	43533	486	0.21	19.14
97	Kersiang	42446	4.628	1.987	3.965	9.215	43088	-642	0.20	6.06
98	Diamond Harbour	41802	4.621	1.991	3.983	9.222	42093	-291	0.20	12.27
99	Nalhati	41534	4.618	1.996	4.000	9.237	42221	-687	0.20	-
100	Memari	41451	4.618	2.000	4.017	9.255	41804	-353	0.20	14.48
101	Taki	38263	4.583	2.004	4.034	9.205	41393	-3130	0.18	2.57
102	Dubrajpur	38041	4.580	2.009	4.052	9.219	40990	-2949	0.18	16.15
103	Taherpur	38039	4.580	2.013	4.068	9.238	40595	-2556	0.18	4.09
104	Pujali	37047	4.569	2.017	4.085	9.234	40208	-3161	0.18	9.42
105	Dalkhola	36930	4.567	2.021	4.102	9.250	39827	-2897	0.17	165.78
106	Dinhata	36124	4.558	2.025	4.118	9.250	39454	-3330	0.17	5.40
107	Guskara	35388	4.549	2.029	4.135	9.250	39088	-3700	0.17	11.05
108	Tarakeswar	30947	4.491	2.033	4.151	9.149	38729	-7782	0.15	9.79
109	Birnagar	30799	4.489	2.037	4.167	9.163	38376	-7577	0.15	8.82
110	Egra	30148	4.479	2.041	4.183	9.162	38029	-7881	0.14	19.73
111	Sonamukhi	29085	4.464	2.045	4.199	9.147	37689	-8604	0.14	6.33
112	Beldanga	29205	4.465	2.049	4.215	9.168	37354	-8149	0.14	15.16
113	Jaynagar Mazilpur	25922	4.414	2.053	4.231	9.078	37028	-11106	0.12	11.18
114	Raghunathpur	25561	4.408	2.057	4.246	9.083	36703	-11142	0.12	16.55
115	Mal	25218	4.402	2.061	4.262	9.087	36386	-11168	0.12	8.61

116	Dainhat	24397	4.387	2.064	4.277	9.074	36074	-11677	0.12	7.97
117	Mathabhanga	23890	4.378	2.068	4.293	9.071	35767	-11877	0.11	13.19
118	Chandrakona	23629	4.373	2.072	4.308	9.077	35466	-11837	0.11	15.84
119	Cooper's Camp	23119	4.364	2.076	4.323	9.073	35170	-12051	0.11	7.67
120	Tufanganj	20998	4.322	2.079	4.338	9.002	34879	-13881	0.10	8.74
121	Ramjibanpur	19611	4.292	2.083	4.353	8.956	34592	-14981	0.09	12.94
122	Jhalda	19544	4.291	2.086	4.368	8.968	34310	-14766	0.09	9.36
123	Barrackpur	17380	4.240	2.090	4.382	8.876	34033	-16653	0.08	-21.15
124	Khirpai	16384	4.214	2.093	4.397	8.837	33760	-17376	0.08	12.62
125	Haldibari	14404	4.158	2.097	4.412	8.734	33491	-19087	0.07	9.25
126	Kharar	12118	4.083	2.100	4.426	8.591	33227	-21109	0.06	4.65
127	Mirik	11513	4.061	2.104	4.440	8.558	32967	-21454	0.05	25.95
128	Mekhliganj	9127	3.960	2.107	4.455	8.359	32711	-23584	0.04	-15.76

Source: Calculated by scholar