Distribution and Status of Health Care Facilities in Bihar

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Abstract : In this paper, we discuss about distribution of health care facilities in Bihar. For this purpose we use data from the 2011 census. This paper also highlights the inequality in the availability of health care facilities in public and private across villages in Bihar. The data available through the 2011 population census suggest that the total number of health care facilities in the rural areas of the state is higher than the total number of inhabited villages in the state but the available health care facilities are concentrated in selected villages only so that there is no health care facility of any type in almost two-third villages of the state. This means that a high degree of the spatial inequality in the distribution of the health care facilities across villages of the state is largely because of the concentration of health care facilities in selected villages and not because of the lack of the availability of health care facilities. The analysis calls for a spatial approach, especially for establishing public health care facilities to reduce the observed spatial inequality in the availability of health care facilities across villages. It must be ensured that more than one public health facilities are established in any village of the state. The analysis suggests that if it can be ensured that there is only one public health care facility in one village, then the spatial inequality in the distribution of health care facilities across villages can be reduced substantially. At the same time, regulating the establishment of the private health care facilities in the rural areas may lead to a drastic reduction in the spatial inequality in the availability of health care facilities across villages.

Keywords : Health care facilities, Rural areas, Distribution, Inequality, Bihar.

I. Introduction

The poor state of the health system in rural areas is not the outcome of a particular occurrence but a consolidated outgrowth of degraded system. It signifies not only lacunae in existing policy and infrastructure but blockage in potential development also. The expenditure on public health has not only been ignored by the state but by common man also. The Common man terms expenditure on public health as useless. In their view, the quality of treatment and medicines in government-run hospitals has degraded. Utilisation of health care facilities that prevent and treat diseases is one of the key determinants of the health status of the people. The use of health care facilities, in turn, depends upon the access to health care facilities which is a function of the availability of health care facilities. People may not be able to access health care facilities because either health care facilities are not available or there is difficulty in physical access or people are financially constrained to pay for health care (WHO, 2008). This means that the access to health care facilities has, among others, a spatial theme also. The distribution of health infrastructure at a sub-national level attracts considerable policy interest with relevance for health inequalities, health care planning, and resource allocation. If the access to a health care facility is poor, then the use of health care services available at the facility is bound to be poor. This implies that the spatial inequality in the availability of health care facilities may influence the spatial inequality in the access and the use of health care services and hence spatial inequality in the health of the people. However, systematic evidence on spatial inequalities in the distribution of health care facilities is still relatively scarce, although there is a growing body of literature which highlights the importance of addressing the spatial inequalities in the distribution of health care facilities in reducing the spatial inequalities in the access and use of health care facilities and in the health of the people (Kanbur, Venables and Wan, 2006).

II. Health Care Facilities in India

India has a vast health care system, but there remain many differences in quality between rural and urban areas as well as between public and private health care. The health care system in India is primarily administered by the states. State governments provide healthcare services and health education, while the central government offers administrative and technical services. India has both public and private health care facilities. Public health care facilities are established and managed by the government out of its budgetary resources. In the rural areas of the country, population based norms have been adopted for establishing public health care facilities (Government of India, 2015). The lowest public health care facility in the rural areas of the country is the Sub-Centre (SC) which is established on the basis of the norm of one SC for every 5 thousand population in plain areas and for every 3 thousand population in hilly/tribal and difficult areas. Besides the SC, there is a primary health centre (PHC) is established following the norm of one PHC for every 30 thousand population in plain areas and 20 thousand population in hilly/tribal/difficult areas. In other words, there should be one PHC for every 6 SCs. Similarly, there is one community health centre (CHC) for every 120 thousand population in plain areas and 80 thousand population in hilly/tribal/difficult areas which means that there should be one CHC for every 4-5 PHCs (Government of India, 2015). There are hierarchical linkages between the three types of public health care facilities in the rural areas so that the entire rural population of the country is covered by the network of CHCs, PHCs and SCs.

One implication of adopting the population based norms for establishing public health care facilities in the rural areas is that many rural habitations, especially small ones, have no public health care facility. According to India's 2011 population census, there were 5,97,483 inhabited villages of varying population size in the country which implies that the population of a village in the country, on average, was 1395 at the 2011 population census. This means, that there is, on average, SC for every 4-5 villages, one PHC for every 14-22 villages and one CHC for every 90-100 villages. This essentially means that in most of the villages, there is no public health care facility and people living in these villages have to travel a distance to access public health care facilities. This also means that the health care needs of the people living in villages without any public health care facility, are met, largely, by the private health care services providers. There are, however, not many studies that have analysed the spatial distribution of health care facilities in the rural areas of the country (Aggarwal, 2003; Akhtar and Khan, 1993; Hodgson and Valadares, 1983; Massam, Askew and Singh, 1987; Saini and Kaur, 2015; Yadav and Prasad, 2002).These studies have highlighted the availability, functionality and hierarchical ordering of health care facilities in different states of the country and the relationship of the access and use of health care services with the social structure of the population. Most of these studies are however small-scale studies. For example, Saini and Kaur (2015) have analysed the spatial distribution of health care facilities in one region of the state of Punjab whereas Aggarwal (2003) has analysed the level of health amenities in the tribal areas of two sub-districts of Rajasthan. There is no study which has analysed the spatial distribution of health care facilities - public or private - in either rural or urban areas at the state or national level. As such, the current understanding of the availability and access to health care facilities at the local level is extremely limited.

Bihar is the third most populous State in India according to the 2011 population census. It has a population density of 880 persons per sq. km. and has recorded the highest decadal population growth during the nineties. Around 40% of population is below poverty line. The major health and demographic indicators of the State like infant mortality rate, maternal mortality ratio, total fertility rate, etc. are substantially higher than the all India average and reflect the poor health status of the people of the State. Bihar ranks 35th in the country based on the indicators primarily related to primary health care infrastructure and reproductive and child health care, (DLHS 2002-04). There are substantial gaps in health

sector infrastructure and essential health requirements in terms of manpower, equipment, drugs and consumables in primary health care institutions. The State has a shortage of 1210 sub-centres, 13 primary health centres, and 389 community health centres. As per the 11th Plan approach paper of Government of Bihar, there is only one sub-centre for 10,000 population. However, according to the national norms there should be at least one sub-centre for 5000 population. Moreover, Bihar has one Primary Health Centre for one lakh population whereas there should ideally be one PHC for every 30,000 population. There is a drastic decline in the share of public health facilities in treatment of non-hospitalized ailments in both rural and urban areas. In Bihar, there are substantial gaps in sub-centers, primary health centers, and a very large gap in community health centers along with shortage of manpower, drugs and equipments necessary for Primary Health Care and woefully inadequate training facilities (Government of India, 2007). The above considerations provide the rationale for the present paper which analyses the spatial distribution of health care facilities-public and private in the rural areas of Bihar. According to the 2011 population census, the rural population of Bihar was around 92.3 million which was distributed across 39,073 inhabited villages of varying population size. More specifically the present paper has the following objectives:

1. Study the inter-district variations in the distribution of health care facilities in the rural areas of the state.
2. Analyse the spatial inequality in the availability of public and private health care facilities across the villages of the state.

III. Data and Methodology : The only source of information about the availability of health care facilities at the village level is the District Census Hand Book (DCHB).

IV. Availability of Health Care Facilities in Villages of Bihar

According to the 2011 population census, there were 45,322 health care facilities – 22,266 public and 24,056 private - in the rural areas of Bihar which were distributed across 39,073 inhabited villages. This means that there were, on average, 119 health care facilities - public as well as private - available for every 100 inhabited villages in the state at the time of 2011 population census. There were, on average, 57 public health care facilities for every 100 villages whereas there were, on average, 62 private health care facilities for every 100 villages in the state. The availability of health care facilities, on average, varies by the size of the village. In village with population less than 1000, the availability of any health care facility was 106 per 100 villages compared to 151 per 100 villages in villages with at least 5000 population. In fact, availability of any health care facility in villages with at least 10 thousand population is 11 times more than that in villages with less than 500 population (Table 1). The inequality in the availability of any health care facility by population size is the distribution of any health care facility by population size is around 0.363 and is higher in case of public health care facilities (0.426) as compared to private health care facilities (0.305). When medicine shop and other private health care facility are excluded, the spatial inequality in the inter-village distribution of private health care facilities decreases further with a Gini concentration coefficient of 0.262.

Table 1: Distribution of health care facilities by the population of the village, Bihar, 2011

Population	Number of villages	Type of health care facilities							
		All		Public		Private		Private excluding medical shop and others	
		Number	%	Number	%	Number	%	Number	%
<500	6988	3204	6.9	1097	4.9	2107	8.8	785	9.9
500-999	7536	4528	9.8	1722	7.7	2806	11.6	1005	12.7
1000-1999	10076	8308	17.9	3698	16.6	4610	19.2	1576	20.0
2000-2999	5360	6815	14.7	3412	15.3	3403	14.2	1147	14.5

3000-3999	3027	4967	10.7	2609	11.7	2358	9.8	786	10.0
4000-4999	1741	3512	7.6	1931	8.7	1581	6.6	898	6.3
5000-5999	1180	2769	6.0	1486	6.7	1283	5.3	382	4.8
6000-6999	820	2397	5.2	1297	5.8	1100	4.6	293	3.7
7000-7999	522	1480	3.2	867	3.9	613	2.6	174	2.2
8000-8999	404	1425	3.1	710	3.2	715	3.0	192	2.4
9000-10000	290	1129	2.4	565	2.5	564	2.3	164	2.1
≥ 10000	1129	5788	12.5	2872	12.9	2916	12.1	890	11.3
Total	39073	46322	100.0	22266	100.0	24056	100.0	7892	100.0

Source: Author's Calculation based on DCHB data, Census 2011.

Although, total number of health care facilities – public or private – in the rural areas is found to be more than the total number of inhabited villages in the state, yet there were 25,909 (66 percent) villages in the state where there was no health care facility of any type. This means that in many villages of the state, there was more than one health care facility. Table 2 indicates that in 9,169 (23 percent) villages of the state, there was more than one health care facility. There were 30,367 (77.7 percent) villages where there was no public health care facility whereas there were more than one public health care facilities in 5,101 (13 percent) villages. On the other hand, there was no private health care facility in 31,266 (80 percent) villages but more than one health care facility in 4,921 (percent) villages. If medicine shops and other health care facilities are excluded, then there was no private health care facility in 36,924 (94.5 percent) villages whereas there was more than one private health care facility in 1,598 (4.1 percent) villages. This means that 46,322 health care facilities in the rural areas of the state enumerated at the 2011 population census were concentrated in only 13,164 villages (33 percent) - 22,266 public health care facilities were concentrated in only 8,706 villages whereas 24,056 private health care facilities were concentrated in only 7,807 villages. If medicine shops and other facilities are excluded then 7,892 private health care facilities were concentrated in only 2,149 (5.5 percent) villages of the state.

Table 2: Distribution of villages by the number of health care facilities, Bihar, 2011

Number of health care facilities in the village	**Type of health care facilities**							
	All		**Public**		**Private**		**Private excluding medical shop and others**	
	Number	**%**	**Number**	**%**	**Number**	**%**	**Number**	**%**
No health care facility	25909	66.3	30367	77.7	31266	80.0	36924	94.5
1 health care facility	3995	10.2	3605	9.2	2886	7.4	551	1.4
2 health care facilities	2281	5.8	936	2.4	1941	5.0	473	1.2
3 health care facilities	2178	5.6	2299	5.9	684	1.8	197	0.5
4 health care facilities	1246	3.2	253	0.6	906	2.3	232	0.6
5 health care facilities	947	2.4	822	2.1	274	0.7	111	0.3
6 health care facilities	908	2.3	767	2.0	274	0.7	407	1.0
≥ 6 health care facilities	1609	4.1	24	0.1	842	2.2	178	0.5
Total inhabited villages	39073	100.0	39073	100.0	39073	100.0	39073	100.0

Source: Author's Calculation based on DCHB data, Census 2011.

More specifically, there are 24 villages in the state where at least 7 public health care facilities were available whereas 6 public heath care facilities in 767 villages, 5 public health care facilities in 822 villages, 4 public health care facilities in 253 villages, 3 public health care facilities in 2,299 villages and 2 public health care facilities were available in 936 villages. If it can be ensured that only one public health care

facility, irrespective of the type of facility, is located in one village, then one public health care facility can be made available in 22,266 (57 percent) villages which means that, on average, there will be one public health care facility for every two villages in the state. In other words, a relocation of the already existing public health care facilities in the rural areas of the state can lead to a substantial reduction in the spatial inequality in the availability of public health facilities across villages which may lead to a substantially improvement in the physical access to public health care facilities which is an essential requirement for increasing the use services available at the public health care facilities. It is very much evident from table 3 that by adopting a spatial approach to locating public health care facilities, a significant improvement in the physical access to public health care facilities can be achieved in the state. Similarly, there were 31,266 (80 percent) villages where there was no private health care facility whereas in 1,390 villages, at least five private health care facilities were available which means that like the public health care facilities, the distribution of private health care facilities across villages is also highly unequal (Table 2). Moreover, the concentration of private health care facilities also increases with the increase in the village population size. Establishment of private health care facilities, it may be pointed out, is not based on any population-based norm as is the case with public health care facilities. Private health care facilities are established primarily by economic considerations so that they are concentrated primarily in large villages than in small villages.

Inter-district Variation in the Distribution of Health Care Facilities across Villages The distribution of health care facilities across villages is different in different districts of the state (Table 3). There are three districts - Banka, Rohtas and Jamui - where there was no health care facility in more than 80 percent villages in the district whereas in four districts - Khagaria, Sheohar, Madhubani and Purba Champaran - at least one health care facility was available in more than 50 percent villages with at least one health care facility in more than 65 percent villages in district Khagaria. This is in quite contrast to district Jamui where there was no public health care facility in more than 90 percent villages of the district. It is also clear from table 3 that in most of the districts of the state, no public health care facility was available in more than 70 percent villages.

Table 3: Villages without health care facility in districts of Bihar, 2011

District	Proportion (Per cent) of villages without health facility				Number of villages
	All	Public	Private	Private excluding medicine shop and others	
Araria	66.2	80.9	76.1	93.2	716
Arwal	66.6	76.3	79.9	95.3	299
Aurangabad	75.6	83.1	89.5	96.2	1742
Banka	80.7	89.2	88.8	97.3	1702
Begusarai	64.3	76.2	82.4	97.6	694
Bhagalpur	70.6	77.6	87.4	94.5	966
Bhojpur	63.6	75.3	79.7	92.3	997
Buxar	69.1	72.2	91.7	97.7	835
Darbhanga	56.9	74.5	71.6	92.2	1069
Gaya	76.7	82.7	90.6	96.6	2682
Gopalganj	73.8	87.9	81.7	96.3	1395
Jamui	86.7	90.8	92.5	98.3	1324
Jehanabad	71.3	78.6	85.8	98.7	541
Kaimur (Bhabua)	77.9	83.5	87.4	98.1	1337
Katihar	73.6	81.9	85.7	96.7	1306
Khagaria	34.7	44.9	60.0	82.4	245
Kishanganj	73.4	85.7	83.7	96.2	732
Lakhisarai	58.8	67.4	80.4	97.0	362

Madhepura	52.9	61.6	74.2	95.0	380
Madhubani	47.8	65.4	60.9	91.2	1040
Munger	68.9	76.8	88.2	97.4	534
Muzaffarpur	57.4	79.5	67.7	89.2	1719
Nalanda	55.4	66.7	76.4	89.4	1003
Nawada	67.0	75.8	68.4	93.5	955
Pashchim Champaran	60.9	70.8	80.4	94.5	1365
Patna	62.0	78.6	75.3	86.9	1264
Purba Champaran	47.9	63.5	69.6	93.8	1252
Purnia	79.6	80.3	99.0	99.7	1113
Rohtas	81.9	88.4	91.3	96.0	1717
Saharsa	57.5	69.0	72.8	97.3	445
Samastipur	53.9	69.4	70.1	95.7	1129
Saran	58.0	81.0	65.7	91.5	1570
Sheikhpura	60.2	62.8	89.3	93.9	261
Sheohar	36.6	67.0	43.5	88.0	191
Sitamarhi	55.1	67.5	70.5	95.8	808
Siwan	55.6	69.2	75.9	92.3	1435
Supaul	63.3	71.5	84.8	95.4	526
Vaishali	56.7	78.0	66.5	90.7	1422
Bihar	66.3	77.7	80.0	94.5	39073

Source: Author's Calculation based on DCHB data, Census 2011.

The inter-district variation in the availability of private health care facilities in villages is also quite marked. In district Purnia, more than 99 percent villages had no private health care facility whereas this proportion was less than 45 percent in district Sheohar. It is also evident from table 4 that in 19 districts, there was no private health care facility in more than 80 percent villages. If medicine shop and other facilities are excluded then there was no private health care facility was available in more than 80 percent of villages in all districts of the state. In general, number of health care facilities in the rural areas is more than the number of inhabited villages in most of the districts of the state (Table 4).

Table 4: Village level health care facilities in districts of Bihar, 2011

District	**Number of health care facilities**				**Number of villages**
	All	**Public**	**Private**	**Private without medicine shop and others**	
Araria	1097	492	605	133	716
Arwal	453	267	186	51	299
Aurangabad	2130	1458	672	289	1742
Banka	1023	485	538	191	1702
Begusarai	892	574	318	69	694
Bhagalpur	1137	781	356	144	966
Bhojpur	1227	654	573	262	997
Buxar	596	410	186	71	835
Darbhanga	1574	489	1085	343	1069
Gaya	1592	858	734	269	2682
Gopalganj	1274	492	782	175	1395
Jamui	520	287	233	54	1324
Jehanabad	648	409	239	21	541
Kaimur (Bhabua)	1251	781	470	102	1337
Katihar	1023	384	639	179	1306
Khagaria	795	467	328	127	245
Kishanganj	712	313	399	118	732
Lakhisarai	524	371	153	30	362

Madhepura	695	390	305	100	380
Madhubani	1891	709	1182	309	1040
Munger	383	204	179	47	534
Muzaffarpur	2097	630	1467	436	1719
Nalanda	1182	524	658	287	1003
Nawada	1508	784	724	289	955
Pashchim Champaran	1695	836	859	299	1365
Patna	2387	786	1601	958	1264
Purba Champaran	2396	1339	1057	240	1252
Purnia	325	299	26	10	1113
Rohtas	1328	810	518	211	1717
Saharsa	639	195	444	44	445
Samastipur	2113	1147	966	183	1129
Saran	1975	457	1518	538	1570
Sheikhpura	487	336	151	100	261
Sheohar	337	86	251	53	191
Sitamarhi	1722	900	822	129	808
Siwan	1767	711	1056	445	1435
Supaul	703	422	281	82	526
Vaishali	2224	729	1495	504	1422
Bihar	46322	22266	24056	7892	39073

Source: Author's Calculation based on DCHB data, Census 2011.

Table 5: Village level health care facilities in districts of Bihar, 2011

District	Number of facilities per village				Number of villages
	All	Public	Private	Private without medicine shop and others	
Araria	1.53	0.69	0.84	0.19	716
Arwal	1.52	0.89	0.62	0.17	299
Aurangabad	1.22	0.84	0.39	0.17	1742
Banka	0.60	0.28	0.32	0.11	1702
Begusarai	1.29	0.83	0.46	0.10	694
Bhagalpur	1.18	0.81	0.37	0.15	966
Bhojpur	1.23	0.66	0.57	0.26	997
Buxar	0.71	0.49	0.22	0.09	835
Darbhanga	1.47	0.46	1.01	0.32	1069
Gaya	0.59	0.32	0.27	0.10	2682
Gopalganj	0.91	0.35	0.56	0.13	1395
Jamui	0.39	0.22	0.18	0.04	1324
Jehanabad	1.20	0.76	0.44	0.04	541
Kaimur (Bhabua)	0.94	0.58	0.35	0.08	1337
Katihar	0.78	0.29	0.49	0.14	1306
Khagaria	3.24	1.91	1.34	0.52	245
Kishanganj	0.97	0.43	0.55	0.16	732
Lakhisarai	1.45	1.02	0.42	0.08	362
Madhepura	1.83	1.03	0.80	0.26	380
Madhubani	1.82	0.68	1.14	0.30	1040
Munger	0.72	0.38	0.34	0.09	534
Muzaffarpur	1.22	0.37	0.85	0.25	1719
Nalanda	1.18	0.52	0.66	0.29	1003
Nawada	1.58	0.82	0.76	0.30	955
Pashchim Champaran	1.24	0.61	0.63	0.22	1365
Patna	1.89	0.62	1.27	0.76	1264

Purba Champaran	1.91	1.07	0.84	0.19	1252
Purnia	0.29	0.27	0.02	0.01	1113
Rohtas	0.77	0.47	0.30	0.12	1717
Saharsa	1.44	0.44	1.00	0.10	445
Samastipur	1.87	1.02	0.86	0.16	1129
Saran	1.26	0.29	0.97	0.34	1570
Sheikhpura	1.87	1.29	0.58	0.38	261
Sheohar	1.76	0.45	1.31	0.28	191
Sitamarhi	2.13	1.11	1.02	0.16	808
Siwan	1.23	0.50	0.74	0.31	1435
Supaul	1.34	0.80	0.53	0.16	526
Vaishali	1.56	0.51	1.05	0.35	1422
Bihar	1.19	0.57	0.62	0.20	39073

Source: Author's Calculation based on DCHB data, Census 2011.

There are only 11 districts where the total number of health care facilities – public or private - in the rural areas of the district was less than the total number of inhabited villages in the district. On the other hand, there are only seven districts where total number of public health care facilities in the rural areas was more than the total number of inhabited villages in the district. Similarly, there were only 6 districts where total number of private health care facilities was more than the total number of villages in the district. However, if medicine shop and other facilities are excluded, then there is no district in the state where the number of private health care facilities in the rural areas was more than the number of villages in the district. The concentration of health care facilities – public or private – in a few villages also varies widely across districts. This concentration is the highest in district Khagaria but the lowest in district Purnia. In case of public health care facilities, the concentration is the highest in district Saran but the lowest in district Purnia whereas in case of private health care facilities, the concentration is the highest in district Purnia but the lowest in district Saran. It is obvious from table 5 that if the public health care facilities in the districts are re-located on the principle of at the most one public health care facility in one village, then the inter-village or spatial inequality in the availability of public health care facilities can be substantially reduce in all the districts of the state. The importance of adopting a spatial approach to locating public health care facilities is very much obvious from the analysis. In all districts of the state, there are villages where at least five of the seven public health care facilities were found to be located in the same village whereas no public health care facility was available in majority of the villages in the district. If it is ensured that there is only one public health care facility in one village, then there will be at least one public health care facility in all villages of seven districts of the state - Khagaria, Lakhisarai, Madhepura, Purba Champaran, Samastipur, Sheikhpura and Sitamarhi. Moreover, in district Khagaria, nearly all villages will have almost two public health care facilities.

V. Conclusions

The present analysis highlights the inequality in the availability of health care facilities- public and private – across villages in Bihar. The data available through the 2011 population census suggest that the total number of health care facilities in the rural areas of the state is higher than the total number of inhabited villages in the state but the available health care facilities are concentrated in selected villages only so that there is no health care facility of any type in almost two-third villages of the state. This means that a high degree of the spatial inequality in the distribution of the health care facilities across villages of the state is largely because of the concentration of health care facilities in selected villages and not because of the lack of the availability of health care facilities. The analysis suggests that if it can be ensured that there is only one public health care facility in one village, then the spatial inequality in the distribution of

health care facilities across villages can be reduced substantially. At the same time, regulating the establishment of the private health care facilities in the rural areas may lead to a drastic reduction in the spatial inequality in the availability of health care facilities across villages. The analysis calls for a spatial approach, especially for establishing public health care facilities to reduce the observed spatial inequality in the availability of health care facilities across villages. It must be ensured that more than one public health facilities are established in any village of the state.

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