

A Spatial-temporal analysis of Health care infrastructure in Haryana 1970-71 to 2010-11

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Abstract: Health is a basic need along with food, shelter, and education and is a precondition for productivity and growth. Health care infrastructures have a major influence on the well-being of individuals and societies, and are an important part of a nation's politics and economy. The present paper aims to analyze the spatial and temporal variation in health care infrastructure from 1970-1971 to 2001-2011. The present paper is based on secondary data. The statistical tools i.e. Karl Pearson correlation of coefficient method and t-test has been used for the present study. The main finding of the present paper is that there has been a considerable increase in medical institutions such as hospital, PHC, CHC, Sub-center and Dispensary.

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Key Words: Health, Infrastructure, Influence, Correlation coefficient, T-test.

Introduction:-

Health and development are closely related as health affects every aspects of life. i.e. our ability to work. Health is important because it is direct measure of human wellbeing. Health of human beings is directly related with human recourses development and economic development. According to WHO defines health as "a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity? The role of health care infrastructure cannot be undermined. It is well known that before the advent of new medical technologies, minor illness use of result of epidemics. Health care infrastructure has been referred to as the nerves center of the public health system. That's why it is the pertinent to study healthcare infrastructure of an area.

According to NRHM:-

- ❖ **Community health center (CHC) - 80000 to 120000 Populations.**
- ❖ **Primary Health center (PHC) - 5000 to 30000 Population.**
- ❖ **Sub center - 3500 to 5000 Population.**
- ❖ **Medical officer - 3500 Population.**

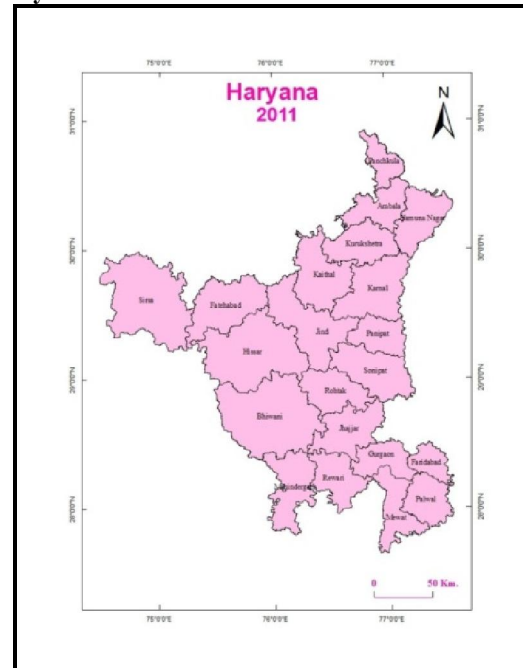
The present study has been aimed to analyses the spatial patterns of the availability of healthcare facilities, its decadal temporal change (1970-71 to 2010-11) and also correlates between population and available healthcare infrastructure.

Objective:

❖ To examine the spatial patterns of availability of health care facilities and their temporal change in Haryana.

❖ To study the relationship between population and medical institutions. .

Study Area:



The present study relates to the state of Haryana, which lies between 27°39' to 30°35' north latitudes and 74°28' and 77°36' east longitudes. It is situated in north-western part of India and is a part of Indo-Gangtic plain. The total area of the state is 44212 sq.km. It forms 1.3 percent of total area of the country and occupies the 21th position in area as compared with other states and union territories. Haryana state is bordered in a clockwise direction by Himachal

Pradesh in the north, Uttrakhand, Uttar Pradesh and Delhi in the east, Rajasthan in south and southwest and Punjab in the Northwest. In terms of physical features, it is bordered in in the northeast by the shiwalik hills. In the east, the river Yamuna makes the boundary between Haryana and Uttar Pradesh. In the north, the seasonal Ghaggar River forms part of boundary between Punjab and Haryana. In southwest is penetrated by the Arawalli range.

Data Base and Methodology:.

The data for the present study is collected from secondary sources i.e. data regarding medical institution have been collected from “Economic and Statistical Abstract 2011-2012”, published by

government of Haryana and data of population of Haryana have been obtained from Census of India 2011. Hospitals, Primary health centers, Dispensaries, Community health centers, Sub centers, Indicators are used. Following methods are used to analyses the data, simple statistical methods have been used. Karl Pearson correlation of coefficient method is used for analyses correlation:

$$r = \frac{\sum xy - \frac{\sum x \sum y}{n}}{\sqrt{\sum x^2 - \frac{(\sum x)^2}{n}} \sqrt{\sum y^2 - \frac{(\sum y)^2}{n}}}, \text{ T test:- } t = r \sqrt{\frac{N-2}{1-r^2}}$$

Results and Discussion:

Table 1 shows the number of hospitals, PHCs, CHCs, dispensaries and sub-centers in rural and urban Haryana from 1970-2011.

Number of health care facilities in Rural and Urban												
Year	Hospitals		PHC's		Dispensaries		CHC'		Sub center's		Total	
	R	U	R	U	R	U	R	U	R	U	R	U
1968-69	3	58	73	16	70	55	0	0	510	NA	656	129
1970-71	6	64	71	18	98	49	0	0	534	NA	709	131
1980-81	6	78	71	18	149	98	0	0	1060	NA	1286	194
1985-86	8	77	164	20	120	106	0	3	1894	NA	2186	206
1990-91	8	71	348	46	39	191	15	26	2293	NA	2703	334
1995-96	8	71	351	47	40	192	26	37	2299	NA	2724	347
2000-01	7	71	361	41	35	194	32	32	2299	NA	2734	338
2005-06	6	54	363	46	31	162	43	38	2433	NA	2876	300
2009-10	6	63	393	36	31	162	55	30	2465	NA	2950	291
2010-11	6	63	393	36	31	162	56	30	2465	NA	2951	291
2011-12	6	63	395	36	31	162	56	30	2465	NA	2953	291

Source: Based on Primary census Abstract 2011- 2012. (Rural-Urban), R- Rural, U-Urban.

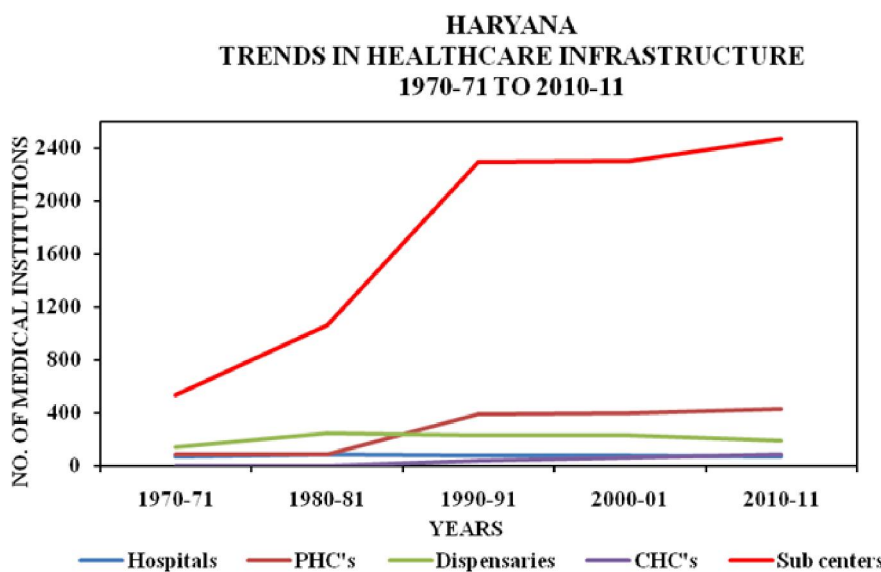


Figure 2 shows the trends in healthcare infrastructure in Haryana from 1970-2011.

Source: Based on Primary census Abstract 2011- 2012.

It shows that the number of hospitals has remained nearly same over the year which is about 70 hospitals in both rural and urban areas combined. The graph shows that the number of PHCs remained near 90 during 1970-80, after that is experienced an increase and jumped to 400 marks in the next decade and remained stable after that. It also depicts that the number of dispensaries has increased over these years with crossing the 200 mark in the 1980-81 period and then decreasing by a small number. Further the graph shows that the number of CHCs had been very low and there has not shown any remarkable improvement over the years. It can also be inferred from graph that number of sub-centers has increased constantly over the years reaching 2400 in 2011 from 400 in 1970. Sharp increase has been observed during the years 1980-90.

Table 2 shows the population in lakh being served per hospital, PHC, CHC, dispensary and sub-centers. It shows that Faridabad district has the highest population in lakh being served per hospital and Panchkula has the least. The population in lakh being served per PHCs is lowest in Mahendragarh and highest in Faridabad. Number of population in lakh served by CHCs is highest in Faridabad and least in Rohtak district. Kaithal and Faridabad districts have lowest and highest number of population in lakh being served by one sub-center respectively. It can be summarized that Faridabad district has poor healthcare facilities in Haryana.

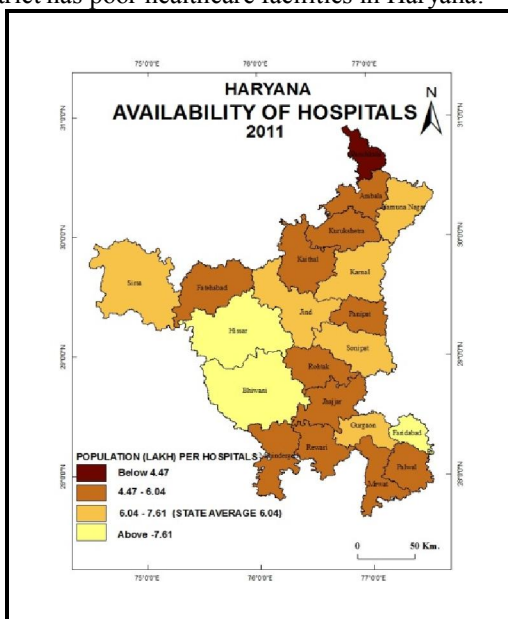


Figure 3 shows the availability of hospitals in various districts of Haryana in 2011. It can be inferred that districts of Hisar, Bhiwani and Faridabad has the least availability of hospitals while Panchkula being the highest. The poor condition of former districts can be attributed to the comparatively high population of

these districts. That is why even when the number of hospitals in these districts is nearly same but still Panchkula provides better healthcare facilities. Most of the northern states and southern states lie in the 4.47-6.04 categories.

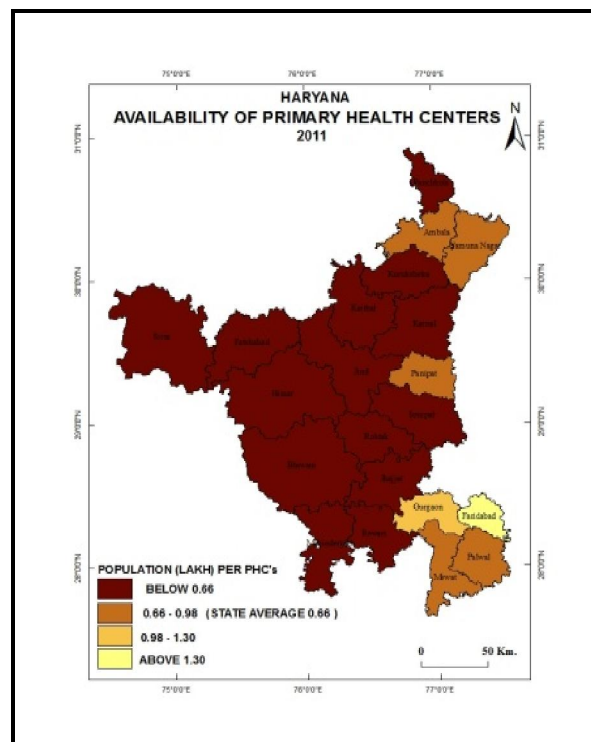


Figure 4 shows the availability of Primary Health Centers in various districts of Haryana in 2011. It can be inferred that districts of Faridabad has the least availability of Primary Health Centers. The poor condition of this district can be attributed to the comparatively high population of this district. Most of the districts in Haryana have less than 66,000 populations being served per PHC. It includes western, southern and central districts of Haryana. The north-eastern and south-eastern districts like Ambala, Yamunanagar and Palwal; Mewat has availability of PHCs near state-average which is 0.66. Gurgaon district also has lesser availability of PHCs below state average.

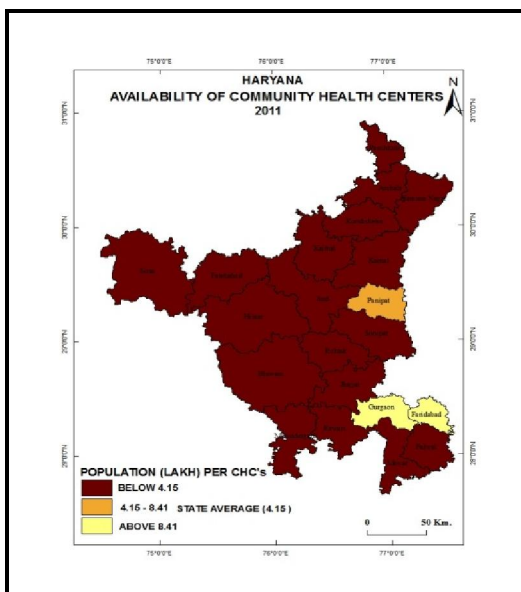


Figure 5 shows the availability of Community Health Centers in various districts of Haryana in 2011. It can be inferred that districts of Faridabad, Gurgaon has the least availability of Community Health Centers. The poor condition of this district can be attributed to the comparatively high population of this district. Panipat district has the availability of CHCs near state average which is 4.15. All the districts in Haryana except these three have less than 4.15 lakh population being served per CHC which is below state average. It includes most of the northern, central and south-western districts of Haryana.

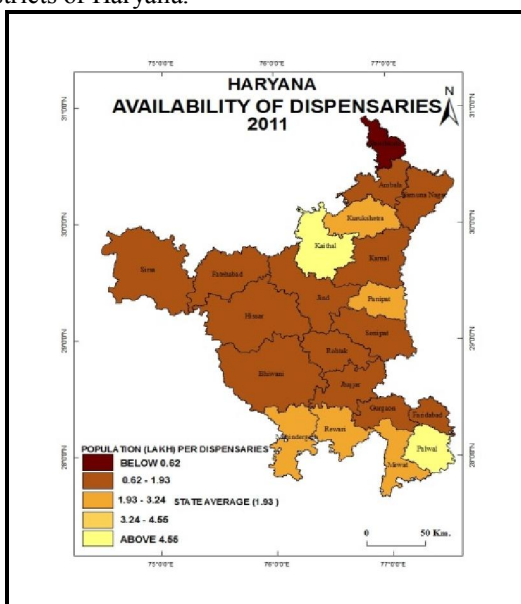


Figure 6 shows the availability of dispensaries in various districts of Haryana in 2011. It can be inferred

that districts of Palwal and Kaithal have the least availability of dispensaries. Population in lakh being served per dispensary is near about five lakh. Districts of Kurukshetra, Panipat, Rewari, Mahendergarh and Mewat have availability of dispensaries near state average which is 1.93. Most of the districts of central, western, northern have availability of dispensaries between 0.62-1.93. Panchkula district has the least number of people served by one dispensary which shows the good health care facility in this district.

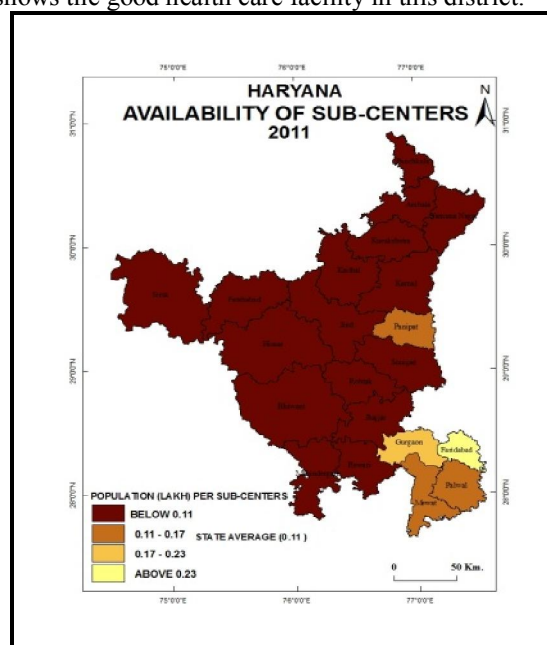


Figure 7 shows the availability of Sub Centers in various districts of Haryana in 2011. It can be inferred that districts of Faridabad, Gurgaon has the least availability of Sub Centers. Panipat, Mewat and Palwal districts have the availability of Sub-Centers near state average which is 0.11. All the districts in Haryana except these three have less than 0.11 lakh population being served per Sub Center which is below state average. It includes most of the northern, central and south-western districts of Haryana. The poor condition of south eastern districts can be attributed to the lack of development and high population in these areas.

Table 2

District name	Total population	Population per lakh	Population in lakh per hospital	Population in lakh per PHC	Population in lakh per CHC	Population in lakh per sub-center
Panchkula	558890	5.59	2.79	0.62	2.79	0.11
Rewari	896129	8.96	4.48	0.53	1.79	0.08
M.garh	921680	9.22	4.61	0.38	1.84	0.09
Fatehabad	941522	9.42	4.71	0.59	3.14	0.09
Jhajjar	956907	9.57	4.78	0.43	2.39	0.08
Kurukshetra	964231	9.64	4.82	0.46	2.41	0.09
Palwal	1040493	10.40	5.20	0.74	3.47	0.13
Rohtak	1058683	10.59	5.29	0.50	1.76	0.09
Kaithal	1072861	10.73	5.36	0.49	2.15	0.07
Mewat	1089406	10.89	5.45	0.84	3.63	0.13
Ambala	1136784	11.37	5.68	0.67	3.79	0.11
Panipat	1202811	12.03	6.01	0.75	6.01	0.13
Y. Nagar	1214162	12.14	6.07	0.67	3.04	0.11
Sirsa	1295114	12.95	6.48	0.54	3.24	0.09
Jind	1332042	13.32	6.66	0.49	2.22	0.08
Sonipat	1480080	14.80	7.40	0.51	2.47	0.09
Karnal	1506323	15.06	7.53	0.60	3.01	0.11
Gurgaon	1514085	15.14	7.57	1.26	15.14	0.21
Bhiwani	1629109	16.29	8.15	0.42	2.72	0.08
Hisar	1742815	17.43	8.71	0.50	2.18	0.09
Faridabad	1798954	17.99	8.99	1.80	17.99	0.32

Source: Census of India 20011, Primary Census Abstract, Registrar General of Census.

Table: 3.

Relationship between population and Total no. Of Healthcare infrastructure		
District Name	Population in Lakh	Total No. Of Health care Infrastructure
Panchkula	5.5889	77
Ambala	11.36784	132
Yamuna Nagar	12.14162	149
Kurukshetra	9.64231	137
Kaithal	10.72861	174
Karnal	15.06323	185
Sirsa	12.95114	188
Jind	13.32042	203
Fatehabad	9.41522	132
Hisar	17.42815	265
Panipat	12.02811	116
Sonipat	14.8008	212
Bhiwani	16.29109	283
Jhajjar	9.56907	157
Rohtak	10.58683	160
Mewat	10.89406	105
Palwal	10.40493	98
Rewari	8.96129	136
Mahendergarh	9.2168	136
Gurgaon	15.14085	98
Faridabad	17.98954	101
Correlation		0.54

Source: Census of India 2011, Primary Census Abstract, Registrar General of Census.

Table 3 shows the relationship between population and total number of healthcare infrastructure in Haryana in 2011. Bhiwani district has the most number of healthcare infrastructures in Haryana which is 283 and least being 77 in Panchkula district. Despite of this the healthcare facilities in Bhiwani are poor because of the high population and

due to low population of Panchkula there is better healthcare despite of low number of healthcare infrastructure. Similar scenario like Bhiwani is observed in Hisar. The correlation of relationship between population and healthcare infrastructure is equal to 0.54.

Table: 4

Correlation Matrix Between Population And Health Care Infrastructure							
Indicators		X ¹	X ²	X ³	X ⁴	X ⁵	X ⁶
Population	X ¹	1.00	0.50	0.45	0.66	0.20	0.47
Hospitals	X ²		1.00	0.37	0.50	0.28	0.38
PHC's	X ³			1.00	0.13	0.86	0.97
Dispensaries	X ⁴				1.00	-0.01	0.12
CHC's	X ⁵					1.00	0.85
Sub Center's	X ⁶						1.00

Source: Based on Primary census Abstract 2011- 2012.

Table 4 shows the correlation matrix between population and healthcare infrastructure. The indicators selected for correlation matrix in this table includes population, hospitals, CHs, PHCs, dispensaries and sub-centers. In this table the relation of an indicator is correlation with all other indicators including. It is observed that the correlation between dispensary and CHCs is negative and hence not significant. All other indicators have positive and significant correlation between population and healthcare infrastructure. .

Conclusion:-

The results of the present study reveals that increasing trends has been observed in the total number of medical institutions but slightly increasing trends found in PHC's, CHC's and drastic change also has been observed during 1980-81 in case of sub centers. Decreasing trends has been observed in dispensaries. poor availability of hospitals on one lakh population within the Hisar, Bhiwani, Faridabad, availability of PHC's is in Faridabad, availability of Dispensaries in Kaithal and Palwal, CHC's in Faridabad and Gurgaon, and sub center in Faridabad are in worst condition in case of medical infrastructure. Faridabad has poor facilities in all type of medical infrastructure. These districts have higher population which is responsible for poor health care facilities. In order to overcome this problem more number of hospitals and other medical infrastructure

should be opened in these areas. It is required that the number of health care infrastructures should be proportional to the population of the districts. The correlation between district wise population and number of medical institutions is 0.54. In cases the coefficient of correlation is moderately positive. But *t-test* of number of institutions (value 2.796) is significant at 10 percent level.

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