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Assessment of Health Infrastructure as a Major Asset in Rural Himachal Pradesh, 2001-2011

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Abstract: ***The present study is an attempt to understand the development ofhealth care facilities in rural Himachal Pradesh, 2001-2011. This study focuses on some important indicators of healthcare infrastructure such as rural population served by health institutions, rural area served by health institutions, patient treated per institution, beds per 1000 population, patient treated per family welfare centre, number of PHSCs covered by PHC and CHC in term of average area (km2) covered by PHSC and number of PHSCs covered by PHC and CHC in term of rural population covered by PHSC. These indicators help to determine the level of health care facilities developed in rural Himachal Pradesh. The main statistical tool used in present study is composite index which is an outcome of z-score. The distribution of healthcare facilities in rural area of Himachal Pradesh is uneven i.e. Shimla and Una shows highest position in the composite index of level of health care facilities which is followed by following districts Kullu, Chamba, Mandi, Bilaspur, Lahaul & Spiti, Hamirpur, Sirmaur, Kangra, Solan and Kinnaur***.

Keywords: Healthcare infrastructure, rural areas, z-score, composite index

1. Introduction

The health facilities are an essential part of social development. It can be divided in to two important categories viz. educational facilities and service infrastructure. Educational facilities includes all types of medical courses and educational institutions as well who delivered these courses; whereas service infrastructure involves all types of health institutions like primary health sub-centre, primary health centre, community health centre, T.B. clinics, dispensary, mobiles health clinic, availability of beds, medical practitioner etc. (National health profile, 2010). The present study is delimited with the availability of service health facilities in rural Himachal Pradesh.

The healthcare system of India is divided into three tiers structure that is based on predetermined population norms. The sub-centre is the first contact point for the rural folks and the primary healthcare system in the country. It is followed by primary health centres (PHCs) as a second tier of healthcare system in the country. These types of primary health centres are created to provide integrated curative and preventive healthcare to rural folks. Community health centres (CHCs) are forming the uppermost tier in healthcare infrastructure. These health centres are maintained and established by the state government under the minimum need programme and basic minimum service programme (India infrastructure report, 2007).

Himachal Pradesh is a mountainous state of north India which acquires special and special category status in Indian Territory. Its physiography becomes a barrier in dissemination and accessibility of health services. Therefore, the availability of health facilities in rural Himachal Pradesh is unevenly distributed and the inter-district variation in state becomes a challenging task for state and central governments.

2. Objectives of the Study

The objective of present study is to critically examine the spatial pattern of healthcare facilities in rural Himachal Pradesh in 2011.

3. Study Area

Himachal Pradesh is a mountainous state of India situated in north western Himalaya. Its geographical location lies in between the longitude and latitudes of 30° 22' 44" to 33° 12' 40"and 75° 45' 55" to 79° 04' 20" E. It extends from the Shiwalik hills in the south to the Great Himalayan range, including a slice of Trans-Himalaya in the north. It is characterized by the physiographic diversity with altitude varying from 300 m in plains of Kangra and Una to nearly 7,000m in Central Himalayan range of Lahaul and Spiti. It covers a geographical area of 55,673 km^2, which is about 1.69 percent total geographical area of India. Administratively, Himachal Pradesh is divided into 3 divisions, 12 districts, 55 sub divisions, 85 tehsils, 78 blocks and 17, 882 inhabited villages. In 2011, the population of the Himachal Pradesh was 68.65 lakhs, in which 34.82 lakhs male and 33.83 lakhs were females. The most important characteristic of the population distribution is that about 89.96 percent lives in rural Himachal Pradesh. The region is drained by five major rivers i.e. Satluj, Beas, Chenab, Yamuna and Ravi (Census of India, 2011).

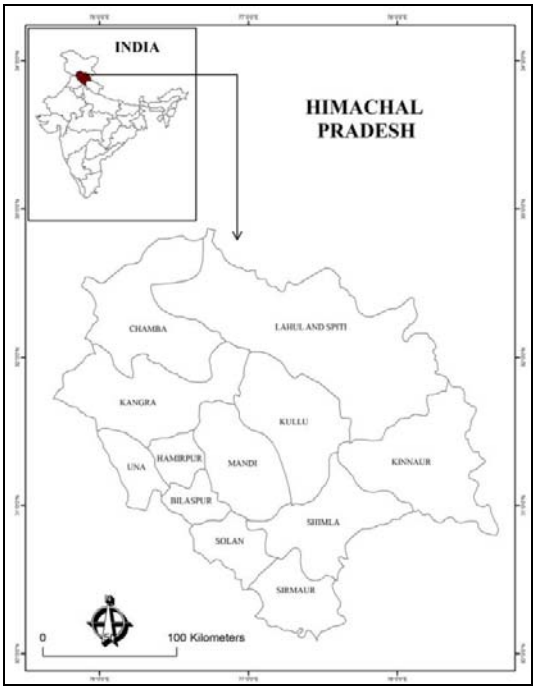

Figure 1

Himachal Pradesh is primarily an agrarian state where agriculture and horticulture are major economic activities. Tourism activities both religious and adventurous are the other major economic activities that play an important role in source of livelihood.The concentration of population is high in southern area whereas other areas are sparsely populated. The state is also vulnerable to the natural hazard i.e. earthquakes, flood, landslide and glacial lake outburst floods. The global warming is also a big challenge in front of the state; it has an adverse impact on agriculture belt of apple. The accessibility, availability, sustainability, quality and affordability of socio-economic and infrastructure development are the biggest challenges for state (Singh, 2014).

4. Database and Methodology

4.1 Database

Database of the present study is based on secondary sources. Various types of data are required for the fulfillment of the objectives of present study. Various sources have been used i.e.statistical abstract of Himachal Pradesh and village directory of Census of India, 2011. The data used in present study is rural population, no. of hospitals, allopathic, community health centre (CHC/RH), primary health centre (PHCs), total beds in every district, patient treated allopathic, Ayurvedic hospitals, health centre, no. of doctors nurses, patient treated in family welfare centre, sterilization no. of IUD, no of contraceptive (CC user) and no. of oral pill user. The above mention data is prepared by the Directorate of Health Services, and Directorate of Ayurvedic, H.P. and this data is compiled by the Department of Economics and Statistics, Himachal Pradesh in Statistical Abstract of Himachal Pradesh.

4.2 Methodology

The present study has used "Composite Index/score" as an important statistical tool to solve the research problem. A composite index/score is an index that shows the overall picture of the concerned problem and this problem is solved by selecting some important indicators. These indicators are decided in advance for the understanding the entire phenomena in a composite whole. Another key statistical tool of composite index is the "Z-score". The z-score is an outcome from the following formula, Z-score = X– $\overline{X}$ / S.D., Where, S.D. is standard deviation, X is the simple value of indicators and $\overline{X}$ is the mean of all the values of X. Maps have been prepared by arc gis 9.3 and quartile method is taken for the categorization of data.

5. Health Institution

The health institutions of Himachal Pradesh grouped into various types of categories by the Census of India, 2011 i.e. Community health centre, primary health centre, primary health sub centre, maternity and child welfare centre, T.B. clinic, hospital-allopathic, hospital-alternative medicine, dispensary, mobile health clinic, family welfare centre and other health institutions. The highest number of health institutions is concentrated in Kangra district; it is the only district in Himachal Pradesh where the number of total health institutions is more than one thousand and follwed by other districts like Mandi, Shimla, Chamba, Una, Solan, Hamirpur, Sirmaur, Bilaspur, Kinnaur and Lahaul & Spiti.

5.1 Rural Population Served by Health Institutions

Rural population served by a health institution is an important indicator to evaluate the availability of health facilities. This indicator is considered as negatively correlated with the availability of health facilities. Higher the population served by health institution lower will be the standard of health facilities and vice-versa. It means that if the population per health institution is small then the health facilities will be delivered efficiently; otherwise the management of health institution will be difficult. It is observed that Lahaul and Spiti is the district in which health institutes serves smaller population than other district. This district is followed by Kinnaur, Chamba, Bilaspur, Una, Kullu, Mandi, Shimla, Hamirpur, Kangra, Sirmaur and Solan.

It is also identified that there is a positive correlation between the population size served and number of health institutions. It means that the population size of any district also positively affect the number of health institutions of that area. The average population served by one CHC is 96501, PHC served 13339 populations and the smallest unit in three tier structure of health system PHSCs served 6220 population. As PHSCs are the smallest unit in health system, hence, we have taken the average population served by PHSC as a single unit to understand the average population served by all other tiers of health system. The average population served by a PHSCs, PHCs and CHCs is taken as an indicator to understand the availability of health facilities in rural Himachal Pradesh. The average population served by PHCs is more than twice than the population served by a PHSC whereas it is more than 15 times in relation to CHCs. Thus it is observed that one CHC is equal to 15.52 PHSCs and one PHC is equal to 2.14 PHSCs.

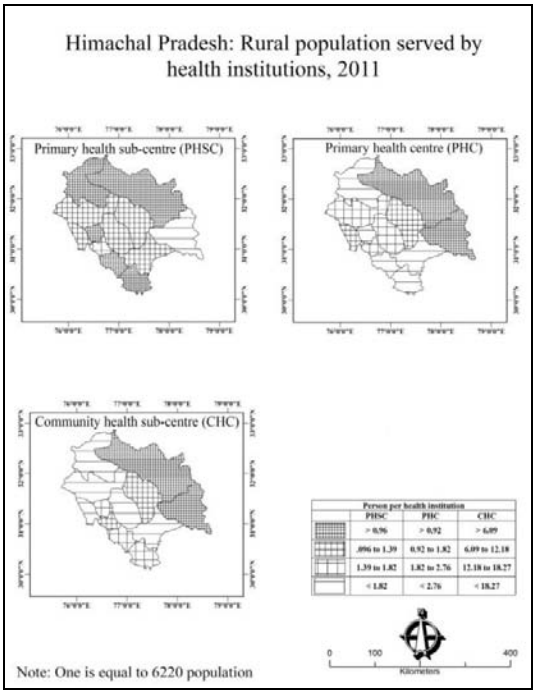

Figure 2

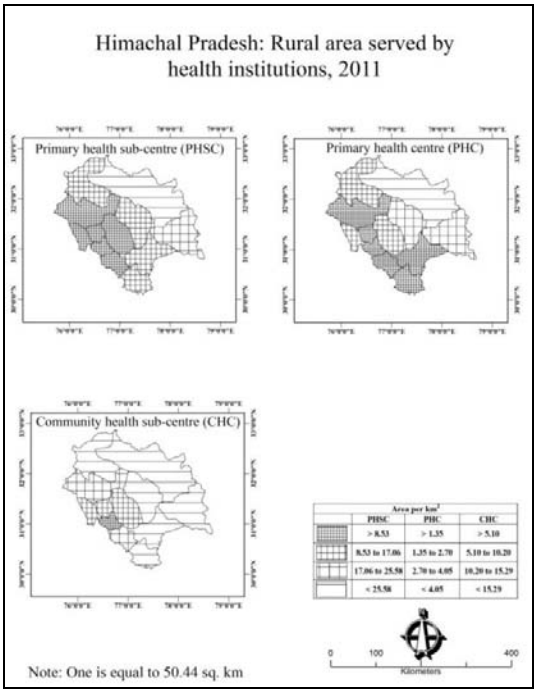

Figure 3

The average population covered by one CHC is highest in Kangra district followed by Mandi. These districts cover about 25 time larger population than the population under one PHSC. The population per institution in Kangra is highest. This type of situation raises a question mark on the efficient delivery of healthcare services because one doctor can handle only patients of doctor's threshold limits and beyond that it become as a burden. Contrarily, in Lahaul and Spiti and Kinnaur one CHC is equal to 1.27 and 2.25 PHSCs respectively. This is due to the fact that the population of these districts is exceptionally small than the other districts of the Himachal Pradesh due to extreme weather conditions and inhospitable terrain. The areas with low density of population acquire high position in term of health care facilities i.e. Kinnaur, Lahaul & Spiti and Chamba; and areas with high density of population shows reverse situation i.e. Shimla, Solan, Hamirpur, Kangra, Bilaspur and Mandi.

5.2 Rural Area Covered by Health Institutions

The rural area served by a health centre is an important indicator in the evaluation of health facilities in rural Himachal Pradesh. This indicator is negatively correlated with the availability of health facilities. Larger the area served by a health institution lower will be the accessibility of healthcare facilities and vice-versa. This can be positively correlated if the mean of transportation is highly developed. But the situation in developing countries like India is worsened especially in the hilly states like Himachal Pradesh where the mean of transportation is still not adequately developed.

The average rural area covered by one PHSC in the state is considered as a unit to measure the average area covered by PHCs and CHCs. One PHC in the state covered more than double the rural area as compare to the area covered by one PHSC; whereas the area covered by one CHC is more than 15 times than the area covered by a PHSC. There are wide spatial differences in the state in term of area covered by health institutions i.e. the districts like Bilaspur, Una, Hamirpur, Mandi, Solan, Kangra arethe districts where accessibility of health institution lies within the area between 9.77 to 27.26 km^2; whereas other districts like Sirmaur, Shimla, Kullu and Chamba the accessibility of health institution lies within the area between 53.63 to 102.85 km^2. Kinnaur and Lahaul & Spiti are the only two districts where the accessibility of health institution is above 256 to 814 km^2.The main reason for the lack of accessibility and availability of health institutions in Kinnaur and Lahaul & Spiti is the presence of rough terrain in the district; and these districts remains cut from rest of the India during winter season. Along with this, low density of population in these districts is a factor in better availability of health facilities.

5.3 Medical Practitioner

The availability of doctors in rural area is very important to understand the overall situation of the health facilities. It is positively correlated with the quality of health facilities in any area; more the number of doctors in any area greater would be health facilities in that area. Doctors play an important role in maintaining any region healthy and wealthy. The present study takes person per doctor as an indicator to understand the health facilities in Himachal Pradesh. This indicator is negatively correlated with the level of health facilities.

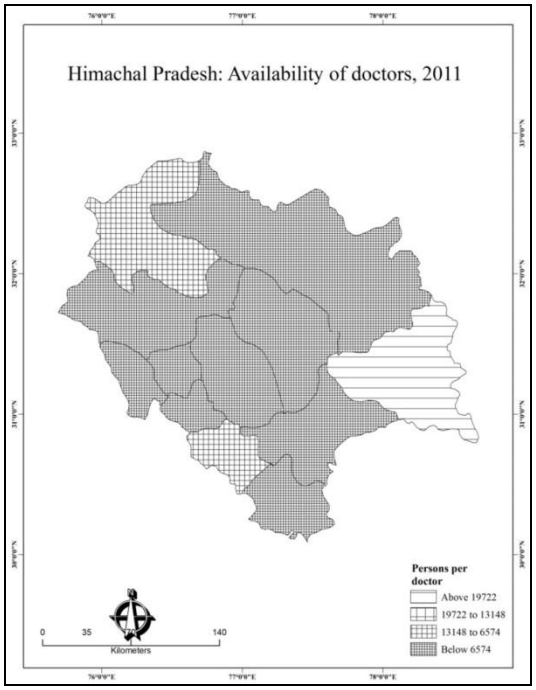

Figure 4

There is wide spatial variation in term of distribution of medical practitioner in rural area of the state i.e. Kangra, Una, Mandi and Hamirpur are the district having more than 100 medical practitioners. Kangra district have 536 medical practitioners and occupy first position in term of availability of medical practitioner in the state whereas, the availability of medical practitioner is less than 20 in Kullu and Kinnaur. They have only 17 and 3 medical practitioners respectively. The state average for persons per doctor is 3933. Kinnaur occupy first position in term of person per doctor; it is followed by Chamba, Solan, Mandi, Hamirpur, Una, Bilaspur, Sirmaur, Shimla, Kangra, Lahaul and Spiti and Kullu. It means that condition of health facilities in Kinnaur district is lowest in term of availability of doctors.

5.6 Availability of Beds

Availability of beds is an important indicator to learn about the health facilities in any area. It is positively correlated with the level of health facilities; larger number of beds available in hospitals indicates toward good quality of health facilities and vice-versa. The present study uses the indicator in term of beds per thousand populations. In the attainment of this figure various types of health institution are used i.e. mobile health clinic beds, nursing home beds, family welfare centre beds, dispensary/health centre beds, T.B. hospital/ clinic beds, maternity home beds, hospital alternative medicine beds and hospital allopathic beds.

There is an inter-district variation in term of beds availability i.e. Shimla is the only district in which about 2444 beds are available for rural patient; whereas district like Kangra, Mandi and Solan ranges from 527 to 970 total beds. Further, these districts are followed by Sirmaur, Chamba, Hamirpur, Kullu, Bilaspur, Kinnaur, Una and Lahaul & Spiti. However, in terms of beds per thousand populations, Lahaul & Spiti acquire first position largely because the concentration of population and the density of populationis low. It is followed by Shimla where beds per thousand populations are about 3.99 beds per thousand rural populations. These districts are further followed by Kinnaur, Solan, Sirmaur, Bilaspur, Hamirpur, Chamba, Mandi, Kullu, Kangra and Una.

Figure 5

5.7 Patient Treated Per Centre

Patient treated in rural Himachal Pradesh is taken as an important indicator to understand the overall picture of health facilities. The number of patient treated in health institutions is affected by several factors i.e. prevalence of disease, density of population, and presence of healthcare infrastructure.

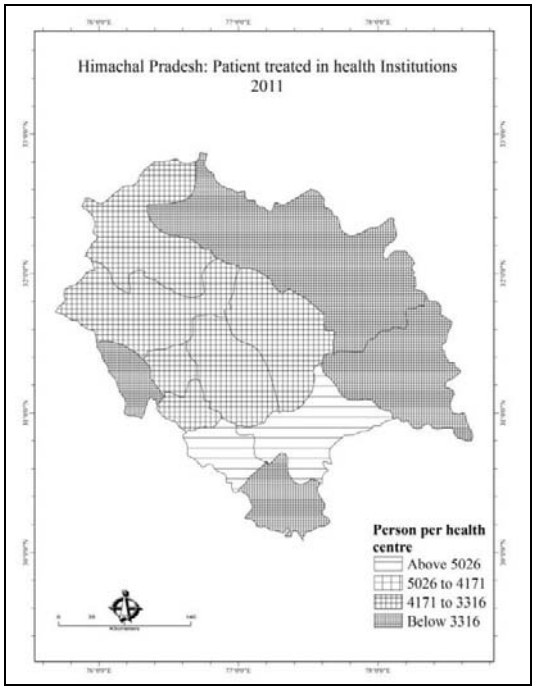

Figure 6

The absolute number of population treated in health institutions is considered as a positive symbol in term of healthcare services provides by the healthcare institutions. But it is considered as a burden when it crosses the threshold limit (patient holding capacity) of health institution. Therefore, this indicator is negatively correlated with the level of health facilities. Higher the burden of patient on healthcare facilities lowers the quality of health care facilities and vice-versa.

The average number of patient treated per health institution is 4159. The highest number of patients per institution treated in Shimla; it is followed by Solan, Bilaspur, Hamirpur, Kullu, Kangra, Mandi, Chamba, Sirmaur, Una, Kinnaur and Lahaul & Spiti. If we want to know the quality of healthcare facilities then we have to just reverse the sequence of above mention districts. Hence, the regions with low density of population lie in the category of high development and vice-versa.

5.8 Person Benefited from Family Planning Centres

The centres of family planning acquire a special status in this world where population increasing isconsidered as a burden on existing resources.Family planning centre provides various types of helps to eligible person i.e. information related with sterilization, intra-uterus device (IUD), contraceptives (CC) and oral pill uses etc. This indicator is positively correlated with the level of health facilities. Higher the person benefited from family planning centres more the population is control and vice-versa. The distribution of family welfare centres shows that Kangra got first position in term of family welfare centres in rural area. It is followed by Mandi, Bilaspur, Solan, Chamba, Una, Hamirpur, Sirmaur, Shimla, Lahaul & Spiti, Kinnaur and Kullu. Kangra is most populated district in Himachal Pradesh that is why it requires larger number of family planning centres than other districts; whereas district like Kullu, Kinnaur and Lahaul & Spiti are sparsely populated district and need not larger number of family planning centres. According to this indicator Kullu occupies first position; it is followed by Shimla, Hamirpur, Una, Mandi, Sirmaur, Chamba, Solan, Bilaspur, Kinnaur, Kangra and Lahaul & Spiti.

Figure 7

6. Conclusion

Health facilities are an essential requirement to live a healthy life; it became prime importance in the areas where the physiographic diversity is high. Himachal Pradesh is a land of physiographic diversity in which the accessibility of healthcare services is a challenging task for the government as well as private sectors. The inter-district variation in term of healthcare facilities is a common phenomenon in this state. The Shimla district acquires first position in term of health facilities in rural Himachal Pradesh. The availability of high level of healthcare facilities in this district is associated with many other factors i.e. density of population is very high, third largest population concentration, only class I town in the state and road density is also very high in this district. Along with this Shimla have third largest number of health institution, it acquire fifth position in term of population served by health institution and seventh position in term of rural area served by health institutions. The condition of Shimla in term of person per doctor is not so good; it is even below the state average whereas in term of beds availability and person benefited in family planning centres it got high ranks among other districts. The combinations of all these facilities in Shimla make it possible to get first position in term of health facilities. Una stands on second position in term of health facilities in rural Himachal Pradesh. It acquire a respectedposition in term of rural area served by the health institutions; its road density is very high that is why the accessibility of health care facilities in this district is satisfactory than many other districts of the state. It also got third position in Himachal Pradesh in term of patient treated per centre and fourth position in term of person benefited per family planning

centres. The condition of availability of beds per thousand populations is not so good in the district because it has sixth largest population concentration; whereas it account only 239 beds of all categories in the district.

Figure 8

Kullu maintains third position in term of healthcare facilities in rural Himachal Pradesh. It reserves first position in term of person per doctors and person benefited per family planning centre; whereas third in term of rural population served by health institutions. The rural area served by the health institutions in this district is comes on bottom level it is because of the lacks in other infrastructure facilities like road density. The road density in this district is only0.35 km per km^2. In term of healthcare facilities in rural Himachal Pradesh, this district is followed by Chamba, Mandi, Bilaspur, Lahaul & Spiti, Hamirpur, Sirmaur, Kangra, Solan and Kinnaur.

Kinnaur lies at bottom level in term of healthcare facilities in rural Himachal Pradesh because it got 11^{th} position in term of rural population served by health institutions, 10^{th} in rural area served by health institute, road density is only 0.16 km per km^2 area, 12^{th} position in term of doctors availability and person per doctor and in the last it occupies 10^{th} position among all districts in term of beds per thousand population. All these indicators make Kinnaur as a district with marginal healthcare infrastructure.

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