



# AVAILABILITY ASPECT OF HEALTHCARE ACCESS IN HUNSUR TALUK, MYSURU DISTRICT- A SPATIAL ANALYSIS

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Received: 02.02.2020

Accepted: 11.05.2020

Published: 23.05.2020

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**Citation:** Minutha V, Jayashree P. (2020). AVAILABILITY ASPECT OF HEALTHCARE ACCESS IN HUNSUR TALUK, MYSURU DISTRICT- A SPATIAL ANALYSIS. *Geo-Eye*. 9(1): 43-48. <https://doi.org/10.53989/bu.ge.v9i1.9>

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**Funding:** The research reported in this paper was supported by University Grants Commission from the Post-Doctoral Fellowship for Women (UGC-PDFWM), New Delhi

**Competing Interests:** None

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Published By Bangalore University, Bengaluru, Karnataka

ISSN

Print: 2347-4246

Electronic: XXXX-XXXX

## Abstract

*This paper aims to attempt the study of availability, accessibility and Infrastructure of public healthcare Facilities in Hunsur taluk, Mysuru District. It also tries to find out the gap between existing public health care facilities and normative requirement of public health care facilities as set by the government of India. The base map of study area has been geo-referenced and digitized using ARC GIS software. The Global positioning system (GPS) was adopted to take the coordinate of all the existing Public health centers in the study area. Data is analyzed through simple quantitative techniques like ratios, percentage and the spatial disparity of health centers were measured with the help of Nearest Neighbour Techniques. The results show that the availability of Public healthcare center is unequally distributed and there is scarcity in the availability of infrastructure and workforce among the study area. A large proportion of the residents have to travel a long way to access the health care facilities. There is a high inequality in the distribution of public Health centers, Health infrastructure facilities and Health Workforce in the hoblis of Hunsur taluk, Mysuru District. The Public Healthcare centers are not increasing with the population so there we can identify the gap between them. To reduce the imbalance in the health centres, the establishment of new health care centres should be based on structured criteria and geographical aspects, and there is need to improve the infrastructure of existing healthcare centers and increase the number of staffs in the study area for balanced regional development.*

**Keywords:** Availability; Accessibility; Nearest Neighbour Techniques; GIS and GPS

## Introduction

Access can be described as the 'degree of fit' between users and a service. The 'degree of fit' might be influenced by the availability, accessibility, accommodation, affordability and acceptability of a service<sup>(1)</sup>. The accessibility of healthcare centers is one of the most important indi-

cators for measuring the efficiency of a healthcare system. Accessibility is a complex indicator that reflects the number of health care institutions, their geographical distribution and the impact of different types of barriers social, Economic and culture<sup>(2)</sup>. Geographers are mainly concerned with geographical accessibility for

the calculation. The concern for equitable healthcare access to people is a basic element of many health policies. Governments have been committed to ensuring access to healthcare and success is highly dependent on the nature of existing inequality and in the healthcare needs of the people<sup>(3)</sup>. Thus, access to healthcare is a multidimensional concept that is subject to the influences of both the geographical, social and economic factors<sup>(4)</sup>. The service availability is another influencing factor for the geographical accessibility of healthcare<sup>(5)</sup>. Healthcare is concerned with all the issues that are related to the location and facilities. These issues include the optimal location of healthcare centers. GIS is a technique which provide a set of tools for describing and understanding the spatial distribution of healthcare facilities, evaluating accessibility and barriers to health care delivery of health facilities and Creating a map of health infrastructure. With this background this paper attempts to study, the Spatial distribution of public healthcare centers and their services in Hunsur taluk, to find out the gap between existing public health care facilities and normative requirement of public health care facilities as set by the government of India

### Study Area

Hunsur taluk it is one one of the seven taluk of Mysuru District in Karnataka. The study area geographically lies between latitude 12°31' North and longitude 76°29' east. The Taluk spreads across an area of 898 kms with an average elevation of about 792 meters. The area is bordered by K.R. Nagar taluk to the Northern part, H.D.Kote Taluk to the South and in the east by Mysuru, and Periyapatna taluk and Madakeri to the Western Side (Map.1). Totally, Hunsur taluk comprises of 4 Hobblis, 30 Gram Panchayaths, 1 town, 192 inhabited Villages, and 21 uninhabited villages. According to the Census of 2011 Hunsur taluk had a population about 2, 82,963 lakhs out of which males were 1, 42,946 and 1, 40,017 are females respectively. Total 65,584 families residing in Hunsur Taluk, among them 50,865 people lives in urban areas and 2, 32,098 populations are living in rural areas. The Average Sex ratio of Hunsur taluk is 980. The Total literacy rate of Hunsur Taluk is 67.03%. The male Literacy rate is 66.28% and the females literacy rate is 52.84% in Hunsur Taluk.

### Database and Methodology

The present study is based on both Primary and Secondary source data. The study was conducted hobliwise in Hunsur taluk of Mysuru district. The secondary related to public healthcare centres are collected from various offices like District Health Office and Taluk Health Office. The Spatial Data Such as, Toposheets of the study area at a scale of 1:50,000 are collect from Survey of India and to generate the spatial village maps involves the extraction of taluk and

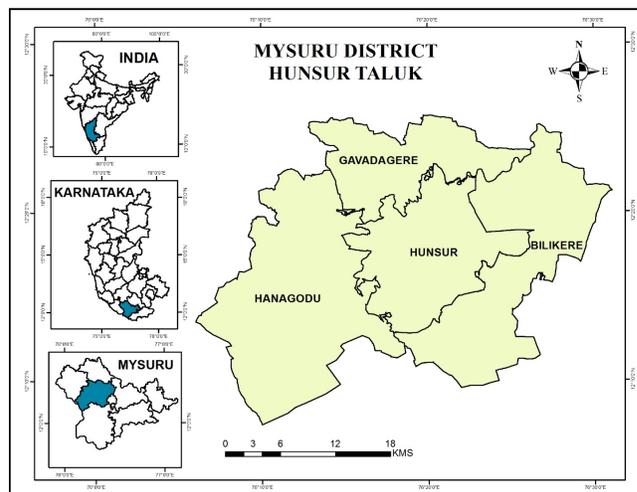


Fig. 1. Location of Hunsuru Taluk, Mysuru District

Hobli boundaries from topographical map. The base map of the study areas has been geo-referenced and digitized using ARCGIS software 10.3, to show the spatial distribution and accessibility of Public healthcare centers. The primary sources of data have been collected from field survey through the questionnaire related to infrastructure and health workforce facilities in the hospital and personal observation. The Global positioning system (GPS) was adopted to take the coordinate of all Public health centers in the study area. The collected information has been compiled and put in the form of maps and tables for further analysis. Data is analyzed though simple quantitative techniques like ratios, percentage and the spatial disparity of health centers were measured with the help of Nearest Neighbour Techniques. Various Maps have been generated to show the health care services in the study area.

### Results and Discussions

#### Availability and Accessibility of Public HealthCare Centres

The distribution of public healthcare facilities varies not only in rural and urban areas but also within rural and urban areas. Public Healthcare centers are providing health services to the people for promoting good health for all, but it depends on accessibility of healthcare centers. Therefore, Availability of the health centers are primarily effect on utilize of healthcare facilities. The Hunsur taluk had 4 hoblis encompasses 95 public health centers, which includes One Taluk Hospital, 21 Primary Healthcare centers,73 Health sub centers and 1 mobile health units. The Hobliwise distribution of Public healthcare centres and Ratios of Population has been shown in (Table 1 and Figure 2).



**Table 1. Hobli Wise Distribution of Public Healthcare Centers and Ratios of Population**

Sl. No.	Hoblis	Health Institutes				
		Population	No. of PHC's	PHCPopulation Ratio	No. of HSC	HSCPopulation Ratio
1	Bilikere	68594	6	1:11432	20	1:3429
2	Hunsur	106095	3	1:35365	21	1:5052
3	Gavadagere	41099	4	1:10275	15	1:2740
4	Hanagodu	67175	8	1:8397	17	1:3951
<b>Total</b>		<b>282963</b>	<b>21</b>	<b>1:13474</b>	<b>73</b>	<b>1:3876</b>

Source: District Health Office, Mysuru

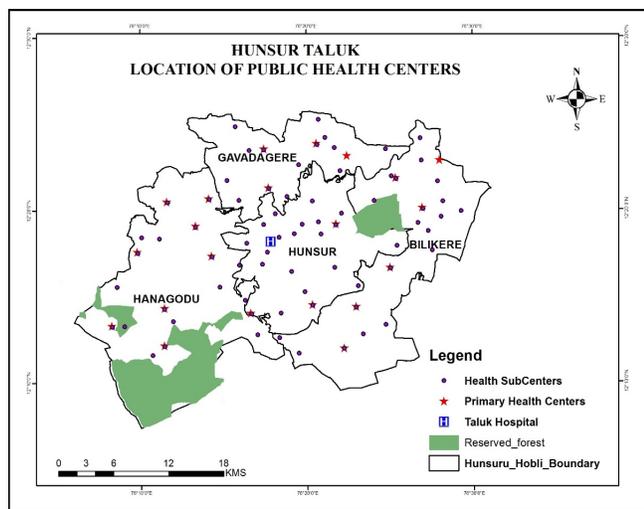


Fig. 2. Hobli Wise Distribution of Public Healthcare Centres

**Health Care Centres and Population Ratio**

As per Government of India, National Rural Health Mission (NRHM), the public health institutions in rural areas are to be upgraded from its present level of a set of standards called Indian Public Health Standards (IPHS). According to NRHM policy the population norms for the provision of Sub-Centres, PHC's and Community Health Centres in plain areas are suggested 5000, 30,000, 1, 20,000 people respectively, where as in the Hilly/Tribal regions it is 3,000, 20,000, 80,000 respectively. The (Table 1) shows the Hobliwise Distribution of Public HealthCare Centers and Ratios of Health Centers to the population. In the study area, 2, 82,963 populations are served by One Taluk Hospital, 21 Primary Health Centers and 73 Health Sub Centers. The Community Health Centre is not located in Hunsur taluks, as the city has got general hospital, which can cover all the facilities of community health centre.

The High concentration of PHCs are located in Hanagodu Hobli (8), serving the population ratio of 1:8397, followed by Bilikere hobli (6), serving the population ratio of 1: 11432. The lowest concentration of PHC's is located in Gavadagere Hobli (4) and Hunsur Hoblis (3) with serving population ratio is 1:10275 and 1:35365 respectively. PHC's it acts as a referral

unit for 6 Sub-Centres, it reveals that, the each PHC is serving to a population ratio of 1:13474 persons. The highest and lowest numbers of Sub Centers are located in Hunsur Hobli (21) and Bilikere Hoblis (20) with serving population ratio of 1:5052 and 1: 3429 respectively. Followed by Hanagodu Hobli (17) with serving population ratio of 1:3951 and the lowest concentration of HSC's is located in Gavadeagere hobli (15) with serving population ratio is 1:2740, it reveals that, the each HSC is serving to a population ratio of 1:3876 persons. Though it shows there is regional imbalance in the distribution of Public healthcare centres among hoblis of the Hunsur taluk.

**Health Infrastructure and Workforce Ratio**

As per National Rural Health Mission (NRHM) highlights the healthcare facilities available at different levels namely, Primary and Sub health centers levels in terms of health services, workforce and infrastructure facilities. The Responsibility of healthcare centers is in two folds, providing skilled medical staff in the healthcare centers and Realization of Millnnium Developed Goals of improving healthcare facilities to reduce the different kinds of diseases. By primary survey and observation in context of availability of workforce and health infrastructure facilities of 21 Primary Health Centers and 73 Health Sub Centers of the study area are discussed here. In this survey availability of health workforce and health infrastructure like weighing machine, Blood Pressure instrument, steam sterilizer, labour room, wards, OPD, laboratory facility and with their own building, having public utilities like (electricity, drinking water, vehicle and toilets) are included to identify the shortcoming of physical infrastructure facilities with regards to recommended norms have been discussed under the following subheads.

The below (Table 2) shows the of availability of health workforce and health infrastructure facilities of PHCs of the study area are discussed here. In this survey availability of workforce like doctors, nurse, Asha and infrastructure facilities like beds wards, Equipments etc., are included.

The Primary Health Centres are the first contact point of medical persons with the community. It acts as a referral unit for 6 Sub-Centres and refers out cases to CHC and higher order public hospitals located at taluk and district level.



**Table 2. Ratios of Population and Health Workforce**

Sl. No	Hoblis	Population	Doctors		Nurse		Asha	
			No	Ratios	No	Ratios	No	Ratios
1	Bilikere	68594	5	1:13718	5	1:13718	52	1:1319
2	Hunsur	106095	3	1:35365	4	1:26523	30	1:3536
3	Gavadagere	41099	3	1:13699	2	1:20549	34	1:1209
4	Hanagodu	67175	6	1:11196	3	1:22392	49	1:1370
Total		282963	17	1:16644	14	1:20211	165	1:1714

Source: Field Survey & Compiled by Author

But, CHCs are not available in the study area. However, as the population density in the country is not uniform, the number of PHCs would depend upon the case load<sup>(6)</sup>. The PHC essential of health workforce is one medical officer, 3 staff nurses, one paramedical and four other staffs. The above (Table 2) shows that, Hobliwise distribution of health workforce of the PHC's and ratio's of Health Services to the Population. Among the 4 hoblis in that high concentration of Health Workforce Observed in Bilikere hobli having (5) Doctors serving the population at the ratio of 1:13718, (5) Nurse with 1:13718, and (52) Asha worker with 1:1319 ratio. Followed by Hanagodu Hobli (6) Doctors serving the population at the ratio of 1:11196, (3) Nurse with 1:22392 and (49) Asha worker with 1:1370 ratios. Respectively, Hunsur hobli having (3) Doctors serving the population at the ratio of 1:35365, (4) Nurse with 1:26523 and (30) Asha workers with 1:3536 ratio. The lowest concentration of Health workforce observed in Gavadagere hobli consists with (3) Doctors serving the population at the ratio of 1:13699, (2) Nurse with 1:20549 and (34) Asha workers with 1:1209 ratio respectively. It can be observe in the above (Table 2), though there is high population but the availability of Health workforce are less according to IPHS norms.

The essential physical infrastructure facilities at PHCs should have 6 beds, with adult weighing machine, Blood Pressure instrument, steam sterilizer, labour room, wards, OPD, laboratory facility and with their own building, having public utilities like (electricity, drinking water, vehicle and toilets). The Table 3 shows that, Hobliwise distribution of health Infrastructure facilities available at PHC's and ratio's of Health Services to the Population. Among the 4 hoblis in that high concentration of Health Infrastructure Observed in Hanagodu hobli having 8 PHCs with (41) Beds serving the population at the ratio of 1:1638, (6) Wards, 11 weighing machine and 11 Bp Monitor, one Wheel Chair, one Trolley and one functional vehicle is available. All the 4 PHCs possess own building, steam sterilizer, labour room, wards, OPD, laboratory facilities, one functional vehicle and public utilities like (electricity, drinking water, and toilets) are in working condition. Remaining 4 PHCs are rented building and the infrastructure facilities were not in good condition. Followed by Bilikere Hobli having 6 PHCs with (36) Beds

serving the population at the ratio of 1:1905, (6) Wards, 5 weighing machine and 9 Bp Monitor among them 2 Bp Monitor is not in working condition. In Bilikere hobli among 6 PHCs 4 PHCs possess own building remaining 2 are rented building, wards, OPD, facilities and public utilities are not in working condition and one functional Vehicle, one wheel chair is available. Respectively, Gavadagere hobli consists of 4 PHCs with (22) Beds serving the population at the ratio of 1:1868 (2) Wards, 5 weighing machine 5 Bp Monitor, one wheel chair, one trolley and one functional vehicle is available. Among 4 PHCs, 2 PHCs possess own building another 2 Rented building, steam sterilizer, labour room, wards, OPD, laboratory facilities, one functional vehicle, and public utilities like (electricity, drinking water) are in working condition in 2 PHCs only. The health infrastructure of Hunsur hobli consists with 3 PHCs with (14) Beds serving the population at the ratio of 1:7578 (1) Wards, 6 weighing machine, 10 Bp Monitor and two functional vehicle available. Among 3 PHCs 2 PHCs possess own building, another one Rented building, steam sterilizer, labour room, wards, OPD, laboratory facilities, two functional vehicle, and public utilities like (electricity, drinking water and toilets) are in working condition in 2 PHCs only. It can be observe in the above (Table 3), though there is high population in the study area but the availability of Health Infrastructure facilities are less according to IPHS norms.

Health sub-centres are basic or pre-primary health and medical care service centres at the grassroots level. The staffs of the unit are managed by a male health worker and an auxiliary nurse and mid-waves in each sub-centre to provide curative health/medical services and join the national programmes. The work of these staff members consists of house to house visits for collecting vital statistics of all families and to communicate the health related programmes under the direction of medical officers of the concerned primary health centre-unit. In addition to that they give the treatment for minor ailments, health education in respect of common communicable diseases, family welfare, immunization, vaccination etc. with adequate field staff. These sub-centres are expected to show progress in each month in programmes that are envisaged by each sub-centre. Totally, Study area comprises 73 Health Sub Centre among



**Table 3. P opulation and Health Infrastructure**

Sl. No	Hoblis	Population	Equipments						
			Beds		Wards	Bp Apparatus	Weighing Machine	Vehicle	Wheel Chair, Trolley, etc
			No	Ratios					
1	Bilikere	68594	36	1:1905	6	9	5	1	1
2	Hunsur	106095	14	1:7578	1	10	6	2	7
3	Gavadagere	41099	22	1:1868	2	5	5	1	2
4	Hanagodu	67175	41	1:1638	6	11	11	1	2
Total		282963	113	1:2504	15	35	27	5	12

Source: Field Survey & Compiled by Author

them 22 HSCs have their own building and remaining they are functioning under rented building. On an average 24.71 percent sub-centers are running in their own building, while 75.29 Percent are running under rented building. In the study area, Most of the Sub-centers have depend on bore well but some of that is not working in the places like Hirekyanahalli, Karimuddanahalli, Doddahahejjur and Thattekere; other sub-centers have hand pump for water supply. Totally, 60% of the sub-centers have hand pump, 20% of the sub-centers depend on well and remaining 10 % sub-centers do not have water supply in their premises, So they want to travel for water. All Sub-Centers do not have telephone connection, electric facilities and water supply only 60% of sub-centers have electricity connection, telephone and water supply.

**Nearest Neighbour Techniques :** The Spatial distributions of health centers are unevenly distributed in the study area. In the present study Nearest Neighbour Technique has been used to observe how these health centers are distributed in Hunsur Taluk. The ‘Nearest Neighbour method, was firstly developed by two botanists, Clark and evens 1954, they have used this techniques to measures the pattern of incidence of different species of plants in a region. Later on, geographers have widely used this technique in order to study the distributional pattern of the places and other phenomena in different geographical regions of the world. As a result, this technique has been used in research to study the Geographical distribution of health centers in the study area. The following formula is as:

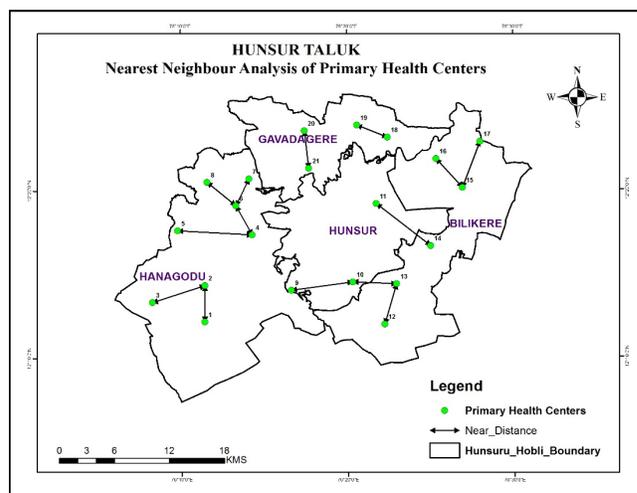
$$Rn = 2\bar{d}\sqrt{\frac{n}{A}}$$

Where: Rn = The description of the distribution

n = The number of points (Health Centers) in the study area

By using this formula, Rn values for Four Hoblies of the taluks have been calculated.

The Nearest Neighbour analysis statistics for all four hoblies of Hunsur taluk were derived from the distance between nearest health centers. The Rn Value of the study area is 1.1929, it shows that these health centers are randomly distributed, these can be observed in the Map no 3. Since



**Fig. 3. Nearest Neighbour Analysis of Primary Health Centers**

**Table 4. Hobliwise Rn Values of Health Centers in Hunsur Taluk**

Sl. No	Hoblis	Rn Value	Pattern
1	Bilikere	1:8536	Ran- domly Distributed
2	Hunsur	1:2838	
3	Gavadagere	1:7761	
4	Hanagodu	1:1745	
<b>Total</b>		1.1929	

Source: Compiled by Author

south western part of the taluk is forest region, So a large proportion of the residents have to travel a long way to access the health care facilities.

### Conclusion

This study investigated spatial accessibility to Public health care facilities in Hunsur Taluk of Mysuru District. The Study reveals that, the spatial distribution of public Health centers, which were not evenly distributed across the study area. The hobliwise distributions of Public healthcare centers are vary from one hobli to another. Public Healthcare centers are not increasing with the population so there we can identify the



gap between them. In the study area the Public health care centers are randomly distributed (Table 4), the Rn value of the health centers in the taluk is 1.1929. To reduce the imbalance in the distribution of public health centers, the establishment of new health care centers should be based on structured criteria and geographical aspects. These health centers are the mirror of the rural mass in the study area. Availability and affordability of means of transport is important factor for utilizing the health services. So, there is a need to give more importance on the development of transport network in Hunsur taluk. Since south western part of the taluk is forest region, a large proportion of the residents have to travel a long way to access the health care facilities. So there is need to establish more mobile health units to provide service to its people in their region at doorstep. In addition to this there is scarcity in the availability of Health Workforce and Health infrastructure in the study area. The proportionate ratio between health workforce and population is in imbalance, because the rate of increase in population is greater than that of increasing rate of health workforce. Thus there is need to improve the infrastructure of existing healthcare centers and increase the number of staffs in the study area for balanced regional development. Majority of the government health centers are not having clean portable water. So, the study recommends that, to provide clean water for health seekers. In fact, health's institutions are dissemination of education of cleanliness but the institutions itself are not having the facility

of portable drinking water. The use of advance GIS tools has proved to be boon to the researchers and planner to visualize and conceptualize the health plans and policy. And also the public health administrators are at the advantage of saving time and resources by application of such tools.

## Acknowledgment

The research reported in this paper was supported by University Grants Commission from the Post-Doctoral Fellowship for Women (UGC-PDFWM), New Delhi.

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