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# Spatial Distribution of Public Healthcare Centers: A Case Study of Bidar District

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## Abstract

Human health plays an important role in the development of the region or the country. Health care system of any country or region has an important role to play for the sustainable health management. In this paper an attempt has been made to study the spatial distribution of public healthcare centers and their services in Bidar District. As a result, the present paper aimed to identify the served and unserved area by the health centers based on their functions. At present, totally there are 70 public health centers in the study area and each health centers has different types of structure and functions and served area of various sizes. So, there is a need to study the public health center, their function and served and unserved areas of each health centers to reduce the gaps and take into the consideration of unserved areas by proposing new healthcare centers in the study area. The Secondary data related to health care centres are collected from various offices like District Health Office and Taluk Health Office. 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 simple Euclidean buffers are mapped and analyzed to define the service area. The results show that the availability of healthcare centers are unequally distributed among the study area.

**Keywords:** Spatial; Health centers; Euclidean Buffer; GIS; GPS

## 1 Introduction

The spatial distribution of health center is required to enhance optimization of effectiveness and resources utilization among service providers. The study of regional variations in the distribution of social services (like healthcare) has captured the interest of geographers, planners and other scientists because of their general interest in the spatial variation of phenomena on the earth's surface.

In particular, the question of access to sources of human need or want satisfaction stresses the importance of location and distance. When dealing with problems of space, mapping is a geographical research tool used to compare the spatial distribution of a set of features to a hypothetically based random spatial distribution. These spatial distributions are of interest to many areas of geographic research because they can help to identify and quantify patterns of features in space

so that the underlying cause of the distribution can be determined. Spatial techniques GIS is a technology with unique and valuable application for planners, geographers, social scientist and in many fields. So, GIS is becoming increasingly popular in health care research in recent years.

### 1.1 Objective

This paper describes the spatial distribution of public health-care centers and their services in Bidar District. As a result, the present paper aimed to identify the served and unserved area by the health centers based on their functions.

### 1.2 Study area

Bidar District is a top of hill city located on the Deccan Plateau, in the northeastern part of Karnataka State in India. Bidar District lies between  $17^0$  to  $35^1$  N to  $18^0$  to  $25^1$  N Latitude and from  $76^0$  to  $42^1$  E to  $77^0$  to  $39^1$  E Longitudes. Bidar District covers an area of 5448 sq.km and accounts for 2.84% of the state's total geographical area. It's bordered by Nanded and Osmanabad District of Maharashtra state on the Northern side, south by Gulbarga District of Karnataka state, Latur and Osmanabad Districts of Maharashtra state, on the western side and Nizamabad and Medak districts of Andhra Pradesh State on the eastern side. Totally, Bidar District consists of five taluks, such as, Aurad, Basavakalyan, Bhalki, Bidar and Humnabad with 30 hoblies, 175 Grama Panchayaths, 7 towns 6 Municipalities and Bidar being the head quarters of the district. District consists of 621 villages, out of which 599 inhabited and 22 uninhabited villages. As per 2011 census, the population of the Bidar district is 1,703,300 of which male and female were 870,665 and 832,635 respectively.

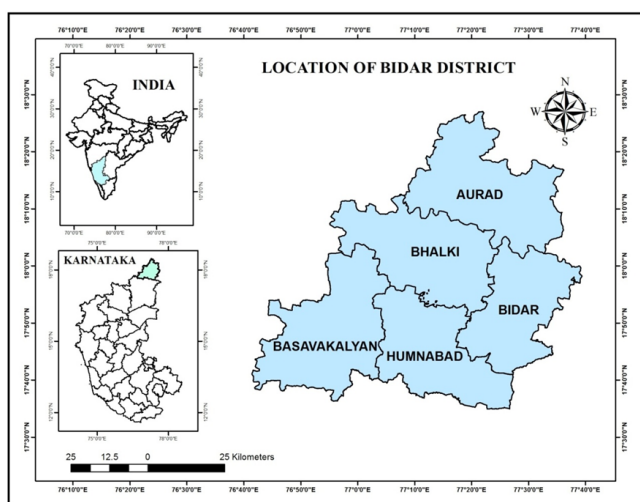


Fig. 1. Location Map of Bidar District

## 2 Methodology

The study was conducted in five taluks of Bidar district. The Secondary data 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 boundaries from topographical maps. The base map of the study area has been geo-referenced and digitized using ARC GIS software 10.3, to show the spatial distribution and accessibility of public healthcare centers. The Data for the study were collected from primary sources also. The Global positioning system (GPS) was adopted to take the coordinate of all the existing 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

## 3 Results and Discussions

### 3.1 Spatial Distributions of Public healthcare Centers in Bidar District

The Existing government healthcare centres can be organized in different hierarchical order as the Health Sub Centre, Primary Health Centre including Community health care, General Hospitals and District Hospital. They are located on the basis of economic feasibility and requirement of the people. The spatial distribution of healthcare centres of Bidar District has been analyzed for all five taluks. The uneven distribution of health centres is observed even at micro level not only between the regions but within the region also depending up on the necessity of the health care centers and for the people. So far as the public healthcare centers of the Bidar district is concerned, it comprises of one District Hospital, Four General/Taluk hospitals, 57 Primary Health Centres out of that 33 are working 24x7 and 8 Community Health Centres. The distribution of Public healthcare centres as been shown in the following Table 1 and Figure 2.

The Present hospitals system varies in size and kinds of medical care services, where one can get all types of treatments that are needed by a patient. In the study area, the existing public healthcare centers can be structured in different hierarchical order to study the optimum use of available resources in different health centers.

### 3.2 Health Care Centres and Population Ratio In Bidar District (2011)

According to 2011 census the total population of Bidar district was 1703300. As per NRHM norms in Bidar district reveals that, the existing number of health institutions each community hospital serves 2,43,328 populations, whereas each PHC is serving to a population of 29882 persons and the

**Table 1. Spatial Distribution of Public Healthcare Centres in Bidar District**

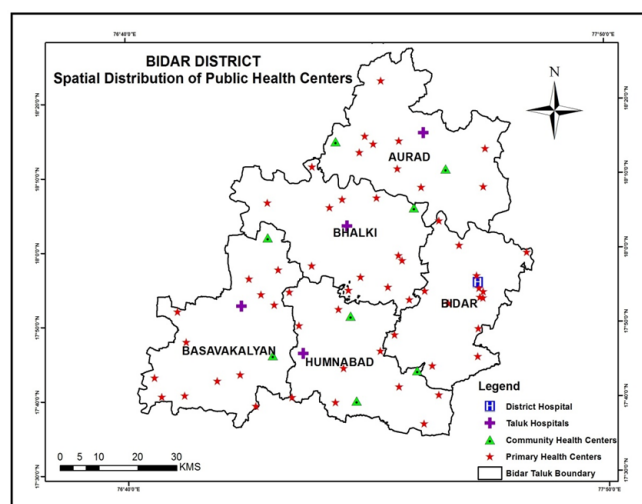
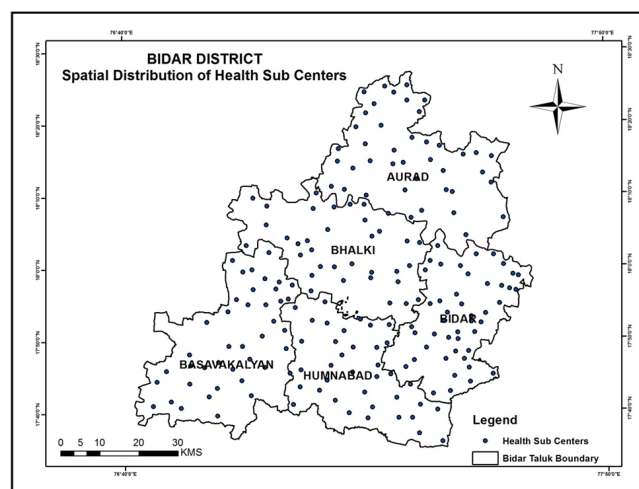
Sl. No.	Taluks	Population	Health Institutes				
			District Hospi- tal	Taluk Hos- pitals	CHC	PHC	HSC
1	Aurad	278400	0	1	2	9	58
2	Basavakalyan	345247	0	1	2	12	55
3	Bhalki	277350	0	1	1	12	54
4	Bidar	469941	1	0	0	14	54
5	Humanabad	332362	0	1	3	10	54
<b>Total</b>		1703300	1	4	8	57	275

Source: District Health Office, Bidar District 2019

**Table 2. BIDAR DISTRICT: Ratios of Population and Health Centres Services - 2011**

Sl. No	Taluks	Population	CHC	CHC/Population Ratio (1:1,20,000)	PHC	PHC/Population Ratio (1:30,000)	Sub Centre	Sub Centre/ Popula- tion Ratio (1:5,000)
1	Aurad	2,78,400	2	1:1,39,200	9	1:30,933	58	1:4800
2	Basavakalyan	3,45,247	2	1:1,72,623	12	1:28,770	55	1:6277
3	Bhalki	2,77,350	1	1:2,77,350	12	1:23,112	54	1:5136
4	Bidar	4,69,941	0	0	14	1:33,567	54	1:8703
5	Humanabad	3,32,362	3	1:1,66,181	10	1:33,236	54	1:6155
<b>Total</b>		17,03,300	8	1:2,43,328	57	1:29,882	275	1:6194

Source: Field Survey and Compiled by Author

**Fig. 2. Spatial Distribution of Public Healthcare Centers****Fig. 3. Spatial Distributions of Health Sub Centers**

Sub Centres available in the district serving the population of 6194 persons. It reveals that, the study area had less numbers of health institutions when compared to NRHM norms. The below Table 2 shows, the ratios of population and Public Health Centres in Bidar district.

### 3.3 Served and Unserved Areas by the Public Health Care Centers (Phc's)

Buffer analysis has been used to show the served and unserved area for PHC's in the study area. It has been used to identify the villages within a given buffer limit of facility. Euclidean buffer is drawn around each PHC. The villages of an area can be easily determined whether they are served

or un-served. A village within the buffer was considered to have access to a facility, while those outside the buffer were assumed not to have access. In the present study the buffers are drawn from each PHC at a distance of 5 and 7 Kilometers to define different service areas, Figure 4 and Table 3 shows the illustration.

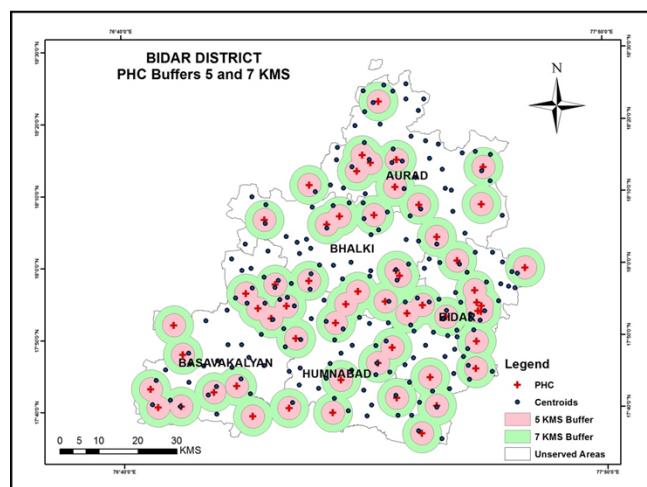


Fig. 4. Euclidean Buffers of PHC Service area

The results of served and unserved areas for PHC's, is shown in the above table in the study area. The 67.28 percent of the population is being served within the buffer of 5 kilometers and 9.03 percent of population is being served by PHC's. Beyond the buffer of 5 kilometers up to 7 Kilometers. The unserved area accounts the population of 23.69 percent of the total population of the study area.

Table 3. Buffer Analysis

Buffer	Population	Percentage of Population
Less than 5 KMS	1259070	67.28
5-7 KMS	383730	9.03
More than 7 KMS (Unserved)	60500	23.69
Total	1703300	100

### 3.4 Health Gaps

However, gaps remain large in rural urban differences, exemplified by IMR estimates of 70 for rural areas and 25

for urban areas (SRS, 2015). Despite overall improvements in health indicators, inter district and regional disparities continue. The five taluks of Bidar is still facing problems like Under-nutrition in under five age children and anemia in women continue to remain unacceptably high. Women's health, mental health and disability care are still relatively neglected. Certain preventable health problems remain more prevalent in geographical regions or among particular groups. Structural reforms as suggested by the task force on Health have to be made and more effective management practices imbued with accountability have to be introduced to ensure swift and effective local responses to Health Problems. The relatively low level of public confidence in public health services particularly at primary health centers. Lack of Credibility of services adversely affects the functioning of all programmes. Underlying reasons for implementation gaps need to be understood and addressed.

## Conclusion

From the above analysis it can be concluded that, healthcare centres are not equally distributed among different taluks of Bidar District. Public Healthcare centers are not increasing with the population so there we can identify gap between them. The study reveals that, though the numbers of centers appear to be enough, but they are inadequate. The Public health care centres of all the taluk are randomly distributed (Table 2). To reduce the imbalance in the distribution of public health centres, the establishment of new health care centres should be based on structured criteria and geographical aspects and also transportation is responsible for emergence of new health centers. These health centers are the mirror of the rural mass in the study area .

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