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SPATIAL DISTRIBUTION OF HEALTH CARE CENTRES IN MYSORE CITY

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Abstract

The main theme of healthcare is to provide complete health facilities, to protect every one for physical, social, and mental health, to decrease the death rate, to increase the life expectancy of man. In this paper an attempt has been made to study the spatial distribution patterns of existing Health care Centres and different aspects of health care facilities available in Mysore city using GIS techniques. The present study is based on both Primary and Secondary source of Data. The Primary data have been collected from field survey and personal observation. The Secondary data related to health care are collected from various offices. The Base Map of Study area has been Geo-referenced and digitized using GIS Software. Location of healthcare centres will be mapped with the help of Global Position System (GPS). Data is analyzed through simple quantitative techniques like ratios, percentage and the spatial disparity of health centers were measured by applying location quotient. Various Maps have been generated to show the health care services in the study area. The results show that the availability of healthcare center is unequally distributed.

Keywords: Healthcare; Spatial; Distribution; Location quotient GIS; GPS

Introduction

The spatial distribution of healthcare centres is uneven as the human population on the earth's surface and the factors for such uneven distribution is almost similar. The uneven distribution of health centres are observed even at micro level not only between the regions but within the region also depending up on the demand for the health care institution and the supply of the patients. The population of our country suffers from many diseases in spite of the various healthcare programs. These are all because of lack of management of facilities, optimum route

to the hospital, slum area development, and lack of knowledge about technologies. 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 Pattern of healthcare facilities, evaluating accessibility and barriers to health care delivery of health facilities. GIS can be effectively used as a tool for decision-making in relation to optimum location & gainful utilization of available medical resource in study area.

With this background this paper attempts to study the spatial distribution pattern of existing Health care Centres and different aspects of health care facilities available in Mysuru city that can be shown using GIS techniques.

Materials and Methods

The Present study used both Primary and Secondary Source data. The Secondary data related to health care are collected from various offices like District Health Office, Municipal Office, CADD-station of the Mysore City and the Population data are collected from Census office Bangalore. The Primary source of information has been collected through the field survey by visiting all the health care centers and personal observation. The road map, ward wise map and Zone wise map which are procured from CADD-Station has been geo-referenced using the top sheets. The maps were digitized using ARC GIS 10.3 software. Location of healthcare centres will be mapped with the help of Global Position System (GPS). Thematic map are prepared to show the Zone wise distribution of public health centres and the spatial disparity of health centers zone wise was measured by applying location quotient. The collected information has been compiled and put in the form of maps and tables for further analysis.

Study Area

Mysore City is an Ancient, historic and one of the beautiful cities of the country. It is the 2nd largest city in the state of Karnataka, next to Bangalore. It lies about 146km (91 miles) southwest of Bangalore, the capital of Karnataka. The Mysore city is located between 12° 14' 41"N to 12° 22' 25" N latitudes and 76° 34' 20"E to 76° 43' 23"E longitude at an altitude of 2526ft above the mean sea level (Figure 1). Mysore city Spread across an area of 128.42 km² (50 sq.miles) & it lies in the saucer shaped basin & is situated at the base of the Chamundi hills. The City of Mysore in Karnataka is one of the most visited tourist destinations of the state. City is divided into 9 Zones and they sub divided as 65 wards by MCC (Mysore City Corporation) based on 2011 data. The population is about 8, 93,062 in 2011 census, with males 4,46,676 and 4,46,386 females respectively.

Results and Discussions

Spatial Distribution Pattern of Public HealthCare Centres

The study is based on the spatial distribution of both public and private health centres of Mysore City. The Health Services are unevenly distributed and are not sufficient to serve population; it is not only in rural areas but also in urban areas. The Health services are available in the area through medical institutions, either by Public/government or

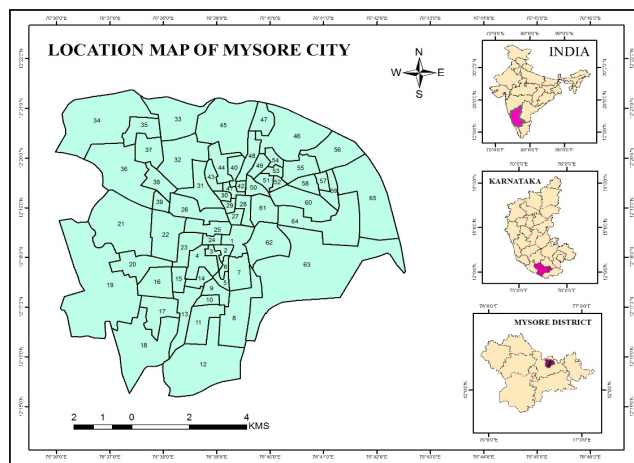


Fig. 1. Location of Mysore City with Wards

private/Non Government organization. Most of the Health Facilities are provided through Medical Organizations like District Hospital, Community Health care and Primary HealthCare Centers. Besides, the maternity health care, Child Health care and Family Planning centers, Clinics and though Private hospitals and clinics health services are provided to the people in the study area. They are located on the basis of economic feasibility and requirement by the people. 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 Total Public health care centers of Mysore City include One District Hospital, One Community Health Centers, 21 Primary Healthcare centers, 5 maternity and 76 Private Health centres. The distribution of Public healthcare centres has been shown in Table 1 and Figure 2.

Table 1. Spatial Distribution of Health Centres in Mysore City

Sl. No.	Health Institutes	Units	Percentage
1	District Hospital	1	0.96
2	Community Health Centers	1	0.96
3	Primary Health Centers	21	20.19
4	Maternity Hospital	5	4.80
5	Private Health Centres	76	73.09
Total		104	100

Source: District Health Office & MCC, Mysore.

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 centres can be structured in different hierarchical order and they are unevenly distributed. Most of the health centers are found heart of the city and remaining health centers are dispersed or scattered

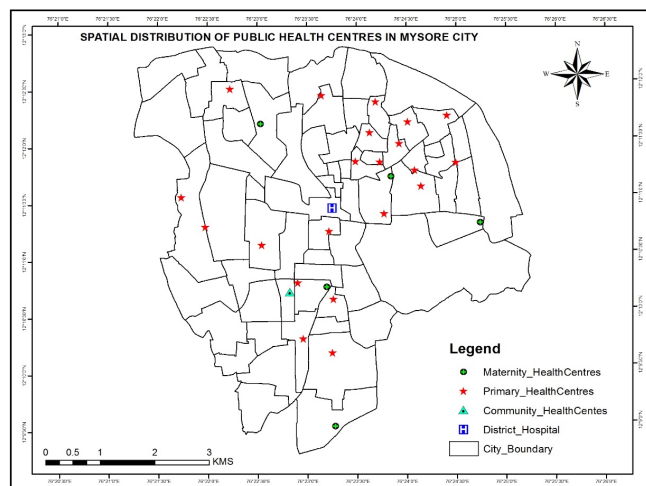


Fig. 2. Spatial Distribution of Public Healthcare Centres in Mysore City with Wards

distributed. Hence, measuring adequacy availability of public and private health centers to population is a challenge.

Spatial Distribution of Private HealthCare Centres in Mysore City

Private hospital is a broad sector is a group that includes for profit and not-for-profit providers, among them some are registered and some not. For this purpose the private sector providers divided into three major groups, it includes NGO's, Religious-based facilities and profit sector (M.Marikkani, 2012). Private hospital has become dominant source of health care services, both institutional and non-institutional for patients in rural and urban areas. Of those seeking treatment, urban population are availing private hospitals facilities more than the rural people. Majority of the private healthcare with multi-oriented specialties of higher order quality hospitals are mainly found within the Mysore city and in broader context these Private health centres are profit oriented but public health care centres are service oriented, it is directly controlled by the Director of Health Services, Government of Karnataka and executed by the District Health Officer in the district. In Mysore City there are 76 private hospitals which are distributed among different wards of the city. Most of the people of study area utilize the Public health care facilities due to cost despite charging significantly higher prices for its services and lack of awareness about the healthcare services and their facilities. The distribution of private healthcare centres has been shown in the following Figure 3.

Spatial distribution of health care centers plays an important role in maintaining the health status of the people. Availability of the health centers are primarily influence on utilization of healthcare facilities and important factor is distance, if the increase in distance than decrease in utilization of health-

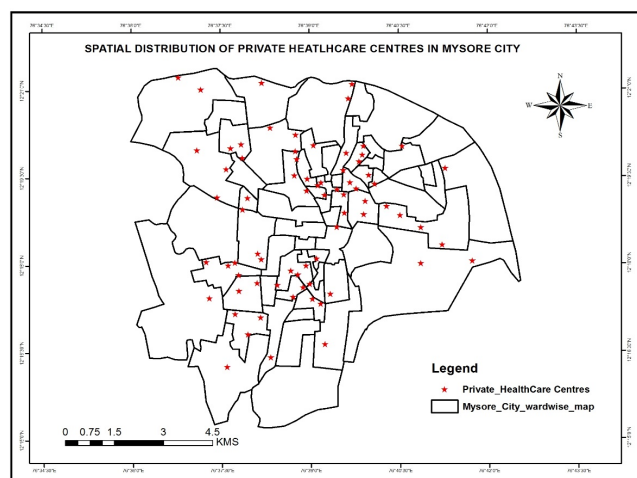


Fig. 3. Spatial Distribution of Private Healthcare Centres in Mysore City with Wards

care services. Table 2 shows the urban Healthcare centres distribution with ward number and population

NRHM aims to provide accessible affordable acceptable health care through a functional public health care system. It is designed to various components of public system like preventative, curative and promotive for human resources management and to improve the service delivery. As per Government of India, National Rural Health Mission (NRHM) policy the population norms for the provision of Primary health care centres and Community Health Centres in plain areas are suggested One PHC serve 30,000 and One CHC serve 1,20,000 people. But, the table reveals that, the existing number of health institutions is less to serve the population in the study area. Because, now a day's urban area increasingly becoming congested, due to increase of population and rural to urban migration. Especially, slum and slum like habitations, and with improper and poor sanitation, water supply, garbage disposal mechanism, emergence in urban infectious diseases. Majority of the population of the study area use the Public Health centers due to Socio-Economic conditions. So considering this, the government should provide new healthcare centers for the growing population.

Zone Wise Distribution of Healthcare Centers in Mysore City

According to the above table 3, the zone 9 Gayathripuram is the highest population 151,885 which include the wards like Kalyangiri, Yaranahalli, Vidyanagar, Ragavendrannagar, Goushiya nagar, Shantinagar, Kyathmaranahalli, Gayatri puram, Siddharthanagar, Ittegegudu. It consists of 3 Primary health centers and one maternity hospital, this zone as an uneven distribution of health centres. This zone having high area under slum compare to total area of the ward

Table 2. Urban HealthCare Centres

Sl. No.	Facility Name	Name of the Health Centres	Ward Numbers	Facility Wise Population List
1	PHC	Ashokapuram	9, 13,14,15,17	61,752
2	PHC	Chamundipuram	3,4,6,7	46,242
3	PHC	Erangere	34,38,39,40	38,420
4	PHC	Giribhavanpalya	57,58	20,035
5	PHC	Gayathripuram	62, 63,56	53,486
6	PHC	Jalpuri	41,50	19,706
7	PHC	Jyothinagar	51,61	23,515
8	PHC	Krishnamurthypuram	8,16,18,19	54,273
9	PHC	Kumbarkoppalu	26, 27,28	58,614
10	PHC	Nazarbad	1,2,5,37,64,65	69,724
11	PHC	N.R.Mohalla	42,43,49	39,110
12	PHC	OLD Agrahara	31,32,33,35,36	51,293
13	PHC	Saraswathipuram	20,21	17,337
14	PHC	Udayagir	52,53	32,245
15	PHC	Vijayanagar	24,25	47,855
16	PHC	Vishweshwaranagara	10, 11, 12	47,983
17	IIP8	Bannimanatapa	29,30,44,45	50,092
18	IIP8	Kyathamaranahalli	59,60	37,450
19	IIP8	Rajendranagara	46,47,48	42,157
20	IIP8	Shanthinagara	54,55	49,619
21	IIP8	T.K.Layout	22, 23	32,154
22	CHC	Jayanagara	65 wards	8,93,062
23	DH	K.R.Hospital	7 Taluks	3,01,127
24	PH	Private_Hospitals	76 for 65 Wards	8,93,062

Source: District Health office & Mysore City Corporation

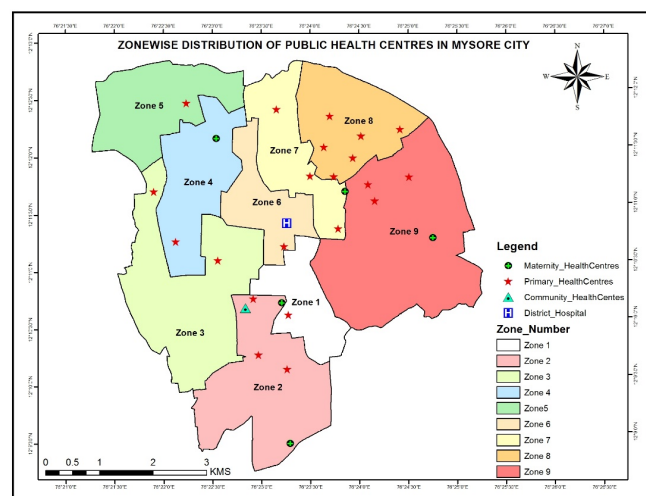


Fig. 4. Zonewise Distribution of Public Health Centres in Mysore City

is relatively highly concentrated. Consequently, this zone is also more prone to diseases; it needs 2 more hospitals in future. The zone 2 Jayanagar it had high population 110,910 which include the ward names like Jayanagar, Ashokapuram, K.M.puram, Vidyaranya puram, J.P nagar, shirampura, Arvinda nagar, vishweshwaranagar etc. In this area is highly prone for malaria because it has slums. These zones consists one CHC, 3 PHC's and one Maternity hospital are sufficient, but healthcare infrastructure facilities are not sufficient here. So this area needs one more healthcare centers in future and improvement of the infrastructure facilities. The zone number 6 R.M.C. is having lowest population i.e., 49,339 it include the ward names like Yadavgi, Devaraja Mohalla, Subbarayanakere, Lakshkar Mohalla, Mandi Mohalla. This area consists of one PHC's it's a developed area but public healthcare centers are not sufficient to this population so, this area also needs one more hospitals in future. The Zone number 3 Sharadadevi nagar it had population 140,248, these zone consists only two primary health centre and they are not sufficient for the existed population, this area also needs three more PHC's in future. The Zone number 1, 4 and 5 each zone

Table 3. Zone wise Distribution of Health centers and Population Ratio

Zones No	Name Of The Zones	No Of Wards	Population 2011	Health Centers			PHC/ Population Ratio (1:30,000)	PHCs Needed
				Public				
				MAT	CHC	PHC		
Zone 1	AKKANABALAGA	1 to 6	71,433	1	0	1	71433	2
Zone 2	JAYANAGARA	7 to 14	110,910	1	1	3	36970	1
Zone 3	SHARADADEVI NAGAR	15 to 24 excluded ward-23	140,248	0	0	2	70124	3
Zone 4	VONTIKOPPAL	30 to 33included ward 23	63,619	1	0	1	63619	1
Zone 5	HEBBAL	25 to 29	76,790	0	0	1	76790	2
Zone 6	R.M.C	34 to 38	49,339	0	0	1	49339	1
Zone 7	N.R.MOHOLLA	39 to 45 included ward no-64	84,156	1	0	3	28052	0
Zone 8	UDAYAGIRI	46 to 54	144,682	0	0	6	24113	0
Zone 9	GAYATHRIPURAM	55 to 65 excluded ward 64	151,885	1	0	3	50628	2
TOTAL		65	893,062	5	1	21	1:47106	12

SOURCE: Filed Survey and Compiled by Author

consists of one primary health centre and they are not sufficient for the existed population, this area also needs two more PHCs in each zone. Zone number 8 is udayagiri with 144,682 populations it consists of 6 primary health centre with good facilities for the existed population and for the surrounding population also. According to the NRHM norms in Mysore city reveals that the each PHC is serving to a population of 47107 persons. It reveals that the study area had less number of health institutions compare to NRHM norms. Here, health-care centers are not sufficient to this population so, study area needs more health centers in future.

Location Quotient

It is a simple tool used to determine the spatial distribution of a phenomenon in an area compared to an entire region. Here, the spatial distribution of primary healthcare centers by zone wise compared to entire city. Location Quotient (LQ) is calculated using the following equation.

$$LQ = \frac{\text{PHCs in a Zone} / \text{Zone Population}}{\text{PHCs in a City} / \text{City Population}}$$

The Table 4 shows the details of zone wise distribution of PHCs. Location quotient value with more than 1.50 is considered as high spatial concentration category. Udayagiri and N.R.mohalla zone have high concentration of PHCs compared to City as a whole. LQ value between 1.00 to 1.50 is considered as equal spatial concentration category is

found in Jayanagara zone; it indicates that the health facilities are equally distributed. A value less than 1 considered as low spatial concentration category, it indicates a deficit in the services. Akkanabalaga, Sharadadevingar, Vontikoppal, Hebbal, R.M.C and Gayathripuram zones with low spatial concentration of PHCs. More PHCs should be started in these zones to attain equal distributions.

Conclusion

The study reveals that, the spatial distribution of health centers are unevenly distributed among different wards of the Mysore City, and they are not sufficient to serve entire population. Majority of the population in the study area use the Public Health centers due to Socio-Economic conditions. The patients of the PHCs also avail the health services from private hospitals whenever the services are not available in PHCs. The distribution of Public health centers indicates that the city possess a less number of PHC's as the health center population ratio is found more than the Prescribed norms. The analysis of Location quotient of PHC's shows that in Akkanabalaga, Sharadadevingar, Vontikoppal, Hebbal, R.M.C and Gayathripuram zones with low spatial concentration of PHCs. Which need more PHC's to satisfy the service to available population. Availability of the health centers are primarily effect on utilization of healthcare facilities and important factor is distance, a large proportion of the residents have to travel a long way to access the Public

Table 4. Location Quotient of Primary Health Centers

Zones No	Name of The Zones	Population 2011	Available PHCs	Location Quotient (LQ)	Description
Zone 1	AKKANABALAGA	71,433	1	0.59	Low Spatial Concentration
Zone 2	JAYANAGARA	110,910	3	1.14	Equal Spatial Concentration
Zone 3	SHARADADEVI NAGAR	140,248	2	0.60	Low Spatial Concentration
Zone 4	VONTIKOPPAL	63,619	1	0.66	Low Spatial Concentration
Zone 5	HEBBAL	76,790	1	0.55	Low Spatial Concentration
Zone 6	R.M.C	49,339	1	0.85	Low Spatial Concentration
Zone 7	N.R.MOHOLLA	84,156	3	1.51	High Spatial Concentration
Zone 8	UDAYAGIRI	144,682	6	1.75	High Spatial Concentration
Zone 9	GAYATHRIPURAM	151,885	3	0.83	Low Spatial Concentration
TOTAL		893,062	21		

Source: Field Survey and Compiled by Author

healthcare facilities. In order to overcome this issue, the government should provide new Public healthcare centers for the growing population.

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