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**GRT** **A GEOGRAPHICAL STUDY OF SPATIAL  
DISTRIBUTION OF HEALTH CARE FACILITIES  
IN MARATHWADA REGION OF MAHARASHTRA (INDIA)**



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**Abstract:** The study of health care facilities is the integral part of Medical Geography. Health care is defined as a programme of services that should make available all facilities of health and allied services necessary to promote and maintain the health of mind and body. In this paper researcher has attempted to analyze the spatial distribution pattern of the existing health care facilities available in Marathwada region. The units like Primary health centers, Health sub-centers, Hospitals, Dispensaries, and number of Hospital beds, Nurses and Doctors available are also considered for this study.

The data used in the present study are concerned with public and public aided institutions as well as private institutions published in district statistical abstract by government of Maharashtra. To study the spatial distribution of health care facilities, the number of health institutions per 100000 population has been calculated for each health care facility and four distribution –levels have been decided on the basis of quartiles. Various norms suggested by different health committees, taking these norms, expected values of primary health centers, health sub-centers, hospital beds, and doctors have been calculated and percentage of deficiency has been obtained. Finally, deficiency areas of health care facilities have been demarcated.

**Key words:** Primary Health Care, Health Sub-centre, Dispensaries, Health Care, Public, Private, Quartile.

**INTRODUCTION:**

The study of health care facilities is the integral part of Medical Geography. The overall organizational structure and system of public health care provision are not very different across the country. Even though health is a state subject most states follows a similar pattern of health care administration and management. This is largely because of a common planning framework, which is governed by the planning commission and National Development council (Duggal, Ravi and et. all 2005).

Health care is defined as a programme of services that should make available all facilities of health and allied services necessary to promote and maintain the health of mind and body (Agnihotri, R.C, 1995). In this programme, the physical, social and family environment should take in to consideration in the view of prevention of diseases and restoration of health.

The health services may be analyzed in terms of the community for which they serve and deal with. These services are the integral part of a particular health system and represent responses to the health concern and to the health needs. But it has been found that the localization of the community to which they serve and hence unequal distribution of medical facilities are observed in any region (Pandurkar, R.G. 1981).

In this paper researcher has attempted to analyze the existing health care facilities available in Marathwada

region. The units like primary health centers (P.H.C), health sub-centers (H.S.C), Hospitals, Dispensaries, and number of Hospital beds, Nurses, Doctors available are also considered for this study.

**STUDY REGION:**

The researcher has specific purpose to select the Marathwada region. As Medical geography is concerned with an analysis of the study of areal distribution of health care facilities and the functional and physical nature of the facilities.

The area under study comprises of eight (8) districts of Marathwada region namely Aurangabad, Beed, Jalna, Nanded, Osmanabad, Latur, Parbhani and Hingoli (Hingoli district separated from Parbhani at May 1999). The rural population (2011) of these eight districts is 13660000, which is 72.90% to the total population of Marathwada region and urban population is 5078000, which is only 27.10% to the total population of Marathwada region. The total population of these eight districts is 18738000, which is 16.68% of the total population of Maharashtra.

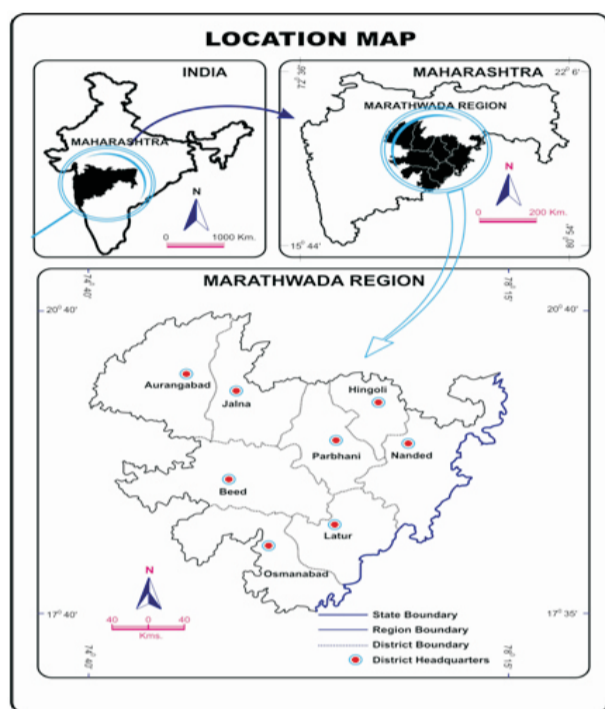


Fig.1

The latitudinal and longitudinal extent of the area is 17° 35' North to 20° 40' North and 74° 40' East to 78° 15' East respectively.

Marathwada region is located in the (south) central part of Maharashtra state and it covers 64813-km<sup>2</sup> area (21.04 percent). The environmental, socio-cultural, and political factors of this region may cause the larger disparity in the distribution of health care facilities in the study region.

**OBJECTIVES:**

- I.To study the spatial distribution pattern of Health Care Facilities in the study region
- II.To find the deficiency of health care facilities in the study region

**DATABASE AND METHODOLOGY:**

The researcher proposes to analyze the available data at various stages is being calculated by using various statistical methods. The distributional pattern of health care facilities is to be investigated at district level. The units like P.H.C., P.S.C, Hospitals, Dispensaries, and number of Hospital Beds, Doctors and Nurses available are also considered for this study. The data used in the present study are concerned with public and public aided institutions as well as private institutions published in district statistical abstract by government of Maharashtra. To study the spatial distribution of health care facilities, the number of health institutions per 100000 population has been calculated for each health care facility and four distribution –levels have been decided on the basis of quartiles. The various graphical and distributional methods are used for showing distribution. Various norms suggested by different health committees, taking these norms, expected values of primary health

centers, health sub-centers, hospital beds, and doctors have been calculated and percentage of deficiency has been obtained. Finally, deficiency areas of health care facilities have been demarcated.

The data collected, has been analyzed by choropleth method is used for understanding comparison, quartile technique have been used for dividing the parameters in different ranges to obtain the levels of distribution. The various graphical and distributional methods are used for showing distribution.

**HEALTH CARE SYSTEMS:**

In Marathwada region, the system of health care facilities is now mainly based on the modern allopathic system of treatment rendered through a system of hospitals, dispensaries and primary health centers.

Medical college, located at Aurangabad, Nanded and Latur Basically provides research cum education and training facilities as well as highly intensive health care in their hospitals. Figure 1 shows organization and locational aspects of health care facilities in the region.

Hospital plays an important role in providing the preventive, promotive and rehabilitative services to local community including training and research (Agnihotri, R.C.1995). The organizational system of hospitals consists of regional hospital, district hospitals and local hospitals. In the study area, medical college hospital at Aurangabad is considered as the regional hospital extending highly advanced treatment and diagnostic and intensive care facilities. The second order hospitals are the district hospitals located at each district headquarters. In addition, district hospitals provide general treatment and facilities.

There are 1144 hospitals in the study area.

**1.Dispensaries:**

Dispensaries are fourth order medical facilities providing normally outdoor treatment with the help of one physician and one pharmacist. There are 2177 dispensaries in the study region. Dispensaries are mainly concentrated in the rural areas.

**2.Primary Health Centers:**

Primary health care is essential health care made universally accessible to individuals and acceptable to them, through their full participation and at a cost the community and country can afford (W.H.O., 1978). Primary health center play an important role in the health care system emphasizing preventive rather than curative services. It provides the first contact care to villagers. The PHCs implement all the national programmes and schemes under public health and family welfare. Primary health centre extends both outdoor and indoor treatment facilities as well as field services such as vaccination, family health care, family planning, blindness and leprosy control etc. (Agnihotri, R. C.1995).

There are 346 primary health centers in the study area.

**3.Health Sub-centers:**

Each primary health center commands over four to

five sub-centers. The sub-center is the peripheral outpost of the existing health delivery system in rural areas. The main functions of the sub-centers are maternity and child health, collection of vital statistics, treatment of minor ailments, immunization, prevention of malnutrition and health education in respect of common communicable diseases, family planning services and counseling etc.

There are 1942 Health sub-centers in the study area existing mainly in rural areas.

**DISTRIBUTION OF HEALTH CARE FACILITIES**

The spatial organization of health care facilities, likewise other commercial and retail functions appears to be affected by interrelated factors of physiographic constraints, development of agriculture, nature, type and location of industrial units and various demographic characteristics. A cumulative effect of positive or negative interaction of these factors has contributed towards a spatial pattern of effective demand, and the distribution of health facilities responds to this effective demand neglecting the need of the people (Mc Glashan N.D.1974).

The disparity in the distribution of health care facilities is well pronounced. It is highly centralized. Though 80 percent of the Indian population lives in rural areas, where 11 per cent of the physicians practice in these areas (Banarjee Guha, S. and Joshi, S.1985).

To study the spatial distribution of health care facilities, the number of health institutions per 100000 population has been calculated for each health care facility. (Table 1) and four distribution –levels have been decided on the basis of quartiles (Fig. 2)

**1.Hospital:**

In Marathwada, region hospital-population density is 6.10 hospitals per 100000 persons, which is less than the state average of Maharashtra. The concentration of hospital facility (8.72>) is observed in the Aurangabad and Beed districts. The districts namely Osmanabad and Latur observed low hospital population density (Fig. 1). The distribution of hospitals shows close correspondence with the distribution of urban population.

**2.Dispensary:**

Marathwada region shows high dispensary-population density (11.61). As the dispensaries are generally located in rural areas, the districts having lower urban population possess high dispensary density (>Q3). The districts namely Osmanabad and Nanded form the areas of low dispensary density (<Q1) (Fig. 2).

**Table 1**  
**Marathwada Region**  
**Population Density of Health care Facilities (2011)**

Sr. No	Districts	(Per 100000 populations)			
		Hospital	Dispensary	Primary Health Centre	Health Sub-Centre
1	Aurangabad	15.84	23.35	1.35	7.54
2	Jalna	8.00	8.47	2.04	10.87
3	Beed	10.89	11.00	1.93	10.81
4	Nanded	1.43	6.28	1.88	10.89
5	Osmanabad	0.66	5.00	2.53	12.40
6	Latur	0.69	19.87	1.87	10.24
7	Parbhani	1.68	6.63	1.68	11.63
8	Hingoli	1.02	8.05	2.03	11.19
	Marathwada Region	6.10	11.61	1.85	10.36

Source: Computed by Authors based on District Statistical Abstract 2011.

**1.Primary Health Center:**

Marathwada region shows higher PHCs population density (1.85) than density of Maharashtra state (1.61). Figure 2 shows that Jalna and Osmanabad district exhibit high PHCs population density (>Q3) whereas Aurangabad and Parbhani districts shows low density (<Q1). The moderate density pattern is extended over 4 districts with density between Q1 and Q3. As the PHCs are the main feature of rural health care system, the districts having high percentage of rural population possess high PHC density.

**2.Health Sub-centre:**

Health sub-centre-population density observed 10.36 per 100000 populations against corresponding figure of Maharashtra (9.42). High density (>Q3) of sub centers is observed in Osmanabad and Parbhani districts whereas Aurangabad and Latur observed low density (<Q1).

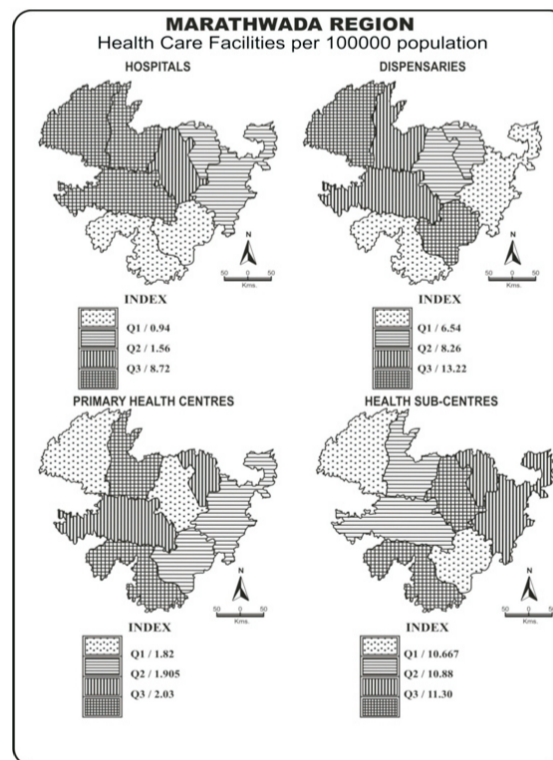


Fig.2

**PHYSICAL AND FUNCTIONAL NATURE OF HEALTH CARE FACILITIES**

The real contribution of health care institutions in the health care of an area can be assessed by its different components deciding its physical and functional nature e.g., number of personnel (Doctors and Nurses), number of beds, technical facilities etc. The nature of health care facilities depend on number of doctors, number of nurses and number of beds available in the health care institution can be analyzed spatially.

**Health Personnels:**

Health personals form the backbone of the health care system. The health care responsibilities of the communities rest on variety of health personnel, which may be grouped as doctors and nurses (Agnihotri, R. C. 1995).

**1.Doctors:**

Doctors include physicians, surgeons and specialists of different branches of medicine e.g., Allopathic, Ayurveda, Homeopathy and Unani. To present the distributional pattern of doctors in the area under study doctor-population ratio (number of doctors/100000 population) has been calculated (Table 2) and the level of distribution have been decided with the help of quartiles (Fig 3). The doctor- population ratio for Marathwada region is 24.98 that ranges between 10.42 (lowest) in Osmanabad and 61.7 (highest) in Aurangabad. The distribution pattern of doctors follows the trend of urbanization. High availability of doctors observed in Aurangabad and Beed districts. Very low availability of doctors is found in the districts of Osmanabad and Nanded.

**2.Nurses:**

There are 4408 nurses serving the region. The regional average of nurses-population ratio is 28.96. Figure 2 shows the four levels of distribution of nurses, i.e., very low, low, moderate and high based on quartiles. The distributional pattern reveals that the districts Aurangabad, Beed represent the high ratio (>Q3) of nurses while very low ratio (<Q1) is observed in Latur and Hingoli districts.

**Table 2**  
**Marathwada Region**  
**Health Personnel, Bed-Population Ratio (2011)**

(Per 100000 populations)				
Sr.No	Districts	Doctors	Nurse	Beds
1	Aurangabad	61.7	54.43	214.56
2	Jalna	24.69	29.13	166.48
3	Beed	30.30	34.67	79.42
4	Nanded	13.96	22.20	59.23
5	Osmanabad	10.42	26.63	61.20
6	Latur	24.51	17.03	108.58
7	Parbhani	16.03	25.65	100.38
8	Hingoli	18.22	22.03	44.75
	Marathwada Region	24.98	28.97	104.33

Source: Computed by Authors based on District Statistical Abstract 2011.

**Hospital Beds:**

Availability of beds is an area significant indicator of health facilities. In Marathwada region, there are 21311 hospital beds for 187.38 lakh population. The regional average of nurses-population ratio is. The bed-population ratio is very high in Aurangabad (214.56) and very low in Hingoli district (44.75).

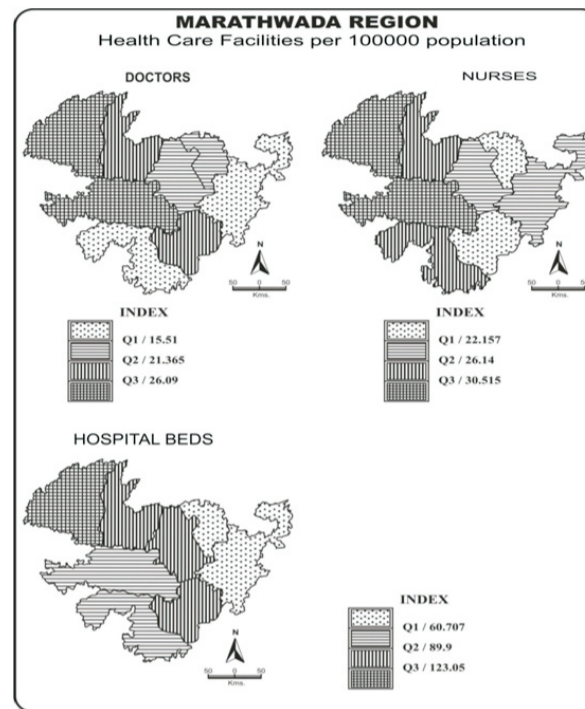


Fig.3

**DEFICIENCY OF HEALTH CARE FACILITIES**

In the study region, a health care facility to the local people is far beyond the standard norms. It is an attempt has been made to find out the distribution of deficiency of health care facilities against standard norms. Various norms suggested by different health committees, which is as following-

- i) One primary health centre for a group of 30,000 population over 6 sub centre.
- ii) One health sub centre for a group of 5,000 population.
- iii) One hospital bed for 1,000 population.
- iv) One doctor for a group of 3,500 population.

Taking these norms, expected values of primary health centers, health sub-centers, hospital beds, and doctors have been calculated and percentage of deficiency has been obtained (Table 3).

**Table 3**  
**Marathwada Region**  
**Deficiency of Health care Facilities**

Sr. No	Districts	Primary Health Centre Deficiency in %	Health Sub-centre Deficiency in %	Beds Deficiency in %	*Doctors Deficiency in %
1	Aurangabad	27.86	33.00	Surplus	58.57
2	Jalna	24.11	32.59	Surplus	67.86
3	Beed	27.54	32.37	20.60	64.86
4	Nanded	22.62	25.15	40.77	75.21
5	Osmanabad	8.62	25.36	38.80	63.50
6	Latur	24.59	31.15	Surplus	69.84
7	Parbhani	26.54	15.42	Surplus	72.81
8	Hingoli	28.00	34.00	55.25	63.80
	Marathwada Region	24.00	28.86	Surplus	67.03

Source : Computed by Authors based on District Statistical Abstract 2011

**\* Excluding Private Doctors**

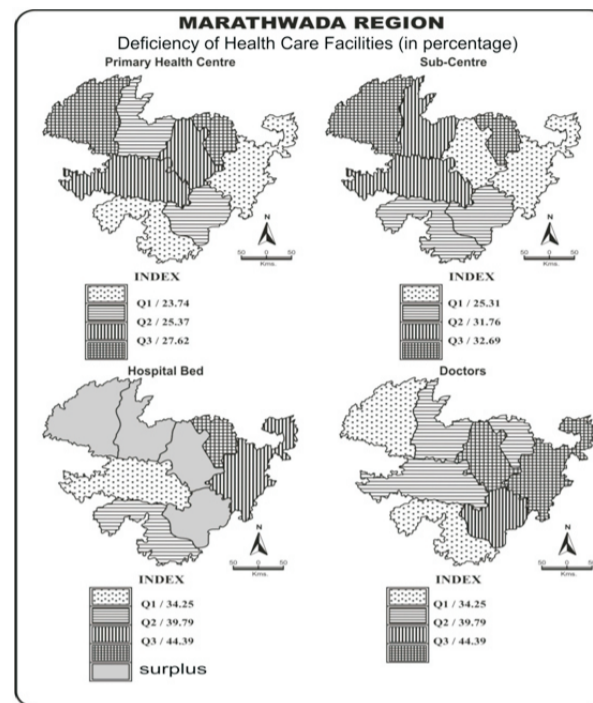
Table 3 shows the deficiency of health care facilities in the study area. The deficiency of primary health centers is observed 24.00% to the required it in the study region. In Osmanabad district, the requirement of P.H.Cs is low because the low deficiency value (8.62%). However, in Hingoli and Aurangabad district the deficiency of primary health centers is very high as compared to the remaining districts. As regards health sub-centre, the average deficiency of the region is 28.86%. The deficiency of health sub centers is very high in Hingoli and low in Parbhani district (Fig.4).

There are four districts in the study region showing sufficiency of hospital beds e.g. Aurangabad, Jalna, Latur and Parbhani. Very high deficiency of hospital beds is observed in Hingoli district. The deficiency of doctors is very high in Nanded (75.21%) and Parbhani (72.81%) district. The situation of availability of doctors is marginally good in Aurangabad district (Fig.4).

**CONCLUSION AND SUGGESTION:**

This research paper shows the important findings of district wise spatial distribution of Health Care Facilities in Marathwada region. The whole analysis is based on population density of health care facilities available in the study region.

It is found that the availability of health care facilities in the region is inadequate from all standards. The districts of Aurangabad, Jalna, Latur and Parbhani only observed surplus bed –population ratio.



**Fig. 4**

This Study considered major medical facilities, such as Hospital, Dispensary, Primary Health Centers, Health Sub-centers, Hospital Bed, Doctors, and Nurses. The distribution of Primary Health Centre is not same in Marathwada region. As per the norms one Primary Health Centers per 30,000 persons in rural area and 20,000 persons in tribal area. There is no ideal situation in any districts. However, the same situation is found in the distribution of health sub-centers. So, there is need of establishment of Primary Health Centers and Health Sub-centers according to the norms in the study region.

The health care facilities are mainly concentrated in urban areas serving only 27.10 per cent population. Lack of specialized treatment facilities and quality of it is a common phenomenon in the study region. In the study region uneven distribution of health care facilities caused by political issues, economical condition of the state and social condition of the region.

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