



Geographical Distribution, Availability and Population Ratio of Health Care Facilities in Parbhani City: A Geographical Study

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Abstract:

Health care is one of the most important basic social services directly associated with the quality of human life. With increasing urbanization, population growth, migration and changing health requirements, the equitable distribution of health care facilities has become an important component of urban planning. The present study examines the availability, spatial distribution and population ratio of health care facilities in Parbhani City, Maharashtra. The study focuses on the distribution of hospitals, clinics, doctors, hospital beds, medical stores and various specialist medical services across sixteen sectors of the city. The study is based mainly on secondary data compiled by the researcher. According to the available data, Parbhani City has a total of 580 doctors, 297 hospitals and clinics, 998 hospital beds and 492 medical stores. The spatial distribution of these facilities is highly uneven. Sectors XV, XIV and VIII have a high concentration of health care facilities, whereas sectors II, IV, VI, VII, XII, XIII and XVI have comparatively fewer facilities. Sector XV has the highest number of hospitals and clinics, while Sector IX has a very high number of beds because of the presence of the District Civil Hospital.

According to the 2011 population of 307,170, the doctor-population ratio is 1:530, the hospital-population ratio is 1:1,034, the bed-population ratio is 1:308 and the medical-store-population ratio is 1:624. The findings indicate that although Parbhani City has developed a considerable network of health care services, the spatial distribution is not balanced. The central part of the city has a greater concentration of medical facilities, while peripheral sectors have comparatively inadequate services. The study therefore recommends balanced sector-wise distribution of health facilities, expansion of primary and emergency health services, increased bed capacity, improved specialist services and better health infrastructure in peripheral areas.

Keywords: Health Care Facilities, Spatial Distribution, Parbhani City, Hospitals, Doctors, Beds, Medical Stores, Population Ratio, Urban Health.

1. Introduction:

Health is one of the fundamental components of human development and social well-being. A healthy population contributes significantly to economic productivity, social development and overall quality of life.

In the modern period, rapid urbanization, population growth, migration, changing lifestyles and the increasing incidence of communicable and non-communicable diseases have increased the importance of health care facilities. In India, the Central and State Governments have made considerable efforts to expand public health infrastructure. Government hospitals, Primary Health Centres, Rural Hospitals, Sub-Centres, District Hospitals and various government-supported health programmes provide medical services to the population. At the same time, private hospitals, clinics, diagnostic centres and specialist medical services have also expanded considerably, particularly in urban areas.

Parbhani is an important urban centre in the Marathwada region of Maharashtra and serves as the administrative and service centre of Parbhani District. The city provides health care not only to its urban population but also to people from surrounding rural areas. Consequently, the demand for health care facilities in Parbhani is higher than that generated by the urban population alone. The distribution of health care facilities within Parbhani City is not uniform. A large concentration of hospitals, doctors, medical stores and specialist services is found in the central parts of the city. In contrast, several peripheral sectors have relatively fewer health care facilities. This uneven spatial distribution has important implications for accessibility, emergency medical services and urban health planning. Therefore, the present study attempts to analyse the spatial distribution of health care facilities in Parbhani City, examine the availability of different medical specialists, study the distribution of hospitals and beds, and determine the ratio between health care facilities and population.

2. Need and Significance of the Study

Health care facilities are an essential component of urban infrastructure. The quality of health care cannot be evaluated only by counting hospitals and doctors. Their spatial accessibility, distribution, bed capacity, availability of specialists and emergency services are equally important. Parbhani City had a population of 307,170 according to the 2011 Census. As the city continues to develop and expand, it is necessary to examine whether health care facilities are distributed according to population requirements.

The study is significant for the following reasons:

1. It provides an understanding of the spatial distribution of health care facilities in Parbhani City.
2. It identifies areas with a high concentration of health services.
3. It highlights sectors where health care facilities are comparatively inadequate.
4. It examines the availability of doctors, hospitals, beds and medical stores.
5. It establishes the relationship between health care facilities and population.
6. It provides useful information for future urban health planning.
7. It helps identify the possible pressure on health infrastructure during emergencies and pandemics.

3. Objectives of the Study

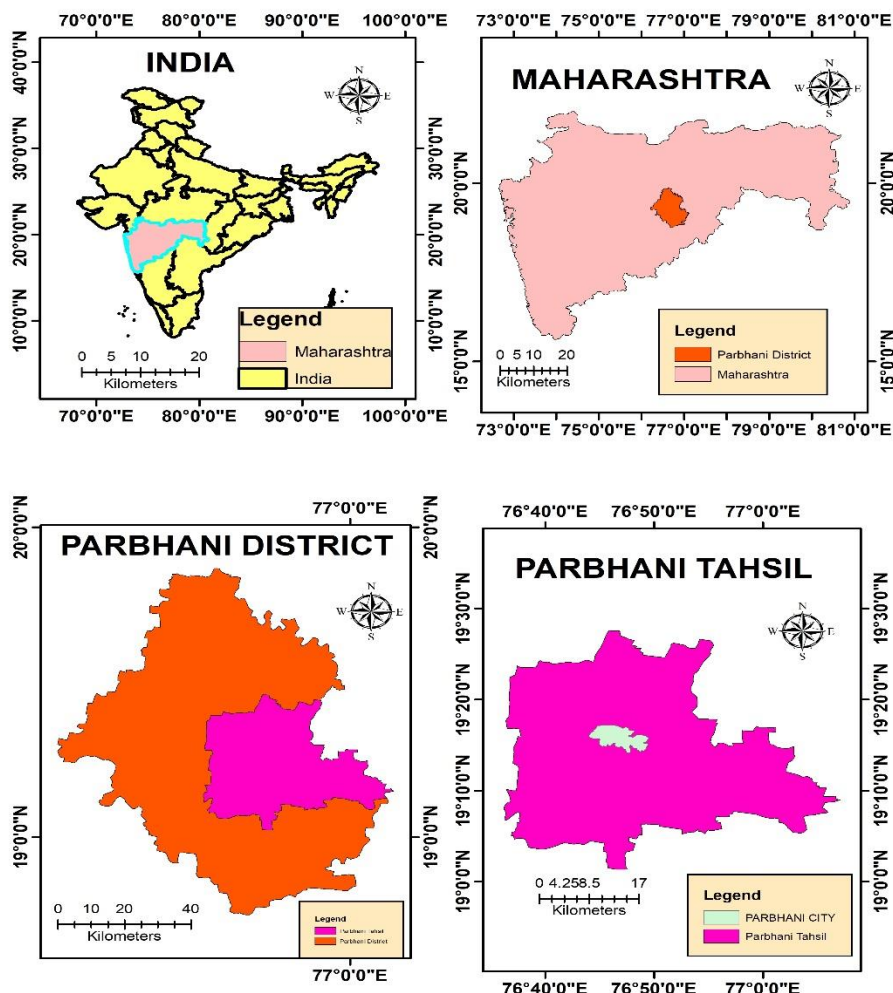
The major objectives of the present study are:

1. To assess the availability of health care facilities in Parbhani City.
2. To analyse their spatial distribution across the city sectors.
3. To examine the relationship between health care facilities and population.
4. To suggest measures for equitable and improved health care provision.

4. Research Methodology

4.1 Study Area

The present study is confined to Parbhani City in Maharashtra. Parbhani is an important urban centre of the Marathwada region and functions as the administrative headquarters of Parbhani District. The city has developed a wide range of public and private health care facilities. For the purpose of spatial analysis, the city has been divided into sixteen sectors.



4.2 Sources of Data

The study is primarily based on secondary data compiled by the researcher. The major data used in the study include:

- Number of doctors
- Number of hospitals and clinics
- Number of hospital beds
- Number of medical stores
- Number of specialist doctors
- Sector-wise health care facilities
- Population of Parbhani City according to the 2011 Census
- Available tables and records related to health care facilities

4.3 Materials and Method:

The present study is based on both primary and secondary data. Secondary data on health care facilities were collected from the District Health Office and Parbhani Municipal Corporation, while population data were obtained from the Census Office, Maharashtra. Primary data were collected through field surveys, visits to health care centres, and direct observation. The locations of health care centres were recorded using Global Positioning System (GPS) and spatial data were digitized and analysed using ArcGIS 10.4 software. Thematic maps were prepared to illustrate the spatial distribution of health care facilities across different sectors of Parbhani City. The collected data were systematically compiled and analysed using tables, maps and statistical ratios. The spatial disparity in health care facilities was assessed using the Location Quotient (LQ) technique. The analysis focused on the distribution of health care centres, doctors, hospital beds and medical stores in relation to population and their spatial distribution across the city.

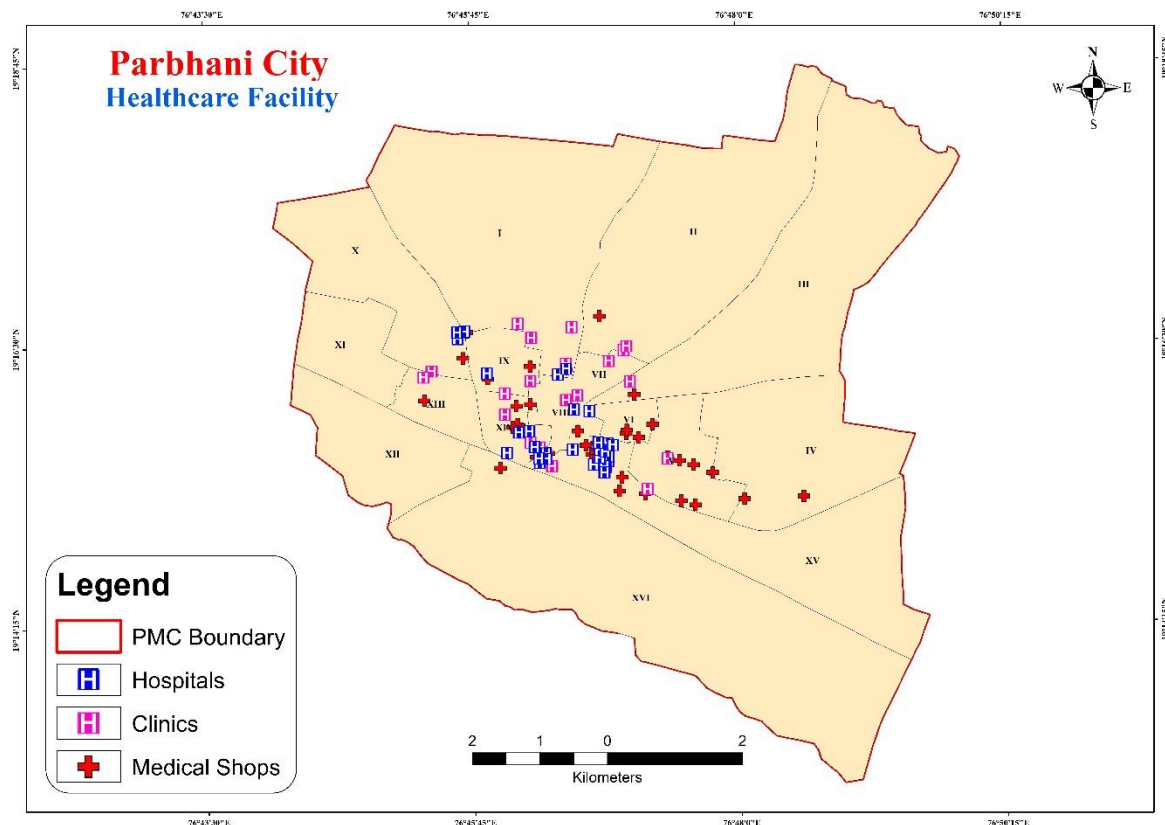
5. Status of Health Care Facilities in Parbhani City

Parbhani City has developed health care facilities through both public and private sectors. According to the available data, the city has:

- 580 doctors
- 297 hospitals and clinics
- 998 hospital beds
- 492 medical stores

A wide range of medical services is available in the city. These include general medicine, surgery, cardiology, diabetes treatment, kidney-related services, oncology, paediatrics, gynaecology, ophthalmology, ENT services, psychiatry, dermatology, dentistry, physiotherapy, Ayurveda, Homeopathy and Unani medicine. The Government Hospital and other major hospitals play an important role in providing health services to both urban residents and people from surrounding rural areas. The availability of diagnostic and emergency facilities such as X-ray, sonography, CT scan, pathology laboratories, intensive care services, maternity services and accident-related treatment increases the importance of Parbhani as a regional health service centre.

Sr. Specialization		Number of Doctor	Number of Hospital	Number of Bed
1	Ayurvedic specialist	09	05	12
2	General physician specialist	60	26	120
3	Rheumatics Arthritis Specialist	05	05	--
4	Neuro Physician	10	06	16
5	Cardiologist Spec. (Asthma, T.B. Allergy)	22	08	50
6	Diabetics Specialist	30	21	70
7	Kidney Disease Specialist	12	07	62
8	Surgeons	67	14	97
9	Urologist	11	05	44
10	Cancer Surgeons	03	01	02
11	Plastic Surgeons	06	03	20
12	Pediatric Surgeons	16	07	35
13	Nauru Surgeons	05	05	77
14	Gynecologists	30	11	153
15	Ethologist Specialist	02	01	08
16	Ophthalmic Specialist, Phecho Surgeons, Special Eye Laser Spec.	40	27	46
17	Retina Surgeon	08	03	--
18	Child Specialist	21	17	85
19	Psychiatrists	07	02	---
20	Ear, Nose, Throat Specialist	52	38	76
21	Radiologist	25	18	--
22	Pathologist	25	09	--
23	Skin, Cosmetology, Laser & V. D. Specialist, Leprosy	16	11	17
24	Anesthesiologists Specialist	15	02	--
25	Test Tube Baby Centre	08	04	--
26	Eye bank	03	01	---
27	Dentist Specialist	22	10	08
28	Physiotherapist Specialist	09	09	--
29	Homeopathic Specialist	35	15	--
30	Unani Specialist	02	02	--
31	Blood bank, Ambulance, Lab	04	04	--
Total		580	297	998



6. Availability of Medical Facilities

The available data indicate the presence of a wide variety of medical specialists in Parbhani City. The table demonstrates that Parbhani City has a diversified health care structure. General physicians, surgeons, ENT specialists, ophthalmic specialists, homeopathic specialists and gynaecologists are available in comparatively larger numbers. However, the number of specialists in certain critical fields is relatively low. For example, only three cancer surgeons and seven psychiatrists are reported. Similarly, specialized services such as eye banking and certain super-speciality treatments are available at a limited number of centres. This indicates that although general medical services are relatively well developed, there is a need to strengthen selected super-speciality and critical-care services.

7. Spatial Distribution of Health Care Facilities

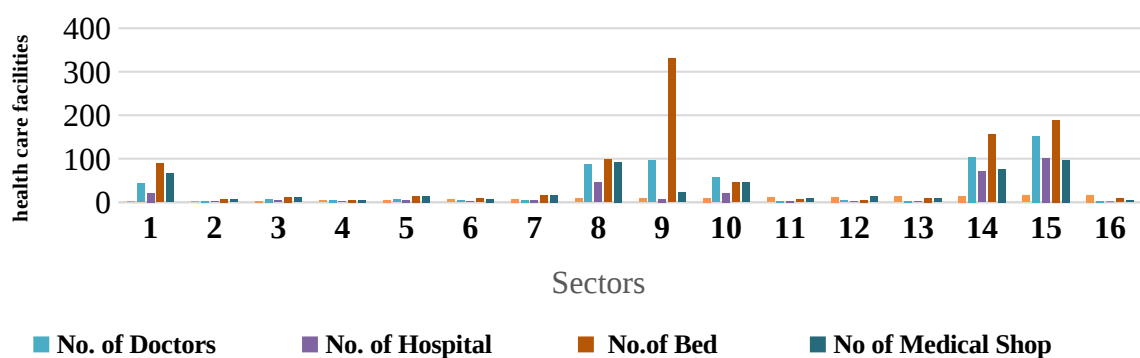
The spatial distribution of health care facilities across the sixteen sectors of Parbhani City is highly uneven.

Table 1: Sector-wise Health Care Facilities in Parbhani City

Sector	No. of Doctors	No. of Hospitals & Clinic	No. of Beds	No. of Medical Store
I	43	21	89	66
II	03	02	07	06
III	07	04	12	11
IV	05	02	05	05
V	06	05	14	14
VI	04	02	08	07
VII	05	05	16	17

VIII	86	46	98	92
IX	96	07	330	22
X	56	21	45	46
XI	03	03	06	08
XII	04	02	05	13
XIII	03	02	10	08
XIV	104	71	155	76
XV	152	102	189	97
XVI	03	02	09	04
Total	580	297	998	492

PARBHANI CITY SECTOR WISE HEALTH CARE FACILITIES



7.1 Sector XV

Sector XV has the highest concentration of health care facilities in the city. It has 152 doctors, 102 hospitals and clinics, 189 beds and 97 medical stores. The concentration of health facilities in this sector can be associated with its central location, transportation facilities and proximity to major urban activity centres. The railway station and bus stand provide connectivity to different parts of the city and surrounding areas. As a result, Sector XV has emerged as one of the most important health service zones in Parbhani City.

7.2 Sector XIV

Sector XIV is another important health care zone. It has 104 doctors, 71 hospitals and clinics, 155 beds and 76 medical stores. The relatively high concentration of health facilities in this sector indicates its importance within the urban health service network.

7.3 Sector VIII

Sector VIII has 86 doctors, 46 hospitals and clinics, 98 beds and 92 medical stores. It is also one of the major concentrations of health care facilities in the city.

7.4 Sector IX

Sector IX presents a unique pattern. It has 96 doctors and as many as 330 beds, but only seven hospitals and clinics. This indicates that the hospitals in this sector have relatively large bed capacities. The presence of the District Civil Hospital makes Sector IX particularly important for health care services in Parbhani and the surrounding region.

7.5 Sectors with Low Health Facilities

Sectors II, IV, VI, XII, XIII and XVI have only two hospitals and clinics each. These sectors therefore have comparatively limited health care infrastructure. This uneven pattern indicates that the spatial distribution of health care facilities does not correspond equally to all parts of the city.

8. Spatial Concentration of Health Care Facilities

The analysis indicates that health care facilities are strongly concentrated in the central part of Parbhani City. Sectors VIII, XIV and XV contain a substantial proportion of the city's hospitals, doctors and medical stores. The concentration can be explained by several factors:

1. High population concentration in the central city.
2. Historical development of the old city.
3. Better road connectivity.
4. Availability of railway transport.
5. Proximity to the bus stand.
6. Concentration of commercial activities.
7. Availability of supporting infrastructure.
8. Greater demand for specialized medical services.

The centralization of health services provides certain advantages, particularly in terms of accessibility by public transport and availability of multiple specialists.

However, excessive concentration also creates disadvantages. People living in peripheral sectors may have to travel longer distances to access specialized health services. During emergencies, this may increase travel time and delay treatment.

9. Ratio of Hospitals, Doctors, Beds and Medical Stores

The overall ratio of health care facilities in Parbhani City is as follows:

- Hospital: Doctor = **1: 1.4**
- Hospital: Bed = **1: 4.6**
- Hospital: Medical Store = **1: 1.9**

These ratios demonstrate considerable variation between different sectors.

In Sector IX, the hospital-doctor ratio is **1:13.7**, which is the highest among all sectors. This indicates a concentration of doctors in this sector. The hospital-bed ratio in Sector IX is **1:47.1**, which is exceptionally high compared with other sectors. The presence of a large government hospital with substantial bed capacity explains this pattern. In contrast, Sector XV has a hospital-bed ratio of **1:1.9**, indicating that a large number of hospitals and clinics are operating with comparatively smaller bed capacities. The hospital-medical-store ratio is highest in Sector XII at **1:6.5**, whereas Sector XV has a comparatively low ratio of **1:1.0**.

10. Ratio of Health Care Facilities to Population

According to the 2011 Census, Parbhani City had a population of **307,170**.

The relationship between health care facilities and population is presented below.

Table 2: Ratio of Health Care Facilities and Population

Sr. No.	Health Care Facilities	Total	Population (2011)	Ratio
1	Doctor	580	307170	1:530
2	Hospital	297	307170	1:1034
3	Bed	998	307170	1:308
4	Medical Store	492	307170	1:624

The table reveals the relationship between the available health care facilities and the city's population.

10.1 Doctor-Population Ratio

There is approximately one doctor for every 530 persons. Considering the additional population from surrounding rural areas that depends on Parbhani health services, the actual pressure on doctors may be higher.

10.2 Hospital-Population Ratio

There is approximately one hospital or clinic for every 1,034 persons. However, the number of hospitals alone does not fully represent health care capacity because hospitals differ considerably in size, bed capacity and specialized services.

10.3 Bed-Population Ratio

There is approximately one hospital bed for every 308 persons. During emergencies, epidemics or pandemics, the available bed capacity may come under considerable pressure.

10.4 Medical Store-Population Ratio

There is approximately one medical store for every 624 persons. Although medicines are available through a considerable network of medical stores, their distribution across the different sectors is uneven.

11. Role of Public and Private Health Care Services

Both public and private sectors play an important role in the health care system of Parbhani City. Government hospitals provide essential medical services to the general population, particularly to economically weaker sections. They also provide services to people from rural areas surrounding Parbhani. Private hospitals and clinics supplement the public health system by providing specialized medical treatment, diagnostic facilities and emergency services. The availability of ICU facilities, X-ray, sonography, CT scan, pathology laboratories and specialist doctors increase the overall capacity of the city's health care system. However, private health care may be relatively expensive for economically weaker households. Therefore, coordination between public and private health care providers is essential for ensuring affordable and accessible health services.

12. Emergency Health Care Services

Emergency medical services depend heavily on the location of hospitals and the quality of transport infrastructure. Parbhani railway station, bus stand and major transport routes provide good connectivity to the central parts of the city. This improves access to hospitals during emergencies. Patients suffering from

accidents, cardiac problems, severe infections, pregnancy-related emergencies or other critical conditions require rapid transportation to appropriate medical facilities. The concentration of hospitals in the central part of the city provides better access for people living nearby. However, residents of peripheral sectors may face greater travel distances and longer response times. Therefore, emergency health facilities should also be strengthened in peripheral areas.

13. Major Problems of Health Care Facilities in Parbhani City

The analysis of the available data highlights several major problems.

13.1 Unequal Spatial Distribution

Health facilities are not equally distributed across all sixteen sectors. Some sectors have a large concentration of hospitals, doctors and beds, whereas others have very limited facilities.

13.2 Excessive Dependence on the Central Area

The central part of the city provides a large proportion of health services. This creates additional pressure on hospitals and doctors located in the central sectors.

13.3 Inadequate Facilities in Peripheral Areas

Peripheral sectors have fewer hospitals, doctors and beds. Residents therefore have to travel towards the central city for medical treatment.

13.4 Limited Super-Speciality Services

Certain specialized services are available only through a small number of specialists and hospitals. This may require patients to travel to larger regional or metropolitan centres for advanced treatment.

13.5 Increasing Population Pressure

As the population of Parbhani continues to increase, the existing health infrastructure may face additional pressure unless new facilities are developed.

13.6 Rural Population Pressure

Parbhani functions as an important regional service centre. People from surrounding rural areas also depend on the city's hospitals and specialist services. Therefore, the actual demand for health care services is greater than that generated by the urban population alone.

14. Major Findings

The major findings of the study are as follows:

1. Parbhani City has a diversified network of health care facilities.
2. The city has 580 doctors, 297 hospitals and clinics, 998 beds and 492 medical stores.
3. The distribution of health care facilities across the sixteen sectors is highly uneven.
4. Sector XV has the highest concentration of hospitals and clinics.
5. Sectors XIV and VIII are also major health care concentration zones.

6. Sector IX has 330 beds and 96 doctors, mainly due to the presence of a major government hospital.
7. Sectors II, IV, VI, XII, XIII and XVI have comparatively fewer health care facilities.
8. The overall hospital-doctor ratio is 1:1.4.
9. The overall hospital-bed ratio is 1:4.6.
10. The overall hospital-medical-store ratio is 1:1.9.
11. The doctor-population ratio is approximately 1:530.
12. The hospital-population ratio is approximately 1:1,034.
13. The bed-population ratio is approximately 1:308.
14. The medical-store-population ratio is approximately 1:624.
15. Health facilities are concentrated mainly in the central part of the city.
16. Peripheral sectors have comparatively inadequate health infrastructure.
17. The surrounding rural population also depends on Parbhani City's health care facilities.
- 18.** Future health planning should focus on balanced spatial distribution and expansion of facilities.

15. Suggestions and Recommendations

Based on the findings, the following measures are recommended for improving health care facilities in Parbhani City.

15.1 Sector-wise Health Planning

Health planning should be undertaken separately for each of the sixteen sectors. Population size, population density and existing health facilities should be considered while preparing sector-wise health plans.

15.2 Development of Health Centres in Peripheral Areas

New Primary Health Centres, Urban Health Centres, clinics and dispensaries should be established in sectors where the availability of hospitals and doctors is low.

15.3 Increase in Hospital Beds

Hospital bed capacity should be increased according to present and projected population requirements. Particular attention should be given to areas with limited bed availability.

15.4 Expansion of Specialist Services

Specialist services such as oncology, cardiology, nephrology, neurology, psychiatry and critical care should be strengthened.

15.5 Improvement of Emergency Services

Emergency medical services should be strengthened in peripheral areas through strategically located ambulance stations, emergency centres and improved road connectivity.

15.6 Promotion of Digital Health Services

Telemedicine, online consultation, digital health records and remote diagnostic services can help reduce the pressure on central hospitals.

15.7 Public-Private Partnership

Greater coordination between government and private hospitals can improve the utilization of available medical infrastructure, particularly during emergencies and epidemics.

15.8 Future Population-Based Planning

Health planning should not depend only on the 2011 population. Current population estimates and future population projections should be considered while developing new health infrastructure.

16. Conclusion

The study of health care facilities in Parbhani City reveals that the city has a relatively diverse and developed network of medical services. A total of 580 doctors, 297 hospitals and clinics, 998 hospital beds and 492 medical stores are reported in the available data. A wide range of medical specialists and diagnostic services are also available. However, the spatial distribution of these facilities is highly uneven. Sectors XV, XIV and VIII have a high concentration of hospitals, doctors and medical stores, whereas several peripheral sectors have comparatively inadequate facilities. Sector IX presents a different pattern, with a large number of beds and doctors because of the presence of the District Civil Hospital. The population ratio further demonstrates the pressure on the health care system. With a population of 307,170 in 2011, there was approximately one doctor for every 530 persons, one hospital for every 1,034 persons, one bed for every 308 persons and one medical store for every 624 persons. The situation becomes more significant because Parbhani is not only serving its urban population but also providing health services to people from surrounding rural areas. Therefore, the actual demand for health services is likely to be higher than what is indicated by the urban population alone. The major challenge is therefore not merely increasing the total number of health facilities but ensuring their equitable geographical distribution, accessibility, affordability and adequacy. Peripheral sectors require additional primary health centres, hospitals, doctors, beds and emergency services. At the same time, specialized and super-specialized services should be strengthened in the major health care centres. Thus, future urban health planning in Parbhani should follow a population-oriented, sector-wise and spatially balanced approach. Such planning would help reduce the pressure on central hospitals, improve accessibility for peripheral populations and strengthen the overall health care system of Parbhani City.

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