

**GEOGRAPHY OF RURAL HEALTH CARE**  
**Approaches and Methods**

BY

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## **PREFACE**

Better health is central to human happiness and wellbeing. It also makes an important contribution to economic progresses as healthy population live longer is more productive. Availability of rural health care amenities and facility may not be regarded as good indicators of human resource development until and unless their optimum distribution, accessibility and allocation with to threshold population and range of goods.

The rural health care system in India is not adequate or prepared to contain COVID-19 transmission in many Indian States because of the shortage of doctors, hospital beds, and equipment and other health facility. The COVID-19 pandemic creates a special challenge due to the paucity of testing services, weak surveillance system and above all poor medical care. The impacts of this pandemic, and especially the lockdown strategy, are multi-dimensional. In view of this present book 'Geography of Rural Health Care' a micro analysis highlighted geographic study methods, approaches and rural health care services and infrastructure. It is the urgent need to take immediate steps to control the spread and its aftereffects and to use this opportunity to strengthen and improve its primary health care system in rural India.

However, studies on the measurement of efficiency in rural health care are limited both in number and coverage. Most of the available

studies deal with macro level analysis and do not apply quantitative techniques at micro level. In this context this book is a very useful attempt at measuring efficiency and planning for rural health care services at district as well as micro level using different theoretical approaches, qualitative methods and research tools. For the micro level analysis of geography of rural health care system 'Solapur district' of Maharashtra state is selected.

In the first edition of Geography of Rural Health Care Dr. Abhiman Ganpat Nimase explore the ways in which geographic ideas and approaches can inform our understanding of especially rural health care services and infrastructure. The book's focus on a broad range of physical and social factors that drive health care in places and spaces offers students and scholars an important holistic perspective on the study of rural public health care services in the modern era.

Present book mainly focus on medical care system consists of spatial and behavioral analysis. Geography of rural health care helps us to understand the context in which patients live; it helps us to better understand the distribution of the health care workforce and services. The book covers introductory part and a good literature to study of rural health care services. This book focuses on growth and distribution of health care centres, health care facilities, human resource, Centrality, Hierarchy and Service area of health centres, concept such as utility and accessibility equality, equity, and efficiency in analyzing health care. Planning for health care and present status and future prospects of health centres also aimed in this book. Health care also needs to be seen from the perspective of its contributions to the communities where it is located as an employer, a generator of employment both directly and indirectly to the delivery of services and as part of place identity.

In this edition, the book emphasizes the theoretical significance of spatial and behavioral approaches to health care. Spatial methods are now reinforced throughout the book, and other qualitative and quantitative methods are discussed in greater depth. Data and examples are used extensively to illustrate key points and have been updated throughout, including several new approaches of health care geography. The book contains more number of tables, including new and updated information and data graphics. The book is designed to be used as the core text for geography of rural health care for graduate, post graduate

students and is relevant to students of biology, medicine, entomology, social science, urban planning, and public health department.

Writing a reference book and the monograph including the micro level analysis is not a simple task for me. It is simply not possible with the help and guidance of my respected and dearest peoples. The main source of energy and motivation is Prin. Dr. V. S. Shivankar, Secretary, Rayat Shikshan Sanstha Satara. I am very grateful to Dr. T. N. Lokhande, My Ph.D. guide for the inspiration and continuous guidance for me.

While compiling research material for this book, search many websites, visit many rural health centres, libraries for ensuring the authenticity of the other matter and current update. We are sincerely grateful to all these resource as without this the publication of this book wouldn't have been possible. This work is not possible without my colleagues of Department of Geography, Chhatrapati Shivaji College, Satara and Dr. S.T. Lokhande, Librarian. I am thankful to them also. I am thankful to Gangadhar Divekar and publisher of Dnyanmangal Prakashan Vitran, Kolhapur.

I have also the great pleasure to record my beloved wife Sou. Suvarna and my sons Ritesh and Vishwanjali, for their tolerance, patience and source of encouragement. I must acknowledge the constant support and encouragement of my parents.

Place: Satara

**Dr. Abhiman Ganpat Nimase**

Date : 15 August, 2021

## CHAPTER I INTRODUCTION TO RURAL HEALTH CARE

### Introduction

The rural health care system in India is not adequate or prepared to contain COVID-19 transmission, especially in many densely populated northern Indian States because of the shortage of doctors, hospital beds, and equipment. The COVID-19 pandemic creates a special challenge due to the paucity of testing services, weak surveillance system and above all poor medical care. The impacts of this pandemic, and especially the lockdown strategy, are multi-dimensional. The authors argue for the need to take immediate steps to control the spread and its aftereffects and to use this opportunity to strengthen and improve its rural primary health care system in rural India.

Health problems in a developing country such as India are predominantly reflections of poverty. Three-fourths of the population lives below poverty line or at subsistence levels. This means seventy to ninety percent of their incomes go towards food and related consumption. In such a context social security support for health, education, housing etc. become critical. India has one of the largest private health care sectors in the world with over eighty percent of ambulatory care and only twenty percent ambulatory care being supported through public health care sector. Though, 80 per cent of the Indian population lives in rural areas and only 11 percent of the physicians practice in these areas.

The current global pandemic of COVID-19 necessitates a public health strategy with more emphasis on epidemiology, especially with

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regards to understanding the causes as well as identifying appropriate population-based behavioral and educational programs. It is important to realize that the pandemic of COVID-19 has initially happened in well-developed countries that have achieved the so-called health transition. However, the virus does not differentiate between rich-poor or rural-urban dichotomies. It is particularly a threat to a country like India, where 65–68% of the population lives in rural areas that also have the highest overall burden of disease globally.

The health care services and systems in India are still developing and have challenges of workforce shortages, absenteeism, poor infrastructure and quality of care. Despite the National Health Mission and Government's commitment, adequate and affordable healthcare is still a mirage. The healthcare system in rural India faces a chronic shortage of medical professionals which is detrimental to the rural health system in terms of the quality and availability of care for rural people. The State focus has been on curative care, whereas poor infrastructure and poor coordination between the line departments makes it difficult to tackle public health emergencies such as COVID-19.

It is a wakeup call and what is important at this moment is to use the lessons of this pandemic in the rural areas of many Indian states where the health care systems have to be improved considering the huge population in rural areas, untrained staff in caring and handling of patients during an outbreak of infectious diseases, and a huge shortage of beds, and equipment. Despite these challenges, the government can take a three-pronged approach to stop the epidemic. These are to invest and prepare healthcare providers in rural areas for the epidemic; massive education programme to educate people; and to create a strong surveillance system that can help in reducing the spread and fatality. Besides, many health care providers in rural areas are unregistered and untrained and do not know what to do in such an emergency. Hence providing clinical guidelines, training and handholding may help.

Presently rural India may become the next coronavirus hotbed and emphasized the need to use this opportunity to strengthen and improve its primary health care system. Although it is impossible to transform its primary health care in a day or a week or a month, the right steps in this direction will definitely help in the future. The coming weeks and months is challenging for India and it needs to take strong

actions to meet this emergency and its aftereffects.

Increasing population of India requires medical facilities to maintain public health. 'Public health care centers constitute the backbone of the rural health care services'. The public health care services are very inadequate therefore private sector has a virtual monopoly over ambulatory curative services in both rural and urban areas and over half of hospital care. Further, a very large proportion of private provider is not qualified to provide modern health care because they are either trained in other systems of medicine. Nearly seventy per cent of India's population lives in the rural areas. The rural public Health care system consists, primary, secondary and tertiary care institutions, manned by medical and paramedical personnel. Medical colleges and professional training institutions need manpower train and give the required academic input.

Rural public health care service is provided through a network of sub-centers, primary health care centers, rural hospital, Sub-district and district hospitals. Rural public health care institutions are established and maintained by the State Government out of funds provided to them by the Central Government under the Minimum Needs Programmes and Basic Minimum Services Programmes. Programme managers managing ongoing programmes at central, state and district levels. In spite of the primary, secondary and tertiary care institutions and medical college hospitals there are not well organized referral linkages between them. The programme managers and teachers in medical colleges do not link with institutions in any of the three tiers; essential linkages between structure and function are not in place. During the Tenth Plan period, efforts should be made to reorganize health system, build up essential linkages between different components of the system so that there should be substantial improvement in functional status. The public health care system in India, at present, has a three-tiered structure namely primary, secondary and tertiary which provides health care services to the peoples. (WHO, 1971).

"Health care in India is handicapped because it has to face serious crises in cost, quality of care and equitable distribution of modes and standards of service to the population as a whole" (Shinde S.D 1980). The distribution of health care services and modern health facilities is highly centralized. Though 80 per cent of the Indian

population lives in rural areas, only 11 per cent of the physicians practice in these areas (Banerjee-Guha. S. and Joshi S. 1985).

Studies in medical geography increasing attention of geographers in India that is regarded as rural and urban area. In the present time study of primary health care system become a multifaceted subject in health practices all over world. 'Human resource' is an important resource upon which regional development is depending. (Akhtar R., 1982). Quality of human resource is based upon some social index like literacy rate, population growth rate, density, education, health facility, sex ratio, life expectancy etc. Among these 'health' is an assertion input the development of human resource and the quality of life (Wood J., 1982). The human resource is an important resource in the world. Man has optimum ability to make those resources. The optimal working condition of man depends on health. The creativity of human beings is very important in this process. Therefore, the study of human well-being becomes an important aspect. Human creativity depends on his health condition.

In the developing countries, the emphasis in medical geography seems to have significantly shifted within the last fifteen years. This is primarily reflected in the desire to apply techniques of spatial analysis to problems of location and delivery of health care (Stamp L.D., 1964).

The necessity of sufficient availability of health services such as hospital, health centres, beds, doctors, and other health facility infrastructure is inherited from colonial India (Clarke M. and Wilson A.G., 1948). Two important geographical perspectives on health care provision have essential namely 'access' and 'utilization' (Joseph A.E. and Philips D.R., 1984, P.9). Radhika Ramasubban (1984) has rightly emphasized that "at all times the highest priority was the protection of the European population. Another was to ensure that disease and epidemics did not affect Britain's trade." The Royal Sanitary Commission report (2000) also states that "the main enemy of the British soldier in India was not the Indian enemy but disease". Simultaneously the indigenous of traditional system of medicine that used to serve the vast majority of the population was greatly discouraged and the western type of medicine introduced that too in the select place. Such process had led to enclaves of development in terms of health facilities, and it may rightly be said that health facilities are abundant where there is

less need and vice versa.

Each village should have its own health centre or sub-centre, with staff and functions. However, countries such as India can't afford to provide health centres to each and every village. But a group of village could be provided one health centre ideally located and also equipped with the health needs of the region. Unfortunately in India, ideal health planning has been replaced health planning or political epidemiology (Cliff A.D. and Haggett P., 1987).

### **1.1 Concept of Health And Health Care System**

All communities have their concepts of health, as a part of their culture. Many more dimensions have also been suggested which is spiritual, emotional, vocational and political health (May J.M. 1958). The widely accepted definition of health is given by world Health organization (WHO) in the preamble of its constitution in 1948. "Health is a state of complete physical, mental and social well-being and not merely an absence of diseases or infirmity". The WHO definition of health investigate three specific dimensions – the physical, the mental and social are interact with one another.

Health of an individual is closely related to the various geographical factors. Geographical factors are more influencing and they determine the health of individual and the community. Health is considered as a major determinant of happiness. The link between health and development is very close.

Dubos (1965) defined "Health implies the relative absence of pain and discomfort and a continuous adaption and adjustment to the environment to ensure optimal function". The Oxford English Dictionary defines as "Health is a condition of the body or some part or organ of the body interrupting the performance of vital functions. According to Audy J.R. (1971) "Health is a continuing properly that can be measured by the individual's ability to rally from a wide range and considerable amplitude of insults, the insults being chemical, physical, infectious, psychological and optimal function.

Geographical epidemiology is the systemic study of the spatial distribution ad disease with reference to physical and cultural environmental hazard and communicable disease. This part of study becomes the domain of health care management (Lokhande, T. N. and

Kale, V.P., 2014). According to (Joshi C.K. 1988) has concluded today, human resources development through public health center is become essential issue to geographical epidemiology, medical geography and spatial pattern of health services in rural community. Public health centers constitute the back bone of the rural health care services.

### **INDIA : PUBLIC HEALTH CARE SYSTEM**

India has a union of twenty nine states including Telangana and seven union territories. States are largely independent in matters relating to the delivery of health care to the people. Each state has developed its own system of health care delivery, independent of the Central Government. The Central Government responsibility consists mainly of policy making, planning, guiding, assisting, evaluating and coordinating the work of the State Health Ministries. The health system in India has three main links like central, state and local or peripheral.

The health system at the national level consists of ministry of health and family welfare, the directorate general of health services and the central council of health and family welfare. At the district level there are 593 districts health centres in India (2011). Within each district, there are six types of administrative areas such as Sub-division, Tahsils, Community Development Blocks, Municipalities and Corporations, Villages and Panchayats. India's health care system that has two parts namely, Private health care system and Public health care system.

#### **Organization of Public Health Care System**

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 follow 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 the national development council, as also legacy of a common history of British colonial rule that laid the foundation of the health care bureaucracy. Further the fiscal devolution of resource is determined by central government and this is done through Plan schemes or programme, which are usually uniform across states.

Public health services are governed by the ministry of Health and family welfare through various departments. In Maharashtra the Ministry is divided into two departments the Public Health department,

which includes Family welfare, Medical relief and ESIS, and the Department of Medical Education and Drugs. Both these departments have a separate minister and Minister of state and their secretariat, and also have technical wings called directorate of Health and directorate of Medical Education and research, respectively.

#### **Rural Public Health Care System**

Nearly seventy per cent of India's population lives in the rural areas. The rural public Health care system consists, primary, secondary and tertiary care institutions, manned by medical and paramedical personnel. Medical colleges and professional training institutions need manpower train and give the required academic input. Rural public health care service is provided through a network of sub-centers, primary health care centers, rural hospital, Sub-district and district hospitals. Rural public health care institutions are established and maintained by the State Government out of funds provided to them by the Central Government under the Minimum Needs Programmes and Basic Minimum Services Programmes. Programme managers managing ongoing programmes at central, state and district levels. In spite of the primary, secondary and tertiary care institutions and medical college hospitals there are not well organized referral linkages between them. The programme managers and teachers in medical colleges do not link with institutions in any of the three tiers; essential linkages between structure and function are not in place. During the Tenth Plan period, efforts should be made to reorganize health system, build up essential linkages between different components of the system so that there should be substantial improvement in functional status. The public health care system in India, at present, has a three-tiered structure namely primary, secondary and tertiary which provides health care services to the peoples. (WHO, 1971).

#### **Structure of Public Health at District**

A special feature of Maharashtra's health organization system has been the early devolution of primary health care implementation to the Zilla parishads as early as 1961 primary health care, school education and other social sector programmes/schemes have been given to the Zilla Parishad to implement. The Zilla Parishad get grants under section 183 and 182, respectively, of the Maharashtra Zilla Parishad and Panchayat Samiti Act, 1961 for carrying out the Vaccinations, School

Health clinics, Primary Health centres, Primary Health Units, Mobile Health Units, Allopathic dispensaries, Mobile Launch Units, Construction and up gradation of PHCs and Sub-Centres, Health checkup Ashram school Children, District Local Board scheme under section 183 activities. The early devolution process helped Maharashtra to gain an early lead among states to expand the rural health care infrastructure.

In the 1980 as part of expansion of the rural health infrastructure under the minimum needs programme, Rural Hospitals (RH) were set up by upgrading some of the older PHCs. This was with the idea of making first referral care available to the rural population closer to where they live. These are 30 bed hospital with four basic specialties- medicine, surgery, Obstetrics and gynecology, and pediatrics. Radiography and Pathology services are also available. Maharashtra has 3229 (2011) rural hospital each reaching out to about 150,000 populations (one per five PHCs). Maharashtra was one of the first states to establish the norm of one PHC per 30000 populations and one sub-Center per 5000 population in the early eighties itself.

### **I. Primary Health Care Services**

The first tier known as primary tier, has been developed to provide health care services to the vast majority of rural peoples. The primary tier comprises three types of health care institution: Sub-Centre (SC), Primary Health Center (PHC). The primary health care infrastructure provides the first level of contact between the population and healthcare providers. Realizing its importance in the delivery of health services, the centres, states and several government related agencies simultaneously started creating primary health care infrastructure and manpower.

#### **The Sub-centre (SC)**

Sub-Center is the first contact point between health worker and village community. The Sub-centres is the most peripheral health institution available to the rural population. Even though the sub-centres population norms at the national level have been met, there are wide inter-state variations. States with poor health indices do not have the required number of sub-centres especially in remote areas.

#### **Primary Health Center (PHC)**

The concept of Primary Health Center was first introduced by planning committee of Indian national concerns chaired by Jawaharlal Nehru in 1940. The Bhole committee in 1946 gave the concept of to provide as services close to the people as possible and integrated curative and preventive health care to the rural population. The central council of health as its first meeting held in January 1953 had recommended the establishment of primary health centers, community development blocks to provide comprehensive health care to the rural population. As per Indian Public Health Standard primary health center means “A center which to provide as services close to the people as possible and integrated curative and preventive health care to the rural community.

#### **Indian Public Health Standards for PHCs**

As per Indian public health standard (IPHS), Primary Health Center means ‘A center which to provide as services close to the people as possible and integrated curative and preventive health care to the rural community.’ IPHS prescribed standards for a PHC covering 20,000 to 30,000 populations with one primary health centers and population having a minimum 5000 to 10,000 with single sub centers. As on 22370 primary health centers have been established in the country. Today, human resources development through primary health center is become essential issue to geographical epidemiology, medical geography and spatial pattern of health services in rural community. Primary health centers constitute the back bone of the rural health care services.

#### **Rural Hospital (RH)**

Rural Hospital (RH) is the first referral unit for four PHCs offering specialist care. According to the norms each CHC should have at least 30 beds, one operation theatre, X-ray machine, labour room and laboratory facilities and is to be staffed at least by four specialists i.e. a surgeon, a physician, a gynecologist and a pediatrician supported by 21 para-medical and other staff. Rural Health Center (RH) serves as a four PHCs (National norms population cover 120,000 in plain areas and 80,000 in hilly/tribal area).

### **II. Secondary Health Care Services**

The second tier known as secondary tier, the secondary health care infrastructure at the sub-district hospitals is currently also taking care of the primary health care needs of the population in the city/town



in which they are located. This inevitably leads to overcrowding and underutilization of the specialized services. Strengthening secondary health care services was an identified priority in the Ninth Plan.

Progress in strengthening of physical infrastructure, functional improvement in terms of patient care, organization of referral linkages between RHs, district hospitals and tertiary care institutions, Improvement in different components of care - hospital waste management, disease surveillance and response.

### **III. Tertiary Health Care Services**

At the apex body of public health care delivery system, tertiary institutions called District Hospital. The levels at the district headquarters that have, also called Civil Hospital sit is usually 100-500 bedded hospitals having the most basic specialist (some of the larger ones are used as teaching specialist). In Maharashtra there are 29 civil hospitals with 8821 beds (2011). In other words not all districts have a civil hospital as yet. These hospitals are core center for referral medical care for the rural areas, apart from catering of the district town. Many tahsils and other town have sub-district hospitals, which are often run by local government bodies. In Maharashtra these are called cottage hospitals.

#### **1.2 Rural Public Health Care System of Solapur District**

Present book focus on only how the rural public health care system is served in Solapur district in relation to health care. Because of proportion of rural population is very high (68.17%) as compare to urban population (31.83%) of Solapur district. And proportion of rural area is very high (97.72%) as compare to urban areas (2.28%).

Increasing population of any region requires medical facilities to maintain public health. District Solapur has population 43,17,756 (Census, 2011). There are a district hospital, seventy seven primary health centers and four hundred thirty one sub-centers (Aarogya Bhavan Georges Hospital Com. fort Mumbai). But still there are shortages of medical facilities and health of population is not satisfactory so there is need to study real position of the public health facilities in the district. Micro level study of rural public health care system is undertaken for following reasons.

1. Public health is one of the most important areas of human development and sadly one of the most neglected in modern India as

well as in the study area.

2. The study of health care system is hardly touched in field of medical geography of the district.

3. There is regional variation of health care facilities in the district.

4. About 31.83 per cent population lives in urban area and 68.17 per cent population lives in rural area in the Solapur district. Urban population is aware and has ready access to health care facilities because of this health indices of the urban population are also better than those of the rural population.

5. Rural public health centre are backbone of rural community especially Solapur district because of proportion of rural area is high (97.72 %) as compare to urban areas (2.28 %).

#### **1.3 Significance of Rural Health Care**

Health care system has its own significance which has been discussed hereunder. WHO (1971) stated that 'Health is regarded as for sustained development in intervention both at the individual community and national level improved is a part of total socio economic development and is regarded as an index of social development. McGlashan N.D., (1972), stressed the tasks of medical geographer include the preparation and collection of data and to map them to show where a disease is present and to apply objective statistical tests to the distribution to assess whether or not the pattern is likely to have occurred by chance. Husain Majid, (1994), medical geography is the analysis of the human-environmental relationship of disease, Nutrition and medical care system in order to explain its interrelationship in space. Singh R.P, (1981), Medical geography provide scope for applying traditional geographical methodology in the elucidation of real world problems providing that the analysis does not lose sight of the border context in which environmental conditions are generated. Homes G.M. (1972), Geography of health is concerned with a real variation of disease incidence as expressed by mortality or mobility indices and with demonstration of possible cause effect relationship with elements of physical, cultural, and biological environment in space.

According to Misra, R.P (2007), Medical geography is concerned with four aspects of health, 1) it studies the spatial patterns

of health and ill health at all possible levels: global to local. 2) Medical geography studies the intensity and frequency of the problems encountered that includes degree of morbidity and mortality; periodicity of occurrence, the characteristics of the population affected that includes age, sex, rural-urban, agricultural, industrial, and the natural as well as the physical environment settings of the regions affected. 3) It studies the determinants of health and ill health by testing etiological hypotheses to identify underlying causes or risk factors and. 4) it provides models for policy analysis, planning and programming of health services. The geography of health care is a separate sub-discipline of geography therefore is not a sub-section of medical geography (Shannon, 1973).

Present book mainly focused on medical care system consists of spatial and behavioral analysis. In the present research to focus part is only how the rural public health care system is served in Solapur district in relation to growth and distribution of primary health centres, perspectives of human resources engaged in the public health department, health care facilities, utility and accessibility of health care services, spatial patterns, health practices, distributional characteristics and infrastructural facilities, centrality, hierarchy and service areas of health centres among the Solapur district. Studies also include planning for health care development and find out the problems facing rural public health care system.

#### **1.4 Study Area**

For the micro level analysis of geography of rural health care system Solapur district of Maharashtra state is selected because:

1. Solapur district come under the rain shadow area. Major field of this district lies in drought-prone area that's why that it needed to study their geographical phenomena.

2. It is need to pay attention on rural community health development of Solapur district like health planning, appropriate health services, support according to the needs, resources, and focuses their problem because said area lies social disparity in health development. Proportion of rural area is very high (97.72%) as compare to urban areas (2.28%) as per geographical area is concern study area.

3. Study area provides insufficient basic public health care services to rural community. Presently there are only four hundred thirty

one Primary health Sub-centres, seventy seven primary health centres, fourteen rural hospital, four sub-district hospital and one district hospital run by public health department among whole Solapur district as compare to rural areas (97.72%).

4. Uneven distribution of health care services lies in Solapur district due to the cause of population differences and governmental policies.

5. In medical geography from the view point of health care system especially Solapur district of Maharashtra ignored from the view point of geographical research.

The Solapur district of Maharashtra has been selected as an area for the present book. It is situated on the south east fringe of Maharashtra state. It lies between 17° 10' to 18° 32' north latitude and 74° 42' to 76° 15' east longitude. The district is bounded on the north by Ahmednagar and Osmanabad districts, on the east by Gulbarga districts (Karnataka state), on the south by Sangli and Bijapur (Karnataka state) and on the west by Satara and Pune districts. It comprises about 14895 sq.kms area (11 tahsils) out of which 338.8 sq.km. is urban (2.28%) and 14556.2 sq.kms. (97.72%) is rural area. Agro Climatically entire district comes under rain shadow area. Average rainfall of the district is 545.4 mms. The monsoon period is from second fortnight of June to end September bringing rains from south-west monsoon. The average maximum temperature of the district is 40.10 C while average minimum is 16.10 C respectively. (Socio-economic Abstract of Solapur District, 2011). The underline basalt on disintegration and decomposition brought varieties agencies had yielded three kinds of soil viz. deep black, medium deep and shallow soils. The district is provided with Bhima right bank canal and Neera and Man left bank canals. The total population of Solapur district is 4317756 (Census, 2011) out of total population 68.17 per cent population lives in rural area and 31.83 per cent population lives in urban area. Density and literacy of population of Solapur district is 290 persons per sq.km. and 77.01 per cent respectively.

#### **1.5 Objectives**

Present book mainly aimed to study the rural public health care system of Solapur district. The specific objectives of the book are as under:

1. To throw light on physical and socio-economic setting of the study area as a basis for the affecting factor on rural public health care system.

2. To study the growth and distributional characteristics of public health care centers.

3. To examine the facilities available in the public health care system.

4. To study the perspectives of human resources engaged in the public health care system.

5. To study the centrality and hierarchy of health centres and to delimit and map the service areas of public health care health centres.

6. To investigate the extent of utility, accessibility of health care services and to identify the problems and to plan for the future of public health care system.

7. To assess the present and future public health care system in the study area and to recommend made for the improvement of rural public health care system.

## 1.6 Methodology

For the analysis of the existing status of the various aspects of health centres, related data and information have been collected from various sources. All the relevant published and unpublished records have been consulted. However, the present work is based mainly on primary and secondary data. Secondary data has been collected mainly from the District Census Hand Books, Solapur District, Maharashtra State Gazetteer of Solapur District, Socio-economic reviews and District Statistical Abstracts etc. Official records of rural public health care system, OPD registers, PHCs vaccination annual register, PHCs & SCs annual report, published governmental health reports of Solapur district and of Maharashtra, Annual records and registers of health division of Solapur district, District level health status report, Apart from these, Internet, books, different research journals, published and unpublished thesis, dissertations, projects and atlas also referred for present research work.

The Primary data has been collected through intensive field work in the study areas. Stratified Random Sampling technique has been used to select primary health centers and sub-centers where villages

served and number of patient are the strata. The data compiled from the selected primary health centers and sub-centers by the tools like questionnaire, schedule, and interview and supported by empirical observations. The questionnaire for target group of health personal and beneficiaries and other different types questionnaires also been used as per objectives.

The compilation of data has been followed by computation and re-arrangement of the data in a tabular form. The analysis and interpretation of data comprises both the empirical and theoretical approaches. The statistical methods such as correlation analysis have been used to find out the relationship between health centres and area, population, inhabited villages.

To measure the level or growth of primary health care centers in the study area two variables that is number of PHC and number of persons who gives the services.

For the identification of spatial distributional pattern of primary health centers and sub-centers, Nearest Neighbor Technique developed by plant Ecologist P.J. Clark and Evince (1954) has been used. For the purpose of size and spacing study, Mather's formula, (1944) has been referred. An attempt has been made to classify the level of public health centres on the basis of workload factor and has been calculated by using the formula, Mc.Glashans N.D., (1972).

The centrality indices are calculated with the help of W.K.D. 'Davies Location Quotient method' (1967) and Godlund's method (1966) beside this on the basis of centrality score hierarchical groups of health care service centers has been prepared. For the delimitation of service area of the health centres, the established methods of theoretical approach has been used, which include, V.L.S. PrakshRao's (1994) modified method. The overlay technique has been applied for creating different layer to the location of PHCs for the district is first marked. The population of village by each PHC and distance from existing center are the parameters taken into consideration for the allocation of new PHCs.

The simple percentile has been considered to various parameters wherever necessary. Correlation is a statistical device which helps us in analyzing the covariation of two more variables correlation between primary health centres and other variables calculated with the help of

Karl Pearson's coefficient method. Besides this other statistical techniques like mean, standard deviation, correlation analysis has been done wherever necessary. The processed data represented in tabular forms as well as it has further presented with the help of maps, figures, diagrams, different graphs and photo plates etc.

### 1.7 Review of Literature

Notwithstanding that there are vast disparities in the country, and though geographers in India can contribute significantly in the health planning process, very much important contribution of geographers appeared yet on this aspect of medical geography.

The books on Medical geography/Health Care Geography written by Misra R.P. (1960), Irwin L.W. (1964), Culyer, (1971), Audy J.R. (1971), Glashan Mc N.D. (1972), Pyle G.F. (1976), Culyer A.J. (1976), Meade M.S. (1982), Joseph A.E. (1984), Akhtar Rais (1985), Roy T.K. (1991), Sharma A. (1994), Baum, F. and Sanders, D. (1995), Barrett F. (2000), Perrot, M. (2000), Podgar, A. and Hagan, P. (2000), Bhatt K.N. (2000), Hagar, S. (2000), Mayer I.A. (2001), Dadibhavi R. V and Bagalkoti (2004), have analyzed the various aspects of health care system like growth, distribution, facilities, behavior of health personnel staff and health care system in different region.

Culyer A.J. (1976) wrote the book *Need of the National Health Service*. In his book he explain a basic distinction that we shall have to make is between the nations of a person's demand for health as compared with his demand for health. Robin Haynes (1987): *The geography of health services in Britain*. In this book he studied the health in rural areas people live long and healthy lives compared with city dwellers is widely held. It is supported by evidence on mortality which shows that when standardized for age and sex, death rate in rural area lower than those in urban areas. Sharma A. (1994): *Poverty, Nutrition and Health in Assam*. In this journal she explains two health indices are constructed one reflecting the medical facilities and second is health status reflecting the performance indicators of health care index. Balan K. (2000): *Health for all by 2000 AD*: In this book he explained health care facilities and services are mostly important for government because planning for future how many money spent in medical sector. Thamilarasan S. & Ravi G. (2009): *A study on impact of public health services in Thanjavare District*. In these journals he explains diagnostic health care services

and income wise respondent wise diagnostic health care services.

Researcher for their M.Phil. and doctoral dissertation in different research centres, institutes and universities, has completed some important studies in the field of health care and medical geography. There are several M. Phil dissertations like Gambhire D. B. (1985) analyzed spatial distribution of diseases and health care facilities in rural area of Kolhapur district. Patil K. B. (1987) explains the spatio-temporal analysis of major diseases in Vidarbha. Mulik J. D. (1987) focuses on spatial analysis of communicable diseases in Konkan region". Thomas M. (1988) gives the account of private hospital facilities in greater Bombay. Gharge R. R. (1990) studied geo-medical analysis of some water borne disease in Maharashtra state. Bandekar A. G. (1991) investigates on some diseases in Sindhudurg district". Patil N.J. (1994) examined geo-medical studies of some diseases of Pune division of Maharashtra state. Mane H. S. (1995) explain pattern of diseases and health care facilities in Marathwada division. Hazare M. T. (1996) studied diseases and health care facilities of Kolhapur district.

Several research scholars have completed their Ph.D. in the field of Medical geography in various universities in India. In the year 1981, Pandurkar R. G. (1990) explains spatial distribution of major diseases in Maharashtra. Pagnis R. B. (1990) focuses on geographical aspects of health in the rural area of Pune district, Maharashtra". Amer Dev explains geography of health care spatial and social accessibility to the health care facilities in rural Himachal Pradesh in 1992 to the University of Mumbai. Power V.B. (1997) throws light on geographical epidemiology and spatial pattern of health services in rural area Dhule district. Shaikh F.M.A. studied spatial distribution of some diseases in cities of Solapur district. Karande H. Y. (2005) investigates spatial pattern of diseases and medical care facilities in western Maharashtra. Suryawanshi D. S. (2007) analyzed geographical epidemiology and spatial pattern of health services in the tribal area of Western Satpura region.

In India as well as in a foreign countries various geographers and other scholars also focused their attention through various research papers published in various journals, on the facets of health centres, the role of public health centres, origin and evolution, location, growth and distribution, health care system, accessibility of health centres,

utility, disparities of health centres, network and development of health centres, Patient behavior, health personnel behavior, Spatio-functional gap of health centres, availability of health facilities, workload on facilities, perspectives on human resources in health department, centrality and hierarchy of health centres, planning and perspectives etc.

Some of the notable work published in the form of research papers by different Indian as well as foreign geographers is as below. Akhtar R. (1978) he highlighted the disparities in the health facilities in Rajasthan during 1961-71. The International union Symposium on Geography of Health, which was held in Madras at the end of 1981, placed before medical geographers in India an opportunity to do meaningful research on applied aspect of medical geography and a number of medical geographers carried out case studies in health care geography. A joint paper by Akhtar R. and Nilfor Izhar (1986) concerned with the growth and disparities in the provision of hospital and bed facilities in India during availability of medical facilities in Tamilnadu. On the health planning aspect a few interesting papers were presented at the Madras symposium. Mahadev P.D. and Thangamani K. studied the locational and accessibility constraints of rural health services planning in Bellary district of Karnataka. Karmarkar P.R. and Pagnis R. B. carried out a survey at the primary health centre level in two tahsils of Poona district. Douglas B. and Vardarajan K. carried out the research paper on Health Status in Tamil Nadu”, Meeram Hira, Smith and Ghosh A. R. focus on respiratory diseases and suspended particulate matter in Calcutta, in 2001, Rao K. S. and Dasgupta focus his paper on chital health and immunization, Ghosh I. and Continho I. highlighted in his paper on norms and crises in theme of cholera an ethonography of cholera in Calcutta, Ghosh A. R. in his research paper give a account of Air, Pollution and Health in Caluctta, Hazrae J. (2002) Published article health and development of North East India, Singh B. stated in research article spatial variation of medical centres in Haryana, India in 2004. Gill S. S. and Grumman R. S. (2003) explain Punjab Rural Health Practice Role for the State. Nayak D. K. (2004) studied spatial patterns of health care in the Khasi Hills of Meghalaya, Bhole A. S. and Bhangle S analyzed a geographical study of urban slums centers in Jalgaon district of Maharashtra in 2004. 2. Pagare P.K. (2007) studied

articles A Study of Medicinal plant Resources in Betual Plateau, Madhya Pradesh, Suryawanshi D. S. and Chaudhari S. R. explains in his article health care services in tribal area of western Satpura region, India: Ahmad A. and Ali M. J. (2010) published article Accessibility of health facilities in Malad district: a micro level regional planning, Nath D. studied Edible herbs and Hepatices Treatment in Sivsagar District of Assam. F. Sadr Nabavi & M. Annapurna (2010): Health care of Muslim women: A comparative study of Bangalore in India and Mashhad in Iran. In this articles he studied the education level, family income, age of mirage are affecting on family planning and Health. Rolee K. and Ghosh T. (2011) studied the groundwater arsenic contamination and health status in Nandia district, West Bengal and Nasir J. investigate in his paper diseases and health infrastructure in Jaipur city, and Rajasthan. Tamilenth S. Punithavathi J. and Arul P. have studied geographical analysis of heart diseases Trichirapalli, Tamilnadu, India. Nimase A.G. and Lokhande T.N. (2013), focus in his paper on spatial distribution of primary health centres in Solapur district of Maharashtra. Lokhande, T. N. and Kale, V.P. (2014), studied planning for primary health care centers in Osmanabad district of Maharashtra.



## CHAPTER II

### DISTRIBUTION OF HEALTH CARE IN RURAL POPULATION

#### 2.1 Introduction

The quantitative and qualitative development of the health facilities is basic necessity of the society. The quality and quantity of the health centres can be well understood by the study of growth and distribution of these health centres. Present chapter growth of health centres has been studied in the view of number, population and dependence etc. and also deals with distribution of health centres in view of physiography, area, population and distance etc. with special reference to rural public health care system.

#### 2.2 Regional Growth Characteristics

The trend of population growth rates is basic to the change in the overall geographical personality of any area. Because of differences in socio-economic, cultural, political and geographical systems, the problems of developing and developed regions relating to population differ. The knowledge of population density and distribution size, growth finding out the disparities associated with socio-economic development in a particular region. Hence, the understanding of population growth is highly useful for the socio-economic and political development of a region. The knowledge associated with the spatial and temporal distribution of population, growth and composition helps planners to assess the existing pressure of population on available facilities and may plan for the future orientated development programme to solve the existing problems in that region. The most important problem before the country today, is the one created by population explosion North Solapur district also experienced enormous increase in the total

population. There are many factors which are responsible for increasing, the natural growth of population. The demographic factors and social factors influence the growth rate of population.

The growth of population in any areas is an index of its economic and social development, social awaking and many of characters (Chandana and Sidhu, 1980). The growth of population is one of the significant factor associated with man's occupancy. In other words, it flows in size from time to time and people migrate temporarily or permanently both within the administrative boundaries and across them (Bajaj, 1963).

#### The Growth of Population

The growth of population may be approached just by taking into consideration the next growth of population over the basic year. The growth rate assumes special significance, when viewed in temporal perspective. The growth of population has been taken in to consideration for the last ten decades that is for 1901-2001. The growth rate of population has a great significance for the geographer to understand the various social and economic problems.

#### Growth Rate

The actual growth rate of specific decade is obtained by dividing the difference between the populations of two dates and multiplying it with 100 as under:

$$r = \frac{P_n - P_o}{P_o} \times 100$$

Where: r = Growth rate.

P<sub>n</sub> = Population of next year.

P<sub>o</sub> = Population of base year.

The regional analysis of present growth of population has been shows in table 2.1. Here an attempt has been made to study the tahsil wise and decade wise growth of population of the study region.

In 2001-2011 the growth rate of population was 19.14 per cent, which has decrease up to 12.16 per cent. Though, the overall growth rate of population is insignificant, at tahsil level there is considerable variation in the population growth rate. Pandharpur tahsil shows very high growth rate above 26.89 per cent (Table 2.1). It has been also

observed that this tahsil has maintained decrease in growth rate up it last decade (2011). It is followed by Mohol, Malshiras, Karmala tahsil 24.45, 20.62, 19.89 respectively this tahsil has also shown constant increase above the regional level, growth rate (19.41 per cent). The tahsil Viz., Mangalwedha, Madha, Malshiras, Karmala and Sangola have moderate growth rate in the decade 1991-2001 (15-20 per cent). Akkalkot tahsil very low growth rate it lies 10.33 per cent in the decade 191-2001 .

**Table 2.1**  
**Solapur District: Growth of Population**

Sr. No	Tahsil	Population			Actual Growth		Growth in %	
		1991	2001	2011	2001	2011	2001	2011
1	Akkalkot	262872	290037	314570	27165	24533	10.33	8.45
2	Barshi	302158	340831	372711	38673	31880	12.79	9.35
3	Karmala	194600	233316	254489	38716	21173	19.89	9.07
4	Madha	250176	292611	324027	42435	31416	16.96	10.73
5	Malshiras	350346	422600	485645	72254	63045	20.62	14.91
6	Mangalwedha	148893	171261	205932	22368	34671	15.02	20.24
7	Mohol	202900	252526	276920	49626	24394	24.45	9.65
8	North Solapur	784361	960803	1057352	176442	96549	22.49	10.04
9	Pandharpur	317348	402707	442368	85359	39661	26.89	9.84
10	Sangola	230246	272077	322845	41831	50768	18.16	18.65
11	South Solapur	187157	210774	260897	23617	50123	12.61	23.78
<b>District</b>		3231057	3849543	4317756	618486	468213	19.14	12.16

Source: District Census Hand Book, Solapur District

In the decade 2001-2011 the growth rate of population was 19.14 per cent, which has decrease up to 12.16 per cent. (Table 2.1). However, at tahsil level there is variation in the growth rate of population. The tahsil viz. South Solapur and Mangalwedha tahsil shows high growth rate above 20.6 per cent respectively first and second rank (Table 2.1). It is followed by moderate growth rate in Sangola, Malshiras, Madha and South Solapur, tahsil 18.65, 14.91, 10.73, 10.04 respectively. The tahsil viz. Karmala, Barshi, Mohol, Pandharpur and Akkalkot, have low growth rate in the decade (2001-2011) below 10 per cent. Akkalkot tahsil very low growth rate it lies 8.45 per cent in the

decade 2001-2011

### Tahsilwise Growth in Population of Health

Here an attempt has been made to study the tahsil wise changes in population of health centres. The study area experiences increasing growth rate from 5.79 per cent to 8.32 per cent in the study period. It is interspacing to note that though the growth rate of population in decreasing the growth in population of health centres. Barshi tahsil shows declining growth rate of population of health centres in the decade 1991- 2001. There are some remarkable variations in the population growth rate of health centres at different tahsils. The comparative analysis of the population change in the health centres show that during the year 2001 the changing pattern of the growth of the population of health centres for the region is 5.79 %. The tahsils of Karmala, Malshiras, Sangola, Mangalwedha and South Solapur fall in a group of high growth rate (above 6 per cent). Whereas the tahsils viz Pandharpur belong to a group of medium growth rate (3 to 6%). Remaining tahsils are observed in the group of low growth rate of below three per cent.

**Table 2.2**  
**Solapur District: Growth in Population of Health Centres (1991- 2011)**

Sr.No.	Tahsil	Population			Actual growth		Growth in per cent	
		1991	2001	2011	2001	2011	2001	2011
1	Akkalkot	46570	49552	60256	2982	10704	6.40	21.60
2	Barshi	66350	64237	72563	-2113	8326	-3.18	12.96
3	Karmala	60230	67450	61780	7220	-5670	11.99	-8.41
4	Madha	46590	47856	55610	1266	7754	2.72	16.20
5	Malshiras	101421	111563	122560	10142	10997	10.00	9.86
6	Mangalwedha	61450	65230	67890	3780	2660	6.15	4.08
7	Mohol	51000	52410	58664	1410	6254	2.76	11.93
8	N. Solapur	28552	29310	30210	758	900	2.65	3.07
9	Pandharpur	67210	69880	74550	2670	4670	3.97	6.68
10	Sangola	29500	33524	34560	4024	1036	13.64	3.09
11	S. Solapur	27845	29650	33660	1805	4010	6.48	13.52
<b>District</b>		586718	620662	672303	33944	51641	5.79	8.32

Source: Solapur District Census Hand Book

The highest growth rate is observed in Akkalkot, Madha, South Solapur, Barshi and Mohol tahsils by decrease in growth rate in population of Besides this tahsils namely North Solapur, Sangola, Mangalwedha, experiences low growth rate.

The changing pattern of the growth rate of the population of health centres for the region as a whole is 8.32%. The tahsils of Barshi, Madha, Mohol, South Solapur and Akkalkot have a high growth rate (more than 10 per cent). Whereas, the tahsils viz; Pandharpur and Malshiras are in a group of moderate growth rate, between 5 to 10 per cent. Remaining tahsils viz Karmala, North Solapur, Mangalwedha and Sangola are observed in the group of low growth rate, below 5 per cent. It has also observed for the decade 2001 that the high growth rate of population (13.64 %) of Sangola tahsil and decade 2011 that the high growth rate of population (21.60%) of Akkalkot tahsil.

#### 2.4 Growth of the Health Centers According to their Population Size

Here an attempt has been made to study the tahsil wise health centers according to their size of population. The health centres have been classified into five categories. There is insignificant change in the number of primary health centres. However, category wise and tahsil wise analysis reveals considerable shift in categories of health centres. As such there were 11 health centres in the first category (below 30000 persons) in 1991, same in the situation in 2001 and which has increase to 15, in the year 2011. Similarly second category (30000 to 35000 persons) of primary health centres has also shown increasing trend from 13 to 17 and third category (35000 to 40000 persons) declining trend 17 to 16. Whereas remaining category have recorded increase in number of health centres. The notable change is observed in fourth category (above 40000 to 45000 persons) where numbers of health centres have been increase 14 to 20. In the fifth category year 1991 and 2011 reduced from 11 to 09 respectively. Tahsil level analysis also reveals more or less similar trend in average of study region (Table 2.3). It is also evident from district level analysis reveals increasing trend growth of primary health centres according to their population size.

**Table 2.3**  
**Solapur District: Growth of PHCs According To Their Population Size- 1991- 2011**

Sr.No	Tahsil	Year	No of primary health centres in each category					Total
			Below 30000	30000-35000	35000-40000	40000-45000	Above 45000	
1	Akkalkot	1991	1	1	2	1	2	7
		2001	1	1	2	1	3	8
		2011	2	2	1	1	2	8
2	Barshi	1991	2	1	1	2	1	7
		2001	1	2	1	1	0	5
		2011	2	1	1	2	1	7
3	Karmala	1991	1	1	3	0	0	5
		2001	0	2	3	1	2	8
		2011	1	1	1	2	0	5
4	Madha	1991	1	1	2	1	1	6
		2001	1	1	2	1	1	6
		2011	0	2	2	2	2	8
5	Malshiras	1991	1	3	2	3	2	11
		2001	1	3	2	3	2	11
		2011	2	3	2	3	2	12
6	Mangalwedha	1991	1	1	1	1	1	5
		2001	1	1	1	1	1	5
		2011	0	1	2	2	2	7
7	Mohol	1991	0	1	2	1	1	5
		2001	0	1	2	1	1	5
		2011	1	2	1	1	2	7
8	North Solapur	1991	0	1	1	1	1	4
		2001	1	1	1	1	1	5
		2011	1	1	1	1	1	5
9	Pandharpur	1991	2	1	2	1	0	6
		2001	2	1	2	1	0	6
		2011	3	2	1	2	0	8
10	Sangola	1991	1	1	1	1	1	5
		2001	1	1	1	1	1	5
		2011	2	1	2	3	0	8
11	South Solapur	1991	1	1	0	2	1	5
		2001	1	1	1	1	1	5
		2011	2	1	2	1	0	6
District		1991	11	13	17	14	11	66
		2001	11	16	19	14	11	71
		2011	15	17	16	20	09	77

Source: District Census Handbook, Solapur



## 2.5 Decadal Growth of Primary Health Centres

It is necessary to look into the details of the form of health centres evolved in this region during last fifty years, i.e. the period after independence since 1961. It is evident from table 2.4 that in the study region there is gradational growth of health centres during last four decades. In 1961 there were 15 primary health centres, which have increased to 77 in 2011. However, it is noteworthy that the growth of health centres has fluctuated from decade to decade. During 1961 there were 15 primary health centres which have increased up 16, 16, 66, 71, and 77 in the successive decades. Various factors are responsible for this situation increasing more population and changing socio-economical and political aspects and increasing more population are the some of the boosting factors for the successive growth of primary health centres in the study region.

**Table 2.4**

**Solapur District: Decadal Growth of Primary Health Centres**

Sr.No	Year	No. of PHCs	Decadal Growth	Per cent of Growth
1	1961	15	-	-
2	1971	16	1	6.25
3	1981	16	-	0
4	1991	66	50	75.75
5	2001	71	5	7.04
6	2011	77	6	7.79

*Source: District Census Handbook Solapur District*

Other factors include increasing density of communication network, growth of population, development of irrigation, development of agriculture etc. Beside these, medical facilities, services of ASHA, new policy of state government and role of NRHM, electricity, telephone facilities are also contributing factors to development of new health centres.

It is noteworthy that, the study region has experienced growth in the number of health centres in the last decades. The decrease in number of health centres is not use to the lack of threshold population. About 6.25 per cent increase the primary health centres in the year

1971. There were no changes in the total number of primary health centres in 1981. There were notable change occurs in 2001, 75.75 per cent health centres increased. A slight change occurs in 2011, only 77 health centres established among the study area.

## 2.6 Tahasilwise Growth In Number of Primary Health Care Centres

In order to serve maximum population in rural sector, the government has taken initiative to establish primary health care centres like primary health centres and Sub-Centres in various places of the district. This facility is provided for the people at reasonable and cheaper rate, in order to avoid many complications of rural people. Hence an attempt has been made to understand the spatial and temporal trends in the availability of primary health centres. The information was collected from the socio-economic abstract for primary health centres for the various places off study area.

### Primary health Centres

In the year 1961, there were only fifteen primary health centres in the district the stress was being on rural areas of the district. Out of fifteen there were two primary health centres, each in Barshi, Akkalkot, Sangola and Malshiras tahsils. Remaining 7 tahsil there were one primary health centres in each tahsil level among the Solapur district.

During the next two decade of 1971 and 1981, there has been no change in the number and remained sixteen for district as a whole. The pattern more or less, remained the same with exception Akkalkot, in 1971 when primary health centres become one in Karmala tahsil, the number of primary health centres become two. This shows that the period 1961, 1971 and 1981 there has been no progress in the establishment of primary health centres in different part of Solapur district. This means that during the three decades of investigation particularly 1961 to 1981, the government has not much paid attention for the establishment of primary health centres due to lack of resources and availability of doctor and nurses were also not sufficient. In the year 1991 and 2001, there were 66 and 71 primary health centres respectively which increased number than four times during last four decades. In the 2011 there were seventy seven primary health centres in the district highest number of PHCs followed by Akkalkot, Madha and Pandharpur.

**Table 2.5**

**Solapur District: Tahsilwise Decadal Growth of Primary Health Centres -1961-2011**

Sr.No	Tahsil	1961	1971	1981	1991	2001	2011
1	Akkalkot	2	3	2	7	8	8
2	Barshi	2	2	2	7	5	7
3	Karmala	1	1	2	5	8	5
4	Madha	1	1	1	6	6	8
5	Malshiras	2	2	2	11	11	12
6	Mangalwedha	1	1	1	5	5	5
7	Mohol	1	1	1	5	5	7
8	N.Solapur	1	1	1	4	5	5
9	Pandharpur	1	1	1	6	6	8
10	Sangola	2	2	2	5	5	6
11	S.Solapur	1	1	1	5	5	6
<b>Total</b>		<b>15</b>	<b>16</b>	<b>16</b>	<b>66</b>	<b>71</b>	<b>77</b>

Source : District Census Handbook, Solapur District

Highest number was for Malshiras tahsil, Akkalkot, Karmala and Pandharpur represented eight primary health centers. While Barshi represented seven, Madha and Pandharpur represented six each PHC. Remaining rest five tahsils have five PHC in the Solapur district.

### Primary Health Sub-Centre

The recent development in the field of medical facilities was the distribution of sub primary health centres particularly during the last three decades. In the year 1991 there were 321 sub health centres in district of Solapur. These sub primary health centres are distributed in various tahsils Madha and Barshi respected each 36 sub-health centres, fortunately, Malshiras having forty Sub-Primary health centres in the year 1991. It was followed by Akkalkot and Pandharpur tahsils which show that rural medical centres are this tahsils. South Solapur and Sangola were having moderate number of sub-PHC. While the North Solapur tahsil represents least number of sub-PHC.

In year 2001, the number of Sub-PHCs was 341 in the district and these were distributed randomly over the different tahsil of Solapur district because of uneven density of population. The highest number being for Malshiras and lowest for North Solapur tahsil, in the rest tahsil the number of Sub-PHCs was moderate in year 2001

**Table 2.6**

**Solapur District : Number of Primary Health Sub-Centres, 1971-2011**

Sr.No	Tahsil	1971	1981	1991	2001	2011
1	Akkalkot	27	30	33	35	39
2	Barshi	31	34	36	39	43
3	Karmala	24	28	29	30	32
4	Madha	33	35	36	37	45
5	Malshiras	35	38	40	41	76
6	Mangalwedha	19	20	22	25	26
7	Mohol	18	20	22	24	36
8	North Solapur	14	15	16	19	20
9	Pandharpur	29	31	32	33	42
10	Sangola	26	27	28	29	39
11	South Solapur	23	24	27	29	33
<b>District</b>		<b>279</b>	<b>302</b>	<b>321</b>	<b>341</b>	<b>431</b>

Source : District Census Handbook, Solapur District

The year 2011, the number of Sub-PHCs was 431 in the district and these were distributed randomly over the different tahsils. The highest number being for Malshiras tahsil which are listed seventy six sub-health centres and lowest for North Solapur tahsil, in the remaining tahsils the number of sub-PHC were slight change in year 2011.

### 2.7 Spatial Distribution

Geographers are mainly concerned with the spatial distribution of geographical phenomena. In case of primary health care centres, their origin, growth, development and spatial distribution are the results of combined effects of various factors. The distributional characteristics of health centres are influenced by mainly population and policy of government. In the study region health centres are unevenly distributed. Even at the tahsil level there is great variation in the distribution of health centres. Population is the most important factor affecting on health distribution among the study region because according to IPHS norms every 30000-20000 population have a one primary health centres and each 3-6 PHCs have a one Sub-Centre in plain and hilly/remote region respectively.

#### 2.7.1 Topographic Region and Primary Health Centres:

Generally physiographic characters of the study region influence the spatial distribution of any geographical phenomena. But here is

entire study area coming under the plain region. There is no important hill system in the district. Only in the north of Barshi tahsil several spurs of Balaghat range pass south for a few kilometers. There are also a few scattered hills in Karmala, Madha and Malshiras tahsil. The district in general has flat or undulating terrain. The low table and small separate hills in Karmala tahsil act as a watershed between Bhima and Seena rivers.

**Table 2.7**

**Solapur District: Topographic Divisions and Distribution of PHCs, 2011**

Sr.No.	Topographical Division	Area in sq.km	Percentage to Total Area	Total No. of PHCs	Percentage to total PHCs
1	The Hilly Region	497	3.34	03	3.9
2	The Plateau Region	11916	80.00	56	72.7
3	The Plain (Lowland) Region	2482	16.66	18	23.4
<b>Total</b>		14895	100	77	100

Above table reveals that Population plays the important role to locating Primary health care centres in Solapur district. As such only 3.9 per cent of total primary health centres are in operation in hilly region which covers 3.34 percentage of total geographical area of the study region (Table 2.7). In contrast 72.7 per cent of the total primary health centres are located in plateau region which comprise just 80.0 per cent of the total area. Whereas 23.4 percentage of health centres are confined to the 16.66 per cent of geographical area which is plain (lowland) region.

**2.7.2 Area and Primary Health Centres Ratio**

The district covers geographical area of 14895 Sq.kms. This is 4.82% of the total area of Maharashtra state. Out of the total area of the district 339.60sq.km (2.28%) is urban and remaining 14555.40 Sq.kms (97.72%) is rural area. Area wise Malshiras tahsil is biggest covering an area of 1588.43 Sq.kms and North Solapur is smallest covering an area of 694.87 Sq.kms. The number of health centres per 100 sq.km of area is 0.51 for the entire district.

However, this spatial variation at tahsil level is remarkable (Dr.

Lokhande and Nimase, 2013). In Malshiras tahsil the ratio is 15.58 which considerably decreased to 6.49 in Karmala, Mangalwedha, South Solapur and Sangola tahsil. As such highest 15.58 per cent of Primary health centres are in operation in Malshiras tahsil and lowest 6.49 percentage PHCs are in Karmala, North-Solapur, Sangola and South Solapur tahsil.

It is also observed that the six tahsils fall in the classes above X. Out of which Akkalkot, Madha, Mohol, and Pandharpur fall in the class X+1 S.D. and Malshiras and North Solapur tahsil fall in the class X+2 S.D. Remaining five tahsil are below X. Out of which Karmala and Sangola are fall in the class X-1 S.D. and rest of tahsils are in the class X-2 S.D. However it is observed that the co-relation that between these two variables is insignificant ( $r = 0.47$ ). It is simply because the area does not matter but its location and development status important to support the population as threshold support the health centres.

**2.7.3 Population and Primary Health Centre Ratio**

The number of primary health centre per 10,000 populations comes to 0.22 for the region as a whole. However these spatial variations at tahsil level are remarkable. This ratio comes to 0.001 in case of North Solapur and Mohol tahsil. Which decrease to 0.025 the in case of Mohol and Akkalkot.

The Akkalkot, Madha, Mohol, South Solapur Mangalwedha and Malshiras tahsil has their value above the mean 0.020. Out of which Akkalkot, Madha, Malshiras, Mohol and South Solapur fall in the class X+1 S.D. and no any tahsil fall in the class X+2 S.D. Remaining tahsil are below the mean (0.020) out of which only one North Solapur tahsil fall in the class X-1 S.D. and only three tahsils like Barshi, Pandharpur and Sangola are fall in the class X- 2 S.D.

The co-relation analysis between the two variables indicates ( $r = 0.84$ ) very high positive relationship has provided the required demand to sustain the health centres.

**2.7.4 Inhabited Village and Primary Health Centre Ratio**

The number of health centre per 100 inhabited villages is 6.76 in the district .But there is also spatial variation at tahsil level. This relationship ranges from 12.5 in North Solapur tahsil to 2.32 in Karmala tahsil.

The relationship shows that two tahsil fall in classes above the mean (7.13) Out of which Pandharpur tahsil fall in the class X+1 S.D. and Malshiras and South Solapur tahsils fall in the class X+2 S.D. Remaining tahsils are below X. Out of which Akkalkot, Barshi, Madha, Mangalwedha, Mohol, Sangola, South Solapur fall in the class X-1 S.D. and Karmala tahsil fall in the class X-2 S.D.

The co-relations analysis between these of two variables indicates ( $r = 0.47$ ) the significant relationship. It is also observed that the population of settlements is low where the number of health centre is less, whereas population of settlements is greater, the number of health centre is more. It is mainly due to the size of the settlement affect on health centres

**Table 2.8**

**Solapur District: Primary Health Centres –Distributional Relationship with Area, Population and Village**

Sr.No	Tahsil	No of Primary Health Centres			
		No. of PHC	Per 100sq.km	Per 1000 Rural Population	Per 100 inhabited village
1	Akkalkot	8	0.57	0.025	5.92
2	Barshi	7	0.44	0.018	5.10
3	Karmala	5	0.31	0.020	2.32
4	Madha	8	0.52	0.024	6.89
5	Malshiras	12	0.75	0.024	10.25
6	Mangalwedha	5	0.44	0.024	6.17
7	Mohol	7	0.53	0.025	6.93
8	North Solapur	5	0.73	0.001	12.5
9	Pandharpur	8	0.61	0.018	8
10	Sangola	6	0.38	0.018	5.88
11	South Solapur	6	0.49	0.022	6.59
	$\bar{X}$	7	0.52	0.020	7.13
	S.D.	1.85	0.12	0.019	2.40
	<b>District</b>	77	5.77	0.221	78.46

Source: Compiled by the Researcher

### Co-relational Study

Correlation is a statistical device which helps us in analyzing the covariation of two more variables. If two or more quantities vary in sympathy so that movements in the others they are said to be corrected Correlation does not tell us anything about the cause and effect relationship because the correlation may be due to pure chance especially in small samples. Correlated variables may be influenced by one or more other variables or the correlated variable may be mutually influenced each other so that neither can be designed as a cause and the other the effect.

Correlation is classified into the following ways;

1. Positive or Negative Correlation
2. Simple, Partial and Multiple
3. Linear and Non-Linear

There are three methods of studying simple linear correlation.

They are:

1. Scatter Diagram Method
2. Karl Pearson's correlation coefficient method
3. Spearman's rank correlation method

Above scatter diagram method is a simple and non-mathematical but cannot establish the exact degree of correlation hence herewith used the Karl Pearson's coefficient of correlation method to expressing the relationship between primary health centres with area rural population and inhabited villages.

### Karl Pearson's Coefficient of Correlation

Correlation coefficient (denoted by r is a pure number showing the strength) and direction of correlation between two variables. Karl Pearson's coefficient correlation between two variables x and y is given by the formula-

$$r = \frac{\frac{1}{N} \sum (X-\bar{X})(Y-\bar{Y})}{\sqrt{\frac{1}{N} \sum (X-\bar{X})^2} \sqrt{\frac{1}{N} \sum (Y-\bar{Y})^2}}$$

$$= \frac{\text{Covariance between x and y}}{\sqrt{\text{variance of X}} \sqrt{\text{variance of Y}}}$$

$$= \frac{\sum (X-\bar{X})(Y-\bar{Y})}{\sqrt{\sum (X-\bar{X})^2} \sqrt{\sum (Y-\bar{Y})^2}}$$

It can be proved that the coefficient of correlation (r) lies between -1 and + 1. The various values of r are interpreted as follows:

'r' value	Correlation
-1	Perfect negative correlation
-0.95	Strong negative correlation
-0.50	Moderate negative correlation
-0.10	Weak negative correlation
0.00	No correlation
+0.10	Weak positive correlation
+0.50	Moderate positive correlation
+0.95	Strong positive correlation
+1.00	Perfect positive correlations

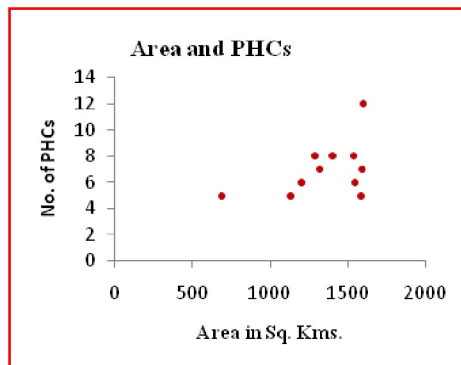


Fig. 2.1A

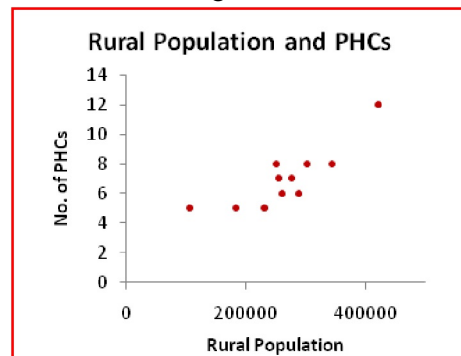


Fig.2.1 B

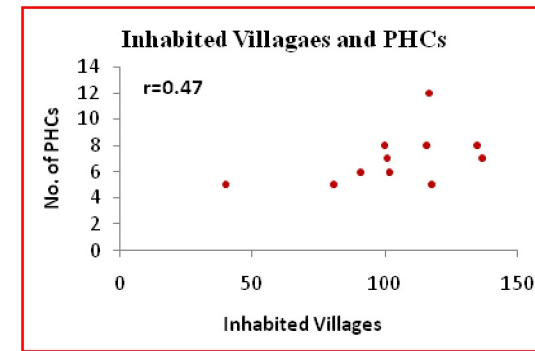


Fig. 2.1 C

Table 2.9

**Solapur District: PHCs and SCs with Village, Population and Area**

Sr.No	Tahsil	PHCs	SCs	Villages	Rural Population	Area In Sq.Kms
1	Akkalkot	8	39	135	250890	1401.11
2	Barshi	7	43	137	253989	1588.43
3	Karmala	5	32	118	231290	1581.76
4	Madha	8	45	116	301564	1535.98
5	Malshiras	12	76	117	421244	1597.88
6	Mangalwedha	5	26	81	184108	1136.21
7	Mohol	7	36	101	276920	1319.15
8	North Solapur	5	20	40	105794	694.87
9	Pandharpur	8	42	100	343445	1290.93
10	Sangola	6	39	102	288524	1544.4
11	South Solapur	6	33	91	260897	1204.28
	District	77	431	1138	2918665	14895

Source: Village Health Directory Solapur District, 2011

**2.8 Primary Health Sub-Centres and Their Distance From The Nearest PHCs**

Another important aspect in the study of health care geography is the distance between a two health centres as well as PHCs and PHSCs. It will help for to understanding what are their pattern are existed among the region.

**Table 2.10**  
**Solapur District: Nearest Primary Health Centres and Sub-Centres**

Sr. No	Tahsil	No of Primary Health Centres	No. of primary sub-health centres from nearest primary health centre distance class (in km)			
			0 to 5	5-10	10-15	Total Sub-centres
1	Akkalkot	8	33	04	02	39
2	Barshi	7	39	03	1	43
3	Karmala	5	29	02	1	32
4	Madha	8	41	04	0	45
5	Malshiras	12	72	03	1	76
6	Mangalwedha	5	23	03	0	26
7	Mohol	7	34	02	0	36
8	North Solapur	5	18	01	01	20
9	Pandharpur	8	39	03	0	42
10	Sangola	6	37	02	0	39
11	South Solapur	6	31	01	01	33
<b>District</b>		<b>77</b>	<b>396</b>	<b>28</b>	<b>07</b>	<b>431</b>

Source: Registers of Public Health System

In the Solapur district there are 431 sub primary health centres located in the year 2011. Out of these 396 sub-primary health centres established from nearest primary health centres from 0-5 km distance size in class. Twenty eight sub health centres located from 5-10 km away from nearest PHCs and 07 sub centres away from 10- 15km from nearest primary health centres. In the tahsil like Madha Mohol, Mangalwedha, Pandharpur and Sangola there are no any sub centres located form above 10km hence that is accessible for people for their treatment. Akkalkot tahsil two sub centres located from above 10 km from nearest primary health centres thats why that centres inaccessible for community. Barshi, Karmala, Malshiras, North Solapur and south Solapur tahsils there are only one sub centres away from nearest PHCs above 10 Km distance in size class (Table 3.10).

### 2.9 Distributional Pattern of Health Centres

The spatial distribution of primary health centres and sub-centres varies from tahsil to tahsil. Each and every geographical aspect is uneven distributed among the region because of differential of population, uneven topography. Health centres are also uneven distributed in the Solapur district. Population is the major effective element on distribution

of health centres. Health centres area the backbone of rural community. Herewith the term health centre included primary health centres, primary sub-health centres.

The distribution of health centres has been examined by the technique of 'Nearest Neighbour analyses. This technique developed by Plant ecologist Clark and Evans (1954), has been used to measure the patterns of incidence of different species of plants. Recently it has been employed by geographers to study the spatial distribution pattern of settlements. For the present investigation, following formula developed by Hamond and mcullaugh (1974) has been employed.

$$R_n = \frac{\text{Dobs}}{\text{Dran}}$$

Where

Dobs = is the measured mean distance between the nearest neighbor point observed in a given area

Dran = is the expected mean distance for a similar number of points distributed in the same area

$R_n$  = is the nearest neighbor index

$$D_{ran} = \frac{1}{2(N/A)}$$

Where,

N = is the number of health centres in the study region.

A = is area of study region/ spatial unit.

Since the study area presents a visible contrast in the density pattern and spacing of health centres, the  $R_n$  values at tahsil level are also calculated. In such situation different R values for different tahsils are obtained.  $R_n$  value for the district has been calculated in order to find out the association of health centres with each other. The results have been summarized in the table no 3.12 and positions of various tahsils have been marked on the R value scale 1.74(Fig 2.8).

#### 2.9.1 Nearest Neighbor of Primary Health Centres

The analysis reveals that the primary health centres have noticed a near to regular distribution whereas the degree of random to regular

is 1.74. The comparative analysis of the values of randomness shows that tahsils like Barshi, Karmala, Madha, Malshiras, Moholand North Solapur have the range of 0.51-1.00 where the health centres are distributed in a random manner. In the case of Pandharpur it is found near to random pattern, having the range of Rn between 1.00 to 1.09. The health centres in South Solapur tahsils indicate random distribution towards regular pattern, having the Rn value 1.34. Whereas Mangalwedha having Rn value above 1.50 has regular uniform pattern.

**Table 2.11**

**Solapur District: Primary Health Centres Nearest Neighbor Statistics**

Sr.No	Tahsil	No. of PHCs	Dobs (Kms)	Dran (Kms)	'R <sub>n</sub> ' Values
1	Akkalkot	8	7.3	7.14	1.02
2	Barshi	7	4.7	7.57	0.62
3	Karmala	5	4.9	9.09	0.53
4	Madha	8	7.00	7.14	0.98
5	Malshiras	12	4.7	7.93	0.59
6	Mangalwedha	5	4.5	2.39	1.88
7	Mohol	7	4.8	7.14	0.67
8	North Solapur	5	2.8	6.02	0.46
9	Pandharpur	8	7.1	6.49	1.09
10	Sangola	6	4.7	9.25	0.50
11	South Solapur	6	8.1	6.02	1.34
<b>District</b>		77	10.50	6.02	1.74

*Source: Compiled by Researcher*

**Table 2.12**

**Solapur District: Primary Health Sub-Centres Nearest Neighbour Statistics**

Sr.No	Tahsil	No. of PHSCs	Dobs (Km)	Dran (Km)	'R <sub>n</sub> ' Values
1	Akkalkot	39	3.71	3.46	1.07
2	Barshi	43	3.67	3.57	1.03
3	Karmala	32	4.53	2.66	1.70
4	Madha	45	3.56	4.16	0.86
5	Malshiras	76	3.41	5.02	0.68
6	Mangalwedha	26	5.73	4.06	1.41
7	Mohol	36	5.36	4.64	1.16
8	North Solapur	20	7.25	5.35	1.36
9	Pandharpur	42	9.99	6.89	1.45
10	Sangola	39	4.76	3.78	1.26
11	South Solapur	33	7.22	5.31	1.36
<b>District</b>		431	4.15	4.24	0.98

*Source: Compiled by Researcher*

**2.9.2 Nearest Neighbor of Primary Health Sub-Centres**

The above table reveals that the sub primary health centres have noticed in study region a near to random distribution. Where the degree of randomness is 0.98. The comparative analysis of the values of randomness shows that tahsils like Barshi, Karmala, Madha, Malshiras, Mohol, North Solapur have the range of 0.51-1.00 where the health centres are distributed in a random manner.

In the case of Pandharpur it is found near to random pattern, having the range of Rn between 1.00 to 1.09. The health centres in South Solapur tahsils indicate random distribution towards regular pattern, having the Rn value 1.34. Whereas Mangalwedha having Rn value above 1.50 has regular uniform pattern.

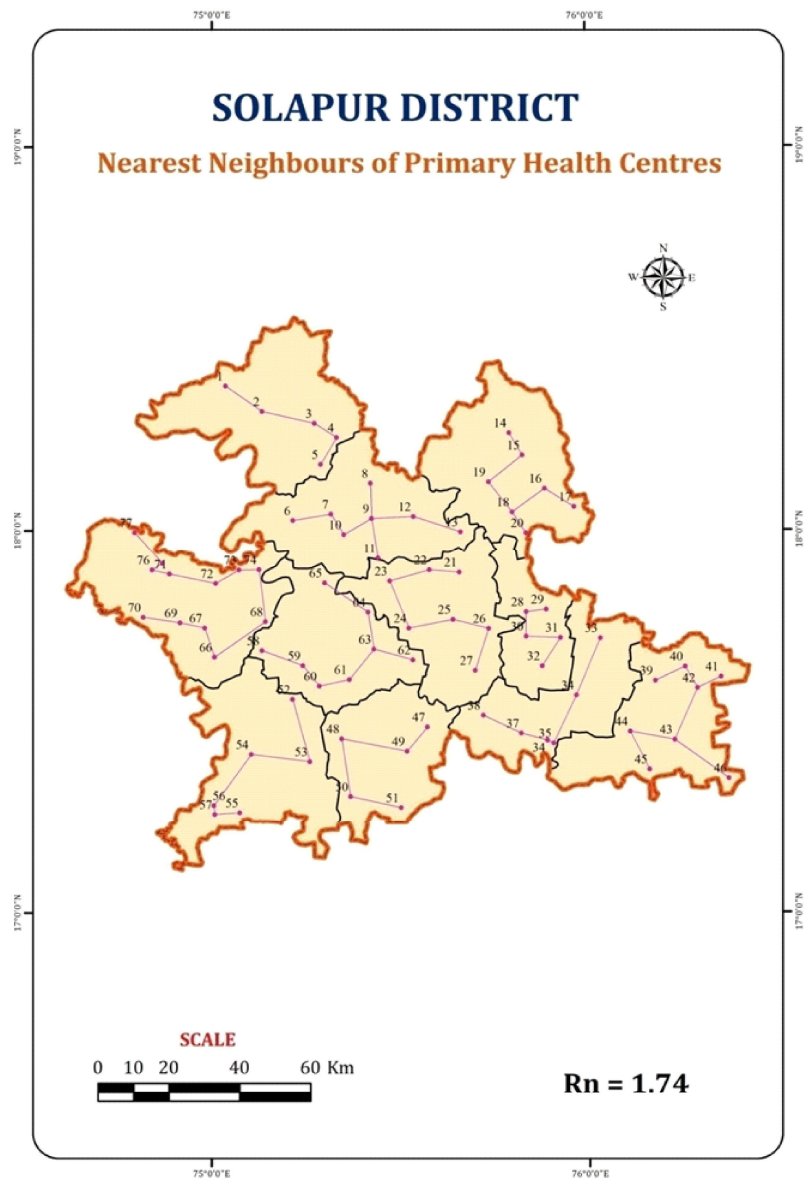


Fig.2.2

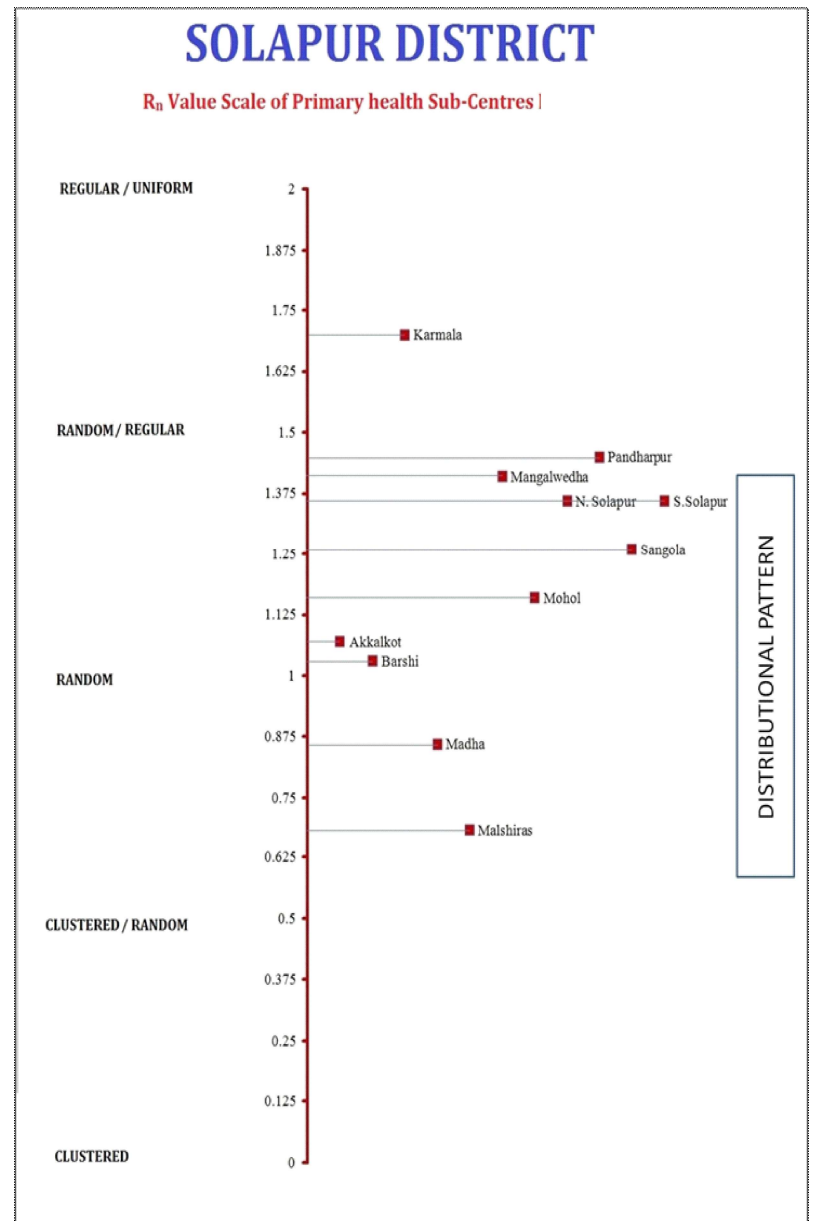
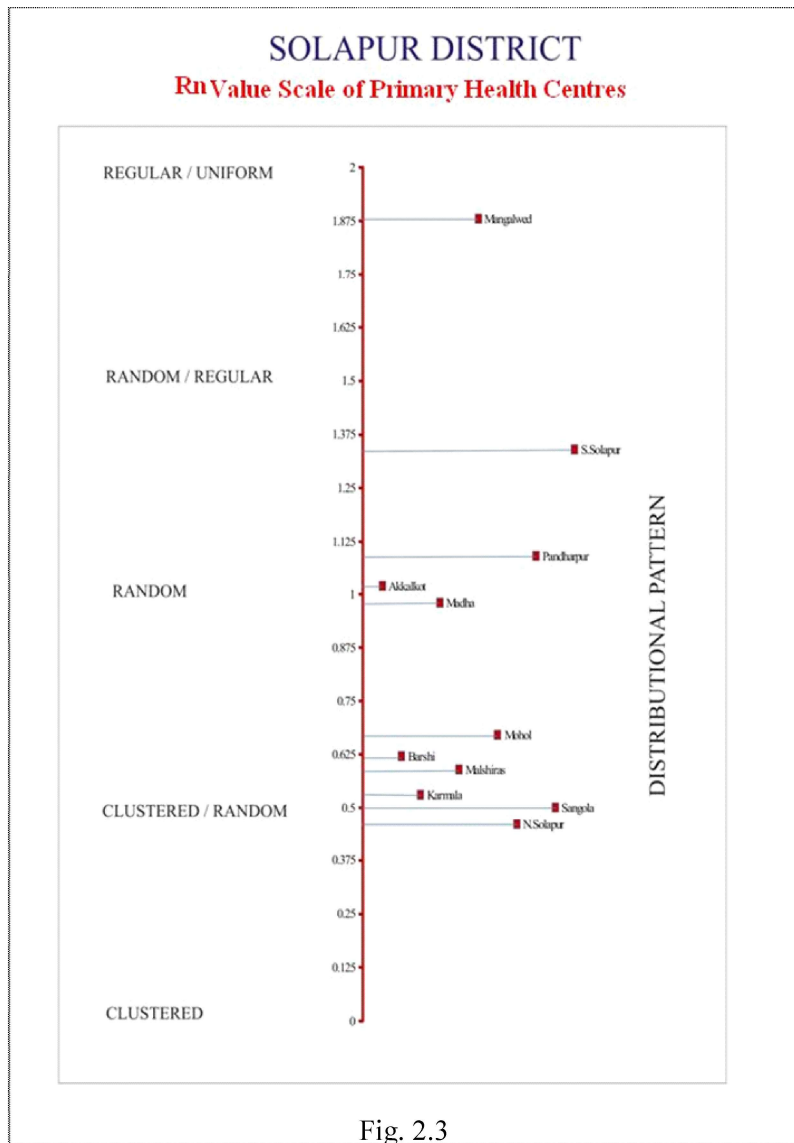
## 2.10 Dispensaries in Solapur District

Another means of health facilities is provided by dispensaries which are distributed all over the region in Solapur district. The table concerned represents the number of dispensaries in each taluka for the last five decades. In the year 1961, there were thirty five dispensaries in district as a whole, which went on increasing continuously in each subsequent decade and became, one hundred and four nine the year 2001. For Mangalwedha and South Solapur talukas, the number was quiet low having only one in each taluka. Barshi and Sangola represented three dispensaries in 1961, with exception of Pandharpur. Rest talukas consisting of Mohol, Malshiras and Karmala, had two dispensaries each in the year 1961.

In the year 1971, with slight fluctuation the pattern remained same, retaining first position by North Solapur taluka, when number of dispensary was ten and South Solapur and Mangalwedha had only one dispensary. Pandharpur retained the second position as regard to dispensaries number and it was followed by Akkalkot, Madha which had four dispensaries, while Karmala, Sangola and Barshi talukas had shown three dispensaries. Remaining talukas like Malshiras and Mohol showed one and two dispensaries respectively.

In the year 1981, there were forty nine dispensaries in district out of these sixteen dispensaries were found only in North Solapur taluka and six in Pandharpur. There were four talukas consisting of Akkalkot, Sangola, Karmala and Madha representing four each dispensary. Again Mangalwedha taluka was the most backward taluka as far as the number of dispensaries is concerned. Barshi and Mohol represented, three dispensaries, while Malshiras, South Solapur represented only three in each taluka.





**Table 2.13**  
**Solapur District: Number of Dispensaries**

Sr.No	Name of Tahsil	1961	1971	1981	1991	2001	2011
1.	North Solapur	7	10	16	22	32	32
2.	Barshi	3	3	3	4	6	7
3.	Akkalkot	5	5	4	6	8	8
4.	South Solapur	1	1	2	3	4	4
5.	Mohol	2	2	3	4	6	7
6.	Mangalwedha	1	1	1	3	5	5
7.	Pandharpur	4	6	6	10	13	13
8.	Sangola	3	3	4	6	8	8
9.	Malshiras	2	2	2	4	6	6
10.	Karmala	2	3	4	6	8	9
11.	Madha	5	4	4	6	8	8
	<b>District</b>	35	40	49	74	104	107

*Source: Socio-economic Review of Solapur District*

In the year 1991, there were seventy four dispensaries in all district of Solapur. Out of these twenty two in North .Solapur tahsil and ten were in Pandharpur tahsil. Again, there four tahsils consisting of Akkalkot, Sangola, Karmala and Madha represented six dispensaries in each tahsil. While Barshi, Malshiras and Mohol representing four dispensaries in each tahsil. South Solapur and Mangalwedha had three dispensaries in each tahsil.

The number of dispensaries was one hundred and four in 2001, for the district as a whole. As expected, the high number was recorded in North Solapur tahsil due to the existence of Solapur city. It was followed by Pandharpur, where number of dispensaries was thirteen. Further, there were four tahsils namely Akkalkot, Sangola, Karmala and Madha representing eight dispensaries in each tahsil. this time represented as many as five dispensaries in the year 2001.

It may be stated that the number of dispensaries in each tahsil indicates the easy availability of medical facilities; it shows the higher number of dispensaries better is the availability of medical facilities, while the lower number of dispensaries represent the poor availability of medical facilities. The efforts are being made by the government to provide and made available maximum dispensaries, in order to serve most of the people in the local areas at reasonable rate and immediately without wasting time people should get treatment.



## CHAPTER III

# AMENITIES IN RURAL HEALTH CARE

### 3.1 Introduction

The study of health care amenities is the integral part of Medical Geography. After study the growth and distribution of primary health care centres that is essential to study the facilities in health care system. Present chapter intends focus on health infrastructure and facilities concerning to Solapur district of public health care system. There are hierarchies of public health care facilities i.e. primary health care, hospital care facilities. It provides an integrated health services to the rural population by different health personnel like doctor, nurse and male-female health worker etc. It provides an integrated health services to the rural population.

Public Health Centres are the back bone of the rural health care services in the state or any country. The health package of primary Health care provided more input and which promote the well being and good health. Primary objective of rural land development is to provide the basic health care services to rural community through PHCs and Sub-centres. Hence that is necessary to organize to well establish and good health infrastructure facilities among primary health centres. Well infrastructure is a good sign of best facility or medical services. Rural health services like sanitation, drinking water, nutrition etc, therefore have been brought together in the form of an integral package to improve the social, economic and health condition of the people. Hence the primary goal of any public health centres is to organize the health services and optimally utilize the available resources, knowledge, technology with a vital to preventing diseases, disabilities and suffering of the people. The study of medical facilities may also be the focal study of health

care system. The government of India fixes various missions for the development of the nation. Health mission is one of them.

Infrastructure, staff position, supply, equipment operation theatre, Labor room, ambulance, observation ward, lady doctor, generator and water supply are essential facilities of public health care system. Pyramid of health infrastructure has been established to cover the rural centres some centres have not been successful for a variety of reasons that include lack of decent facilities, equipments, etc. Even more important is a social reality there just are not enough trained and qualified doctors to adequately serve of study region even if we could provide financial incentives for them to work in rural areas.

The foregoing analysis of spatial pattern of health care delivery, contributing the ratio between population and health personnel. While concludes that general health status of the people of the area under study is poor. It requires substantial efforts for studying the existing pattern of distribution of health care facilities is view to provide a well-knit and scientifically planned health care system. 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 health programme, the physical, social and family environment should take into consideration in the view of prevention of diseases and restoration of health.

Akhtar R. and Lzhar, N. also stated “ideally each village should have its own health centres or sub-centre with staff and functions. However, countries such as India cannot afford to provide health centers to each and every village. But a group of villages could be provided one health centre ideally located and also equipped with the specific health needs of the region” (Akhtar R.and Lzhar, N.1986). But in India, ideal health planning has been replaced by political health planning or political epidemiology.

Agnihotri R.C in his book entitled “Geo-medical Environment and Health Care stated that “In India, the health care delivery system is controlled by different governments. The wide regional disparities in the levels of development and organization of different government health schemes are obvious due to state government policies and political attitudes in terms of priorities of the different regions”.

In this chapter, to analyze the existing health care facilities in

Solapur district. The availability of health care services has been studied by considering the volume of population of districts. The health care system in the study region by considering all information about health care situation stated by various scholars. The health care facilities available in rural areas in district as whole. The units like P.H.C., P.H.S.C., Hospitals Dispensaries and number of Hospitals Beds available are also considered. Availability of health care amenities and facility may not be regarded as good indicators of human resource development until and unless their optimum distribution, accessibility and allocation with to threshold population and range of goods. The main aim of this chapter is to evaluate the distributional pattern of health care facilities and to examine the Spatio-functional gaps of health facilities.

### 3.2 Health Care Amenities

The rural public health care system forms as integral part of the national health care system, Provision of primary health care is the foundation of rural health care system. ‘For developing vast public health infrastructure and human resource of the country, accelerating the socio-economic development and attaining improved quality of life, the primary health care is accepted as one of the main instrument of action, primary care is the essential health care made universally available and accessible to individuals and acceptable to them through their full participation and at a cost the community can afford’ (Smith, D.M. 1981). Health care facility provided by Maharashtra state government to Solapur district is as follow.

1. Medical and Public Health Services
2. Health care facility of Civil Hospital, Solapur district
3. Health care facility of Sub-district hospitals, Rural hospitals in Solapur district
4. Health Control Programmes conducted in Solapur district by Solapur (SKNP) civil hospital, AIDS Control, STD control, Mental Health control, Cancer control, blindness control and Oral health control programmes are conducted by Solapur (SKNP) civil hospital.
5. Major Healthcare Needs of the Population.
6. Population served per RH, PHC or Sub Centre in Solapur district.

**Table 3.1****Solapur District: Public Health Facilities**

Health Services	Primary Health Care Facilities			Hospital Facilities		
	Primary Health centres	Primary Health Sub-Centres	Z.P. Dispensaries	Rural Hospital	Sub-District Hospital	District Hospital
India	23887	148124	75783	4809	2709	837
Maharashtra	1816	10580	3442	365	112	29
District	77	431	107	14	04	01

Source: Health Status Report Maharashtra

Government of Maharashtra provides public health services to Solapur district through the network of primary and hospital care services. As far as concerning to India there are 23887 primary health centres, 148124 primary health sub-centres and 75783 dispensaries. In Maharashtra 1816, 10589, 3442 primary health centres, primary health sub-centres and dispensaries located respectively. While studying secondary care service/hospital care services at that time overall country 4809 rural hospitals, 2709 sub-district hospitals and eighty hundred thirty seven district hospitals throughout the state of India.

The first tier of public health services known as primary tier has been developed to provide health care services to the vast majority of rural peoples. The primary tier comprises three types of health care institution: Sub-Centre (SC), Primary Health Center (PHC). The primary health care infrastructure provides the first level of contact between the population and healthcare providers. Realizing its importance in the delivery of health Services, the states and several government related agencies simultaneously started creating primary health care infrastructure and manpower. This has resulted in substantial amount of duplication of the infrastructure and manpower.

Primary health care services in the public sector in rural areas in Solapur district is provided through a network of 431 sub-centres, 77 primary health centres, 107 dispensaries during the year 2011. Hospital care services health care services in the public sector in rural areas in Solapur district is provided through a network of 14 rural hospitals, 04 sub-districts and one district hospital during the year 2011

(Table 3.1).

**Table 3.2****Population Norms for Health Facilities in Different Geographical Areas**

Health Centres	Population norms	
	Plain areas	Hilly/Tribal/desert areas
Sub-Centre	5000	3000
Primary Health Centre	30,000	20,000
Rural Hospital	1,20,000	80,000

Source : Maharashtra State Government, IPHs Guideline

Primary Health Center is the first contact point between village community and doctor (National norms population covers 30,000 in plain areas and 20,000 in hilly/tribal area). PHC is a referral unit for six sub-centres. All PHCs provide outpatient services; a majority has four to six in-patient beds. According to the norms they have one medical officer, 14 Para-medical and other supporting staff.

**Table 3.3****Solapur District: Primary Health Care Infrastructures in Solapur District**

Year	1961	1971	1981	1991	2001	2011
Primary Health centres	15	16	16	66	71	77
Primary health sub-Centres	69	77	79	321	341	431
Ayurvedic Dispensaries	-	-	-	02	04	05
Z.P. Dispensaries	14	56	79	96	104	107

Source: District Level Health Status Report

In the year 1961, only fifteen primary health centres are existed in Solapur district and it reaches seventy seven up to 2011. Primary health sub-centres goes from sixty nine towards four hundred thirty one in the year 2011. There is remarkable change in growth of dispensaries like only fourteen dispensaries are located in the year 1961 but increasing up to 107 in the year 2011.

**3.2.1 Facilities in Primary Health Care System**

Infrastructure, staff position, supply, equipment operation theatre, Labor room, ambulance, observation ward, lady doctor,

generator and water supply are essential facilities of public health care system.

### Infrastructure

Pyramid of health infrastructure has been established to cover the rural centre some centres have not been successful for a variety for reasons that include lack of decent facilities, equipments, etc. Infrastructure, staff position, supply, Equipment Operation theatre, Labor room, Ambulance, observation ward, lady doctor, generator and water supply are essential facilities of public health care system.

**Table 3.4**

**Solapur District: Percentage of Sub-Centres by Status of Infrastructure**

Sr.No	Tahsil	No of SCs	Sc functioning	Water Supply		Electricity	Toilet
			Govt. Building	Tap	Others	Yes	Yes
1	Akkalkot	39	31.5	61.5	78.1	76.6	26.6
2	Barshi	43	56.2	67.5	32.3	24.1	72.4
3	Karmala	32	44.1	24.3	67.2	29.5	56.4
4	Madha	45	37.2	33.2	56.2	6.5	48.2
5	Malshiras	76	64.0	26.3	86.4	14.8	30.1
6	Mangalwedha	26	14.01	55.4	16.9	90.2	78.5
7	Mohol	36	37.9	51.2	54.2	27.4	21.0
8	N.Solapur	20	45.00	25.6	52.2	80.0	73.5
9	Pandharpur	42	53.5	22.1	60.6	56.3	64.9
10	Sangola	39	45.1	56.7	44.6	45.3	36.4
11	S.Solapur	33	62.5	12.3	45.1	57.6	66.8
	District	431	44.9	39.6	59.8	53.9	52.2

Source : Facility Survey, Health Project, Maharashtra

### Own Building

44.9 percent of Sub-Centres have their own governmental building. Fifty percent or more SCs in Barshi, Malshiras, and Pandharpur and South Solapur tahsil function from government buildings (Fig.4.1). In Akkalkot, Madha Mohol Karmala, North Solapur and Sangola 45 percent or less is functioning from the governmental building. The situation is worse in only Mangalwedha tahsil where only 14 percent of the SCs are functioning from the government building.

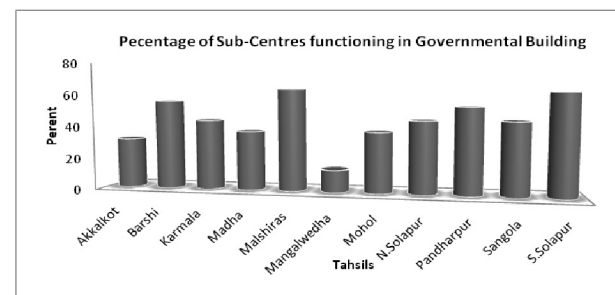


Fig.3.1

### Water Supply

At the all Solapur district level, the proportion of SCs housed in government building which are getting water supply through tap is only 39.6 percent. This means that 40.4 percent SCs are getting water supply from other sources such as tube well, hand pump bore well and other sources. In Akkalkot, Barshi, Mangalwedha, Mohol and Sangola more than fifty percent of the SCs have tap water supply, but in the remaining tahsils, the main source of water supply is other than tap water. The water supply through taps in the SCs in Karmala, South Solapur, Pandharpur and Malshiras is almost negligible.

### Electricity

Forty five percent of the SCs, which are functioning from government building in Solapur district, are without any electricity facility. The situation in Barshi, Karmala Madha, and Malshiras and Moholtahsil is serious where only 6 percent to 30 percent of the Sub-Centres have a supply of electricity. Eighty percent of the sub-centres with an electricity connection are found in the Solapur district of Mangalwedha and North Solapur tahsil.

### Toilet Facility

The facility survey also collected information on the availability of toilets facilities in the SCs. 47.8 percent of the SCs at the all district level are without a toilet facility, while 52.2 percent of the SCs have a toilet facility in district level. Minimum and maximum these facilities range between 26% to 78 percent in Mohol and Mangalwedha tahsil respectively. SCs have electricity as well as toilet facility. Sub-Centre with electricity and toilet facilities is presented. In other tahsil have SCs have electricity as well as toilet facility (Fig.3.4).

## Staff Positio

Public health care system depends on multiple factors, among which human resources (HR) are one of the most important components. Without manpower various circumstances are present in the work of public health care system in the study area. Manpower including medical officer, Para-medical staff such as health worker, health assistant and lab technician, pharmacist etc.

## Health Worker

The information of health worker of SCs by sex was collected for both sanctioned posts and filled posts. The same information is presented in table 5.3. The filled post or the post position is taken from the total sanctioned posts of SCs in each tahsil. 41 Percent of the SCs at the all district level do not have a sanctioned post of male health worker. Out of the SCs, Which have a sanctioned post of male worker, only 56.5 percent of them have filled the posts. The promotion of SCs with at least one sanctioned post for male health worker varies from 17.9 percent in North Solapur to 83.1 percent in Karmala tahsil. The situation is not better in North Solapur (17.9%), Sangola (39.9%) and Mohol (43.8%) in terms of sanctioned posts of male health worker, 43.5 percent or more SCs in the remaining states have at least one sanctioned posts for male health worker.

**Table 3.5**

### Solapur District: Percentage of Sub-Centres with Staff in Position

Sr.No	Tahsil	Noof SCs	Health Worker Male		Health worker Female	
			Post sanction	In position	Post sanction	In position
1	Akkalkot	39	82.6	52.9	56.2	15.9
2	Barshi	43	51.7	51.7	86.4	70.3
3	Karmala	32	83.1	84.5	16.9	39.9
4	Madha	45	69.8	65.8	54.2	86.3
5	Malshiras	76	67.1	63.1	32.2	17.9
6	Mangalwede	26	55.5	50.4	51.7	69.8
7	Mohol	36	43.8	40.8	81.1	55.7
8	N.Solapur	20	17.9	19.5	69.8	83.1
9	Pandharpur	42	70.3	72.3	67.1	59.8
10	Sangola	39	39.9	49.6	57.4	67.1
11	S.Solapur	33	66.3	56.3	48.2	41.7
	District	431	58.9	56.5	56.4	55.2

Source : Facility Survey, Under Reproductive Child health Project, Maharashtra

With the exception of Sangola, Mohol, North Solapur in most of the tahsil 50 percent or more SCs have at least one post of male health worker in position. The SCs with at least one posts of male health worker varies from 19.5 percent in North Solapur to 84.5 percent in Karmala tahsil. The role of female health worker is very important at SCs. 45 percent of the SCs do not have a health worker in position. The situation of sanctioned female post in Karmala is the least, where only 16.9 percent of the SCs have sanctioned post for female health worker. In the remaining tahsils, 32.2 percent SCs or more have a sanctioned post for a female health worker.

## Ancillary Nurse Midwife

The presence of ancillary nurse midwife all 24 hours at the SC is essential for the people to avail the health services. That is why the government has focused on providing quarters to the ANM at SC is not having any quarters facility, the ANM may stay somewhere else (Table 3.6).

## SCs, Quarters an own house in SCs Village

For Solapur a whole, in 50.3 percent of SCs, the ANM stays in quarter attached to the SC, and in another 56.7 percent of SCs, the ANM, stays in her own house but in the village where the SCs is located. The percentage of SCs with the ANM staying in the quarters of SC varies from as low as 22.5 to 24.3 percent in Sangola and Madha to as high as 90.2 percent in Akkalkot tahsil. Except Barshi and Karmala in most of the remaining tahsil, North Solapur, South Solapur, Mangalwedha, Pandharpur, Mohol percent or very ANM resides at the, SCs quarters.

The proportion of SC which provides ANM accommodation in the same village varies from only 13.5 percent in Mangalwedha to 89.1 percent in Akkalkot. With little exception here and there in most of the tahsil, SCs or less have proportion for and accommodation in the same village.

## SC's area or outside SC's Village

The proportion of SCs where the ANM is staying in the SC area, though not in the SC village varies from 33.3 percent in Barshi to 83.1 percent in North Solapur But no any tahsil lies ANM does not stay in any the Sub-centre or even in the SC area. At the all district level,

only in 58.5 percent of the SCs, the ANM stays in the SC area. A case where the ANM stays outside the SC area varies from 8 percent in Sangola to 74.1 percent in Mohol tahsil. In some other tahsil such as Akkalkot, Barshi, Karmala, Mangalwedha and South Solapur the ANM stays away from the SC area in more than 50 percent of the SCs. Thus, this is not a conducive situation in Solapur district, where a large number of ANM stay away from the SC or even away from the SC area.

**Table 3.6**

**Solapur District: Percentage of Sub-Centres by staying places of ANM**

Sr.No	Tahsil	No of SCs	Percentage of SCs				
			In quarter of SC	In own house in SC Villages	In SC area	Outside SC area	Home visits
1	Akkalkot	39	90.2	89.1	46.1	62.2	69.8
2	Barshi	43	88.4	88.5	33.3	66.6	67.1
3	Karmala	32	80.0	43.8	81.1	55.7	55.4
4	Madha	45	24.3	89.1	54.1	33.8	43.8
5	Malshiras	76	33.2	56.7	49.3	49.1	
6	Mangalwedha	26	26.3	13.5	56.2	56.8	56.2
7	Mohol	36	55.4	46.8	51.7	74.1	45.1
8	N.Solapur	20	51.2	44.4	83.1	40.2	37.2
9	Pandharpur	42	25.6	71.3	69.8	48.4	64.0
10	Sangola	39	22.1	19.5	67.1	8.0	14.6
11	S.Solapur	33	56.7	61.2	51.7	66.3	37.9
	District	431	50.3	56.7	58.5	50.01	44.6

Source: Facility Survey, Under Reproductive Child health Project Maharashtra

### 3.2.2 Hospital Care Facilities

The second tier known as secondary tier, the secondary health care infrastructure at the district hospitals and urban hospitals is currently also taking care of the primary health care needs of the population in the city/town in which they are located. This inevitably leads to overcrowding and underutilization of the specialized services. The third tier known as tertiary tier, over the last two decades a majority of the tertiary care institutions in the governmental sector have been facing a resource crunch and have not been able to obtain funds for equipment maintenance, replacement of obsolete equipments, supply of consumables and upgrading the infrastructure to meet the

rapidly growing demand for increasingly complex diagnostic and therapeutic modalities. There is a need to optimize facilities available in tertiary care institutions, enhance the quality of services and strengthen linkages with secondary care institutions. There is overcrowding in tertiary care hospitals and underutilization of expert care due to the lack of a two way referral system with primary and secondary care levels requires correction.

**Table 3.7**

**Solapur District: Hospital Care Health Infrastructures in Solapur District 1961-2011**

Year	1961	1971	1981	1991	2001	2011
Civil Hospital	-	-	-	1	1	1
Sub-district Hospital	-	-	02	03	03	04
Rural Hospital	-	-	10	11	13	14

Source: Socio-economic Review of Solapur District

The year 1961, there were only three hospitals and all these three hospitals were located only in North Solapur tahsil. This is because of the existence of the Solapur city in the north Solapur tahsil. Remaining ten tahsils had no hospital in the year 1961. (Table 3.7)

For the year, 1971, the number of hospitals increased to five due to the demand of growing population. The number of hospital remained the same for North Solapur tahsil, while for two urban centres, namely Pandharpur and Barshi, which are the tahsil head quarters, one each hospital was established in order to full-fill the requirement of the people.

**Table 3.8**  
**Number of Hospital in Solapur District, 1961-2011**

Sr.No	Name of Tahsil	1961	1971	1981	1991	2001	2011
1.	North Solapur	3	3	4	5	6	7
2.	Barshi	-	1	2	2	2	2
3.	Akkalkot	-	-	1	1	1	1
4.	South Solapur	-	-	-	-	-	-
5.	Mohol	-	-	-	1	1	1
6.	Mangalwedha	-	-	-	1	1	1
7.	Pandharpur	-	1	1	2	2	2
8.	Sangola	-	-	-	1	1	1
9.	Malshiras	-	1	1	2	2	2
10.	Karmala	-	-	1	1	1	1
11.	Madha	-	-	-	1	1	1
	District	3	5	10	17	18	19

*Source: Socio-economic Review of Solapur District*

Surprisingly, number of hospitals has doubled in the year 1981, and became as high as ten. North Solapur tahsil represented four while Barshi had two hospitals in this year. Other tahsils head Quarters like Akkalkot, Pandharpur and Karmala had each, one hospital in the year 1981. This increase was due to demand of health services by the growing population. During the next two decades, the total numbers of hospitals were found eighteen and nineteen for the year 2001 and 2011, respectively. In the 1991 Solapur city possesses six hospitals. On the other hand, Barshi, Pandharpur and Malshiras had two each in the year 1991.

In the year 2001 the number of hospital slightly increased and became eighteen. The first rank was occupied by North Solapur tahsil as per as number of hospitals in 2011 is concerned. During this period, the Barshi, Pandharpur and Malshiras again represent the number of hospital of two, except South Solapur, rest other tahsils show each, one hospital in the year 2001. In the year 2011 the number of hospital slightly increased and became nineteen. The first rank was occupied by North

Solapur tahsil as per as number of hospitals in 2001 is concerned. During this period, the Barshi, Pandharpur and Malshiras again represent the number of hospital of two, except, South Solapur, rest other tahsils show each, one hospital in the year 2011 (Table 4.8).

### **District Hospital**

In the hierarchical health care system of the government of India in a district, the district hospital is the apex body, which provides specialized health care services to people on subsidized costs. Every district is expected to have a district hospital (DH). But in some cases, the medical college hospital or any other sub-divisional hospital is found to serve as a DH where a DH as such as not yet been established. Such hospitals are not included in the DH list in this report as they are categorized as different level of health care establishment.

#### **1. Water and Electricity**

District hospital Solapur has a tap water facility and it have other sources of water. In order to continuous water supply, also it has a tank and pump facility. Electricity is also available in these hospitals. Generator is also available in this hospital.

#### **2. Telephones and vehicle**

Telephone facility is available in this hospital. DHs have more functional vehicle.

#### **3. Laboratory**

In the context of provision of RCH services, the availability of laboratories in DHs to test the blood and urine of the women seeking antenatal care as well as for the diagnosis of RTI/STI among women and men is critical.

#### **4. Operation theatre for gynecological purposes**

In this district hospital Solapur have one operation theatre (OT). These theatre for almost have for the purpose of gynecological purposes.

#### **5. Separate aseptic labour room**

A separate aseptic labour room is found in district hospital. However, it should not be taken as an absence of delivery facility. The available labour room may not be clean, may be having seepage, or may be kept open for other purposes when not used for delivery, thereby



defying the definition of aseptic. In some cases the deliveries are conducted in the operation theatre.

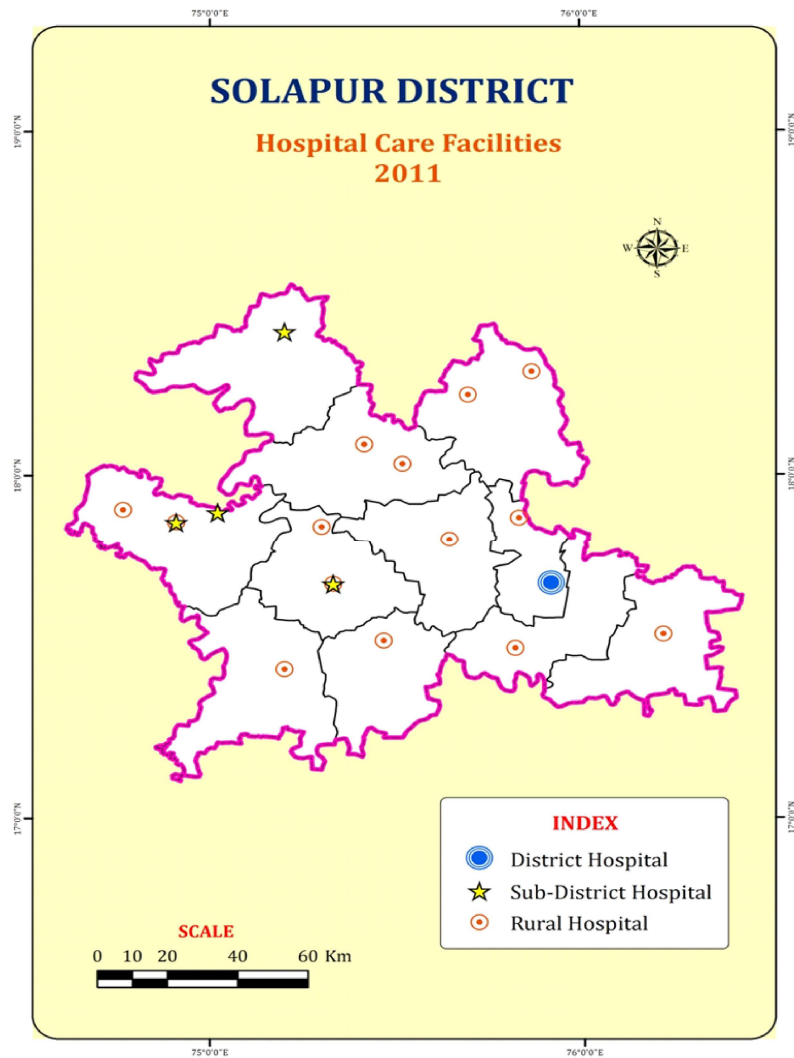


Fig.3.2

**6. Outpatient department (OPD) for gynecology and RTI/STI**

OPD facility for gynecology is available in this hospital.

**7. Linkage with district blood bank**

District hospital Solapur has a linkage with district blood bank

**Sub-District Hospital**

**I. Functional Sub District Hospital Pandharpur, 100 Beded**

**Services provided at Sub District Hospital, Pandharpur**

<b>Specialties available</b>	Physician
	Surgeon
	Anesthetist
	Pediatrician
	Gyneecologist
	Dental Surgeon
	Ophthalmologist
Orthopeditian	
<b>Added Facility</b>	Blood bank
	Physiotherapy
	Dietician
<b>Services</b>	Laboratory Investigations
	X - Ray facility
	ECG
	Treatment of medical conditions
	All major & minor surgeries
	Administration of Anesthesia as required
	Normal delivery & complicated labour
All diseases pertaining to women including major & minor surgeries	
<b>Services</b>	Treatment of children upto the age of 14 including new born intensive care unit
	Treatment of all dental problems including dental surgeries
	Treatment of all ophthalmic diseases & surgeries
	Treatment of diseases related to bones & joints including surgeries & trauma care.
	Availability of blood bank, determining blood groups, testing the blood for 4 hazardous diseases, receiving blood donations, storage of blood samples, issue of blood units to needy patients
	Availability of physiotherapy services
Availability of physiotherapy services	

## II. Sub District Hospital Akluj, Malshiras and Karmala, 50 Beded

Following are the services provided at Sub District Hospital, Akluj and Karmala.

<b>Specialties available</b>	Physician
	Surgeon
	Anesthetist
	Pediatrician
	Gynecologist
<b>Added Facility</b>	Dental Chair with outsourced dental surgeon
<b>Services</b>	Laboratory Investigations
	X - Ray facility
	ECG
	Treatment of medical conditions
	Minor & other surgeries not requiring blood
	Administration of Anesthesia as required
	Administration of Anesthesia as required
	Treatment of children upto the age of 14 including new born intensive care unit
	All diseases pertaining to women including minor surgeries which do not require blood.
	Normal delivery & complicated labour
	Treatment of all dental problems including dental surgeries

### Rural Hospital (RHs)

Rural Hospitals are established and maintained by the State Government under minimum programmes manned by four specialists i.e. a surgeon, a physician, a gynecologist and a pediatrician and supported by 21 paramedical another staff, a RH has 30 indoor beds with one OT, X-Ray, facility, a labour room and laboratory facility. It serves as a referral centre for 4 PHCs. The purpose has been to provide to specialist care and indoor facilities for the rural population. As of 2011 there are fourteen rural hospitals are functioning in the Solapur district as against the requirement of sixteen as per 2011 population norm giving rise to a shortfall of two rural hospital. It is apparent that, the number of rural hospital in the study area is far less than the number of RHs covers of 1138 villages.

The criticism is that the CHC are not providing the services of specialist for which these are established. There may be only very few CHCs in the study area with the entire specialist as listed above. The vacancies position of these all specialist range from 20 to 26 % .The other fact is that surgeon and O and G specialists without an anesthetists are not in opposition to deliver the required surgical interventions. There is acute shortage of anesthetists in the study area. The effort made under RCH-II to hire in the service of anesthetists by payment under RCH have not shown encouraging results.

Both the national population policy and national health policy envisage its maternal mortality Rate to below 100/1000 live births. The current level of MMR in the Solapur district is 407. More than two thirds of infant deaths occur during the first one month of life (Neonatal death). In order to achieve the NPP and NHP goals to use IMR to below 30 per 1000 live births serious effort required to provide 24 hours deliveries and new born care at the PHC and RHs . Under RCH it is envisaged that all the RHs in each district will have these service facilities. RHs should also be in a position to tackle emergency obstetrics cases for which service of specialist is required. This will also require a blood storage facility.

### 3.3. Health Services by Health Personnel

#### Number of Doctors

An attempt has been made to understand the pressure of population over doctors for the period 1971-2011. There were sixty two doctors in total in Solapur district in the year 1971. Out of these, twenty six doctors were found in only in North Solapur tahsil. It was followed by Pandharpur tahsil where seven doctors were serving to the population of pandharpur tahsil. On the other hand Mangalwedha tahsil represented only one doctor in 1971. There were two tahsil namely, Barshi and Madha where six doctors were serving in each tahsils. Akkalkot represented five doctors in entire tahsil. There are three tahsils, namely, Mohol, Sangola and Karmala representing each tahsil, three doctors while rest two tahsils consist of South Solapur and Malshiras represented two doctors in each tahsil.

In the year 1991, there were eighty six doctors in entire district, as expected North Solapur tahsil stood in first rank, since the number of doctor was thirty one. On other hand Mangalwedha represented only

two of doctors two. Akkalkot occupied third position as regard to number of doctors. It was followed by Barshi tahsil. Pandharpur represented seven doctors, while Sangola and Madha tahsil were having six doctors in each tahsil. South Solapur tahsil have three doctors to serve entire population of South Solapur. This may be concluded that the period 1961 and 1971 was a stagnant period when numbers of doctors in the Solapur district were quiet low and North Solapur tahsil was no exception to this rule.

After this period, there has been tremendous progress as regard to number of doctors in the year 1991. It is clear from the fact, that there were two hundred sixty nine doctors in entire district of Solapur district, who were serving at various places. Out of these one hundred seventy eight doctors were serving the people in different hospitals in various tahsil of Solapur district. It was followed by Barshi tahsil where fourteen doctors were found in various hospitals of the tahsil. It was followed by the Akkalkot tahsil, where thirteen doctors served in entire tahsil. Karmala tahsil seems to be in better position as there were twelve doctors serving in the entire tahsil. Pandharpur and Madha had shown ten doctors in each tahsil, while Sangola and Malshiras represented nine doctors in each tahsil. Mangalwedha again lagged behind in the number of doctors South Solapur and Mohol were having five doctors in each tahsil to serve the people (Table 3.9).

In the year 2001, the number of doctors has increased more than two hundred, due to the availability of educated and skilled doctors. Out of these, two hundred one doctors were engaged to serve the people the North Solapur tahsil. This time, Malshiras occupied the second position while, Pandharpur represented third position as regard to number of doctors. The reasons behind Malshiras and Pandharpur may be probably due to the emergence of new hospitals as a result of political influence. Barshi appears to be fortunate in medical facilities as well, because there were seventeen doctors serving to the entire population. Mohol and Mangalwedha represented thirteen doctors in each tahsil. While Akkalkot and Madha showed twelve doctors in each tahsil. On the other hand Sangola lagged behind in the number of doctors in Solapur district, Karmala had eleven doctors while South Solapur tahsil having nine doctors (Fig.3.9).

For the most recent decade of 2011, the number of doctors was

quite impressive for district as whole, since it was almost three hundred thirty eight doctors. There were more than three hundred doctors, found to serve only in North Solapur tahsil. Due to close proximity of Akkalkot with Solapur city, the number of doctors was twenty four followed by Barshi tahsil. Pandharpur and Malshiras tahsils represented better condition as regard to medical facilities since, there were twenty one doctors serving in each tahsil. South Solapur and Mohol tahsils are also in close proximity of Solapur city therefore, the number of doctors was as high as nineteen in each tahsil. Sangola and Karmala tahsil represented sixteen doctors while Madha and Mangalwedha were having twelve doctors in each tahsil.

**Table 3.9**

**Solapur District: Number of Doctors in Health Centres**

Sr.No	Name of Tahsil	1971	1981	1991	2001	2011
1	North Solapur	26	31	178	201	309
2	Barshi	06	08	14	17	22
3	Akkalkot	05	09	13	12	24
4	South Solapur	02	03	05	09	19
5	Mohol	03	04	05	13	19
6	Mangalwedha	01	02	04	13	12
7	Pandharpur	07	07	10	20	21
8	Sangola	03	06	09	07	16
9	Malshiras	02	05	09	23	21
10	Karmala	03	05	12	11	16
11	Madha	06	06	10	12	12
	District	62	64	86	269	338

*Source: Socio-economic Review of Solapur District*

It may be briefly stated, that the number of doctors have been constantly increasing both through space and time. This show that now a day, efforts are being made by government to improve the medical facilities even in the remote areas of the district. There are number of educational institutions for higher learning in general and for medical educations in particular. These are being extended by the government throughout the country resulting in better condition as regard to public health all over the region under study.

#### **Number of Nurses in Health Centres of Solapur District**

In order to understand the problem served by the nurses in Solapur district, their numbers have been found for each tahsil for the

last five decades. In 1971, there eighty nine nurses serving in different hospitals in various tahsils of Solapur district. The highest number of thirty was for North Solapur, while lowest for Karmala and Mangalwedha. Barshi had twelve nurses while Akkalkot nine. It was followed by Pandharpur tahsil. Six nurses were serving in each tahsil of Sangola, Malshiras and Madha tahsil. in South Solapur and Mohol tahsils, four nurses were serving, larger the number of nurses, means the better medial service (Table 4.10).

In the year 1981, there were eighty nine nurses in Solapur district. Due to the location of Solapur city, in Barshi tahsil, the highest number of nurses was serving in different hospitals. Barshi and Akkalkot tahsils were having twenty six and twenty nurses respectively. There were three tahsils having eighteen nurses each tahsil namely Sangola, Malshiras and Madha. Pandharpur represented seventeen nurses while Karmala sixteen nurses. Mangalwedha having the lowest number of nurses and South Solapur and Mohol represented thirteen and fourteen nurses respectively.

For the next decade of 1991, there were two hundred ninety one nurses. Highest being for North Solapur tahsil as expected, it was as high as 356 nurses. It is followed by Barshi tahsil. Akkalkot, Sangola and Karmala represented each 34 nurses, while Malshiras 33 and for rest of the tahsils, there were less than 25 nurses in each tahsil.

In year 2001, due to wide spread of education in medical field and various institutions for training for nurses were started, resulting in the rapid increase of nurses. It was the demand of time to serve increasing population and patients in the hospitals. That is why; the number of nurses multiplied more than two times and became number of nurses as high as six hundred seventy eight. While it was highest for North Solapur and lowest number was recorded for three tahsils consisting of Mohol, Mangalwedha and South Solapur having each 44 nurses. Barshi occupied the second position as regard to number of nurses while Sangola and Karmala remained in third rank as for as number of nurses is concerned. It was followed by Malshiras and Akkalkot where the number of nurses was 64 and 66 respectively.

In the most recent decade of 2011, the number of nurses crossed in figure of 1000 for Solapur district as whole, the number of nurses registered was 1068 for entire district of Solapur. This clearly reveals

that during last five decades there has been astonishing growth in number of nurses, which means that there have been great revolution in medical services. As expected, it was highest for north Solapur tahsil where about one third nurses of Solapur district were engaged in serving in various hospitals. It was followed by Barshi tahsil, where more than 240 nurses served the people. The number of nurses ranging between 100 to 140 was found in Akkalkot, Sangola, Malshiras, Karmala and Madha tahsils. In rest four tahsils of Solapur district, consisting of South Solapur, Mohol, Mangalwedha and Pandharpur tahsils having less than 100 nurses serving in different hospitals.

**Table 3.10**

**Solapur District: Number of Nurses in Health Centres, 1971-2011**

Sr.No	Name of Tahsil	1971	1981	1991	2001	2011
1.	North Solapur	30	11	356	438	548
2.	Barshi	12	26	68	126	241
3.	Akkalkot	09	20	34	64	126
4.	South Solapur	04	13	22	44	89
5.	Mohal	04	14	22	44	89
6.	Mangalwedha	02	10	22	44	89
7.	Pandharpur	08	17	23	46	92
8.	Sangola	06	18	34	68	132
9.	Malshiras	06	18	33	66	126
10.	Karmala	02	16	34	68	128
11.	Madha	06	18	30	60	122
	District	89	89	291	678	1068

*Source: Socio-economic Review of Solapur District*

**Number of Bed's in Hospital**

Another way to estimate, the pressure of population on medical facilities is to consider the number of beds available in each hospital. Therefore, an attempt has been made to understand a pressure of population on hospitals bed, by considering total number of bed in the district as whole as well as in each tahsil of the district in 1971. There were 687, beds available in the district as a whole as well as in different tahsil. There were 475 beds available in only North Solapur tahsil due to presence of Solapur city, the number was go high. It was followed by Barshi tahsil, where more than fifty beds are available. There were two tahsil namely Pandharpur and Akkalkot in the district, having number of beds, 42 and 32 respectively. Around 30 beds were available in Madha tahsil due to the presence of Kurudwadi railway junction Malshiras

and Karmala were in between the range of 10 to 15 beds in the district of Solapur. Rest all tahsils represented 8 beds in each tahsil of South Solapur, Mohol and Sangola (Table 3.11).

In the year 1981, the number of hospital beds increased to 946 beds. Out of these, 566 were found only in North Solapur, because of the location of Solapur city in this tahsil, Barshi and Pandharpur represented relatively higher number of beds around 50 beds it was followed by again Madha tahsil. Malshiras and Karmala were having in between 20 to 30 beds while, Sangola, Mohol and South Solapur having between 15 to 20 beds in hospital. Mangalwedha occupied last position as regard to beds in the hospital.

For decade 1981, due to awareness in the society and demand by the people, the number of hospital gone up to 1688. No wonder, again highest number of hospital beds had recorded for North Solapur, where it was as high as 1089. Similar pattern more or less was observed for the

**Table 3.11**  
**Solapur District: Number of Beds in Hospital**

Sr.No	Name of Tahsil	1971	1981	1991	2001	2011
1.	North Solapur	475	566	1089	1089	1305
2.	Barshi	55	88	154	205	289
3.	Akkalkot	32	53	67	98	122
4.	South Solapur	08	16	26	32	48
5.	Mohol	08	16	26	60	77
6.	Mangalwedha	03	07	15	54	74
7.	Pandharpur	43	87	104	151	209
8.	Sangola	08	17	64	79	102
9.	Malshiras	14	27	52	126	155
10.	Karmala	12	25	37	60	95
11.	Madha	29	44	54	66	77
District		687	946	1688	2168	2553

*Source: Socio-economic Review of Solapur District*

Year 1981, as it was in the previous decades. Barshi, Pandharpur and Akkalkot were of the order of 154, 104 and 67 respectively between 50 to 65 ranges were for Sangola, Madha and Malshiras tahsils as for as hospital beds were concerned. Karmala represented 37 while South

Solapur and Mohol represented 26 beds in each tahsil. Mangalwedha lagged behind in the number of hospital beds in the region under study.

The decade 2001, recorded a consistent increase in the number of hospital beds, as 2168 beds were available in the district, out these 124 beds were available in North Solapur tahsil due to the existence of Solapur city. The spatial pattern as regard to number of beds in the district is concerned; it represented the similar picture as it was for the earlier decade. Barshi, Pandharpur and Malshiras were of the same order representing 205, 15 and 126 beds respectively. There were six tahsils in the range of 50 to 100 beds namely Akkalkot, Sangola, Madha, Karmala, Mohol and Mangalwedha. Surprisingly during this period South Solapur lagged behind in number of beds than other tahsils as for as the number of beds are concerned.

For 2011, a very impressive position has been found out for Solapur district as number of beds increased to 2553. More than half of the beds in the hospital were found only in North Solapur tahsil as city of Solapur located in it. Barshi and Pandharpur occupied second and third position as number of beds is of the order of 289, and 290. Between 100 to 200 beds there were three tahsils namely Akkalkot, Sangola and Malshiras. In the next categories of 50 to 100 beds were four tahsils namely Mohol, Mangalwedha and Karmala. South Solapur again retained the last rank in the district as for as number of beds is concerned.

### 3.4 Spatial Pattern Of Health Care Delivery

The hospital bed, doctor, and nurse ratio with population have been compound in order to study the pattern of health care delivery by tahsil in rural area of Solapur district.

**Table 3.12**

**Solapur District: Total Number of Rural Public Health Centres, Bed, Doctor and Nurse per 10,000 populations: 2001**

Sr. No	Tahsil	Rural Population	Health Centres	Bed	Nurse
1	Akkalkot	88325	5.0	11.3	10.5
2	Barshi	236046	1.9	5.2	4.3
3	Karmala	227922	1.7	3.3	2.9
4	Madha	252526	1.7	5.2	4.1
5	Malshiras	149555	3.5	11.5	10.6
6	Mangalwedha	311328	1.0	2.1	1.7
7	Mohol	243961	1.2	3.6	3.6
8	N. Solapur	422600	0.6	1.0	1.0
9	Pandharpur	211388	1.9	4.6	4.3
10	Sangola	269834	1.3	3.2	3.5
11	S.Solapur	210774	1.7	4.6	3.9
	District	2624259	0.6	4.1	0.4

Source : Field Work

**Health Centres and Population Ratio**

An attempt has been made to map the pattern of health centres in study area in the years 2001 and 2011. The index ranges between one and three more health centres per 10000 of population. It can be observed from figure 4.7.A which shows the distribution of health centres in 2001, that in general high in Akkalkot tahsil areas and low in North Solapur tahsil. Those in general high population density areas of Solapur district of the district lacked adequate hospital facilities in comparison to low population density areas. Generally average 0.6 health care centres were available per 10000 Population. Range having between 0.5 to 5.00 in all districts. Ratio of health centres is very low in North Solapur tahsil like 0.6per 10000 Population. Malshiras the index of health centres rose to 3.5. However with the increase in population during 2001- 2011, the distribution patterns of hospital facilities in 2001 highlight imbalances in the growth o population and the growth of health canter's'. For instance the growth of health centres and was not continuous with the increase in population in Karmala tahsil and Madha tahsil. Instead medium health centres availability areas were scattered all over the study area. The low population density observed and a special preference to the north and central part of Solapur district (Fig.4.7 B).

**Table 3.13**

**Solapur District: Tahsilwise Distribution of Rural Public Health Centres, Bed, Doctor and Nurse per 10,000 Populations: 2011**

Sr. No	Tahsil	Health Centres	Bed	Nurse
1	Akkalkot	1.9	4.2	4.3
2	Barshi	2.0	5.2	4.7
3	Karmala	1.6	3.5	3.7
4	Madha	1.8	4.6	4.2
5	Malshiras	3.01	4.5	4.7
6	Mangalwedha	1.7	3.9	4.0
7	Mohol	1.6	3.6	3.6
8	N.Solapur	2.4	4.2	5.2
9	Pandharpur	1.5	3.0	3.3
10	Sangola	1.6	3.3	3.5
11	S.Solapur	1.6	4.2	3.6
	District	1.7	1.8	0.5

Note : RPHC-include RHs PHCs, SCs, Source:Compiled by Researcher Beds and Population Ratio

An attempt has been made to map the patter of beds in Solapur district in the years 2001 and 2011. The beds /population ratio per ten thousand populations. The index ranges between four and eight more beds per 10000 of population. The distribution of health centres in 2001, that in general high in Akkalkot tahsil areas and low in North Solapur tahsil. Those in general high population density areas of Solapur district Pandharpur tahsil of the district lacked adequate hospital facilities in comparison to low population density areas.

Generally average 1.8beds were available per 10000 Population. Range having between 8 to 4.8 in all districts. Ratio of health centres is very low in Pandharpur tahsil like 1.5 per 10000 Population. N. Solapur the index of beds rose to 2.4. However with the increase in population during 2001- 2011, the distribution patterns of hospital facilities in 2001 highlight imbalances in the growth o population and the growth of beds. For instance the growth of beds and was not conterminous with the increase in population in Akkalkot tahsil and Malshiras tahsil. Instead medium health centres availability areas were scattered all over the study area. The low population density and a special preference to the north and south-west par of Solapur district.

## Nurses and Population Ratio

An attempt has been made to map the pattern of beds in Solapur district in the years 2001 and 2011. The nurses /population ratio per ten thousand populations. The index ranges between four and eight more nurses per 10000 of population. The distribution of nurses in 2001, that in general high in Akkalkot tahsil areas and low in North Solapur tahsil. Those in general high population density areas of Solapur district Barshi tahsil of the district lacked adequate hospital facilities in comparison to low population density areas. Generally average 4.1 nurses were available per 10000 Population. Range having between 4 to above 8 in all districts. Ratio of nurses is very low in Pandharpur tahsil like 1.00 per 10000 Population 2001 and in the year 2011 3.3 in Pandharpur tahsil. N. Solapur the index of nurse rose to 3.3. However with the increase in population during 2001- 2011, the distribution patterns of hospital facilities in 2001 highlight imbalances in the growth of population and the growth of health centers'. For instance the growth of nurses and was not continuous with the increase in population in Akkalkot tahsil and Madha tahsils. Instead medium nurse's availability areas were scattered all over the study area.

**Table 3.14**

### Solapur District: Health Care Facilities per 10000 Populations

Sr.No	Tahsil	Rural population	Primary Health Centres	Sub-Centres	Rural Hospital
1	Akkalkot	250890	3	16	0
2	Barshi	253989	3	17	1
3	Karmala	231290	2	14	0
4	Madha	301564	3	15	1
5	Malshiras	421244	3	18	0
6	Mangalwedha	184108	3	14	1
7	Mohol	276920	3	13	0
8	N.Solapur	105794	5	19	NA
9	Pandharpur	343445	2	12	1
10	Sangola	288524	2	14	0
11	S.Solapur	260897	2	13	1
	District	2918665	3	15	0

Source: Compiled by Researcher

The health care facilities like primary health centres and sub-centres in the year 2011. Five primary health centres contributor per one lakh persons in 2011 tahsil like North Solapur. Three PHCs are acting in Akkalkot, Barshi, Madha, Malshiras and Mohol tahsil. There are only two PHCs per 100000 person's tahsil like Pandharpur, Sangola and south Solapur.

Tahsil like North Solapur having 19 sub-centres exist serve for one lakh person and Pandharpur tahsil very low only twelve sub-centre served for 100000 people. Index range between 12-14 having tahsil came under Karmala, Mohol, Pandharpur, Sangola, Mangalwedha and South Solapur. There are two tahsil namely Madha and Akkalkot between 14-16 sub-centres per one lakh people Malshiras, North Solapur, Barshi tahsil lies range between 16-19 sub-centres for one lakh people.

### 3.5. Essential Infrastructural Facilities

In the Solapur district there are Seventy seven primary health centres along with Four hundred thirty one sub-centres. PHC does not full-fill facilities and some are adequate infrastructure. Structural facilities that were required to be created in the identified PHCs for facilitating the institutional deliveries it included following eight facilities-

- a) A well equipped operation theatre.
- b) Labor room.
- c) An observation ward.
- d) Two quarters cone for lady health worker and one for auxiliary nurse mid – wife.
- e) Provision of water supply.
- f) One generator
- g) One ambulance.
- h) Quarter, Besides, one post of lady doctor/ANM is also required to be created by the state Governments in each of the PHCs under the IPHS norms.

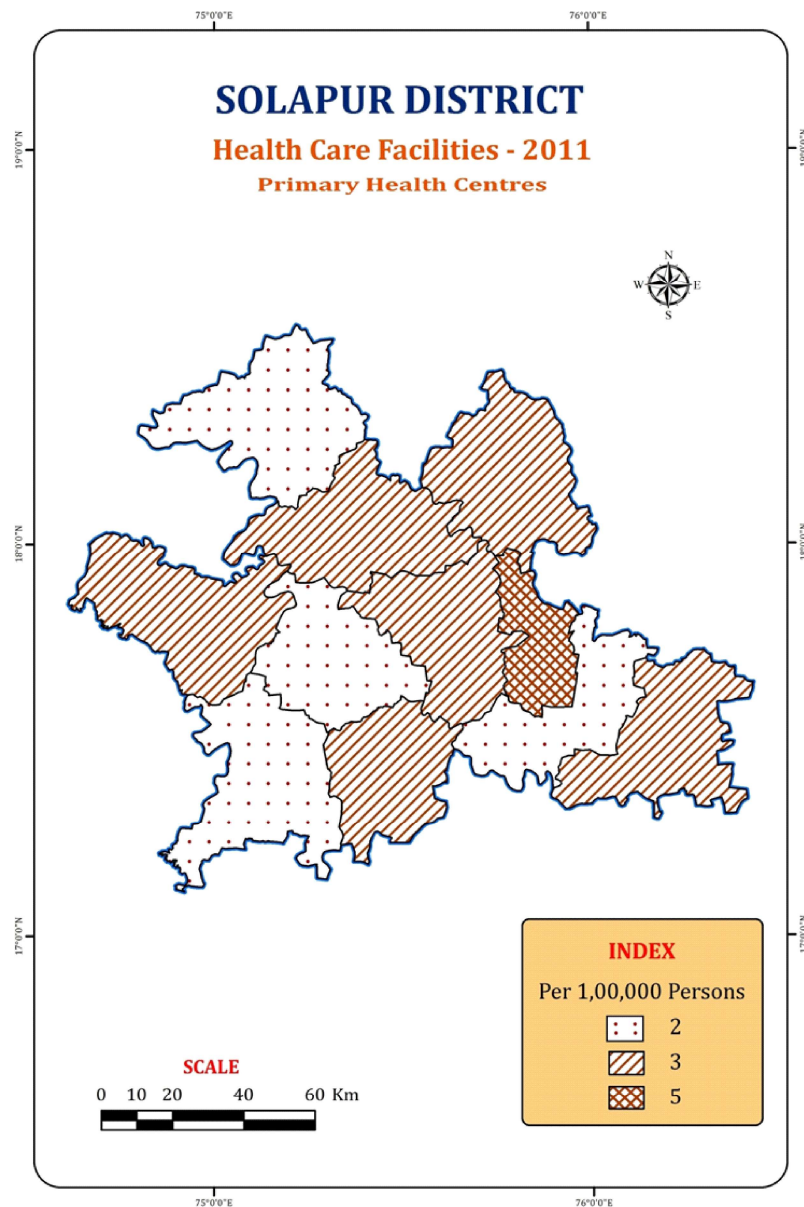
**Table 3.15**

**Solapur District: Tahsilwise Essential Infrastructure Facilities in PHCs: 2011**

Sr. No	Tahsil	No. of PHCs	Operation Theatre in PHCs	Labor Room	Observation Ward	Lady Doctor/ANM
1	Akkalkot	8	*5 \$3	#	*8	3L.D 5 ANM
2	Barshi	7	*6 \$1	#	*7	4ANM 3 L.D.
3	Karmala	5	*4 \$2		*5	1 L.D. 4ANM
4	Madha	8	*7 \$1	#	*8	6ANM 2 L.D.
5	Malshiras	12	*10 \$2		*12	\$1 & 6ANM 5 L.D.
6	Mangalwedha	5	*4 \$1	#	*5	\$1 & 2ANM 2 L.D.
7	Mohol	7	*6 \$1		*7	\$1 ANM
8	N.Solapur	5	*5 \$1	#	*5	3L.D.2ANM
9	Pandharpur	8	*6 \$2		*8	2ANM 6 L.D.
10	Sangola	6	*5 \$1	#	*6	3ANM 3 L.D.
11	S.Solapur	6	*6 -	#	6	1 & 3ANM 2 L.D.

Note : ANM-Ancillary mid-wife, L.D. Lady Doctor, # indicates available facility in all PHCs \* indicate available facility, \$ indicate absent there facility,

Source: Based on field work



**Fig.3.3**



Primary Health Centres has been equipped with required combination of all the eight essential facilities include the post of lady doctor. Though the labor room operation theater and observation ward are available majority in such eleven tahsil primary health centres. Yet such facility could not be utilized for attending delivery cases without availability of lady doctor. This miss-match between man power and essential facilities is a matter of serious concern. Lady Doctor is available in some centres and ancillary mid-wife replace lady doctor available some centres in some tahsil like namely Sangola, Mangalwedha, Pandharpur and Barshi tahsil. (Table 4.15).

**Table 3.16**

**Essential Infrastructure Facilities in PHCs**

Sr. No	Tahsil	No. of PHCs	Quarter	Generator	Availability of Water	Ambulance
1	Akkalkot	8	8	6	#	10
2	Barshi	7	7	5	#	08
3	Karmala	5	5	3	#	09
4	Madha	8	8	6	#	05
5	Malshiras	12	12	11	#	06
6	Mangalwedha	5	5	3	#	07
7	Mohol	7	7	6	#	04
8	N.Solapur	5	5	4	#	06
9	Pandharpur	8	8	6	#	04
10	Sangola	6	6	4	#	05
11	S.Solapur	6	6	6	#	06

Note: # indicate available facility in all PHCs

Source: Field Work

The above table shows infrastructure facilities in PHCs centre of Solapur district during 2011-2012. Quarter facility is available in all seventy seven PHCs centres. Generator is available in three PHC centre in all tahsil. Water is availability in all PHC centre but sources are different i.e. tank, well tube well and pipeline etc. Ambulance is availability is very low in relation to population.

It is noticed from table 3.17 the maximum of eight facilities

are created only sixty six public health centres and minimum three facilities are available in four primary health centres. While the remaining PHC four, five and seven facilities could create three, two and three, primary health centres respectively. All PHC centres in Solapur are located in an easily accessible area. The buildings are prominent board displaying the name of the centre in the local language. All PHC centres areas available the facility for electricity, all weather road communication, adequate water supply and telephone exchange. PHC centres well planned with the entire necessary infrastructure. These centres well and ventilated with as much use of natural light and ventilation as possible. The plinth area would vary from 375 to 450 sq. meters depending on whether facility is opted for. Entrance well and ventilated with space for Registration and record room, drug dispensing room, and waiting area for patients. The doorway leading to the entrances a ramp facilitating easy access for handicapped patients, wheel chairs, stretchers etc. All PHC centre in waiting area, adequate space and seating arrangements for waiting patients but some centre in inadequate space and seating arrangements for waiting patients. In the all primary health centre wall poster in parting in health education. PHC like some tahsil much more booklet may be provided in the waiting area for same purpose. Drinking water available for in patient in waiting area only for thirty one primary health centres and remaining health centres are absent these facility. There is proper notice displaying of the centre available services, names of doctor, user's fee details and list of member of management committee only few centres. Outpatient department; the outpatient room has separate areas for consultation in some tahsil. 5.5 to 3.5 m wards size found in each PHC. In the Solapur district 4 to 6 beds in each PHCs separate ward for male and female. Some PHC centre facility for drinking water and desperate and clean toilet for male and female are not accessible or fulfillment. In the easily accessible from OPD but remaining PHC need for separate nursing staff in ward and OPD during OPD hours. In some tahsil in the PHCs cooking not allowed in the ward for admitted patient but some tahsil like Akkalkot and North Solapur Cooking facility available in the separate area. Suitable arrangement with local agency like local women groups for provision of nutrients at reasonable rate may be made but, in some tahsil no lies this facility. Cleaning of the ward carried out at such time not to enter fear with the work during peak hours and also during time eating

Availability of bed and total population serve to the area surrounding study region are unbalanced. There are great variation in service provide mainly bed. Overall observation recommends regarding bed is very limited total number of bed present in the seventy seven primary health centres. Out of total four hundred sixty two beds 216 beds for male and 246 beds available only for female. Among the total patients women's ratio is very high in all public health centres Solapur district. Highest number of bed facilities in the primary health centres lies in Malshiras tahsil (15.2) and lowest bed facilities occurring in the Mangalwedha tahsil in the Solapur district (Table 3.18). There are separate areas for septic and aseptic deliveries for all centres. The LR well lit and ventilated within attached toilet and drinking water facilities are available in various tahsil in Solapur district. Dressing room- The dressing room located close to the OPD to cater to patients for minor surgeries and emergencies after OPD hours. It is well equipped with all the emergency drugs and instruments.

**Table 3.18**

**Solapur District : Bed Availability in PHCs**

Sr. No	Tahsil	Bed		Total Bed	Percentage
		Male	Female		
1	Akkalkot	23	24	47	10.2
2	Barshi	18	23	41	8.9
3	Karmala	16	23	39	8.4
4	Madha	21	25	46	10.0
5	Malshiras	40	30	70	15.2
6	Mangalwedha	12	18	30	6.5
7	Mohol	14	28	42	9.1
8	N.Solapur	13	17	30	6.5
9	Pandharpur	24	24	48	10.4
10	Sangola	21	15	36	7.8
11	S.Solapur	14	19	33	7.1
District Total		216	246	462	100

Source : IPD Register of PHCs

Sufficient space with workbenches and separate area for collection and screening available in PHC centres. All PHC centres have marble table top for platform and wash basin.

The laboratory services are available in all PHC centres like Routine urine, stool and blood tests, blood examination for malarial parasite, rapid tests for pregnancy or malaria, rapid test kit for fecal contamination of water.

All PHC centres separate area for storage sterile and common lineal and other materials/drugs etc. The area is well and ventilated frees for the some centre. Residential accommodation with all the amenities like 24 hours water supply, electricity, is available of medical officer head quarter. All PHC centre lies in other amenities like Electricity with generator back up, adequate water supply and telephone at least one direct line.

The necessary equipment to deliver the assured services of the PHC centres available in adequate quantity and also be functional. Equipment maintenance given special attention detail of status of furniture. All the drugs available in the sub centre and PHCs. In addition all the drugs required for national health programmers and emergency management available in adequate quantities so as to insure completion of insure by all patients. Drugs required for the AYUSH doctor available in addition to all other facilities in PHC centres. Referral transport facility some primary health centres in Solapur district are available of ambulance for transportation of emergency patients (Photo Plate-6 B).

**3.6 Workload on The Health Facilities**

In any area, the availability of beds is a significant indicator of health facilities. "The workload is defined as the number of people theoretically served by each in -patient beds and thus it represents the ratio between total population and number of beds in unit area. The measurement of a volume of the work, carried out by any health institution, is a difficult task especially in the Indian set-up". (Agnihotri, R. C., 1995). Here an attempt has been made to examine the Tahsilwise disparities in the health facilities available by applying the workload factor.

**Distribution of workload**

To find out the workload, 'Workload factor' has been calculated by using the following formula (Mc Glashan N.D., 1972).

$$WF = \frac{\text{Population Served In Hundred}}{\text{General use in patient's beds}}$$

The workload factor, thus obtained have been tabulated and grouped in to four classes. Lower the value of workload factor represents higher the availability of health facilities and higher the value of workload factor represents lower the availability of health facilities. The workload

factor range from 1.9 lowest in Barshi tahsil which represents higher the availability of health facilities and being a 3.2 highest in Pandharpur tahsil which represents lower the availability of health facilities. The district average of workload is 2.7 which are higher than the state average of Maharashtra.

**Table 3.19**

**Solapur District: Workload on Health facility in Rural Public Health Centres**

Sr.No.	Tahsil	Population served in hundred	Total Beds	Workload Factor
1	Akkalkot	250	105	2.3
2	Barshi	253	133	1.9
3	Karmala	253	81	3.1
4	Madha	301	140	2.1
5	Malshiras	421	188	2.2
6	Mangalwedha	184	72	2.5
7	Mohol	276	99	2.7
8	N.Solapur	105	44	2.3
9	Pandharpur	343	104	3.2
10	Sangola	288	95	3.03
11	S.Solapur	260	109	2.3
District		2934	1074	2.7

*Source: Compiled by Researcher*

It is clear from map, that workload is too high (3.2) in Pandharpur tahsil. The lower (1.9) workload factor in Barshi tahsil. The average workload factor of whole district lies (2.7). Workload of Mohol tahsil is equal to district average. Workload factor of tahsils like Sangola, Karmala and Pandharpur have above than district average.

Workload factor of tahsils like Akkalkot, Madha, Malshiras, Mangalwedha, North Solapur and South Solapur have less than district average. Thus obtained has been calculated at three levels of disparity. It is observed that, low disparity, moderately and high workload in the Solapur district.



## CHAPTER IV HUMAN RESOURCE IN RURAL HEALTH CARE

### 4.1 Introduction

Public health care system depends on multiple factors, among which human resources are one of the most important components. After study of health care facilities in health care system that is essential to study perspectives of human resource in health care centres. In this context present chapter include, strengths of health personnel, job responsibilities, behavioral analysis of staff and patient in the public health care system and community perception about working style of primary health centres in the study area. The World Health Report 2006 documents the wide spread health workforce crisis across the globe similar to other regions and specialty areas, there has been a shortage of well-trained public health workers in the India as well as study area. The role of all functionaries (Medical officer, Nurses, Para-medical staff, Auxiliary staff, and other health personnel) are vital important in the functioning of Public health department of Solapur district.

The aim of this chapter has to study the organization structure of public health at a district and to analysis the perspectives of human resources like behavioral analysis of health personnel engaged in the rural public health care system.

### 4.2 Organization Structure of Public Health at District

A special feature of Maharashtra's public health organization system has been the early decentralization of primary health care implementation to the Zilla parishads as early as 1961 primary health

care, school education and other social sector programmes/schemes have been given to the Zilla Parishad to implement. The Zilla Parishad get grants under section 183 and 182, respectively, of the Maharashtra Zilla Parishad and Panchayat Samiti, Act 1961 for carrying out the Vaccinations, School Health clinics Primary Health centres, Primary Health Units, Mobile Health Units, Allopathic dispensaries, Mobile Launch Units, Construction and up gradation of PHCs and Sub-Centres.

The human resource in public health care delivery system at the district is structured as follows.

The highest levels at the district headquarters that have, what are called civil Hospitals that are usually 100-500 bedded hospitals having the most basic specialist (some of the larger ones are used as teaching specialist). In Maharashtra there are 29 civil hospitals with 8821 beds (2011). In other words not all districts have a civil hospital as yet. These hospitals are core center for referral medical care for the rural areas, apart from catering of the district town. Many tahsils and other town have smaller hospitals or sub-divisional hospitals, which are often run by local government bodies. In Maharashtra these are called cottage hospitals.

In the 1980 as part of expansion of the rural health infrastructure under the minimum needs programme, Rural Hospitals (RH) were set up by upgrading some of the older PHCs. This was with the idea of making first referral care available to the rural population closer to where they live. These are 30 bed hospital with four basic specialties- medicine, surgery, Obstetrics and gynecology, and pediatrics. Radiography and Pathology services are also available. Maharashtra has 3229 (2011) rural hospital each reaching out to about 150,000 populations (one per five PHCs). Maharashtra was one of the first states to establish the norm of one PHC per 30000 populations and one Sub-Center per 5000 population in the early eighties itself.

### 4.3 Man Power in Primary Health Centres

Without manpower various circumstances are present in the work of public health care system in the study area. Manpower including medical officer, Para-medical staff such as health worker, health assistant and lab technician, pharmacist etc. Well qualified staff is the signs of good primary health centres. Levels of health and disease vary between places and over time.

**Table 4.1**  
**Solapur District: Administrative Involvement in Primary Health Centres**

Sr. No	Designation	Detail Regarding Qualification and Post			
		Educational Qualification	Sanctioned	In Position	Vacant
<b>Paramedical Staff</b>					
1	Medical Officer	M.B.B.S.	165	137	28
2	Lab Technician	D.M.L.T./C.M.L.T.	88	41	47
3	Pharmacist	-	79	30	49
4	Nurse Mid wife	-	185	130	55
<b>Auxiliary Paramedical Staff</b>					
5	Health Assistant(Male)	-	122	107	15
6	Health Assistant(Female)	-	100	93	7
7	Health Worker (Male)	H.S.C.+M.P.W.co urseone year	298	217	52
8	Health Worker (Female)	H.S.C.+M.P.W.co urseone year	509	439	70
<b>Other Supporting Staff</b>					
9	Medical Officer (Ayurved)	M.B.B.S.	5	5	0
10	Extension Officer	B.A.M.S.	5	5	0
11	Extension Officer	-	24	24	0
12	Hivtap Supervisor	-	11	0	0
13	Non-Medical supervisor	-	0	0	0
14	Shitsakhali Technician	-	1	1	0
15	Ancillary Nurse Mid Wife (ANM)(Prashikshit Dai	ANM/GNM Course(Nursing course)	620 (Contract Basis)	620	0
16	Clerk (ASHA)(Gramin Arogya Margdarshika)	H.S.C./Typist	2432	1849	583

*Source: Eligibility and Qualification Status Report Solapur District*

At present, there is a pronounced awareness of the important of understanding the geographic aspects of problems of human health. This awareness is a part of an overall attempt within the discipline of geography to strengthen conceptual horizons. It is part twenty –five years from merely descriptive to process-oriented explanations.

Paramedical Staff: In these staff coming under Medical Officer,

lab technician, pharmacist and nurse mid-wife. Role of these staff are vital for functioning the primary health centres.

**Auxiliary Paramedical Staff:** Auxiliary staff are the supporting staff for paramedical staff such as health assistant (Male and Female), health worker (Male and Female).

**Other Supporting Staff:** In the each and every primary health centres medical officer, extension officer, Hivtap supervisor, non-medical supervisor, shitsakhali supervisor and ancillary nurse mid wife, clerk these are the role of very important in functioning the centres.

**Table 4.2**

**Solapur District: Availability of Medical Officer in Public Health Care**

Sr. No	PHC	Sanctioned	In Position	Vacant	% of Vacant
1	Akkalkot	18	16	2	11.11
2	Barshi	19	15	4	21.05
3	Karmala	16	14	2	12.50
4	Madha	17	15	2	11.76
5	Malshiras	18	13	5	27.78
6	Mangalwedha	17	15	2	11.76
7	Mohol	14	12	2	14.29
8	N.Solapur	11	9	2	18.18
9	Pandharpur	14	12	2	14.29
10	Sangola	10	8	2	20.00
11	S.Solapur	11	8	3	27.27
District		165	137	28	17.00

Source : PHC Standard Record of Solapur District

The adequacy of doctor against their sanctioned post seems to be encouraging while 83.00% of doctor are in position and 17 % percent vacant post of doctor in PHC. But there is less sanctioned post of doctor as proportion to increasing population. This follows that the position of availability of doctor is better which can be explained by factor like location of such PHC better of tahsil head quarter. Where Physical infrastructure including connectivity is better. In this context observation reveals that in practice the absenteeism among doctor from this work

pressure is very high in PHCs. The biggest challenge is to ensure the availability of services of doctors in the PHCs. Although the numbers of doctors sanctioned are less than requirement. About sixteen PHCs are without doctors because of misdistributions, lack of basic amenities and lack of incentives for working in the rural areas. Appropriate health manpower policy is needed (Table 4.2).

**Table 4.3**

**Solapur District: Availability of Para-Medical Staff in PHC Centres-2011**

Tahsil	Pharmacist			Nurse Mid Wife			Lab-Technician		
	S	P	V	S	P	V	S	P	V
Akkalkot	7	6	1	14	11	3	9	4	5
Barshi	7	7	0	15	12	3	8	5	3
Karmala	6	6	0	16	10	6	7	3	4
Madha	9	9	0	18	14	4	9	4	5
Malshiras	9	8	1	22	16	4	9	3	6
Mangalwedha	7	7	0	15	9	6	7	2	5
Mohol	6	6	0	16	12	4	8	4	4
N.Solapur	8	7	1	18	11	7	8	5	3
Pandharpur	7	7	0	17	13	6	10	4	6
Sangola	6	6	0	16	12	4	6	3	3
S.Solapur	7	6	1	18	10	8	7	4	3
District	79	30	49	185	130	55	88	41	47
% of Vacant	62.03			29.73			53.41		

Note : S-indicate sanctioned post, P-in position, V-vacant

Availability of Para – medical staff in PHCs of Solapur district during 2010-2011. It is revealed that 62 % post of Pharmacist is vacant in all PHC. 29.73 percent post of nurse mid-wife vacant. The posts of Pharmacist, Lab technician were also sanctioned. The overall availability of main paramedical staff in PHCs is observed satisfactory. There is one vacant post considering Nursing mid wife in the Akkalkot, North Solapur, and South Solapur tahsil. One hundred eighty five posts are sanctioned in the Solapur district. But out if these 130 post in position and thirty five posts are vacant. South Solapur tahsil lies more i.e.

eight post vacant followed by North Solapur, Karmala, Mangalwedha, South Solapur respectively Barshiremain three post vacant overall the picture of these Nurse Mid wife it is not satisfactory. About Lab-technician eighty eight Post are sanctioned and forty one of in position and 53.41% vacant seat in the Solapur district and remaining forty seven posts are vacant. Over all Para – medical staff satisfactory in all primary health centres.

**Table 4.4**

**Solapur District: Availability of Auxiliary Para – Medical Staff in PHCs, 2011**

Sr. No	Tahsil	Health Worker						Health Assistant					
		Male			Female			Male			Female		
		S	P	V	S	P	V	S	P	V	S	P	V
1	Akkalkot	27	22	5	47	41	6	12	10	2	10	8	2
2	Barshi	25	18	7	45	39	6	10	10	0	8	8	0
3	Karmala	23	16	7	52	48	4	11	11	0	8	7	1
4	Madha	26	19	7	43	40	3	10	9	1	8	8	0
5	Malshiras	32	24	8	53	42	11	13	13	0	13	11	2
6	Mangalwedha	26	18	8	41	34	7	11	9	2	11	10	1
7	Mohol	27	17	10	44	39	5	10	7	3	9	9	0
8	N.Solapur	28	21	7	47	36	11	11	7	4	7	6	1
9	Pandharpur	30	23	7	46	38	8	13	13	0	8	8	0
10	Sangola	28	19	9	43	37	6	11	8	3	9	9	0
11	S.Solapur	26	22	4	48	45	3	10	10	0	9	9	0
Total		298	217	81	509	439	70	122	107	15	100	93	7
% of Vacant		27.18			13.75			12.30			07.00		

Note : S= Sanctioned, P= in Position, V=Vacant.

The availability of auxiliary staff in all PHCs in the Solapur district is found to be satisfactory. Availability of Auxiliary Para-medical staff including health worker and Assistant and Educator. Presently in all primary health centres no any vacancy about health assistant especially female candidate except Akkalkot, Malshiras, Mangalwedha and North Solapur. Out of sanctioned post of HW (Male) 217 posts are filled and remaining 27.18% post are vacant. As far as concerning to Health Worker (Female) total 509 posts sanctioned among these 439 posts are in position and 13.75 % posts are vacant. Highest number of post (32) health worker (male) is sanctioned in Malshiras tahsil followed by Karmala, Pandharpur, North Solapur, South Solapur and Akkalkot

tahsil. In the Karmala tahsil very less twenty three posts are sanctioned. In the Mohol tahsil ten posts are vacant and South Solapur tahsil four posts are vacant. (Table 4.4)

Fifty three post of health worker (female) is sanctioned in Malshiras tahsil followed by Pandharpur, Sangola and Akkalkot tahsil. In the Mangalwedha tahsil very less forty one post are sanctioned. In the Malshiras and North Solapur tahsil eleven post are vacant. Considering to health assistant (male) Malshiras and Pandharpur tahsil sanctioned eleven posts among study area. Concerning to Health Assistant (Male) 12.30 % post vacant among the study area while female Health Assistant only seven percent post are vacant.

**4.4 Job Responsibilities of Phcs Staff**

PHCs functioning as the first level in hierarchical system of health care, facilities at this primary level PHCs will play two equally important roles, first diagnosis of diseases based on symptoms and simple laboratory tests, and their treatment either at the centres or through referral second health education leading of family planning better hygiene and sanitation and prevention of communicable disease, especially sexually transmitted diseases. Detail of each functionaries as follow.

**Medical Officer**

The Medical Officer of Primary Health Centre (PHC) is responsible for implementing all activities grouped under Health and Family Welfare delivery system in PHC area. He is responsible in his individual capacity as well as overall in charge. (Photo Plate –4 A). The detailed job functions of Medical officer working in the PHC are as follows.

**Creative Work**

1. The Medical Officer organizes the dispensary, outpatient department and allotment duties to the ancillary staff.
2. He makes suitable arrangements for the distribution of work in the treatment of emergency cases which come outside the normal OPD nurse.
3. He provides guidance to the Health Assistants, Health Workers and Health educator and in the treatment of minor ailments.
4. He co-operates or coordinates with other institution providing medical care services in his area.

5. He visits to each sub-centre in his area at least once in a fixed day not only to check the work of the staff but also to provide creative services.

6. He organizes and participates in the “health day” at Anganwadi centres once in a month.

### **Preventive and Primitive Work**

The Medical officer ensures that all the members of his health team are fully conversant with the various National Health and Family Welfare programs.

1. He visits schools in the PHC area at regular intervals and arrange for medical checkups immunization and treatment with proper follow up of those students found to have defect (Photo Plate – 4 A).

2. He is responsible for proper and successful implementation of family planning programmer in PHC area, including education, medication. He will extend motivational advice to all eligible patients he sees in the OPD.

3. He provides leadership to his team in the implementation of family welfare programmer in the PHC catchments area.

4. He ensures adequate supplies of equipment, drugs, educational material and contraceptives required for the services programmers.

5. He provides MCH services such as ante – natal, intra – natal and post –natal care of mothers and infants and child care through clinics at the PHC and sub centres. He Monitoring Reproductive and child health programs as like MCH Services, Prophylaxis Schemes and Immunization Programmes. He provides leadership and guidance for special programmes such as in nutrition, prophylaxis against blindness and vitamin A deficiency amongst children (1-5 years). He ensures proper storage of vaccine and maintenance and cold chain equipment. He will ensure through his/her health team early detection of pneumonia cases and provide appropriate treatment.

### **Universal Immunization Programmed**

1. Medical Officer plans and implements UIP in line with the latest policy and ensures cent percent coverage of the target population in the PHC. He ensures proper storage of vaccine and maintenance of cold chain equipment, planning and monitoring of performance and training of staff.

2. The Medical Officer guides the Health Workers and Health Assistants on all treatment with. As for as possible he/she should investigate all malaria cases in the area.

3. He should be completely acquainted with all problems and difficulties with all problems and difficult regarding surveillance, diagnosis and treatment and spray operations in his/her PHC areas and be responsible for immediate action whenever the necessity arises (Photo Plate –2 A). He guides the health workers and health assistant on all treatment schedules.

4. He checks the Microscopic test conducted by the Laboratory Technicians.

5. He attend during his monthly meeting ensure proper accounts of Drugs, Chemicals, Glassware etc.

6. He ensures that all the steps are being taken for the control of communicable diseases and for the proper maintenance of sanitation in the villages.

### **Administrative Work**

He supervises the work of staff working under him/her. He scrutinizes the programmers of his/her staff and suggests changes in necessary to suit the priority of work. He gets prepared and display charts in his/her own room to explain clearly the geographical areas, location of peripheral health units, morbidity and mortality, health statistics and other important information about his/her area. He holds monthly staff meeting with his/her own staff with a view to evaluating the progress of work and suggesting steps to be taken for further improvements. He keeps notes of his/her visits to the area and submits every month his/her tour report to the CMO.

### **4.4.2 Health Educator**

The health educator functions under the technical suspension and guidance of the Block Extension Educator However; he works under the immediate administrative control of the PHC medical officer. He responsible for providing support to all health and family welfare programmers in the block. Duties of health educator in primary health centres as given below.

1. He has with him/her all information relevant to development activates in the block particularly concerning health and family welfare,

and will utilize the same for programmer planning.

2. He develops his/her work plan in consultation with the medical officer of his/her PHC and the concerned Block Extension Educator.

3. He collects analysis and interprets the data in respect of extension education work in his PHC area.

4. He has responsible or regular maintenance of records of educational activities, tour programmers, daily dairies and display of relevant maps and charts in the PHC.

5. He assists the medical officer. PHC in conducting training of health workers under the MPW and ASHA and other schemes under NRHM.

6. He organizes the celebration of health days and weeks and publicity programmers at local fairs, on market days etc.

7. He supplies education material on health and family welfare to health workers in the block.

8. He maintains a complete set of educational aids on health and family welfare for his/her own use and for training purpose.

9. He prepares a monthly report on the progress of educational activities in the block and sends it to the higher authority.

#### **4.4.3 Health Assistant**

Under the multipurpose workers scheme a Health Assistant female/male is expected to cover a population of 30,000 (20,000 in tribal and hilly areas) in which there are six sub- centres, each with the health worker male/female. The health assistant male/female will carry out the following duties. Supervise and guide the health worker female/male pays and guide ASHA in the delivery of health care service to the community. Strengthen to the knowledge and skills of the health female. Visit each sub-centre all least once a week on a fixed day to observe and guide the health worker female in her day to day activities. Supervise referral, of at pregnant women for RPR testing at PHC.

#### **4.4.4 Health worker**

Especially Health Worker helps us as part of team and Supplies, equipment and maintenance of sub-centres. Detail of function to health worker as given below.

#### **As part of the team:**

Conduct regular staff meetings with the health worker in coordination with the Health Assistant. Attend staff meetings at the primary health centres. Assist the medical officer of the primary health centres in the organization of the different health services in the area.

#### **Supplies, equipment and maintenance of sub-centres -**

Check that the drugs at the sub centres are properly stored and that the equipment is well maintained. Censure that the health worker female maintains has general kit and midwifery kit and kit in the proper way.

#### **Records and Reports:**

Scrutinize the maintenance and pacer's by the health worker female and guide have in their proper maintenance. Review reports received from the health workers female consolidate them and submit monthly report to the medical officer of the primary health centre.

#### **4.4.5 Village Health Nurse:**

In the functionaries of PHCs and sub – centres provide service at a point of few often in the patient home through Village health nurse.

#### **Other Functions of PHCs**

1. providing regular in – patient and outpatient health care services
2. Implementation of family welfare
3. Implementation of programmed and national health programs
4. Guidance for prevention and control of endemic diseases
5. Providing basic sanitation, immunization etc.

#### **4.5. Behavioral Analysis of Health Personnel (Staff)**

This section is fully devoted on view of human resource in public health care centres in the study area. Their view about their satisfaction level, regarding their job and there profile in relation to age gender, professional distribution, staff view on continuous development of public health centres, Staff desired thinks good public and government support for health centres., staff view of the current doctor/nurse/other patient relationship and the prospects of improving relationship with patient. Result of profile of staff view of in the Public healthcare centres to depict through tables, maps, graphs, and diagram.



**Table 4.5****Solapur District : Distribution of Responding Staff According To Their Age**

Sr. No.	Gender	Percentage of respondent
1	Male	58
2	Female	42
3	Total	100

Source: Field Work

In this context ninety respondent were selected in eleven primary health centres among each tahsil on the basis of coverage of population more than 30000.

The distribution of respondents according to their age. Out of the total sample like 21% are in the age of 21 to 30 years, 47% are in the age of 31 to 40 year and 20% in the age of 41 to 50. And remaining staff are i.e. 12% are 51 to 60 age (Fig.4.1).

**Table 4.6****Solapur District: Sex distribution of respondent (employers)**

Sr. No.	Gender	Percentage of respondent
1	Male	58
2	Female	42
3	Total	100

Source: Field work, 2015

From the above graph it can be intend that 42 % of respondent are male and 58 % are female employees in Public Health Centre of these district.

**Table 4.7****Solapur District: Professional Distribution of Staff.**

Sr. No	Medical Profession	Percentage
1	Doctor	15
2	Nurse	36
3	Other employed(staff)	49
4	Total	100

Source: Field work, 2015

While considering Professional distribution of staff 15% of employers are doctors, 36 % are nurse and 49 % other employers are of other services in Public healthcentres and sub-centres in Solapur district. Noteworthy point proportion of doctors very less as compare to nurses and other staff (Fig.5.3).

**Table 4.8****Solapur District:Medical Staff Proud Level of their Job**

Proud level	Doctor (%)	Nurse (%)	Other (%)
Proud	61	52	51
Very proud	23	12	23
Neutral	16	09	05
Not Neutral	00	00	21

Source: Field Work

The medical staff proud level of their job Out of the total sample like 61% doctor are very proud, 23% and 16% are very and neutral proud respectively. Nurse satisfaction level about their job 52%, 12% and 09% proud, very proud and neutral respectively. Other staff are 51%, 23%, 05%, 21% proud, very proud, neutral and not neutral about their job satisfaction level.

**Table 4.9****Solapur District:Staff View on Continuous Development of PHC**

View of Staff	% of staff Response
Highly optimistic	16
Optimistic	47
Neutral	17
Pessimistic	20

Source: Field Work

From above figure it can be seen staff view on continuous development about Public health centres in study area. 47 % staffs were optimistic, 16% staffs are highly optimistic to continuous development and remaining staff neutral and pessimistic.

**Table 4.10**  
**Solapur District : Staff Desired Think Good Public and Government Support for PHC**

Medical profession	Support Required(Yes)	Not support Required (No)
Doctor	10	04
Nurse	23	03
Other Staff	41	09
Percentage	83	17

Source : Compiled by Researcher

Above table shows the staff desired good public and government support for Public health centres in study region. Total 83 % staffs are support required and remaining 17% staffs are not required.

**Table 4.11**  
**Solapur District:Staff View of the current Doctor/Nurse/other patient relationship**

Employees category	Coordinal (%)	No coordinal (%)
Doctor	14	13
Nurse	38	40
Other Staff	48	47

Source : Field Work

It is clearly show 14 % (D), 38 % (N) and 48 % (OS) of the employees are coordinal relationship between PHC staff –patient and 13 % (D), 40 % (N) and 47 % (OS) of employees are not coordinal have agreed relationship between medical staff-patient relationship among the Public health centres in Pandharpur tahsil.

**Table 4.12**  
**Solapur District:The Prospects of Improving Relationship with Patient**

Sr. No.	Employers Category	Confident	No. Confident
1.	Doctor	10	04
2.	Nurse	27	08
3.	Other medical staff	28	13
Total (%)		72%	28%

Source:Based on Field Work

Concerning the prospects of improving relationship with patient, 72 % employers are confident the prospects of improving relationship with patient and 28% staff are not confident have agreed with the of improving relationship between staff- patient.

**Table 4.13**  
**Solapur District: Staff views on relationship with patient**

Employers category	Sometime Puzzled	percentage	Frequently Puzzled	percentage	Not Puzzled	Percentage
Doctor	04	14	03	23	06	46
Nurse	19	54	08	22	08	22
Medical Staff	06	14	16	38	29	47

Source : Based on Field Work, 2015

Concerning Staff views on relationship with patient 14% doctors are sometime puzzled to patient and twenty three percent patients says doctors are frequently puzzled and forty six patients have doctor not puzzled among the study area. About nurses twenty two percent nurses are not puzzled to patient. Concerning to medical staff only fourteen percent staff sometime puzzled to patient.

#### 4.6 Behavioral Analysis of Beneficiries (Patient)

When discussing the behavior of patient at that time that is essential to understanding the disturbances of emotions such as anxiety, depression, and stress symptoms. There are four ways to change patient behavior which is given below-

**Staff -Patient Relationship-** The first few minutes of meeting a new patient are critical. From the physician’s perspective, there is the importance of body language and reactions to patient different questions. On the patient’s side as well, there are ways to make the encounter more meaningful.

**Imparting the Knowledge of Patient-** The purpose of each test and what it entails, the overall suggested plan, the possible diagnoses and their probabilities should all be touched upon. This need not be done in great detail but in a way in which the patient gets the overall picture. The reason for each medication prescribed and its most common potential side effects is something not always done, leaving patients with prescriptions and many questions even five minutes after leaving the office. A well-informed patient is the best patient.

Technological Support - Digital health tools, whether in the form of patient portals (allowing patients to easily communicate with me and get test results quicker), apps (allowing the patient to keep and upload a diary or use for nutritional, weight loss, or smoking cessation guidance), or reliable websites (for deeper information about their symptoms or diagnosis) should be an important aspect of all medical practices today. A mobile health tech strategy is essential for reaching patients and improving patient satisfaction.

Providing Incentives- Incentives for patients to be better participants in their own healthcare need not be clear. It might be in the form of a physician's conveying sensitivity to costs by prescribing the most economical medications, minimizing tests as well as acknowledging the issue as a concern. Another is to involving decisions and plans with a caregiver who can help achieve established goals along with the patient. In addition, the previous three points will also incentivize the patient via respect and empowerment.

**Table 4.14**

**Solapur District: Distribution of Beneficiaries of Public Health Facilities According to Type of Aliments during 2011**

Sr. No	Tahsil	No. Beneficiaries	Aliment of Respondent							
			Delivery Case	Respiratory Related Diseases	Water Borne Diseases	Vaccine Prevent Table Diseases	Injury	Gynae	Cold, Cough And Fever	Other
1	Akkalkot	25	5	1	5	3	3	3	3	2
2	Barshi	25	4	3	5	3	3	2	2	3
3	Karmala	25	3	1	5	3	5	2	4	2
4	Madha	25	5	3	3	4	1	2	4	3
5	Malshiras	25	2	2	2	8	4	2	4	1
6	Mangalwedha	25	3	1	2	3	0	3	7	6
7	Mohol	25	1	2	4	4	2	4	4	4
8	N.Solapur	25	4	2	3	4	0	5	4	3
9	Pandharpur	25	3	1	3	3	2	6	3	4
10	Sangola	25	1	3	4	4	2	4	4	3
11	S.Solapur	25	2	2	4	3	2	5	4	3
Total		275	33	21	40	42	24	38	43	34
Percentage		100	12	7.63	14.55	15.28	8.72	13.82	15.64	12.37

Source : Field Work

Distribution of beneficiaries of PHCs according to type of ailments during 2013-14. The profile of beneficiaries reveals that a maximum of 15.64 percent of beneficiaries have sought the treatment for minor ailments like cold cough, favor. In the Solapur district followed by the cases suffering from vaccine preventable (15.28%), disease waterborne disease (14.55%), Gynae (13.82%), other (12.37%), delivery case (12.00%), Injury (8.72%) respiratory disease (7.63%) respectively.

**Table 4.15**

**Solapur District: Depict Patient Satisfaction Level of Services Provide in The Public Health Facilities**

Services	Excellent	%	Very Good	%	Good	%	Fair	%	Poor	%
Attended by Mo	37	18.5	89	44.5	23	11.5	31	15.5	20	10.0
Regular Review	43	21.5	47	23.5	56	28.0	33	16.5	21	10.5
Regular investigation	26	13.00	87	43.5	29	14.5	34	17.5	24	12.0
Regular treatment Advise	89	44.5	88	44.0	31	15.5	25	12.5	10	5.5
Advise	56	28.5	83	41.5	22	11.0	24	12.0	15	7.5

Source : Field Work

Depict satisfaction level of services provide in the public health facilities attended by Medical officer 18.5% become excellent, 44.5% very good and 10.00% poor. As far as concerning to Regular review 21.5% become excellent, 10.5% poor. Consisting to regular treatment 44.5 become excellent, 41.5% very good and 5.0% poor. Regular investigation and advise 13.0% and 28.5 become excellent to patient satisfaction level of services provide in the public health facilities in the study area.

**Table 4.16**

**Solapur District: Percentage of Satisfaction Level of Communication about Behavior of Staff**

level	Excellent	Good	Marginal	Fair	Poor
listens	7.5	53.0	13	14	12.5
Time spend explain	6.5	54.5	15	14	10
Advise Reason	6.5	43.5	23	16	11
Total average	6.5	47	22.5	19	6

Source : Field Work

Satisfaction level of services provide in the PHC and Behavior only 6.5% respondent say about community behavior excellent followed (47%) ,(22.5%) marginal, (19%) fair, (6%) poor. Among there listen level 7.5% patient becoming excellent and 12.5% say about poor concerning to listen.

**Table 4.17**

**Solapur District:Depicts Patient Satisfaction about Facilities (Cleanness, ventilation, call bell, toilet, recreation, drinking water visitor etc)**

Particular	Excellent	Good	Fair	Poor
No. of respondent	12	34	83	71
% of respond	6	17	41.5	35.5

*Source : Field Work*

The response of beneficiaries in Solapur district not only satisfaction about cleanness of delivery system only 6 percent of beneficiations / patient belonging to excellent, 17 % patient good, 41.5% fair and a few 35.5% respondent are found poor to be dissatisfied with the functioning or facility provide like cleaner, reiteration, lull bell, toilet, drinking water etc.

Further, of dissatisfied beneficiaries amount have a complained about medical and para-medical staff of PHCs. The main reason for dissatisfaction included non-availability of medical and paramedical staff not examined by doctor and not given proper attention. The second reason for dissatisfaction of patient is the non-availability of medical in PHCs. About 66.67% of the patient expressed their view (Fig.5.7).

#### **4.7 Behavioral Change Communication**

It is a well – known fact that investment in health care improves well – being of the person directly affecting his capacity to work, production and thus helps in improving economic status of the person and community. (Malcolm, L. 2000). Health issues needing behavioral change as given below.

1. Breast feeding.
2. Complimentary feeding.
3. Male preference leading to sex determination and female feticide.

4. Male sterilization.
5. Farley detection and treatment of RTI/STI, HIV/AIDS Immunization.

Non - Health Issues Needing Behavioral Change:

There are a number of non – health issues, which cannot be totally dealt by the health staff. Some of the important non health issues are listed below based upon information according primary health center in Solapur district.

1. Age at marriage, age at first pregnancy
2. Decision for limiting family size by spacing and terminal methods.
3. Male child preference, preference for female sterilization.
4. Male participation in identification/decision of high – risk issues related.
5. IMR and MMR and for timely referral.
6. Nutritional issues.
7. Availing/demanding essential health services linked to status of women.
8. Involvement of panchayat Raj Institutes (PRI)/ Community in monitoring public health services.
9. Gender issues.
10. Gender violence.
11. Women empowerment.

Providing humane and sensitive treatment to the beneficiaries is an essential requirement of all health institutions. For this purpose, bringing about attitudinal and behavioral change in the health staff is very critical. A number of initiatives such as social labs, trainings, exposure visit, appreciative inquiry etc.

#### **4.8 Community Perception About Working Style of PHCs**

As per Indian public health standard primary health center means “A center which to provide as services close to the people as possible and integrated curative and preventive health care to the rural community. PHS prescribed standards for a PHC covering 20,000 to 30,000 populations with one primary health centers respectively hilly / tribal and plain region. Population having a minimum 5000 to 10,000 with single sub centers.

In Solapur district, total seventy seven primary health centers and four hundred thirty one sub-centers are well distributed in Solapur district. According to IPHS norms all primary health centers in study

area covers a population near about 30,000 due to in plain areas with six sub-centres and 4 to 6 bedded systems.

**Table 4.18**

**Solapur District: Community Perception about Working Style of PHCs**

Questionnaire	Response	Male (in %)	Female (in %)	Total (in %)
How often does a Physician Visit PHC?	Regular	26	48	37.00
	Often	37	39	38.00
	Rare	21	11	17.00
	No Visit	16	02	08.00
	Total	100%	100	100%
How often does a peripheral health worker visit PHC?	Regular	53	42	44.5
	Often	42	51	46.5
	Rare	03	03	03
	No Visit	02	04	03
	Total	100	100	100
What do you think PHCs have required facilities?	Yes	46	58	52
	No	49	36	42.5
	Don't Know	04	04	04
	No Response	01	02	01
	Total	100	100	100
Are you satisfied with the service delivery at PHC?	Yes	54	54	51
	No	41	41	43.5
	Don't Know	05	05	5.5
	No Response	00	00	00
	Total	100	100	100
Are you facing these problems at PHC?	Long hours of waiting	28	19	23.50
	Distance factor	23	23	23.00
	Absence of Doctors	21	28	24.50
	Non availability of medicines	17	16	16.50
	No upgraded facility	04	06	05.00
	Rude Behaviors of Staff	07	03	05.00
	No Lady Doctors	00	05	2.50
	Total	100	100	100
Are you satisfied with service?	Yes	24	31	24
	No	72	66	72
	No Response	04	03	04
	Total	100	100	100

Source: Field Work

This study revealed that doctors are available in PHCs only 41 percent in the study region. Multipurpose worker are available 76 percent in the PHCs. region. Here is a rate for medical personnel especially pharmacists 52 percent are available in PHCs, and only for 23 percent lab technicians. 37% respondent says Physician is regularly visit at PHCs, eight percentage respondents says there are no visit of Physician at PHC. As far as concerning peripheral health worker of PHCs 46.5 percentage often visit. 52 percentage male and female have required facilities. 43.5 percentage respondent are not satisfied about service delivery at PHCs. Patient purchase drugs from outside of the PHCs 20 percent of the time even though they are to get free medicines. Delivery of drugs to PHCs and sub-centers do not conduct proper accounting

In this study, an attempt has been made to examine the perception of beneficiary about the quality of healthcare in their respective PHCs. This study has found that 23 percent people are prefer to visit nearby private health centers because of the non-availability of regular staff, equipment, medicine, and diagnostic facilities at PHCs. It is also found that factors like that rude behavior of the staff, distance factor, transport problem, long waiting time, on availability of lady physicians are some of the other reason why people or beneficiaries do not show interest in visiting PHCs. On other hand, a majority of the staff of PHCs has expressed their problems as including lack of proper accommodation, lack of amenities in PHCs, poor quality building, and transport problem, an inadequate supply of both medicine and paramedical staff. Regarding the process of medical care, the frequent transfer of doctors and health staff, lack of their dedication, different attitude towards people, insufficient medicine are observed in study region. Regarding the outcome of these health centers services areas of prevention of disease before their actual attack and lack of follow up methods.

Selecting the PHC treatment depends upon several criteria. Most often, there are several reasons why the beneficiary's families do not visit the primary health centers in their jurisdictions. The common cause of the low level of the choice if PHCs for health care treatment are the lack of knowledge among the beneficiary families about PHCs, lack of funds at PHCs provide efficient service and the repeated absences of doctors. In this study it is discovered that that policymakers, PHC users, communities, and NGOs lack of access to relevant information on health service, and they are not involved in monitoring service providers.

**Table 4.19**

**Solapur District: Opinion of PHC Staff about Government Policy**

Response	Respondent	%
Grant is not enough	32	32
No facility for staff	47	47
Distance factors	6	6
Safety factors	9	9
Other	6	6
Total	100	100

Source : Field Work

The functioning of PHCs in study region is not free from problems. Several impediments on the path of functioning of PHCs such as illiteracy of the people, lack of response from beneficiaries, lack of fund from the government, lack of staff at PHCs and lack of interest of people occupying authority are observed at the time of field work.

While considering the opinion of PHC staff about government policy 32 per cent staff conclude grant is not enough, 47 per cent staff says there is no facility for staff and six per cent staff concluded there is no safety factor.

**Table 4.20**

**Solapur District: Facility Available in the PHCs**

Sr.No.	Facility	PHCs %
1	Own Building	90
2	With Labour room	62
3	With Operation theatre	74
4	With 4-6 Bed	62
5	With 24 hours Delivery Facility	73
6	Without Electric Supply	2.7
7	With Telephone	55.9
8	With Toilet	73
9	Generator Functional	33
10	Vehicle functional	64
11	Linkage with Dist. Blood Bank	25

Source: Field Work

Concerning the facility available in the PHCs 90% PHCs has own building, 62% with Labour room, 74% with Operation theatre, 62% with 4-6 Bed, 73 % with 24 hours Delivery primary health centres. 2.7 per cent PHCs running facility without electric supply and 64 % primary health centres functional vehicle and functional linkage.



**CHAPTER - V**

**CENTRALITY AND HIERARCHY OF RURAL HEALTH SERVICES**

**5.1. Introduction**

Centrality and service area of the health centres shows the condition as a whole where the health centres can be arranged in different hierarchical orders according to centrality value. This kind of study is beneficial to understand not only the present but also prospects of health centres in the study area. The study suggests show to include the various issues about the public health care system. Keeping this view in mind this chapter divided into three parts i.e. Centrality, Hierarchy and Service area of health centres.

**5.2 The Concept of Centrality**

It is obvious that the health centres differ from each other in respect of their population size, functional capacity and aggregate importance. The present attempt with the problem of calculating the centrality values of the health centres in the study area.

Centrality simply means to the measure of importance of a place in terms of its functional capacity to serve the needs of the people in the surrounding area. The centrality of place of can be expressed qualitatively, such as the low and the high centrality as well as quantitatively with the help of the centrality values. The centrality value can be obtained by converting the functional base of a place into the scores on the basis of the frequency and importance of the function performed by the place. The centrality however depends on central functions. These functions have a certain range beyond the limits of the surrounding region. Christaller (1933, 1966) considered central places

as the places, which provide central goods and services to their hinterlands. According to him, the centrality of a place is that component of its functional magnitude which is required for the population of its hinterland.

Every place has certain importance more or less in accordance with its possessions of certain functions or services not nearly for its internal population, but also surrounding areas (Singh, 1977). A central place theoretically enjoy centrality in a given area or region with respect to a variety of functions or services for its adjacent areas. The permanent settlements have certain functions or activities, which provide the socio-economic needs of countryside population.

### **5.3 Methods of Measuring Centrality**

Centrality of a place can be measured in several ways by taking into account asingle function or all the functions available at the place. The single functions index has been used by several researchers. The number of telephone installed was used by Christler (1933) in his original work. Busservices frequency of each centralplace has been used as a measure of centrality by Smaies (1940). The reliability of a single indicator to determines centrality has often been criticized for single functions index may give misleading results. If the indicator does not represent the level of economic development of the region.

Berry and Garrison (1958) have considered all central functions for identifying the centrality a place. Retail service has very important functions, which has been given more attention by several scholars, which others have given more importance to professional and other services.

Davies (1967) has pointed out that, ifthe entire establishment is included for measuring centrality, the problem of equivalence is very important. In the absence of such weight age should be given to such establishment in respect of floor place and turnover. This problem can be resolved to some extent by classifying them as shops of convenience good.

Brush (1953) pointed out that, the status of service was determined by the functions they perform a combination or association or distinctive sets of functions. Mrs. Abiodun (1967) has specifically pointed out the, variables selected for measuring centrality of a place in developed countries, are not applicable for developing countries, because

of their unrealistic results. She had worked on urban hierarchy, of the developing country with special preference to worked or urban hierarchy, of the developing country with special preferencetoNigeria.

Godlund (1966) has also worked out the centrality of the Swedish settlement on the basis of the capacity of the services and services. For calculating the centrality he considered the total population of the place and also the number of the persons engaged in retail serviceand services in the places.

Davies (1967) has formulated the simple method for measuring the centrality in his south Wales studies. He assigns a score to every function Davies is first to introduce a Location Quotient Method for calculating the centrality, taking into account the functional availability of area. He assigns a score to every function in the region, while calculating functional index of a centres, the relevant score for each function is to be multiplied by the number of functional units of the particular function. In this way the values of all the functional units for all the functions available at the centres can be obtained by multiplying with their respective scores. The summation of all these values gives the functional index of a place. The functional index for all places can be calculated by this method. This functional index gives model because this index is not related to the population of a central place. As a result this indexgives misleading results for lower order central places.

In India, several geographers used various functions to measure the centrality of a place. Om Prakash Singh (1968) while studying central places in U.P. gave importance to i) the employment of service ii) as well as existence of establishments providing central services and functions, while Sant Bahadur Singh (1977) used nineteen critical services to measure centrality of places while analyzing the distribution centrality and hierarchy of rural central places in Sultanpur in commercial activities

### **5.4 Choice of Methods For Present Study**

To calculate the centrality of a health centres, several methods are adopted by geographers who can be grouped into single function methods and multifunctional methods. For the present investigation, multifunctional method has been preferred where 21different parameters have been considered, (Appendix-VI). The centrality values have been obtained by location Quotient method of W.K.D. Davis (1967). At the

time Godlunds (1966) modified method of centrality based on population engaged in service has been also used for comparing the results.

**Measurement of Centrality by Davies Location Method :**

Davies (1967) has used this method for south Wales. In this method a score for any single unit of function is calculated by following formula.

$$C = \frac{t}{T} \times 100 \quad \text{----- (I)}$$

Where, C = Score for any function ‘t’

t = One Unit of function ‘t’

T = Total number of functional units of function ‘t’ in the area.

The weightiness scores of all the healthcentre have been considered for the centrality scores for all the variables calculated by adding up all values of single variable, we get composite value or index for each healthcentre. The centrality values of healthcentres calculated by Location Quotient Method (Appendix –VII and Fig 5.1).

**Measurement of Centrality of Godlund’s Method**

When the functional data is not available of the study region, then the investigation of the centrality becomes very difficult. Under such circumstances, the method used by Godlund (1966) is useful to serve the purpose. Godlund has calculated the regional mean index centrality by establishing the relationship between the number of persons employed in retail trade and commerce to the total population of the region.

$$C = \frac{TC}{P} \times 100 \quad \text{.....(II)}$$

Where,

C = Regional mean index of centrality

TC = Number of persons engaged in health system in the study region

P = Total population of the study region

The above formula reformulated by Talikoti (1991) has been

used for calculating the centrality score.

$$C = \frac{ptms}{ptrms} \times 100 \quad \text{..... (III)}$$

Where,

C = Centrality score

ptms = population engaged in health system in the study region

ptrms = population engaged in health sector in all health centres of the study region.

Thus, the centrality scores of all health centres of the study region have been calculated. Appendix-VII depicts the centrality values (the location quotient method of Davies and Godlund method) and the rank position of all health centres of the study area (Fig. 5.2).

**5.5. Regional Analysis of The Centrality**

The composite scores of centrality obtained by the ‘location Quotient method (Davis, 1967), clearly show the notable difference between the lower and higher values. For analysis all the centrality values have been put according to their descending order.

The highest centrality value is obtained by district hospital namely Solapur health centres (628.57) and is followed by Akluj sub-district health centre (598.30), Pandharpur (510.53), Malshiras (468.42) Karmala (415.69) these are very important sub-district health centres in the Solapur district. The centrality index of rural health centres ranges between 400 to 600. It includes mainly Mohol, Kurudwadi, Karmala, Natepute, Mandrup, Pangari, Wadala, Akkalkot, Barshi, etc. Generally these health centres are medium in size and major are located at tahsil head quarter.

About 77 primary health centres have below 200 centrality values. Thus the high centrality value health centres are situated in the western and north part of district, which are high population and agriculturally prosperous zones, and provide more services to the people. While low centrality value of health centres are distributed in the difficult area of the study region, which is less population, difficult road structure and so agriculturally backward (Nimase A.G and Dr. Lokhande, 2013).



The analysis of district healthcentre, (in view of the centrality ranking perspectives) shows that the Solapur health centre has the highest centrality value in the study region by Davies location quotient method. Thus the Solapurhealthcentre proves it's dominancy, whichactasthe district health centerAklujand Pandharpur stood thesecond and third ranks respectively and they serve to the region as the sub-regional health centres, which range between 400 to 600 centrality scores. Whereas, 14 health centres have the centrality scores ranging between 200 to 400, includes mainly Akkalkot,Barshi, Pandharpur, Madha, Kurudwadi, Natepute, Malshiras, Wadala, Pangari, Mohol, Karkamb healthcentre. Generally these health centers are medium in size and population, area are located at tahsil head quarter. Another 77 health centres have centrality values range between below 200 by the Davies's method. It is notable fact that most of the healthcentres of the higher centrality are facilitated, by developed road, higher population and other communication of network and it also consider high accessibility of road density.

The centrality values obtained by Godlund's method indicate the significant differences between the higher and lower value. For analysis purpose all the centrality values have been put according to their descending order and divided into four broad categories.

The highest value is obtained for district hospital Solapur health centre (59.14) followed by Akluj (24.06), Pandharpur 8.05, Karmala 4.15, Malshiras 3.14, While considering to rural hospitals Natepute 2.71, Barshi 2.68, Malshiras 2.61, Mangalwedha 2.52, Karkamb 2.28, Pangari 2.22, Sangola 2.11, Kurudwadi 1.93. Whereas seventy seven health centres have centrality value below 1.74 to 0.008 (Appendix – VII).

A comparative analysis of these methods i.e. 'location quotient method and Godlund method supports the more less results of each other. Centrality scores based on the Godlund's method presents, unsatisfactory results and show the deceptive picture of the study area. For instance, Barshi (RHs) health centres rank 9th in the study area by Godlund method. Mainly due to high population size. On the other hand same centres has the limited functional magnitude and therefore by Davis method it rank 7th in the centrality ranks.The comparative study of both the methods indicate that, the functional magnitude of the

health centres should be given more importance and due consideration instead of only of only giving importance to the population size or population of health centres. It clearly shows (Appendix-VII), that health centres like Shirpur, although it ranks 96th by Godlunds method. By the location Quotient method it has occupying the 47th rank in the study area. In the study there are numbers of such evidences which explain giving the support to be superiority of the Davis method of location quotient as it given the aggregate functional importance of the health centres.

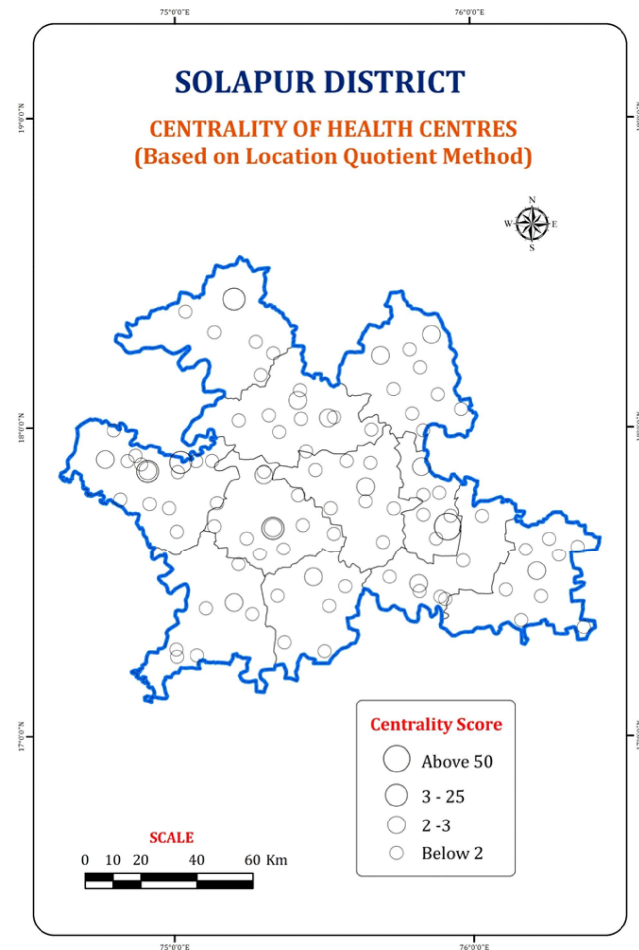


Fig.5.1

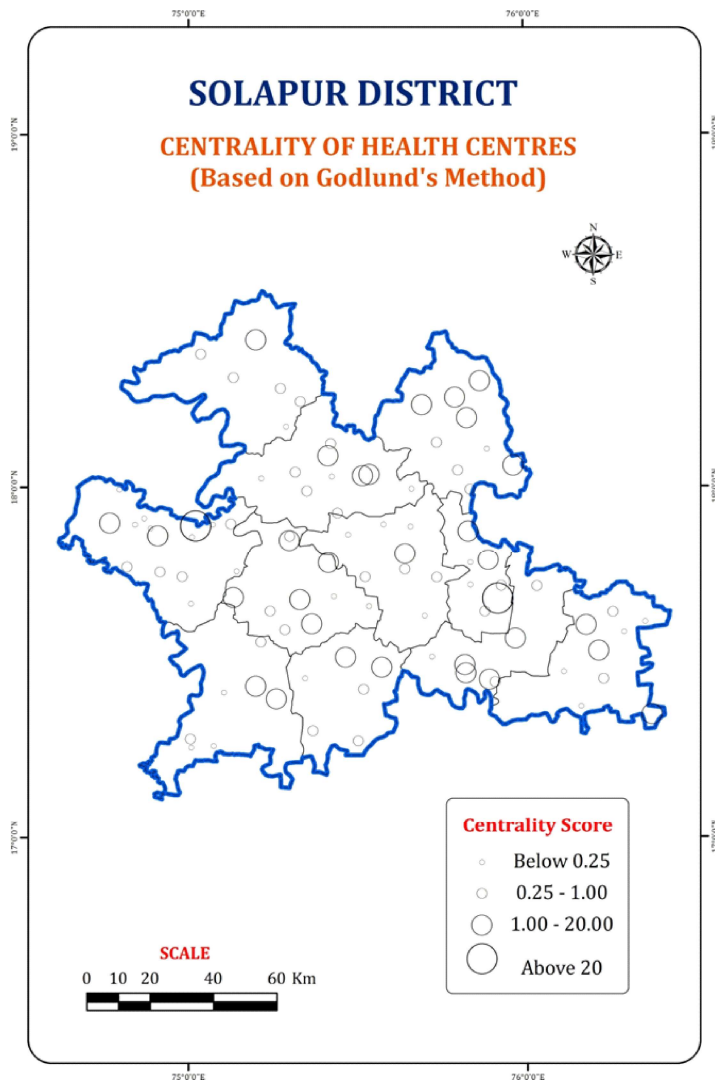


Fig.5.2

## SECTION -II HIERARCHY

### 5.6 The Concept of Hierarchy

Geography is known as the science of spatial organization. The prime concern of geographical study of health centres is their location, distribution and spatial interaction. Health centres and their infrastructure are integral parts of a spatial organization. Health centres have a tendency of concentration of activities, which forms a base for spatial interaction. The relative locational pattern of health centres can be examined in terms of hierarchy.

The concept of hierarchy is widely used by geographers, economists and many other specialists of different disciplines. It is used in medical geography not only for identification of various categories of health centres but also for organizing health centres within the study area. In every region there are few large in size or regional health centres, a medium size or sub-centres and dispensary or primary health centres performing complementary functions. Health hierarchies can be determined on the basis of numbers of sub and primary health centres establishments. The pattern of health hierarchy based on the detailed analysis will provide a base for planning and development of the health centres. A study of hierarchical pattern is essential in order to understand the

- Spatial interdependence of the health centres,
- Functional health system,
- Clear classification of centres

But the fundamental problem of hierarchy is the determination of successive categories of the health centres in a region. Number of geographical studies has been done in this respect but they are of varied nature in terms of selection of variables and also in methodology. These studies can be broadly divided into two categories.

- Studies based on equipment, and
- Studies based on functioning of equipment.

According to Scott (1970) classification of health centres must be based on overall importance. He stated by considering composition of different types of health centres, forms of organization, size of

establishments, size and structure of health area, but in reality it is very difficult to measure all the elements in terms of numerical value and also to correlate all these elements with each other. The hierarchy determined on the basis of each of above mentioned elements will differ to region to region. The total numbers of sub centres in a primary health centres and size of the population of any area may be considered as two variables, which can be used for determination of hierarchy in a simple manner.

The method of determining the hierarchy is the functioning of the equipment. It is based on the sum of annual turnover, in the form of total value and arrival. But it is very difficult to obtain data regarding annual turnover, as well as total health area arrival, especially in a developing region.

The term 'central place' was first used by Mark Jefferson (1931, 1939) to denote a settlement, which is the focal point of one or more economic and social activities of its surrounding area. Walter Christaller (1933) popularized this term, which is in wide use now. Reilly (1929) identified the relationship between the size of settlement and its complementary region and stated that the complexity of functions prevailing in a larger settlement and its complementary region and stated that the complexity of functions prevailing in larger settlements is much more than that of a smaller one and hence size of the central place is highly correlated with the size of its hinterland. According to Christaller a hierarchical class system is inevitable in spatial model of central place. This is belonging to one or the other class sets/ sub-centres. Christaller's central place theory is a much discussed theory and today very few accept all the aspects of his work, despite the criticism, his work has stimulated some of the most advanced and scientific work in geography.

August Losch (1939), who modified central place theory, was another scholar whose economic of location was concerned with the central problem of the location of economic activity. He gave more importance to the economic factors, which are more important for spatial pattern of service centres or settlements. He, too, presumed the equal distribution pattern over flat plain with self-sufficient farms equally spaced. Spatial differences would emerge due to forces of concentration and of the operation of the economics of scale (Saxena, 1990).

Thorpe (1968) on the basis of sale figures of all English centres

has developed hierarchy of services and trade centres in the U.K. He has identified seven types of centres. While, Carruthers (1967) proposed a complex method of determining the hierarchy by using three indices, these indices are, first proportion of non-food sale to the total, second differences between the volume of actual and theoretical sales.

Berry's (1967) identification of the hierarchy of central in southwestern Iowa, south Dakota and Chicago is the notable work in U.S.A. He has identified seven levels of hierarchy, viz., hamlet, village, large village, small town, regional centre, regional metropolis and national metropolis, based on different variables and their correlation.

Richard E. Pereston (1971) has tried to give a new method to find out the hierarchy of central place. He has used the technique of moving average. The cumulative average of differences when plotted on a graph shows more than one slopes. These different slopes can be identified as different groups of central places of different orders.

In studies of hierarchy of health centres have been carried out by Stimson (1983), Thomas (1946) Williams and West (1980), Tood (1975). Cleland has presented a hierarchy of medical care services (1986).

The review of the various studies of hierarchy class order indicates that there is no uniform scale for classifying the central places.

### **5.7 Choice of The Methods For Present Study**

In the present study centrality scores are obtained all the 96 health centres with the help of location quotient Method of Davis (1967) and Godlund. However, the centrality scores obtained by Davies method are used to classify health centres into different hierarchic order. All the health centres are ranked in order of their centrality scores, and they are plotted on X axis and centrality scores on y axis, then the graph shows clear grouped distribution (fig 5.3). Class on an interval, which varies in some regular ways, are the most difficult to calculate.

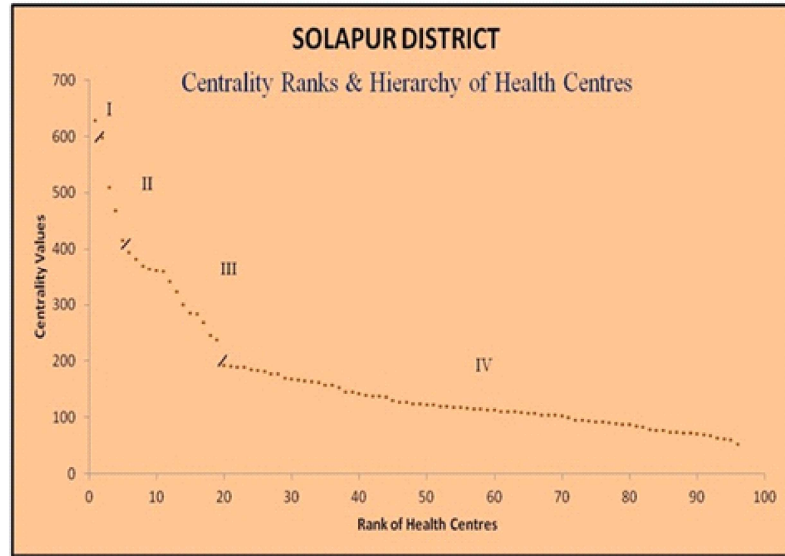


Fig. 5.3

### 5.8 Regional Analysis

With the help of semi-log graph the hierarchy of health centres is determined which are grouped into four classes.

The analysis reveals that nearly 73.92 per cent of the total health centres are grouped in to fourth hierarchic order, which have low centrality values. These small health centres serve most of the rural population of the study region, which have got more importance because of their nearness. It is an indication of developing stage of study region.

Third order health centres, which have centrality values between 200 to 400, accounts for 13.44 per cent of the total health centres of the study region. Whereas second order health centres have centrality values between 400 to 600, which accounts for 3.84 percentage of the total health centre. Concerning to first order health centres have centrality value above 600, which account for 1.04 percentages of the total health centres. The regional analysis of health centres as follow:

Table 5.1

Solapur District: Hierarchic Order, Centrality Score, No. of Health Centres and Their Percentage to Total

Sr.No.	Hierarchic order	category	Centrality range	No. of healthcentres	Percentage to total
1	I	District Hospital	Above 600	1	1.04
2	II	Sub-District Hospitals	400 to 600	4	3.84
3	III	Rural Hospitals	200 to 400	14	13.44
4	IV	Primary HealthCentres	Below 200	77	73.92

Source: Compiled by Researcher, 2014

### District Hospital

Only one healthcentre in the entire region has got the status of district hospital healthcentre i.e. Solapur(Fig.5.4).Its centrality score is maximum (628.57), and it is the district head quarter and biggest town of the region. The district hospital is the apex body which provide health care services for rural as well as urban population and cover the whole study region and adjacent area.It has not only high-level functions in all facilities but also high volume in all the functions, where most of the commercial, social, and administrative district and divisional officers are housed. It is historical, religious and old centrealso, located on national highway No. 9, it is also connected by Railway and Airways. Over the last two decades a majority of the tertiary care institutions inthe governmental sector have been facing a resource crunch and have not been able to obtain funds for equipment maintenance, replacement of obsolete equipments, supply of consumables and upgrading the infrastructure to meet the rapidly growing demand for increasingly complex diagnostic and therapeutic modalities. There is a need to optimize facilities available in tertiary care institutions, enhance the quality of services and strengthen linkages with secondary care institutions. Overcrowding in tertiary care hospitals and underutilization of expert care due to the lack of a two way referral system with primary and secondary care levels requires correction.

### **Sub-District Hospital**

There are three healthcentres in the second hierarchic order (Fig.6.4), out of which two healthcentres are tahsilhead quartersviz; Pandharpur and Malshiras. While remaining healthcentres are medium healthcentres. The centrality score of this class ranges between 400 to 600. Most of the centres included in this class are comparatively away from the transportation network. Health care infrastructure at the sub-district hospitals and urban hospitals is currently also taking care of the primary health care needs of the population in the city/town in which they are located. This inevitably leads to overcrowding and under utilization of the specialized services. They have reported increased availability of ambulances and drugs, improvement in quality of services following training to health care providers, reduction in vacancies and mismatches in health personnel/infrastructure and improvement in hospital waste management, disease surveillance and response systems.

### **Rural Hospitals**

There are fourteen rural healthcentres in the third hierarchic order (Fig.6.4), out of which ten healthcentres are tahsilhead quartersviz; while remaining healthcentres are located in Natepute in Malshirastahsil, Parite in Madha and Karkamb in Pandharpurtahsil. The centrality score of this class ranges between 200 to 400. Rural hospitals have at least 30 beds, one operation theatre, X-ray machine, labour room and laboratory facilities and is to be staffed at least by four specialists i.e. a surgeon, a physician, a gynecologist and a pediatrician supported by 21 para-medical and other staff.

Community Health Center (CHC) serves as a four PHCs (National norms population cover 120,000. Most of the rural hospital/centres included in this class are comparatively away from the transportation network. have provided land, water and electricity at a lower cost to private entrepreneurs setting up tertiary care/super specialty institutions on the condition that they provide outpatient and inpatient care free of cost for people below the poverty line.

### **Primary Health Centres**

There are 77 health centres in the fourth hierarchic order (Fig.6.4), in the 2011 there were seventy seven primary health centres in the district. Malshiras tahsil has highest number of PHCs followed by Akkalkot, Madha and Pandharpur tahsils having each eight primary

health centres. Barshi and Mohol tahsil seven primary healthcentres located in the year 2011. Sangola and South Solapur have six primary health centres. North Solapur and Karmala tahsil lowest number of health centres which are five centres. Centrality score of this class below 200. Most of the centres included in this class are inaccessible and difficult area. All PHCs provide outpatient services; a majority has four to six in-patient beds. According to the norms they have one medical officer, 14 para-medical and other supporting staff. At the national level there are more than an adequate number of PHCs and doctors posted at PHCs but the distribution across states is uneven; there are no functional PHCs in many remote areas in dire need of health care.

## **SECTION– III SERVICE AREA**

After analyzing the centrality and hierarchy of health centres in the above part, and attempt is made here to delimit the service area of individual health centres. Health centres cannot function in isolation. Their growth and development largely depend on surrounding areas populations, called as area of influence, service area of health service. The area the sphere of influence is a territory from which a patient gives more services. The service area of the health centers are related to their functional importance, distance between the health centres and the size of village or settlement. The measurement of service area of health centres are important for understanding preventive health, health data, health centres performance, and for setting up and development of sub-centres and village health nurse etc, and such kind of study help to find out the poorly served areas in the region, which is important for planning and development purpose. Geographers adopted several techniques to delimit the health service area of health centres. These techniques are primarily based on gravity models, some theoretical formulas or empirical methods based on field study.

Health centres, act not merely for exchange of advice and good patient care, services but also act as point of diffusions of innovations and ideas. Thus they maintain linkage between centralized hospital locations and form a part of health centre hierarchy of the countryside region. (Smith, 1982). Health centres are located at convenient points of focus of optimum population or village served. Importance of any health centres depend upon linkage of road, accessibility and connectivity of transport route, minimum population and literacy among the people.

Which are turn dependent upon the land on which they live. Therefore it is clear that in a spatial context of the area of health centres. From where population, inhabitant interact with the particular point of focus to health centres. The ratio between different health service centres on the peripheral region is also significant view point of various experts (Culyer, 1979).

The concept of service area of health centres is a theoretical abstraction, as the clear-cut service areas of health centres are practically non-existent. Service areas of health centres are complex areal phenomenon and are the combined results of size of health itself, functional magnitude of health centres the nature of accessibility, availability and development of transport facilities, the range of services to provide patient and their attitude and unpredictable behavior of population. There are no precise boundaries for a service area of health centre. In fact these areas are simply generalized ones otherwise each commodity has its own range of patient care and its own service area. In view of this the present point deals with delimitation of service areas of different hierarchical orders of health centres in the study region not in spatial context, but also in population context. The theoretical and empirical methods are used for the delimitation of service areas of health centres.

The location size and spacing of health centres clearly indicate the manner in which the health centre are linked to other places outside the health centres limit. Any health centre big or small has its own area linked by economic and social bonds. The health centres not only exist to serve the need of health population living within the bonds, but also ultimately connect with the areas surrounding them. Because of vary nature of health centres they are called the foci of the surrounding area.

There are so many factors which influence the size of service areas of the health centres, of all the factors distance play a very important role in determining the service area.

There are two approaches of the identification and delimitation of service areas. The first has been viewed outward from the town in order to identify the various areas, which are served by it. And the second has been looked inward from the countryside and is more concerned with patient behavior and the way in which people use the various function (Carter, 1972). However, in a developing country like

India, even basic accurate and up-to-date data required for delimitation of service areas are not available. So in delimiting the services area, one has to face the practical difficulty of obtaining correct information. The solution for this is to conduct the study of individual health centres by the way of fieldwork. But when the large number of health centres are to be considered collection of data by field work, become laborious, time consuming and expensive. In such cases generally, empirical method are avoided and theoretical methods and quantitative method based on spatial interaction are adopted for obtaining the better results.

## 5.9 Review of Methods

Geographers and other scholars have devised and applied several methods identifying service areas, and the urban field of influence for the demarcation of service area the various theoretical methods, and empirical methods are evolved. Theoretical methods by and large are based on gravity model and theoretical formula. The early attempt was made by Von Thunen (1926). He postulated that assuming the ideas condition, of an isotropic surface, a market centre would spring up in the centre and have concentric rings of land use around it. Walter Christaller (1933) developed the central place theory and hexagonal shape of market centre area. Berry (1967) gave a good account of various mathematical models used by the scholars in identification and delimitation of market service area. The important, model for demarcating service area boundaries developed by Reilly (1931) was based on laws of Retail gravitation Jackson (1971) has computed the theoretical service area of the Saudi Arabian health centres.

In India, Ghosal (1972) made a general study of market centre areas. Saxena (1975) used a more generalized theoretical market service area by drawing proportion circles in his studies on Rajasthan. Shrivastav and Gupta (1977) made a study of the periodic market centres of Solapur. Tasmaskar (1978) discussed the service area of Chhattisgarh plain and Jana (1978) attempted the service areas of lower Silbati Basin. Ram and Shrivastav (1982) discussed the service area of market centre. Dixit (1988) used "Breaking point equation" for delimiting the area for higher order health centres. He used the following methods for calculating both areas and population served. Dixit takes into consideration the centrality index of the market question, which is as follows.

$$\text{Service areas Boundary distance from } b = \frac{\text{Dab}}{1 + \text{CIa} / \text{CIb}}$$

Where,

a and b are the two healthcentres

D is the distance between the above two healthcentres and CI is the centrality index of the health centres in question.

PrakashRao (1958), in a simple mathematical model, has tried to demarcate the zone of influence of town of Mysore, where he has calculated the radius of zone of influence of each town by considering population size of the town of Mysore, where he has calculated the radius of zone influence of each town by considering population size of the town of Mysore state.

A brief review of various methods used in calculating the zone of influence indicate that the use of empirical methods needs intensive field work and it consumes more time and labour, when larges number of health centres are to be studied, it becomes very difficult to collect required information through field work.

### 5.10 Choice of Methods In Present Study

A demarcated service area boundary does not mean that it is rigid and absolute, because, generally there is a different service area for every different commodity as well as human behavior is subjective and is likely to change with changing circumstances. Nevertheless, by and large a service area reflects the generalized picture of composite command of a service centre.

As mentioned earlier, through empirical methods need intensive fieldwork, the results obtained by these methods area more realistic. As such the empirical method has been employed to find out the area of influence of each health centre. Further the theoretical methods by PrakashRao's break point mathematical equation with some modifications have also been employed to confirm the results obtained by empirical method.

### V. L. S. Prakashrao's Modified Method

In the present study the zone of influence of 96 public health centres of study region have been demarcated by Prakashrao's

mathematical equation with some modifications. Rao's method calculates the degree of influence of urban centres by considering the total number of rural population of the area and the population of individual of individual town. It is felt that a mere population of town if considered, them the correct zone of influence cannot be delimited, because, the zone of influence of a town is not related with the population size of town, but it is related to the functional size of town. Therefore, it was thought that inspire of taking only population of the town the functional importance of the town measured quantitatively in terms of centrality index, is considered to obtain more accurate and realistic results. Considering this aspect the original formula of PrakashRao's, given below has been modified.

$$D = \frac{T \times A}{U}$$

$$R = \frac{T \times A}{U}$$

Where,

'D' is the degree of influence

'A' is the total area of the region

'U' is the total urban population of the region

'T' is the town population

'R' is the radius of a circle

PrakashRao's formula has been modified by Patil (1994) and Pawar&Gharpure (1985). They are used following formula for identifying sphere of influence f health centres.

$$SI = \frac{TC \times A}{C}$$

$$R = \frac{TC \times A}{C}$$

Where,

'SI' is the Sphere of influence

'TC' is the total centrality value of health centres

'A' is the total area of the study region

'T' is the town population

'C' is the total centrality of all health centers'

'R' is radius of a circle indicating the sphere of influence



In the present study the above formula has been used to identify service areas.

### 5.11 Regional Analysis

The results obtained by PrakashRao modified method for all health centres in the study region indicate the Solapur; a first order health center has a highest range (36.12 kms) of services. The second order health centre is Akluj, Pandharpur, Malshiras and Karmala. Their service area range from 15.56 kms for Akluj to 13.4 kms for Karmala the last health centre in second order.

In third order, fourteen health centres are included. Their service areas range from 13.01 kms for Akkalkot to 11.5 kms for Karkamb, the last health centres in third order.

Whereas the service area of health centre of fourth order including Seventy seven health centres, range from 10.97 kms for Ropale to 1.61 kms for Shivane, the last health centre in the hierarchy. (Appendix-VIII).

### Spatial Distribution

The degree of influence of each health centre calculated by this method shows the fact that there is a considerable overlapping in the zone of influence of the health centre in the central and eastern part of study region, where a large number of health centres have agglomerated. In the central part of the study region, a Solapur health centre dominates the entire region, enhancing the degree of influence of other small health centres. In the northeastern part of the study region, in circling the degree of influence of other small health centres. In the western part of the study region, Malshiras, Natepute and Akluj dominate the region with a overlapping of the service areas Borgaon, Fondshiras, Lawang, Malinagar, Mandaki, Mandwe, Morochi, Piliy, Puravaavade, Shankarnagar, Velapur etc. While in the north eastern part of the region Barshis dominates the region with overlapping on Agalgaon, Chikarde, Gaudgaon, Pangaon, Talwade, Upaledumala and Vairag. The overall analysis reveals the three zones of service areas of Fairly Served area, moderately served area, poorly served area. The central and east-west part of the study region is fairly served by health centres, where large concentration of large number of health centres is observed. Because this is most densed populated area of the region, endowed with the well-developed transport, road accessibility network and industrial

development. Here Solapur, PandharpurMadha and Mohol health centres are located. Moderately served area is located near to the fairly served areas where comparatively less concentration o health centres is observed. These areas cover south-west the health centres viz tahsil like Mangalwedha, Sangola, South Solapur and Karmala etc.

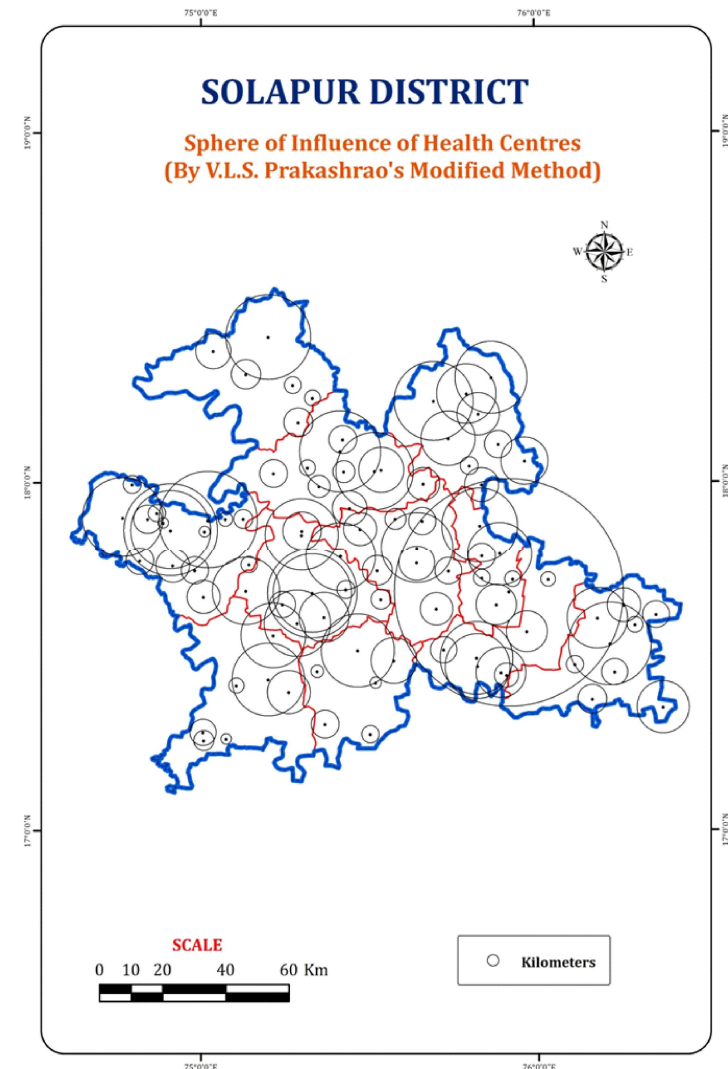


Fig.5.4



Poorly served area occupies mainly the extreme eastern part and southern part of the study region. Due to physiographic impediments, this area is less densely populated, backward in agricultural and industrial development. Few health centres like Jeoor, Kem, Marwade, Akola, Jawala, Walsangetc, are active in this area.

## 5.12 Villages and Population Served by Medical Facilities

### Villages Served by Medical Facilities

In order to understand, the areas served by medical facilities in rural sector to plan for the deficit regions. The percentage of villages having medical facilities for different tahsils of the district and percentage of rural population served by medical facilities in different tahsils has been considered. Out of 1150 villages in the entire district, almost 598 villages have been served by medical facilities in different tahsils of Solapur district in 2001 this comes to 52.20 percent of the served villages by medical facilities. In other words, 47.80 percent villages are unserved by medical facilities in the Solapur district.

**Table 5.2**

### Solapur District: Villages and Population Served by Medical facilities

Sr.No	Name of Tahsil	Villages served by medical facilities (%)	Rural population served by medical facilities (%)
1.	North Solapur	66.04	89.16
2.	Barshi	28.89	52.25
3.	Akkalkot	82.96	92.22
4.	South Solapur	56.18	77.94
5.	Mohol	91.18	95.99
6.	Mangalwedha	24.69	41.25
7.	Pandharpur	31.91	51.58
8.	Sangola	66.34	83.75
9.	Malshiras	75.45	87.00
10.	Karmala	31.36	48.69
11.	Madha	22.41	48.18
	District	<b>52.20</b>	<b>70.41</b>

*Source: District Planning and Development Commission Report.*

It is not worth mentioning here to note that the number of villages in each tahsil, either served or un-served by medical facilities. Therefore, the percentage of villages having medical facilities in each tahsil have been considered, there are wide variations in the percentage of villages having medical facilities within the different tahsils in the region under

study.

It may be stated that Moholtahsil is much better developed for the medical facilities as the percentage of villages having medical facilities, is highest (91.18) followed by Akkalkot (82.96), Malshiras (75.45). On the other hand the North Solapur, South Solapur and Sangola have 56 to 67 percent medical facilities which the moderately served regions of the district. As percentage villages having medical facilities is much lower than the average for the regions and the Karmala, Madha, Mangalwedha, Pandharpur and Barshi.

Hence, these areas poorly served by medical facilities. On the contrary Madha represent lowest percentage for rural population served by medical facilities. North Solapur tahsil, Akkalkot, South Solapur, Sangola and Malshirastahsils are better served by the medical facilities, since the percentage of villages having medical facilities are much higher than the average for the region under study.

### Population Served By Medical Facilities

Another way of evaluation of medical facilities available in different parts of Solapur district, is that the percentage of rural population was calculated, which was served by medical facilities in different tahsils. For region as a whole, 70.41 percent population have been served by medical facilities in the year 2011. There are wide variations within different tahsils of the district. It is clear from fact that Moholtahsil represented almost 95.99 percent rural population served by medical facilities, and occupies first position in the district. On the contrary, Mangalwedha represented lowest percentage for rural population served by medical facilities. Apart from this the tahsils having low per cent of rural population than the region as a whole are Madha, Karmala, Barshi and Pandharpurtahsils. Other tahsils consisting of North and South Solapur, Solapur, Sangola and Malshiras have significantly, higher percent of rural population served by medical facilities than the districts total.

On the other hand the Sangola and South Solapur have the percentage 83.75 and 77.94 per cent having population served by medical facilities these are moderately served region of the district. Karmala, Madha, Barshi, Pandharpur and Mangalwedha have the percentage between 41 to 53 per cent having medical facilities these are the poorly served tahsils of the district.

## CHAPTER - VI

# UTILITY AND ACCESSIBILITY OF RURAL HEALTH CARE SERVICES

### 6.1 Introduction

Better health is central to human happiness and wellbeing. It also makes an important contribution to economic progresses as healthy population live longer is more productive. Availability of health care amenities and facility may not be regarded as good indicators of human resource development until and unless their optimum distribution, accessibility and allocation with to threshold population and range of goods.

In defining utility and accessibility of primary care, it is necessary to describe the nature of services provided to patients, as well as to identify who are the primary care providers. The domain of primary care includes the primary care physician, other physicians who include some primary care services in their practices, and some non-physician providers. However, central to the concept of primary care is the patient. Keeping this view in mind present chapter focus on utilization of health services, utility and accessibility of public health care practices health policies and programmes, social determinant and sources of selected diseases in the study region.

### 6.2 Modelling The Utilisation of Public Health Services

There are many studies within geography and other social sciences in which models have been used to describe, determine and predict utilization of health services. Some of the earliest geographical research in this field of medical geography developed in the mid – 1960's for the urban-social analytical school under the auspices of the Chicago

Regional Hospital Study by R. L. Morrill and others at the University of Chicago. A number of papers were forthcoming from the research which made pioneering inroads into the quantification of how factors such as hospital type, size, location and finance could influence utilization or the distances people would be prepared to travel to them (Morrill, 1970). In addition on normative gravity modeling were used to assign patients to hospitals of a given capacity within certain distances, to reassign patients from over demanded to under demanded locations and to indicate the extra travelling involved in having a spatially inefficient distribution of hospital type and capacity.

The gravity model makes use of the concept of distance decay (the friction of distance or disincentive utilization posed by increasing distance). Evidence for the existence of distance decay will be discussed later but in its application the major weakness of models should be remembered. They are almost invariable based on normative assumption and it is difficult for models to incorporate individual variations in needs, aspirations, abilities and attitudes. It is therefore only possible to use them as average predictors or for normative planning. It is not sensible to use them for fine tuning of health services based on arrogate behavioral assumptions.

Other disciplines have made use of social and psychological variables in models to investigate and attempt explain to utilization of health services. Some have attempted to incorporate aspects of the demand side of the question. Influenced by population variables such as age, sex and social class. Other studies have emphasized that the supply side exerts greater influence, and that the nature of the system, its capabilities, distribution and capacity, are the main influences on utilization. Aday and Anderson (1974) have proposed a useful model which summaries both aspects; they regard the characteristics of the population at risk and the characteristics of the health care delivery system as 'inputs' to their model. Overall health policy influences and reacts to these inputs but the outputs are utilization of health services of a given type at a given site, time and for a specific purpose, which results in certain degree of consumer satisfaction with costs, convenience, quality and outcome. Such a model although very general does provide a blueprint for the analysis of specific components be a health system as in exists and is used, in relation to national policy.

The earlier models tended to include fewer factors, as they attempted to specify the specific variables (mainly on the population side) which might influence use rates and, indirectly, effectiveness of utilization. The thrust of many of these earlier models is that underutilization is the main problem in social services which should be a concern for health planners and providers who wish to optimize the use of facilities for their intended to identify those variable which 'predispose' or 'enable' utilization, with the explicit intention of reducing barriers once identified. One of the earliest writers, for example, stressed the existence of a state of psychological readiness to act, influenced by a person believing himself to be susceptible to a disease which would have serious effect on him but which could be somehow ameliorated or prevented by action on his part (Rosenstock 1960). Rosenstock stresses the importance of a psychological state or readiness but the environmental and cognitive elements of behavior are also emphasized; barriers should be reduced. Later models introduced more variable or stressed different factors. (Suchman, 1964). For example, he hypothesized that very different levels of knowledge and attitudes to disease and illness would exist among ethnic and social groups. This model is of significance in that it may help to explain some difference in utilization behavior between urban and rural resident, between various ethnic minority groups in countries and also behavior in some Third world countries.

A model by Anderson 1968, has emphasized family life-cycle and behavior determinants of utilization. Factors which may predispose towards utilization are families or community's health resources may enhance or utilization in spite of predisposition to use. This model is based in common-sense and makes the useful observation that much health care behavior is, or fact, not voluntary but is either directed or influenced by the professional and therefore these components also warrant inclusion. A recent study has attempted to modify the behavioral model and to refine further the measurement of the variables. This focused upon health service utilization among the non-institution alised elderly and found the model to be useful in explaining variance in health services utilization, with the most important variable being need. This suggests to wolinsky et al. (1983) that the system they were investigating was broadly equitable, as need was the chief determinant of the use rates in this case.

A more sophisticated and complex model by Gross (1972) incorporates behavioral components as major determinants of utilization. A causal model is proposed which includes accessibility; something generally omitted, assumed or glossed over in the earlier efforts.

$$U = (E, P, A, H, X)$$

- Where
- U = Utilization of various services reported by the individual or family
  - E = Enabling factors such as income, family size, education
  - P = Predisposing factors such as attitudes to health care, knowledge of sources of care
  - A = accessibility factors such as distance and / or time from facility and service availability
  - H = perceived health level
  - X = individual and area-wide exogenous variables

This model obviously incorporates a wide range of variables, but their numerical expression and measurement can be very problematic. Indeed, veeder (1975), in a review of such models, indicates that the measurement and quantification of beliefs and attitudes, for example, has proved to be a stumbling block for most. A number of attempts have nevertheless been made to bring the gross model into operation although success has been restricted. It is conceptually and mathematically the most sophisticated of the models developed so far but, ironically, this may prove to be one of its empirical weaknesses, since data are rarely available with which measure the variables sufficiently precisely.

**Social and Demographic Influences on Utilization of Public Health Services**

It is difficult to pinpoint exact causes of differential utilization of facilities as heterogeneous as those of the health services among the study area. Specialization of services is a modern-day norm but much of primary health care is provided on the basis that simple diagnosis and simple treatment can be effectively carried out without recourse to

extensive fixed-location technology. Therefore perhaps the potential for more flexible provision will influence future utilization patterns.

A wide range of factors has been introduced, some inherently geographical in nature (Distance, Location, Mobility) and others less so. In particular, the influence of diagnosis has not been discussed in any depth yet this can certainly influence potential for utilization and for propensity to travel inconvenient distances to facilities (Joseph and Boeckl 1981), for example, found the strength of distance decay effects in utilization to be negatively correlated with severity of diagnosis in the case of mental illness. This inevitably means that gross generalizations such as Jarvis's Law need modification to take account of severity of conditions. Likewise, the referral agent can influence distances travelled and the certainty of care being continued.

In very broad terms, medical geographers have investigated two groups of influences on utilization behavior, those directly associated with distance and accessibility and those concerned with features of the individual or service. However, even this apparently straightforward distinction becomes blurred since, as discussed earlier, some social, demographic and institutional variables show distinct spatial variations. Following factor affect on the utilization of health services.

### 1. Age and Sex

Two of the most important variables associated with differential rates of use of medical services are age and sex. In very simple terms, older people will generally use services more than younger groups, and females attend more than males. However, these distinctions mask a considerable variety of behavior. For example, younger mothers may be frequent users of health care services associated with ante and post-natal care and the youngest age group often receive regular 'check-ups' if not medication.

Females also seem to be more prone to depressive illnesses and neuroses but, since these can sometimes be adequately treated at home some studies, such as one in Tasmania, have sometimes found fewer women than men in residential psychiatric care (Davey and Giles, 1979). It therefore seems increasingly to be recognized that mental illness should be differentiated according to diagnosis. Females it seems are much more likely to suffer neuroses and manic-depression than males whilst this is reversed for personality disorders (Dohrenwend, 1976). Both

sex roles and biological explanations have been advanced to account for different utilization rates of which the former has received some recent support with regard to depression (Rosenfield, 1980)

It has also been suggested that females make more routine use of preventive medicine and follow-ups. It has been claimed that they received more 'total' care than men (Verbrugge and Seiner 1981) and have more frequent contacts with physicians although whether this is because of greater need for care is difficult to establish. In the study area still seems that females were receiving an average of about 2.6 visits to a physician per year compared with 1.9 for men. Therefore, clear suggest there may be real differences in health between males and females and that, contrary to suggestions above, women were not more likely than men to seek help for any particular problem. Nevertheless, it is a fact that, in developed countries at any rate, females almost invariably live longer than males and therefore appear to be somewhat more durable. Perhaps women outlive men in spite of supposedly greater female morbidity in part because of higher male incidence of accidents and occupational diseases.

**Table 6.1**

**Solapur District: Distribution of Beneficiaries of PHCs According to Sex**

Sr. No	Tahsil	No. of Beneficiaries	Sex	
			Male	Female
1	Akkalkot	25	6	19
2	Barshi	25	7	18
3	Karmala	25	4	21
4	Madha	25	7	18
5	Malshiras	25	6	19
6	Mangalwed	25	8	17
7	Mohol	25	5	20
8	N.Solapur	25	9	16
9	Pandharpur	25	12	13
10	Sangola	25	09	16
11	S.Solapur	25	7	18
Total		275	81	194
Percentage		100	29.46	70.54

*Source: Field Work.*

Distribution of beneficence of PHCs according to sex during 2013-2014. The sex profile of sample beneficences it is found that of

the total beneficences (Patient) 70.54% are female and 26.46% male. This indicates that female is more than male.(Table 7.1).

Age influences the utilization of general and specialist health services. Older persons will tend to be in poorer health than younger people and, with gradually decreasing physical competence, they will generally be hospitalized or in need of help more frequently than other groups generally, research has shown that older people (over 60 or 65 years) tend to visit physicians more than any age groups except the very young. In an extensive study of the use of general practitioners found that utilization rates increased with age and that women generally attended the very old, over 75 years of age. Nevertheless, it has still been suggested that the elderly as a group do not visit doctors as often as they should in view of their symptoms, nor as often as is desirable in a study of general practice. Something of dichotomy amongst those aged over 65, some were regular and frequent attenders whilst a considerable proportion did not attend at all which could indicate good health but which might mean some people missing out on care. Specialist services attendance is also influenced by age. A general pattern, for example, in the use of contraceptive services is that the percentage of women obtaining contraception is lowest in the youngest and oldest reproductive ages and highest in the middle reproductive years. A pattern for the use of specific types of contraception very considerably with regard to age amongst expectant mothers, attendance at ante-natal clinics is likewise related to age and time. First attendance decreases with age and whilst frequency of visits increases amongst older women who presumably appreciate more the benefits of early ante-natal care.

**Table 6.2**

**Solapur District: Distribution of Respondent (Patient) to their age**

Age	No.ofRespondent	Percentage
0-10	14	5.00
11-20	29	11.00
21-30	45	16.00
31-40	44	16.00
41-50	52	19.00
51-60	91	33.00
Total	275	100%

Source : Field Work.

As per above figure - 0 to 10 age group of patient belonging – 05%, 11 – 20 age group of patient belonging - 11%, 21 to 30 age group of patient belonging - 16%, 31 – 40 age group of patient belonging 16%, 41 to 50 age group of patient belonging – 19%, above 51-60 age group of patient belonging 33%, this result reveals that patient from various age groups.

**2. Social Class**

Social class has consistently been identified as a variable which influences the demand and rates of health services. Not only do these often differ among social groups but differences in status between professionals and patients have also been identified as potential causes of varying utilization. Almost invariably, research has shown that the lower social classes or socio-economic status groups have greater need for health care, measured in terms of morbidity and mortality. However, when it comes to the use of services in the face of need, or the quality of services available to different social groups, evidence is not as clear-cut. There are problems of definition of health, illness, class and other variables but a picture of social differentiation in disease and illness clearly emerges.

**3. Morbidity**

Morbidity is also generally higher amongst lower social groups. Using data from the general household survey, it can be illustrated that there are usually increasing rates of both chronic and acute ill-health as lower social class groups are write of greater incidence of illnesses in social class V (manual unskilled workers) for respiratory disorders, gastric disorders, and injuries, some or all of which ailments may be work-related. They remind us, however, that this gradient may be partially enhanced by the need for persons in some types of manual employment to obtain certificates for absence from work, leading to a relatively greater recording of their ailments,

Other problems in this area relate to the quality of care received by lower status or poorer persons which is often inferior to that available to the better-off. And also to the benefits derived from consulting also to the benefits derived from consulting professionals. The culture or poverty perspective suggests that the values and beliefs of people in lower classes inhibit their use of physician services but sharp have recently challenged this view. In a study in Illinois, they found that

blacks and the less educated often had positive attitudes towards physician attendance and might attend for symptoms which other groups would not. This contrasts with earlier literature which suggests that such people may hold opinions which make them less likely to visit physicians. It is suggested that systems to equalize financial access to poorer or lower social groups may be working and may enhance their utilization. This could be at the same time that better educated groups are becoming more circumspect about using professional health care and are maintaining more control over their own health. Such finding appears to support some earlier questioning more control over their own health.

**Table 6.3**

**Solapur District: Diseases- Symptoms wise Distribution**

Sex	Acute Disease	Chronic Disease
Male	80	40
Female	35	35
Percentage	71.5	28.8

Source : Field Work.

The maximum 71.5% respondent are come to PHC of acute disease having them 80% male and 35% female and only 28.5% patient of chronic disease having them 40% male and 35% female because chronic disease any treatment to be given in PHC. Medical officer gives advice to go another hospital because disease passes primary stage, however there are chronic diseases

**4. Income**

Income is a variable often implicated in differential use of health services although it can be difficult to distinguish its effects from those more broadly attributable to status and education. In many instances the precise definitions of social class, socio-economic status and other categorizations may subsume this variable. As mentioned earlier, it has been suggested that low income groups can underutilize in a fee-for-service system and also because of a culture of poverty which does not emphasize the importance of good health (Cockerham 1978). It is true that the high costs of medical services and particularly of health insurance or private medicine may exclude certain poorer families from using such services, but state financing in systems is now much more

common. Economic barriers to use should theoretically be reduced in such circumstances but there is still evidence to suggest that costs of attendance, of visiting and the like can inhibit the use of services by the poor.

Many programmes for health insurance supplementation have suffered retrenchment in current financial circumstances. The poor are obviously the least likely to be able to pay directly for care yet they are most likely to be without public or private insurance. Sadly, of course, poverty can often relate directly to poor health status and the inability to work because of illness. This vicious circle is difficult to break without substantial public investment and care from the public who ultimately bear the burden of helping the uninsured in this type of system. The fact is, however in many countries today, health care utilization is probably being curtailed for the low income groups because of lack of public commitment to their assistance.

**Table 6.4**

**Solapur District: Professional Class in the Society (Annual Income) Distribution of Respondent by Annual income.**

Annual Income	No. of Respondent	% of Respondent
<25000	110	55
25000-5000	60	30
50000	30	15
Total	200	100 %

Source : Field Work.

The result from survey show 55.5% respondent (Patient) income are less than 25,000 R.s and very few patient come to PHC (15%) in come over 50,000 and 30% patient comes between Rs. 25 – 50,000 annual income ( Table 6.4).

**6. Attitudes**

It is probable that patients and potential patient’s attitudes to health care will influence how services are used. Indeed, many of the models discussed earlier incorporated health beliefs and knowledge, but perhaps attitudes to care facilities and the providers of care may be sufficiently important to override these and to determine utilization.

This is a complex area of behavioral research.

The physicians affective behavior is unacceptable, then utilization or at least confidence will be reduced. In South Wales, it seemed that people would be willing to travel considerable distances to physicians with whom they had been registered for some time, and perhaps this is a reflection of greater familiarity and favorable attitudes (Phillips 1981). Certainly, patients may feel empathy with the personal doctor who is willing to devote time and be sympathetic (Fox 1960, McCormick 1976). However, in this complex area of communications between patient and professional, involving the estimation of technical skill and the growth of confidence, it is very difficult to be precise about effects on usage.

### 6.3 Utilization and Nature of Health Practices Provide Through PHCs

A primary care practice serves as the patient's first point of entry into the health care system and as the continuing focal point for all needed health care services. Primary care practices provide patients with ready access to their own personal physician. Following are the primary health care practices are adopted in whole Solapur district.

#### Diagnosis & Treatment

When the patient comes in the PHC, the doctor first diagnoses him properly with the help of some tests like blood, Urine test, BP Test etc. Then finds what type of disease he has or got. They he gives him proper treatment about that disease. The treatment like injection, tablets or some time they admitted the patients, & have serious injury or disease. They he gives advice to shift the patients to another hospital by observing poverty (including inadequate income, subsistence and wealth. Test results of selected disease in primary health centers in Solapur district within fifteen months as given below.

Blank and Let diagnoses were primarily due to: incorrect entries due to incomplete information gives from patient to doctor and laboratory test result and Complicated cases. Hence it may be concluded that Incorrect entries, incomplete information given from patient to doctor and lab related problems could be reduced at the PHCs. Complicated cases will be referred to physicians.

**Table 6.5**

**Solapur District: Test Results of Selected Disease in Primary Health Centers**

Sr. No	Type Of Disease	Correct Diagnosis	Blank Diagnosis	Let Diagnosis	Total Cases
1	Malnutrition Anemia Vitamin deficiency	610 (95.31)	20 (3.12)	10 (1.56)	640
2	Viral fever Common cold Malaria Other infectious diseases	1002 (86.97)	50 (4.34)	100 (8.68)	1152
3	Sore throat	107 (84.92)	11 (8.73)	8 (6.34)	126
4	Pregnancy	250 (95.41)	8 (3.05)	4 (1.52)	262
5	Chest pain	240 (94.11)	10 (3.92)	5 (1.96)	255
6	Stomach problems Gastroenteritis Acid peptic disease	925 (91.85)	52 (5.16)	30 (2.97)	1007
7	Back problem Cervical spondylosis	190 (89.20)	5 (2.34)	18 (8.45)	213
8	Genital problem	221 (97.35)	4 (1.76)	2 (0.88)	227
9	Wound Dog bite	440 (96.28)	7 (1.53)	10 (2.18)	457
10	Hypertension Diabetes	250 (97.65)	0 (0)	0 (0)	256
11	Problems with the Nervous system	102 (90.26)	8 (7.07)	3 (2.65)	113
12	Bleeding from any site: nose bleeds, hemorrhoids, injuries	95 (90.47)	4 (3.80)	6 (5.71)	105
13	Urinary problem	208 (89.65)	14 (6.03)	10 (4.31)	232
14	Headache	290 (89.50)	20 (6.17)	14 (4.32)	324
15	Skin diseases	1201 (86.52)	87 (6.26)	100 (7.20)	1388

#### Health Encouragement

These strategies are referred to as primary prevention activities. 'Secondary and tertiary maintaining the health of individuals with chronic conditions, delaying progression of their conditions, and preventing complications (Baum, F. and Sanders, D. 1995)'.

These initiatives include alcohol and substance abuse prevention programs, hearth health, tobacco use reduction, promotion of physical activity and good nutrition, and programs such as "Best Start" and "Healthy tact and promote children," to protect and promote children's health and well – being. More recently, Primary health centers like Mohol, Sangola, Barshi, and Pandharpur has committed to promoting health eating and regular Physical activity through the "Health Weights,

Health Lives.

### Strategic for Successful Health Promotion Applied by PHCs in Solapur District

Each and every primary centre in study area adopted some strategy for the successful promoting. Strategies should be clinically appropriate and adapted to local needs, taking into account the social, cultural and economic needs of patients. The following steps will adopt all primary health centers in study area for successful health promotion and disease prevention. Step: 1: Identifying patient needs and community resources. Step 2: Program Planning

#### 6.4 Utility of Public Health Care Practices

Services provided to rural community are the major objects of public health care centres. Hence assured services cover all the essential elements of preventive, primitive, curative and rehabilitative primary health care. This implies a wide range of services that include.

#### Utilization of Public and Private Facilities in Maharashtra

Household based national surveys by the National Sample Survey Organization (NSSO) and the National Council for Applied Economic Research (NCAER) provides information and utilization for medical care. These surveys show a declining trend in public facility use in Maharashtra over the years.

**Table 6.6**

#### Maharashtra: Utilization of Public and Private Facilities

	Inpatient care				Outpatient care			
	Rural		Urban		Rural		Urban	
	public	others	public	others	Public	others	Public	Other
NSSO 1995-96	41.5	55.5	47.3	52.8	26.2	72.8	25.8	74.0
NCAER 2000	29.4	68.2	57.9	40.3	42.9	55.6	33.2	66.8
NSSO 2010-11	30.5	67.8	30.6	69.2	18.2	81.2	18.1	81.9

The NSSO surveys reveal that use of public hospital for inpatient care has been declined from 41.5 percent of the cases in 1996 to 30.5 percent in 2011 and for outpatient care services the use public facilities has dropped from 26 percent to 18 percent during the same period. The urban areas have marginally higher utilization rates in the public sector as compared to rural areas. The declining use of public health facilities in the context of high level of poverty is a symptom of the deterioration of the public health system. This is evident from the assessment of public health facilities done by the government.

**Table 6.7**

#### Percentage of Users of Public Health Facilities in Solapur District

Types of Services	Rural	Urban
<b>Regular Services</b>		
Inpatient care services	30.2	31.1
Outpatient care services	15.0	15.5
Antenatal care services	51.0	38.4
Pregnancy complication	48.0	29.1
Delivery care	52.2	44.3
Post delivery complications	35.5	37.3
<b>Contraceptive methods</b>		
Pill	27.6	10.5
IUD	35.2	27.6
Condom	27.5	14.3
Female sterilization	86.9	65.6
Male sterilization	90.2	78.4
All modern methods	84.5	56.9
Immunization of children	89.2	67.5
Diarrhea & Pneumonia for children	13.5	10.0

Source: District Level Health Status Reports

The rural area of Solapur district percentage of user for immunization of children having a very high (89.2%), followed by delivery care (52.2) percent, antenatal care service (51) percent, and pregnancy complication (48%). As far as concerning to contraceptive methods pill, IUD, condom, female sterilization and male sterilization, all modern methods among these male sterilization are highest percent like 90 and female sterilization belonging 89.2 percentage.

In the urban area of study area user of delivery service are highest like 44.3 percent followed by antenatal care services, inpatient care services respectively 38.4 and 30.2 percent. Consisting to contraceptive methods in urban area there is a highest user for male sterilization (78.4%).

**Table 6.8**

#### Solapur District: Sources of utilization of Health Care Services (in %)

Types of services	Public	Private
Inpatient care services	29	71
Outpatient care services	15	85
Antenatal care services	47	53
Pregnancy complication	38	62
Delivery care	48	52
Diarrhea & Pneumonia for children	12	88
Contraceptive methods	74	26
Immunization of children	82	18



The comparison between private and public sources of utilization of health care services in study area. In the public sector 82 percent users go for immunization of children and only eighteen percent users go to private sources. 88% users go for Diarrhea and pneumonia for children in private sector and only 12 percent users prefer to public sector. 85 percent users prefer to private hospital for outpatient care services and only fifteen percentage people go in public health centres for outpatient care. (Fig. 6.4).

#### Achievement of Immunization (Polio, BCG and Tetanus)

In all tahsil in the Solapur district immunization target and achievement about various vaccinations like Polio III, BCG, TT for 10 years, TT for 16 years, TT immunization children.

**Table 6.9**

#### Solapur District: Percentage Achievement of Immunization against Vacant Preventable Diseases for Children 2010-11

Sr. No	PHC Name	Polio III		BCG	
		Target	% Ach	Target	% Ach
1	Akkalkot	1780	9.7	2800	9.6
2	Barshi	1560	8.5	2650	9.1
3	Karmala	1230	6.7	2175	7.5
4	Madha	1525	8.3	2550	8.7
5	Malshiras	2020	11	4150	14.2
6	Mangalwedha	1950	10.6	1820	6.2
7	Mohol	1775	9.7	2100	7.2
8	N.Solapur	1550	8.5	1875	6.4
9	Pandharpur	1840	10	3869	13.3
10	Sangola	1530	8.4	2650	9.1
11	S.Solapur	1550	8.5	2550	8.7

Source: PHC Vaccination Annual Register Solapur District

The percentage of achievement of immunization against vacant preventable diseases for children. Regarding the Polio III about very less achievement like 6.7% and very high achievement Malshirastahsil that is 11%. Concerning to BCG about Mangalwedha center very less achievement like 6.2% and very high achievement

Malshirastahsil that is 14.2% (Table 7.9).

Malshirastahsil 10.44 percent achievement about TT Immunization for children is very high followed by Pandharpur, Barshi and Madhatahsil primary health centres. TT for 10 years achievement of very high in primary health centres in Malshirastahsil followed by Madha, Karmala, North Solapur tahsils, South Solapur and Pandharpur lies very less achievement. Considering to TT for 16 year achievement is very high in Akkalkot tahsil and very less south Solapur tahsil health center. Over all one notable thing here is a wide variation of achievement of all DPT Immunization among the study area. (Table 7.10).

**Table 6.10**

#### Solapur District: Tahsil wise Percentage Achievement of D.P.T Immunization PHCs

Sr. No	Tahsil	T.T for 10 years		T.T for 16 year's		T.T Immunization for children	
		Target	% Ach	Target	% Ach	Target	% Ach
1	Akkalkot	1110	8.48	1550	10.88	1250	9.00
2	Barshi	1200	9.17	1425	10.00	1320	9.51
3	Karmala	1250	9.55	1476	10.36	1250	9.00
4	Madha	1320	10.09	1205	8.46	1320	9.51
5	Malshiras	1450	11.08	1400	9.83	1450	10.44
6	Mangalwedha	1150	8.79	1350	9.48	1120	8.07
7	Mohol	1100	8.41	1175	8.25	1230	8.86
8	N.Solapur	1210	9.25	1050	7.37	1150	8.28
9	Pandharpur	1122	8.57	1217	8.54	1376	9.91
10	Sangola	1175	8.98	1350	9.48	1260	9.07
11	S.Solapur	1000	7.64	1050	7.37	1160	8.35
<b>District</b>		<b>13087</b>	<b>100.0</b>	<b>14248</b>	<b>100</b>	<b>13886</b>	<b>100</b>

Source: PHC Vaccination Annual Register, 2011.

**Table 6.11****Solapur District: Judgment on Various Statements about Skills and Knowledge Necessary for the Implementation**

Public health professionals possess sufficient knowledge and skills for:	Mean Value			
	Health promotion	Disease surveillance	Immunization monitoring	Malaria prevention
Needs Assessment				
Program planning	2.00	2.2	3.01	2.7
Monitoring & Evaluation	3.5	2.8	3.2	2.5
Maintain of Record	2.05	3.5	3.1	2.09
Service delivery System	2.06	2.3	3.2	4.7

Source: Record Public Health Department, Solapur District.

The judgment on various statements about skills and knowledge are necessary for the implementation in study area. About the Malaria prevention most people about service delivery system are near about strongly agree. For Programme planning of health promotion and diseases surveillance people disagree. Monitoring and evaluation of health promotion, immunization monitoring major people are neither disagree nor agree. Maintenance of health record of health promotion people are disagree. Overall the entire public health professional possess sufficient knowledge and skill. (Table 6.11).

**Training of Health Workers**

There are few SCs with staff trained for the aforesaid specialization. This is serious at the district level as well as at the state level. A negligible proportion, less than two percent of SCs, received training for IUD insertion at the all district level. The situation is more or less the same in all the tahsil except Pandharpur, Malshiras, Barshi and Sangola, where the corresponding figures are in the range of 11-27 in all the tahsil in Solapur district. Mangalwedha and Madha, none of the staff of SCs are trained for IUD.

The staff receiving training for CDC/ORT is found in only 15 percent or the SCs in Solapur district. At the district level, the same figure diaries from two percent of the SCs in Mangalwedha to 68 percent of the SCs in Mohol. The corresponding figures for most of the remaining tahsil are less than 30 percent of SCs.

In service training for UIP, CSSM, RCH and ARI are available by least one staff member in 17, 14, 19 and 11 percent of the SCs in Solapur district. The status of in-service training of staff is quite unsatisfactory. A similar situation prevails in all the tahsil of Solapur district.

**Regular Supply of Contraceptives and Vaccines**

In the Solapur district, at least ninety percent of the SCs have a regular supply of contraceptives including condoms, oral pills, IUD and other vaccines, such as, IFA large, Vitamin A, ORS and also the delivery disposal Kit.

More than ninety-six percent of the SCs have a regular supply of condoms at the Solapur district. In North Solapur, Karmala, Barshi and Pandharpur, all SCs received condoms regularly. The supply of condom is not encouraging in Karmala, South Solapur, Madha and Barshi where only 50-83 percent of the SCs received condoms on a regular basis. The supply of condoms is regular in at least 90 percent of the Sub-centers in the remaining tahsil.

**Oral pills and IUD**

The supply of oral pills and IUD in the SCs in the Solapur district is more or less the same as in the case of condoms. Overall the supply of oral pills and IUD at the tahsil and district levels is satisfactory. At the national level, 96 percent or more SCs have regular supply. The scenario is similar at the tahsil level with the exception of Barshi, Karmala, Madha, and Pandharpur where supply of oral pills is regular in 67 percent to 87 percent of the SCs and IUD in 40 percent to 80 percent of the SCs. The supply of oral pills and IUD in the remaining tahsils is regular in 90 percent or more SCs.

**Vaccines**

The supply situation of vaccines, such as, IFA (large), Vitamin A, and ORS packets as observed from the Table S6 presents a very good picture. The supply of all these vaccines is the lowest in Karmala where 80 percent of the SCs have a regular supply of these vaccines. The regular supply of all these vaccines in all the remaining tahsil is more than the 90 percent of the SCs. (Photo Plate -Vaccines through Mid-Wife, Devadi Village).

### **Disposal Delivery Kit (DDK)**

Around 91 percent SCs have regular supply of DDK in the Solapur district. The supply of DDK varies from 50 percent sub-centers in Barshi. Fifty percent to seventy seven percent SCs have regular supply of DDK in the tahsil of South Solapur, Mangalwedha, Pandharpur, North Solapur, Mohol, Malshiras, Madhatahsils. But supply is regular in at least 87 percent of the SCs in remaining all tahsil.

### **Equipment and its utilization**

Certain equipment is essential for the delivery of RCH services at SCs. This section discusses the status SCs with respect to the availability of kits which includes kit A, kit B, kit C and equipment comprising needle syringe, immunization card and eligible couple registers. Availability and utilization of kit A, kit B and cat the all India level, 97 percent of the SCs received kit A, and more than 99 percent of those SCs have utilized kit A. The supply and utilization of kit A is unsatisfactory for the tahsil of Karmalawhere only 39 percent the SCs received it, followed by Mangalwedha (63%) Four-fifths or more of the SCs received kit A, in the reaming tahsil in Solapur district. Most of the SCs, which had received kit A, used it in all the statues in India. The utilization is more or less satisfactory in all the states.

Ninety-five percent of the SCs in district level have got the supply of kit B and 99 percent of them have utilized it. The availability of kit B in Madha is very poor where only 38 percent of the SCs have received it which is followed by the tahsil of Mangalwedha (59%) and Barshi (78%)? However, the kit B was received by 86 percent to hundred percent SCs in remaining tahsil in Solapur district. The utilization of the same kit B at district level as well as tahsil is quite satisfactory. The availability of kit C at the district level as well as tahsil level is quite unsatisfactory. Only 26 percent of the SCs received kit C at the district level. At the state level, it varies from one percent in Madhato 71 percent in Malshiras. In all the tahsil except Malshiras less than 50 percent of the SCs received kit C and in all the tahsil, where SCs received kit C, most of them have also utilized it. The utilizations are more or less satisfactory. Kit A and kit B kit more or less satisfactory. Kit A and kit B more art less equally available at the SCs, but availability of kit C is less compared to kit A, and kit adequate supply of needle, syringe, immunization card, and eligible couple register in the Facility survey,

information was collected on the availability of equipment such as needle, syringe, immunization card and eligible couple registers, from all the sampled SCs.

### **Needles**

At the all district level, there are adequate needles available in around 92 percent of the SCs. The availability is not pronounced in Madha, Mangalwedha, Karmala, Malshiras, And Pandharpur, where only 39, 51, 64, and 73 percent of the SCs respectively have an adequate supply of needles. At the time of survey, four-fifths of the SCs of the remaining tahsil sufficient supply of needles for the following month.

### **Syringe**

The availability of syringes is found at 91 percent of the SCs in district. In Pandharpur all the sub centres have adequate syringes for the following month. But only 37 percent of the Sub-centre's in Mangalwedha have adequate syringes for the following month. In 50 percent of the SCs or more in most of the remaining states have adequate syringes for the following month. Immunization card and eligible couple register. The immunization card and eligible couple register are the important ledgers to maintain the immunization and eligible couple records respectively. At the all district level, 92 percent and 85 percent of the SCs have adequate stock of immunization cards and eligible couple respectively. In Madha, Mangalwedha, Karmala, Malshiras, And Pandharpur, Barshi, Sangola and North Solapur 40 percent to 89 percent of the SCs have adequate stock of immunization, while in the rest of the tahsil, ninety percent of the SCs or more have adequate stock of immunization cards. At the all district level and in most of the states, the situation of eligible couple register is not very satisfactory. Only in Malshiras, do all the SCs have adequate eligible couple registers. The situation is worse in Sangolawhere only 20 percent of the SCs have a register. Four-fifths of the SCs of the rest of the states have adequate stock of eligible couple registers for month to come.

### **Performance of Sub-Centre**

All the SCs are expected to provide various services in the area of maternal and child health care, family planning and others. Information on the performance of SCs during the three months preceding the date of survey was collected. As seen out of 18,385 SCs surveyed, the highest percent of SCs which have provided family

planning services are 75 percent for IUD insertion and 87 percent for distribution of condoms. As high as 96 percent of SCs in district registered ANC cases and provided ANC services, and PNC services separately. More than four-fifths of the SCs in Solapur conducted delivery. Ninety-one to ninety-five percent of SCs provided immunization services to children and infants respectively. A little less than four-fifths of the SCs also treated cases. SNS, delivery and PNC services the registration of ANC varies from only 39 percent of the SCs in Karmala to nearly all the SCs in Sangola and N. Solapur. In many tahsil, more than 90 percent of the SCs registered the ANC cases. The proportion of SCs providing ANC services from a low of 37 percent of SCs in Sangola to 47 percent SCs in Pandharpur to 73 percent SCs in Karmala to all SCs in Madha, Mangalwedha, N. Solapur, Malshiras, and Pandharpur, Barshi, Sangolatahsils. The situation in the rest of the states seems to be good where more than 80 percent of the SCs provided ANC services. Only 10 percent to 50 of the SCs conducted delivery in few tahsil during the last three months preceding the survey. Ninety nine percent of the SCs in Malshiras conducted delivery, which is the highest among the district. As far as PNC services are concerned, only 31 percent to 85 percent of the SCs provided PNC services in Madha (31%), Pandharpur (38%), Karmala (65%), Sangola (78%), and Madha (85%). But more than 91 percent of the SCs in remaining states in India provided PNC services. The performance of SCs in the field of family planning is judged by the services provided by the SCs in the form of IUD insertion, condoms and oral pills distribution. Around 3 percent to 25 percent of the SCs did IUD insertion cases in North Solapur (3%), Barshi (14%), Mangalwedha (14.2%), Mohol (20%), Akkalkot (21%), South Solapur (24.6%) and Madha (25%). But in the rest of the tahsil, more than 50 percent of the SCs have conducted IUD insertion. The IUD insertion is the highest in Malshiras, where 95 percent of the SCs rendered this service, followed by Punjab with 90 percent. In Pandharpur, all the SCs distributed oral pills. But the distribution of oral pills is not satisfactory in Madha (35%), Akkalkot (48%), and Madha (70%), where less number of SCs distributed it. However, four-fifths or more SCs distributed oral pills in the rest of the states.

### **Infants and child immunization**

The SCs providing infant and child immunization services are not satisfactory in Karmala, where only 27 percent of the SCs provided

both these categories of health care services respectively. But the situation in most of the remaining states is much better, where four-fifths or more SCs have been providing immunization services to infants and children during the three months preceding the survey. The situation in few tahsils including Mangalwedha (33%), Madha (40%), and Barshi (49%) levels much to be desired.

### **Home visit by ANM**

One of the important duties and responsibilities of the ANM is to make home visits in the SCs area and meet needy people particularly, adolescent girls, pregnant women, children and others to provide. The overall situation of Solapur district seems to be reasonable in 96 percent of the SCs, the ANMs made home visits during the two weeks.

### **Reproductive Health Care Services**

To discuss the current 'status of reproductive health services for women in Solapur district' it is imperative to locate it within the larger narrative of needs and issues that women confront on a regular basis. In this context, it bears pointing out that women are not a monolithic category. They live in different economic, cultural and social circumstances. This fact has been completely ignored by the planners in India, which has resulted in the targeting of the underprivileged sections, particularly poor women being forced to undergo sterilization and other family planning measures. When we focus the present data of reproductive health services for women in Solapur district, we need to analyze the developments chronologically looking at different plans and policies of population control in Solapur district and also observe the shifts over time in ideology and approach. Reproductive health services no doubt are an essential part, but not the hole of the package of interventions and policies necessary for the promotion of women's reproductive health. This is because reproductive health is not purely about techno-centric strategies and neglect of general health problems. It is to some extent the articulation of the social and structural constraints that women confront. This study tries to address the evolution of the concept of 'reproductive health' – providing a brief historical background of reproductive health services and its focus on population policies.

Population control programmes have been too narrowly focused on limiting population through the provision of family planning services. 'In Solapur district the focus has been primarily to achieve demographic

targets by increasing coverage with contraceptive with a focus on female sterilization'. (Ramasuban,Radhika and Jejeebhoy). Stressing only the family planning dimension of reproductive health and subsequently neglecting women's choice has failed both to improve the reproductive health situation subsequently and to satisfy the need for family planning.

No issue is more central to global well-being than reproductive health. Every individual, every family and every community at some point is intimately involved with pregnancy and the success of child birth. Yet every day a large number of mothers are suffering from pregnancy as well as postmortem complication, improving healthcare facilities and availability services both physical and social are impetrative.

**Table 6.12**

**Solapur District: Reason for Not Receiving an Antenatal Check-Up**

Reason for not receiving an antenatal check –up	Urban	Rural	Total
Not necessary	63.4	59.1	59.5
Not customary	3.8	4.3	4.3
Costs too much	11.3	15.0	14.7
Too far /no transport	0.9	3.9	3.7
Poor Quality service	1.6	0.8	0.8
No time to go	2.6	1.7	1.8
Family did not allow	11.3	8.2	8.5
Lack of Knowledge	3.2	4.2	4.1
No health worker visited	0.2	1.6	1.5
Other	1.4	1.1	1.2
Total percent	100	100	100
Number of births	978	10,040	11,018

Reason for not receiving an antenatal check-up botha rural and urban area. In the rural area 59.1 users says there is not necessary to visit for antenatal check-up. Very few people say that 0.8 percent they not visit because of poor quality service inpublic health centres.4.2 percent people not to visit healthcentres because they lack of knowledge.1.7 percent have not time for to go theirs.As far as concerning to urban areas 59.5 percent say there is no necessary to visit for receiving an antenatal care check-up.1.6 say poor quality service due to this reason patient not go in public centres. Family did not allow for go to check-up in public health facilities.

**Table 6.13**

**Solapur District: Sightings of Symptoms**

Sign or Symptoms	Adults	Children
Anaemia	Common	Very Common
Convulsions	Common	Very Common
Cough	Common	Common
Common Cold	Less Common	Very Common
Acidosis	Less Common	Common

Source : OPD Register of Primary Health center

In the study area sightings of various diseases like cough, common cold are common in between adult people and children, acidosis are less common in adult people and it is common found in children. Anemia are very common in the Solapur district among the children. (Table.13)

**Table 6.14**

**Solapur District: Common Immunization schedule of all PHC including vitamin A**

I) Prophylaxis					
Vaccine nation	Age				
	Birth	6 weeks	12 Weeks	24 Weeks	12 months
II) Primary Vaccination					
BCG	X				
Oral Polio	X 1	X	X	X	
DPT		X	X	X	
Hepatitis B <sup>z</sup>		X	X	X	
Measles					X
III) Booster Doses					
DPT + Oral Polio	18 to 24 months				
DT	5 years				
Tetanus Toxoid	At 10 years and against 16 years				
Vitamin A	9,18,24,30 and 36 months				
IV) Pregnant Women					
Tetanus Toxoid (PW)	First dose as early as possible during pregnancy after 1 <sup>st</sup> trimester secant dose 1 month after first dose Booster in previously vaccinated within 3 years.				

Source: Immunization Register

**Common Immunization Schedule of PHC**

Solapurdistrict lies common immunization schedule of all including vitamin A. Vaccine nation from birth to one year. Booster doses like DPT, DT, Vitamin A, Tetanus Oxide etc. First dose as early as possible during pregnancy after 1sttrimester secant dose 1 month after first dose Booster in previously vaccinated within 3 years for pregnant

women.

### 6.5 Accessibility of Public Health Facilities

‘Accessibility’ has now been introduced as another variable and it also is ostensibly simple to define. However as Moseley, (1979) and other authors have pointed out, it is an imprecise and slippery notion :it has overtones of physical availability {proximity, transportation availability}, but social and psychological aspects relating to the costs and perceived value of the service is available in social terms, and not subject to racial, religious or class educational barriers. It is therefore evident that both the distribution of services and the spatial patterning of the variables discussed the socio-spatial differentiation of the population will influence the accessibility of health services. Joseph and Phillips (1984) make the distinction between potential accessibility, which is influenced by the socio -economic and organizational features of society and its health care system, and revealed accessibility, the actual utilization of a service that is measurable in terms of frequency of attendance or even in results. They regard accessibility and utilization as two sides of the same coin. Availability of health care amenities and facility may not be regarded as good indicators of human resource development until and unless their optimum distribution, accessibility and allocation with to threshold population and range of goods. There has been significant development in the health sector in India in the recent years. The main aim of this study is to evaluate the distributional pattern of health care facilities and to examine the Spatio-functional gaps of health facilities. The study was based on the secondary information supplied with primary data collected through field survey. Obtained data has been analyzed based on both qualitative and quantitative methods.

Interpretative distribution based on Mather’s model of mean spacing as follow-

$$S = 1.0746 \sqrt{A/N}$$

Where, S = Mean Spacing, A = Area of the given region, N = Total health centres of the region, and 1.0746 = Spacing constant.

Functional weightage of each facility and proposed of new location of facility has been estimated based on threshold population

estimated based on the technique of Reed Muench Method. (Hagget, P. and Gunawardena, K.A., (1964). Determination of population threshold for settlement function by Reed-Muench Method) Threshold population of any function is the midpoint of its entry level which is specified by a lower population level at which no settlements has that size have that function. The calculated median population Threshold has been given in Table 1.

Adequacy and inadequacy of facilities have been examined through the analysis of spatio-functional gaps. It is a comparison of accessibility of facilities between the complementary region of service centre and whole study area. The model is thus

$$R_{ij} = P/P1 \times f1/f$$

Where,

R<sub>ij</sub> is the relative level of i<sup>th</sup> function,

P is population of study area

P1 is population of complementary region of service centre

F1 is total functional weightage in complementary region of service centre

F denotes total functional weightage study area.

According to the method, the area with ratio of more than 1 is said to adequately served, while area with less than 1 is said to be inadequately served by the particular facility.

**Table 6.15**

#### Solapur District: Public Health Facility

Sr.No	Name of the Facility	Mean Spacing
1	Primary Health Sub-Centres (PHSC)	6.30km
2	Primary Health Centres (PHC)	14.93km
3	Rural Hospitals	36.36km
4	Ayurvedic Centre	58.65km

Source : Compiled by Researcher.

#### Spatial Distribution of Health Facility

There are 431 primary health sub centres distributed in 1138

settlement, servers to the average population personsper unit in the district.

**Table 6.16**

**Solapur District: Distribution of Settlement and Health Facility**

Household Groups	Tahsils	Inhabited Village/settlement		Percent settlement by health facility		
		No	%	PHS C	PHC	RHS
< 34999	Mangalwedha	81	7.11	6.03	6.49	7.69
35000 - 44999	South Solapur,	91	7.99	7.60	6.49	7.49 (Mandrup )
45000 - 54999	Mohol, Karmala Akkalkot, Sangola	456	40.07	33.95	32.40	15.38
55000 - 64999	Madha	116	10.19	10.44	10.38	15.38
65000 - 74999	Barshi	137	12.03	9.97	9.09	23.07 (Pangari)
750000 - 99999	Malshiras, Pandharpur	237	20.82	27.37	25.66	15.38
> 100000	North Solapur	40	0.35	4.64	6.49	Karkamb 7.69
Total percent		-	100	100	100	100
Total number of		1138	-	431	77	14

Source: District Census Hand Book, Solapur District, (Village Directory)

The same table also depict that, the mean spacing of settlement with PHSC is estimated as 14.93 km. 33.95 percent of PHSC are located in the household size varies between 45000-54999. Primary health centres are treatment administrative establishment of the health department. Total 77 unit of primary health centres distributed in 1138 inhabited villages. 40.07 percent settlement with 32.40 PHC is 45000-49999 big in size with household groups in Mohol and Akkalkottahsil. 0.35 percent settlement with 6.49 percent PHC is > 100000 small in size with household groups such as North Solapur tahsil only. 7.11 And 7.99 percent settlement with 6.49 percent PHC is < 34999 and 35000-44999 respectively in size with household groups such as Mangalwedha and south Solapur tahsil. 33.95 percent sub-centres are served for forty

percent settlement in between 45000-44999 household groups. There are only one tahsil i.e. North Solapur 4.64 percent PHSC served for > 100000 household groups, in their 0.35 percent settlement active.

In the study area, total fourteen rural hospitals are serving in Solapur district. Except South Solapur and North Solapur, remaining all nine tahsil give the service of rural health care facility. Mandrup located in South Solapur and Pangari located in Barshitahsil. Two rural health centres are in Madha and Barshitahsils.

**Table 6.17**

**Solapur District : Ayurvedic Center**

Sr.No	Tahsil	Number of Centres	Name of the Ayurvedic centres
1	Barshi	2	Shripat Pimpri and Gadegaon
2	Karmala	1	Jinti
3	Mohol	1	Shetfal
4	Pandharpur	1	Shelve
Total		5	-

Source : Z.P. Annual Statistics, Solapur District

Above table reveals that there are only five ayurvedic centres active for to provide the service for population in study area. These ratios are very low in relation of total population. There is need progress in ayurvedic centres. Except Barshi, Karmala, Mohol and Pandharpur tahsil remaining tahsils lack the ayurvedic service to give to public health care administration.

**Spatio-Functional Gaps of Health Facility**

For the identification of spatio-functional gaps of Primary health facilities and for the proposal of their new locations to fill the existing gaps study region. The settlement located with health facility has been considered as the service center as it provides health care facility to people of surrounding settlements. Complementary region of such service centres has been remarkably based on information gathered through field survey of all settlement of the tahsil. It has been observed that among the aforementioned health care facilities. In Pandharpur (Mundhewadi Bhose, Palshi), Karmala (Ghargaon Khadaki, Parewadi), Sangola (Bamani, Hatid and Nazare) and South Solapur

(Achegaon, Rampur and Gunjegaon) in these tahsils while primary health centre in three settlements. Madhatahsil in two settlements (Papnas and Tulshi) Malshiras (Dhanore and Nevaare) Mohol (Kurul and Bitale) require two primary health centres with site namely.

These above mentioned settlement are located with medical facilities as service centres where people from surrounding settlements commute to avail this facility and from people to go to avail the aforementioned health care facilities, dependent population of each eight service centres have been estimated based on which spatio-functional gaps have been identified.

**Table 6.18**

**Solapur District: Location of the Proposed Primary Health Centre Facilities**

Tahsil	Sr.No of proposed Facilities	Name of the Proposed New Sites	Location code (Village No)	Total no of proposed Facilities- 2011
Akkalkot	-	00		Nil
Barshi	-	00		Nil
Karmala	1	Ghargaon	561815	03
	2	Khadaki	561811	
	3	Parewadi	561778	
Madha	1	Papnas	561912	02
	2	Tulshi	561957	
Malshiras	1	Dhanore	562494	02
	2	Neware	562479	
Mangalwedha	1	Gharniki	562619	01
Mohol	1	Kurul	562264	02
	2	Bitale	562233	
N.Solapur	Nil	00		Nil
Pandharpur	1	Bhose	562315	03
	2	Mundhewadi	562366	
	3	Palshi	562339	
Sangola	1	Bamani	562543	03
	2	Hatid	562596	
	3	Nazare	562563	
S.Solapur	1	Achegaon	562727	03
	2	Rampur	562720	
	3	Gunjegaon	562769	
<b>Total Number of Proposed Facilities</b>				<b>19</b>

Source: Computed by Author

**Table 6.19**

**Solapur District: Shortage/Gap in Primary Health Centres**

Sr.No	Tahsil	Total population	IPHS Norms (As per 30000 Pop. 1 PHC)	In Position	Gap /Shortage	Gap in Percentage
1	Akkalkot	250890	8	8	0	0
2	Barshi	253989	8	8	1	5
3	Karmala	231290	8	5	3	15
4	Madha	301564	10	8	2	10
5	Malshiras	421244	14	12	2	10
6	Mangalwedha	184108	6	5	1	5
7	Mohol	276920	9	7	2	10
8	N.Solapur	105794	4	5	-1	-
9	Pandharpur	343445	11	8	3	15
10	Sangola	288524	9	6	3	15
11	S.Solapur	260897	9	6	3	15
<b>District</b>		<b>2918665</b>	<b>96</b>	<b>77</b>	<b>19</b>	<b>100</b>

**Table 6.20**

**Solapur District: Spatio - Functional Gap of Primary Health Centres 2011 & 2021**

Sr. No	Tahsil	Existing in 2011	Estimated to be exist in 2021
		Primary Health centres	Primary Health centres
1	Akkalkot	0.89	0.86
2	Barshi	0.68	0.66
3	Karmala	0.73	0.69
4	Madha	0.83	0.81
5	Malshiras	0.66	0.61
6	Mangalwedha	0.74	0.77
7	Mohol	0.61	0.65
8	N.Solapur	0.88	0.85
9	Pandharpur	0.81	0.87
10	Sangola	0.89	0.92
11	S.Solapur	0.77	0.86

Note: P=Based on Projected Population

It is observed in the field study that, people travel a distance crossing their own service area boundary to nearest service centres to



avail health facility like PHSC, PHC, RH, Dispensary etc. The functional ratio of only PHC is less than 1 which refers to inadequacy of functions in 2011. Which functional gap is estimated to be widening with the growth of population till 2021. Consequent widen functional gap would become a threat to human resource development as well as social being in the region. To overcome the future problem likely to be arising there is a need of well designed planning model. In order to achieve the goal of balanced regional development of health care facility by filling the estimated spatio-functional gap, a micro-level locational planning model has been proposed for the year 2021. The present planning model for order to save the inhabitants from common health problems. Increasing widening gap and problems arising in health centres are always threat to human resource. The common cause of the low level of the choice of PHCs for health care treatment are (Nimase A. G. & Dr .T.N. Lokhande. Aug-2013) conclude the lack of knowledge among the beneficiary families about PHCs, lack of funds at PHCs provide efficient service and the repeated absences of doctors. This planning model can be implemented without disturbing the present administrative boundary. It is essential to maintain quality of services and reducing gap between primary health centres. (Table 7.19).

For the better accessibility of health care facilities to maximum number of population within a minimum travelling distance, this planning model is of two fold action, first is the estimation of required number of facility in addition to existing number to fill the estimated gap, and second is the determination of new location. New location of proposed facilities has been determined based on priority assessment considering the threshold population of particular facility and nearest neighbor distance, connectivity and distribution of health facility keeping pace with growth of population near about nineteen sub-centres have been proposed for thirty seven new settlements during the plan till 2021. Today, one sub-centreis for every 2.64 villages in the study area and there are one PHC for 14.77 inhabited villages. In addition to existing 2.50 PHCs have been proposed for 37 settlements, while in addition to existing more dispensaries have been essential for new sites in the case of study region. As no any settlements of the region will be have sufficient population required to sustain and proper functioning of these facilities.

### **Status of Primary Health Centres**

After the overall study of the existing spatial distributional pattern of health centres and their proportion to the dependent villages, their health centres service areas, the large number of villages, and the population served, it is felt that, the potentiality of certain villages may be upgraded as health centres. It is also essential from the viewpoint of overall development and the planning of the study area. By considering all this things, with a thought to improve the health centres and dependent village ratio and to fill the health centres gap the proposing the new health centres on favorable site are attempt here.

In addition to the existing health centres, 19 villages are proposed as sites for new primary health centres in the year 2011. The sites of proposed health centres have been determined on the basis of following important criteria's, (i) population size (ii) centrality (iii) easy accessibility (iv) transport facilities and distance from the existing health centres, and the urban centres (v) hinterland (vi) site suitability etc, beside this all this factors empirical evidences of respondent preference are also given due to consideration in the identification of the location of the location of new health centres. By keeping in mind all these things the spatial re-organization health centres would definitely improve the efficiency health system by reducing village ratio and also by bridging the health centres gaps. The clearly shows the existing health centres, proposed health centres and the dependent villages. Thus the spatial re-organization of health centres wills efficiency increase.

### **6.6 Tahsilwise Distribution of Village by Distance From The Nearest Sub-Centre**

Above table clear indicate Malshirastahsil represent 17.63 percent villages having sub-centres in the village therefore there is more accessible for people. North Solapurvery low 4.64 percent villages having sub-centres within villages. Barshitahsil having a more 20.50 percent villages located away from sub-centres 5 to 10 kms hence thee is not suitable for human being for his health. North Solapurtahsil very low that means 4.31 percent villages located away from sub-centres 5 to 10 km therefore there is few problem of accessible. Moholtahsil lies 12.12 percent villages come under sub centre 0 to 5km that is very high proportion of villages and low proportion lies in this category North Solapur viz.20 percent sub centres came under this group.

**Table 6.21**  
**Solapur District: Tahsilwise Distribution of Village by Distance**  
**From the Nearest Sub-Centre**

Tahsil	No of Villages	Sub-centre in the village		Sub-centre 0 to 5 km		Sub-Centres 5 to 10 kms.	
		No of village	%	No of village	%	No of village	%
Akkalkot	135	39	9.04	63	14.68	33	11.87
Barshi	137	43	10.00	37	8.62	57	20.50
Karmala	118	32	7.42	45	10.48	41	14.74
Madha	116	45	10.40	41	9.55	30	10.81
Malshiras	117	76	17.63	26	6.06	15	5.39
Mangalwed	81	26	6.03	38	8.85	17	6.13
Mohol	101	36	8.38	52	12.12	13	4.67
N.Solapur	40	20	4.64	8	2.00	12	4.31
Pandharpur	100	42	9.74	37	8.62	21	7.55
Sangola	102	39	9.04	49	11.42	14	5.03
S.Solapur	91	33	7.68	33	7.69	25	9.00
District Total	<b>1138</b>	<b>431</b>	<b>37.87</b>	<b>429</b>	<b>37.60</b>	<b>278</b>	<b>24.42</b>

Source : District Level Health Status Report.

Out of 1138 villages 431,429, 278 villages by distance from the nearest sub centres away from sub center in the village, sub centre 0 to 5 km and sub centre 5 to 10 km respectively. Overall observation made that 37.87 percent villages having sub centre within villages. 37.60 37.87 percent villages having sub centre away 0 to 5 km.24.42 percent villages their sub centres rage between 5 to 10 km

### 6.7 Health Policies and Programms

#### Functioning of Janani Suraksha Yojana (JSY) :

JananiSurksha Yojana has been started during 2005-06 by central government. To increase the institutional delivers and reduce the MMR, IMR is the main objective of this scheme.For rural area beneficiary after delivery in the institution to be paid Rs.700/- within seven days. JSY programme was well functioning in the district. The total beneficiaries of the district increased from 9078 in 2008-09 to 14087 in 2009-10.However as reported, the number of beneficiaries under schedule tribe category decreased from 485 in 2008-09 to 308 in the 2009-10.Out of 58,822 delivered reported during 2009-10 in the district, 56,745 (96%) were institutional delivers under JSY.

### Implementation of Rogi Kalyan Samiti (RKS) and Village Health and Sanitain Committee (VHSC)

RKSs have been formed in 77 PHCs, 14 RHs and 4 SDHs in the district. Meetings of RKS were being held regularly at all the visited centres. The district utilized 93 % of RKS grant during 2009-10 as compared to 87 % in previous year. The district has formed VHSCs in 1134 villages. The detail of VHSCs funds could be made available in PHC or HSC level but it was observed that taluka MOs distributed in the funds to the VHSCs and joint bank account is maintained to handle the funds.

#### Services of ASHA

2525 ASHAs were selected against 2941 targeted in the district. It was reported that all ASHA were given seven days training in a Solapur district, it was observed that the selected ASHAs 341 are much less against targeted number 600. The drugs kits were not yet supplied to the selected ASHAs in the district at each VHSC.

#### Knowledge and Opinions of Community on Health Services

Whenever contacted the village leader, some of the beneficiaries and villagers to know their knowledge and opinion about health services being rendered in the PHCs and found that the services of PHCs and behavior of the staff was good towards the penitents. The public opinion about the work of male workers in the area of sub-centres was found satisfactory. Some mothers having child up to were contacted. They informed that ANMs were available where needed. All the mothers informed that their deliveries were conducted by trained personnel and their babies weighted after birth. 27 contacted mothers were aware of the use of ORS and 23 mothers had awareness about contraceptive methods and knowledge of ARI. Postnatal services were received by 30 mothers.

#### Small Family Norm

The personal benefit schemes for government and semi-government employees will be linked to acceptance of the small family norm. (From 1st May 2001). Couples accepting the small family norm only will be eligible for subsidies under various schemes. Acceptance of the small family norm will be considered at the time of recruitment to government and semi-government employment. Employees accepting

the small family norm will be given preference for sanctioning facilities like house building advance, vehicle advance etc

#### **Inclusion of Policy Implementation in Officers Confidential Reports**

Implementation of the state policy depends upon the co-ordination and co-operation of officers at various levels. Active involvement in the implementation of the policy will be considered for annual assessment in confidential reports. In the self evaluation format this will be included under “Targets” assigned to governmental officials and under “general Evaluation” of confidential reports of all Divisional Commissioners, Collectors, Chief Executive Officers of Z.P.s, Municipal Commissioners, Chief Officers of Municipal Councils, Block Development Officers of Panchayat Samitees, Tahsildars, District Health Officers, Civil Surgeons, Deputy Directors in charge circles etc.

**Increasing availability of Health Services** - Following points are covered under it.

- a) Two years rural service after post graduate medical training.
- b) Strict implementation of Public Health Department’s policy regarding appointments and transfers.
- c) Strengthening of services and facilities for laparoscopy sterilisations
- d) Implementation of “MatruSurakshaVahini” scheme to facilitate referral services in remote areas.

Organization of Family Welfare Camps by Various Institutions

To provide maternal and child health care, to diagnose Reproductive Tract Infection /Sexually Transmitted Diseases (RTI/STD), to perform sterilizations etc. under the Family Welfare program, Camps will be organized with financial support from sugar factories, co-operatives, district central banks, milk producing co-operatives, textiles, industrial establishments, private medical practitioners, Indian Medical Association, Rotary International, Lions Club etc.

#### **Strict Implementation existing of Acts and Rules**

Following existing Acts and Policies will be implemented more strictly.

- a. Child Marriages Restrain Act of 1978
- b. Prenatal Sex Determination Act of 1994

c. Registration of Births and Deaths Act of 1969

d. Maharashtra Marriage Council Regulation and Marriage Registration Act of 1998

e. Free Education for girls

f. Policy for Women

#### **Acceptance of Small Family Norm as Eligibility condition for Elections**

To generate awareness about the small family norm, it is necessary that role models are created by non-officials of Z.P.s, Panchayat Samitees, Municipal corporations, corporations, co-operatives, district central banks, milk producers organizations, textiles etc. Hence action will be taken to include, the small family norm as one of the conditions in the eligibility criteria for contesting elections, in the rules regarding these elections. Similarly it will be applicable to selection or appointment of members on various government committees.

#### **Jagruk Grampanchayat’ Yojana**

This scheme will be implemented for effective implementation of the state population policy and to enhance community participation and involvement of community leaders and representatives at the Grampanchayat level. Under the scheme, funds will be made available for important local needs like digging well, bore-wells, construction of public toilets, repairs of Grampanchayat or school buildings, road leveling etc., to the Grampanchayats fulfilling specific criteria. This scheme will be implemented from 1st May 2001.



## CHAPTER VII

# RURAL HEALTH CARE PLANNING

### 7.1 Introduction

In the previous chapters an attempt has been made to study the growth, distribution of health centres, health care facilities, perspectives of employee in the health care system, centrality, and hierarchy and service area of health centres and their utility and accessibility aspects of the health centres. After these study the main objectives of the present chapter are to identifying problems of health care system and plan to overall future health centres in the study region with special reference to rural public health care system

Health planning is a modern concept. It is a part of national development planning. Health planning is essential for the economic utilization of material, manpower and financial resources. In India it is a mission. "Planning for health should aim at providing health care, both functionally and spatially. The formulation of plan for optimum health care system, to cover the entire population of the region, is indeed a formidable task considering the immense population size, its varied composition, uneven distribution and inaccessibility of different parts." (Agnihotri R.C., 1995). The purpose of health planning is to meet the health needs and demand of the people it a may be defined as "deficiencies in health that call for preventive, curative, control or eradication measures". (WHO 1971). The need for medical care, safe water supply adequate nutrition, immunization, family planning is all community health needs (Park and Park, 2011).

The general aim of national health plan is to bring the health services increasingly within the reach of all people and thereby to make progressive improvement in the level of health. The policy investigates

a conceptual frame with emphasis on curative services to the preventive and promotive aspect of health care, particularly of deprived and weaker section of the society. (Agnihotri R.C, 1995). To convert these objectives into reality the proposal have made for the development of health care infrastructure.

### 7.2 Problems in Health Care System

In this section we examine the nature and scope of a selected range of planning problems in health care systems, focusing in particular on spatial issues.

A major problem is the planning and organization of the health care system is the diversity in the range of services provided. In relation to spatial scale, these typically can be divided into different specialties and the specialties which would normally be not found in every tahsil (general medicine, surgery, gynecology, etc.). Although this hierarchical system implies that every facility cannot be provided in every location. Over all observation of health facilities it concludes at the time of filed observations. Generally in the rural public health system found some major and minor problem is as given below.

1. Non – Availability of doctor's at some primary health centres and sub-centres in the study region.
2. Doctor does not stay at his headquarter in the campus of health centres.
3. Lack of physical facilities like wan selling hall, waiting room, ambulance or staff quarter etc.
4. Inadequate quantity of drugs and hygiene especially sub-centres like Madha and Mangalwedha tahsil.
5. Lack of accountability to public.
6. Lack of community participation and empathy.
7. Lack of set standard for monitoring quality care and funding.
8. Lack of training for doctor.
9. Lack of common and basic training especially nurses.
10. Lack of Electricity and enough publicity in rural area.
11. Most people don't know health care centres are there located for our society.
12. Inadequate number of personnel in centres viz – ANM, MPW etc.
13. No updated technology i.e. X-ray should be all PHCs.
14. Problem about sanitary issues.

15. No provision of accurate diet for the patient being admitted.
16. Inadequacy of bed facility is a major problem in PHCs and sub – centres serving to total population in study area.
17. No commitment between patient and staff.
18. Poor physical infrastructure lies in sub – centres, poor road access and no electricity supply.
19. Poor laboratory services some in health centres in Pandharpur, Mangalwedha, Madha and Moholtahsil.
20. No family planning services since people are shy total about it.
21. Lack of basic sterilization equipment including ECG, X-ray, facility.
22. Cleanness about PHCs major problem related to ward and toilet maximum percentage of patient is unsatisfied.
23. Less number of 4th grade staff hence impossible to maintain perfect cleanness in health centre.
24. Work pressure on nurse is very high.
25. Not display poster in all PHC that’s why how to get information regarding health education.
26. Shortages of Medicine - the district supplies of several medicines is not commensurate with the requirement and significant quantity of medicines and is inadequately supplied, hence are being purchased in large quantities from flexible funds or are even being obtained from the RH.
27. Less count of Primary health centres and primary health sub centres as compare to population Proportion and norms of IPHS.
28. There is less proportion of primary health centres and sub-centres in relation to area, villages and population.
29. Unavailability of some essential medicines on major health care needs.
30. Proper new Born care hasn’t taken in Civil hospital:
31. Vacancies for the post of Physicians are still not filled.
32. Ambulance service is not up to the mark.
33. Many Primary health sub centres are running without doctors.
34. Lack of awareness of HIV
35. Solapur district does not possess a Women hospital.
36. Mobile health care unit facility is not available at Solapur Civil hospital.
37. They should not maintain properly medicine such as tablet and any other syrup.

### 7.3 Existing and Projected Requirement of Health Care Facilities

As far as planning and implementing various health programme, it is logical to know health needs of the people, their ways of life and factors directing their health behavior. Most of the health care facilities serve rather large population with very scanty resources. The planning of health services means optimum use of available resources which satisfied the needs of society for the successful planning; there is need of accurate information about population and relative data. In this context, researcher has attempted to assess the requirement of health care facilities of Solapur district by 2021, 2031 and 2041 A.D. For the assessments of projective requirement of health care services, the projected population has been used.

#### Population projection

Any long term planning approach may to be realistic without estimation of future population growth. The estimated growth trend of future population is known as population projection. The projected population at district level has been obtained by using the following formula.

$$P_n = \frac{P_o \times \text{Initial Year} + ng}{\text{Initial Year} - ng}$$

Where,

$P_n$  = projected population

$P_o$  = Existing Population

$n$  = number of Years

$g$  = Decennial rate of growth

For the assessment of projected requirement of healthcare facilities, “the series least square method” is used. It is obtained by using the following formula.

Formula

$$Y = Na + bx$$

$$\sum XY = ax + bx$$

$$\sum Y = a + bx$$

Where,

Y = Changing Variables  
 N = Number of Variables'  
 X = Scoring of time series

**Table 7.1**

**Solapur District: Existed and projected Population**

Tahsil	Existing Rural Population			Projected Rural Population		
	1991	2001	2011	2021	2031	2041
Akkalkot	262872	88325	250890	188714	182723	176732
Barshi	213348	236046	253989	275102	295423	315743
Karmala	175078	227922	231290	267642	295748	323854
Madha	228583	252526	301564	333872	370363	406853
Malshiras	350346	149555	421244	377946	413395	448844
Mangalwedha	129235	311328	184108	263097	290533	317970
Mohol	202900	243961	276920	315280	352290	389300
N.Solapur	163515	422600	105794	172915	144055	115194
Pandharpur	237446	211388	343445	370092	423092	476091
Sangola	209390	269834	288524	335050	374617	414184
S.Solapur	187157	210774	260897	293349	330219	367089
District	2301574	2624259	2918665	3231924	3540469	3849015

Source: Compiled by Researcher, 2015

Along with projected population different health communities, national health authorities, recommend various norms and objectives of sixth five year plan, following norms have been accepted for the proposal of health care facilities-

- I. One primary health care centres for a group of 30000 populations in plane area and 20000 populations in hilly area, backward and tribal area.
- II. One health Sub-Centre for a group of 5000 population in plain area and 3000 population in hilly, backward and tribal area.
- III. One rural hospital for 150,000 population
- IV. One dispensary for 10000 population
- V. One hospital bed for 1000 population
- VI. One doctor for a group of 3500 population

Here, an effort has been made to estimate the existing and projected requirement of health care facilities in the study region taking above norms and facts regarding the distribution of health facilities is deficit or adequate.

**7.4. Planning For Health Care System**

Health planning is an essential for progressive development of health planning. It is a part of national development planning. Health planning is essential for the economic utilization of material, manpower and financial resources. The main aims of health planning are to increase and improve the health services. In India, it is admission. "Planning for health should aim at providing health care, both functionally and spatially" (Roy, T.K., Guruswamy, P and Arokiasamy, P. 2004). The formulation of a plan for optimum health care system, to cover the entire population of the region, is indeed a formidable task considering the immense population size, its varied composition, uneven distribution and inaccessibility of different parts. "Ideally each village should have its own health centre or sub-centre with staff and functions. However, countries such as India cannot afford to provide health centers to each and every village. But a group of villages could be provided one health centre ideally located and also equipped with the specific health needs of the region" (AkhtarR.andLzhar, N.1986)

**Existing and Projected Health Facilities**

As far as planning and implementing various health programme, it is logical to know health needs of the people, their ways of life ad factors directing their health behavior. Most of the health care facilities serve rather large population with very scanty resources.

The planning of health services means optimum use of available resources which satisfied the needs of society for the successful planning; there is need of accurate information about population and relative data. In this context, researcher has attempted to assess the requirement of health care facilities of Solapur district by 2021, 2031 and 2041 A.D. For the assessments of projective requirement of health care services, the projected population has been used.

**Planning For Primary Health Centres (PHCs)**

The table no 7.1 projected population up to the year 2041 and table no. 7.2 shows the projected estimated PHC and required PHC as

per projected population up to the same time. The difference between these two projections is the status of facility in the study region.

The health planners in India have utilized the primary health centres to provide the health care facility to rural area. Due to the lack of available funds, these facilities not established as required. The threshold population for PHC is 30000 in plain area and 20000 in hilly, backward and tribal area. There is no tahsil having the facility as per the norms except North Solapur and Akkalkottahsil. The table no 7.2 show the estimation of facility required in rural areas and it also shows the status of facility available in the study region.

Sangola and Mangalwedhatahsil have more deficit of PHC this districts have an urgent need of establishment of PHC. This district will have deficiency of more than 5 PHC for each tahsil in the year 2041.

**Table 7.2**

**Solapur District: Existed and Projected Health Care Facility  
Primary Health Centre**

Sr. No	Tahsil	Projecting 2021			Projecting 2031			Projecting 2041		
		Exist	Required	status	Exist	Required	status	Exist	Required	Status
1	Akkalkot	9	6	3	9	6	3	10	6	4
2	Barshi	6	9	-3	6	10	-4	6	11	-5
3	Karmala	6	9	-3	6	10	-4	6	11	-5
4	Madha	9	11	-2	10	12	-2	11	14	-3
5	Malshiras	12	13	-1	13	14	-1	13	15	-2
6	Mangalwedha	5	9	-4	5	10	-5	5	11	-6
7	Mohol	8	11	-3	9	12	-3	10	13	-3
8	N. Solapur	6	6	0	6	5	1	7	4	3
9	Pandharpur	9	12	-3	10	14	-4	11	16	-5
10	Sangola	6	11	-5	7	12	-5	7	14	-7
11	S.Solapur	6	10	-4	7	11	-4	7	12	-5
	Study Region	82	107	-25	88	118	-30	93	128	-35
	Maharashtra	2484	2295	189	2906	2524	382	3329	2753	576

Source: Compiled by Researcher, 2015

The tahsil Akkalkot and North Solapur shows threat of increase in the facility, which is more than the population. So, the existing population is deficient but the projected position shows the excess facility. Fig. no 7.2 depicts the probable addition of PHCS in the rural areas in the district. It shows that all districts are indefinite in the year 2021 and the condition will remain constant in the future except Akkalkottahsil. All other tahsil is far depicting. So allotting new PHCs, more attention should be given this tahsils. North Solapur tahsil only one tahsil in the year 2021 there is no required single PHC.

**Planning For Primary Health Sub-Centres (Scs)**

The primary health sub-centres are supportive facility for primary health centres in rural areas. The threshold population for primary health sub-centres 5000 the table no 7.3 shows the projection of facility and the status of this facility.

The table 7.4 shows the projected facility and requirement as per the projected population. The difference between them shows the status of facility. Pandharpur and Mangalwedhatahsil show more deficiency of sub-centres. Pandharpur will have 39 and Mangalwedha will have 32 shortages of sub-centres in year 2041. The deficiency increases in Pandharpur, Mangalwedhatahsil, from 2011 whereas in Madha, South Solapur and Barshi deficiency is decreased. Akkalkot, Malshiras and North Solapur tahsil has observed a surplus of facility, but other tahsil have shortage of facility in the year 2011. In future 2041 except Akkalkot and North Solapur, have surplus facility due to the increasing rate of facility is high as compared to rate of population.

Pandharpur, Mangalwedhatahsil should establish the primacy health sub-centres quickly. Sangolatahsil will also experience should the serve shortage of the facility in future. Fig no 7.4 depicts the probable future addition of primary health sub-centres in the study region, in case of primary health sub centres, Malshirastahsil will get more facility. While the Pandharpur and Mangalwedha will suffer a loss. This tahsil deficiency will increase from 20 to 40 in the span of next 30 years. While allotting new primary health sub-centres the first priority should be given to Pandharpur and Mangalwedha district.

**Table 7.3**

**Solapur District: Existed and Projected Health Care Facility  
Primary Health Sub-Centre**

Sr.No.	Tahsil	Projecting 2021			Projecting 2031			Projecting 2041		
		Exist	Required	status	Exist	Required	status	Exist	Required	status
1	Akkalkot	42	38	4	45	37	8	48	35	13
2	Barshi	46	55	-9	50	59	-9	53	63	-10
3	Karmala	33	54	-21	35	59	-24	36	65	-29
4	Madha	48	67	-19	53	74	-21	57	81	-24
5	Malshiras	88	76	12	106	83	23	124	90	34
6	Mangalwedha	28	53	-25	30	58	-28	32	64	-32
7	Mohol	41	63	-22	48	70	-22	55	78	-23
8	N.Solapur	22	35	-13	24	29	-5	26	23	3
9	Pandharpur	46	74	-28	51	85	-34	56	95	-39
10	Sangola	43	67	-24	48	75	-27	54	83	-29
11	S.Solapur	43	59	-16	48	66	-18	54	73	-19
Study Region		475	646	-171	530	708	-178	585	770	-185
Maharashtra		11106	13771	-2665	11714	15145	-3431	12322	16519	-4197

Source: Compiled by Researcher.

**Planning For Hospital Care Services**

The hospital facilities are a very important health care facility for the rural as well as urban areas of the study region. The public health care services are grouped in to three division viz. like District Hospital, sub- District Hospital and Rural Hospital.

**Rural Hospital**

The threshold population for hospital is 20000. The table no 7.4 shows projected picture of existing and required hospital in the study region. The table also shows the status of hospital facility with reference to threshold population. Three tahsil will have surplus hospital facility in the year 2041.

**Table 7.4**

**Solapur District: Existed and Projected Health Care Facility  
Rural Hospitals**

Sr.No	Tahsil	Projecting 2021			Projecting 2031			Projecting 2041		
		Exist	Required	status	Exist	Required	status	Exist	Required	status
1	Akkalkot	1	1	0	1	1	0	1	1	0
2	Barshi	2	2	0	3	2	1	3	2	1
3	Karmala	1	2	-1	1	2	-1	1	2	-1
4	Madha	2	2	0	3	2	1	3	3	0
5	Malshiras	2	3	-1	3	3	0	3	3	0
6	Mangalwedha	1	2	-1	1	2	-1	1	2	-1
7	Mohol	1	2	-1	1	2	-1	1	3	-2
8	N.Solapur	-	1	0	-	1	0	-	1	0
9	Pandharpur	1	2	-1	1	3	-2	1	3	-2
10	Sangola	1	2	-1	1	2	-1	1	3	-2
11	S.Solapur	3	2	1	3	2	1	4	2	2
Study Region		16	22	-6	18	24	-6	20	26	-6

Source: Computed by Authors.

The highest surplus facility will be observed in South Solapur and Barshitahsils will also surplus hospital, MoholSangola and Pandharpur will have depict Pandharpur will have depict hospital in the year 2041. The highest deficiency will be Mohol, Sangola and Pandharpurtahsil. In this district 06 rural hospitals will be less in the future. The projected situation of hospitals is different in the study region. The table no 7.4 shows the projection of existing and required rural hospital and status of hospital facility only three tahsil namely South Solapur, Barshi and Akkalkottahsils will have 1 & 2 surplus hospital respectively in rural areas in 2041. This shows better situation here. So, the development probable additions of hospital in the rural areas will be highly benefited while all other tahsil rural areas will be deprived of the facilities. Mohol, Sangola and Pandharpurtahsil will require more attention of the planners.





## CHAPTER -VIII

### FINDINGS AND RECOMMENDATIONS

#### 8.1 Introduction :

In the present study an attempt has been made to investigate the present status and future prospects of health centres in Solapur District. In view of the objectives, it is the time and need to present the significance result of the investigation in a nutshell to enable to all concerns interested in the study of the health centres and public health care system as well. From the preceding analysis the following findings have emerged.

#### 8.2 Findings

1. The district of Solapur is one of the most important districts of Maharashtra state, in terms of area and population. On the basis of physical setup, the region is divided into three basic physiographic divisions such as the hilly region, plateau region and but mostly low land plain. As far as, the drainage pattern of the region is concerned, the river Bhima is most significant. Its main tributaries are Nira and Man of the right bank. The trap basaltic lava flows, which are covered by thin mental of soil almost everywhere in the district.

2. Broadly, the climate of the Solapur district is monsoonal in nature. The average annual maximum temperature is 29°C to 39°C and minimum temperature is of 14°C to 18°C. An average annual rainfall of the district is about 545.4 mm. and of it about 75 percent rainfall occurs during the monsoon season and about 17 percent during post monsoon season. Soil of the district can be broadly grouped into three type's shallow soil, medium deep black soil and deep black soil. The natural vegetation is consisting three fold divisions, namely, forest, grassland and scrubs.

3. The impact made by education and high level of literacy on the one hand and improved medical facilities on the other, as a result of the growth rate of population was brought under control. Very high density of population is observed in the tahsils of North Solapur and Pandharpur. Among district Karmala, Barshi, Madha, Mohol, Pandharpur, and Mangalwedha tahsils are the low sex ratio below 925. Because these tahsils are entirely rural, hence the sex ratio is lower. North Solapur tahsil rank first in literacy (79.56%) and Barshi held position second rank (78.52 %) literacy rate. Akkalkot, South Solapur, Mangalwedha and Sangola tahsils having a low literacy below 70 percent. The percentage of total cultivable land is quite good, which is about 89.07 per cent of the total geographical area of the district. The total irrigated area is only 11.58 per cent to the total cultivated land of the district. Within the district the percentage of primary workers varies according to degree of industrialization as well as urbanization.

4. The number of health centres is growing during the study period in the study area. The problem observed in the fact, though the number of health centres increasing the ratio of population per health centres is also increasing. Which reveals the growth in number of health centres is not according to growth of population.

5. The growth in health centres is not sufficient to improve health service but the distribution of health centres is also considerable. The relation of primary health centres with topography, area, population and villages has significant spatial variations. This relationship is positive which shows fare distribution according to these aspects but distance from village and nearest neighbor analysis are the key issues. About 40 per cent villages have not near primary health centers. There is a regular or regular to random distribution of primary health centres. The growth and distributional study is only point pattern study but at the same time it become significant to examine what is within these points.

6. About cleanness of the ward, toilet maximum percentage of patients is unsatisfied due to less number of fourth grade staff. Health system reforms in Solapur district, the current public health system has major deficiencies such as unequal distribution and low technical competence of public health workers, as well as poor human resource management practices at district centers of public health. There is less

sanctioned post of doctor as proportion to increasing population. Para – medical staff in PHCs of Solapur district during 2010-2011. The overall availability of main paramedical staff in PHCs is observed satisfactory.

7. There is remarkable change in growth of. About 44.9 percent of Sub-Centres have their own governmental building. About 50 percent of the sub-centres not having their own building and is either in rental buildings or is in donated buildings. Strengthening of the existing infrastructure and establishment of new centres to make full fill for the shortfall. The number of doctors is increased more than two hundred, due to the availability of educated and skilled doctors.

8. All PHC centres in Solapur district are not located in an easily accessible area. All PHC centres areas available the facility for electricity, all weather road communication, adequate water supply and telephone exchange. The requirements are being projected based on the basis of 40 patients per doctor per day. Generally average 0.6 health care centres were available per 10000 Population. Ratio of health centres is very low in North Solapur tahsil and high in Malshiras tahsil. For instance the growth of health centres and was not continuous with the increase in population in Karmala and Madha tahsils.

9. Generally average 1.8 beds were available per 10000 Population. Ratio of health centres is very low in Pandharpur tahsil and high in N. Solapur the index of beds rose to 2.4. The imbalance in the growth of population and the growth of beds is observed. Ratio of nurses very low in Pandharpur tahsil like 1.00 per 10000 Population 2001 and in the year 2011 3.3 in Pandharpur tahsil. Growth of nurses and was not continues with the increase in population in Akkalkot and Madha tahsils.

10. The maintenance of registers and records was not found satisfactory in the visited centres. The average workload factor of whole district lies. The workload factor ranges from lowest in Barshi tahsil which represents higher the availability of health facilities and being a highest in Pandharpur tahsil.

11. Availability of Para – medical staff in PHCs of Solapur district revealed that 62 % post of Pharmacist is vacant, 29.73 percent post of nurse mid-wife vacant and 53.41 % post vacant for lab technician. Out of sanctioned post of HW (Male) 27.18 %, 13.75% (Female) post are vacant. Out of sanctioned post of HA (Male) 12.30 %, 7.00 %

(Female) post are vacant.

12. Highest number of post of auxiliary staff health worker (male) is sanctioned in Malshiras tahsil. In the Karmala tahsil very less posts are sanctioned fifty three post of health worker (female) is sanctioned in Malshiras tahsil followed by Pandharpur, Sangola and Akkalkot tahsils. The gender wise study of distribution of beneficence is PHCs found, more number of female than male. Behavior of the staff observed well towards the penitents. The public opinion about the work of male workers in the area of sub-centres was found satisfactory. Awareness about contraceptive methods and knowledge of ARI is observed very poor among the female.

13. The percentage of women in Solapur district receiving home visit is higher in rural areas. Most of respondents consider fair delivery system in primary health centers. Very low proportion of respondents found poor and dissatisfied with the delivery system. Whatever the dissatisfaction about delivery system it is only due to non availability of medical and paramedical staff, not examined by doctor and not given proper attention and non availability of medical in PHCs.

14. The Medical Officer is not staying in primary health centres. Multipurpose worker are available 76 percent in the PHCs, region. Here a rate for medical personnel, especially pharmacists 52 percent are available in PHCs, and only for 23 percent lab technicians but their visit is observed irregular. Regarding the process of medical care, the frequent transfer of doctors and health staff, lack of their dedication, different attitude towards people and insufficient medicine are observed in the study region.

15. In the study region job responsibilities like medical officer to work divided in to three viz. creative, administrative and preventive. Health educator functions under the technical suspensions and guidance of block extension officer responsible for providing support to all health and family welfare programmes. Although the numbers of doctors sanctioned are less than requirement.

16. Work pressure on staff nurse is high so there is the chance of mistake by nurse. Consider developing patient registry to fallow up with patients with certain risk factors or those who are due or overdue for routine preventive care. The gap between the current salary and expected salary was large current salaries as a reason for dissatisfaction

their job centres dissatisfaction with pay is bound to have a negative impact on service of quality and patient care which is one of the contributing factors to the rift between doctors, other medical staff and patient.

17. In some primary health centres staff position was satisfactory and some are non-satisfactory. The coordination between the human resources engaged in health care system is not good enough. Job pride and commitment in job found low in primary health care system. As an analytical study of patient satisfaction is a concern in the public health centres in that pattern are usually satisfied as human behavior component of the services is concerned, but there was small percentage as dissatisfaction felt by patient in different areas. Administrative staff can play an important role in health promotion disease prevention by calling patterns to schedule routine preventive care and distribution health questionnaires and educational materials in the waiting room. Additionally each PHCs should have a full time staff consisting of a lady doctor, a paramedical to perform initial screening test not trained nurse or physicians, assistants and a laboratory technicians. The service of PHC in Solapur district is median leveled satisfactory. Behavior of lab technician, health assistant, pharmacist, nurse, medical officers is good. But regarding the fourth grade staff, some patients are unsatisfied.

18. The analysis of centrality reveals that the places having high centrality located in the central, western part of study region. These are very important sub-district health centres in the Solapur district. Solapur health centres occupies first order with maximum centrality score proves its supremacy and dominance in the study area. There are four health centres in the second hierarchic order while remaining health centres are medium health centres. Most of the centres included in this class are comparatively away from the transportation network. There are fourteen rural health centres in the third hierarchic order, out of which ten health centres are tahsil headquarters. There are seventy seven health centres are identified as in the fourth hierarchic setup.

19. Solapur is the center of gravitational pull of whole of the study area as it is the only first order health centres of the study region attracts the people from all over the region. About 47.80 per cent villages are unserved by medical facilities in the Solapur district. There is wide variation in the per cent of villages having medical facilities within the

different tahsils in the region under study. It may be stated that Mohol tahsil is much better developed for the medical facilities followed by Akkalkot tahsil. On the other hand the North Solapur, South Solapur and Sangola tahsils are moderately served regions and Madha represent lowest position.

20. About 70.41 per cent population has been served by medical facilities in the year 2011 with wide spatial variation where Mangalwedha tahsil represented lowest percentage for rural population served by medical facilities. As far as concerning to utility of PHCs increasing day by administrative staff can play an important role in utility of health promotion, disease prevention. Forty patients per doctor per day the expected number of beneficiaries for maternal and child health care and family planning and about 60% utilization of the available indoor/observation beds. About age and gender study, generally older people will generally use services more than younger groups, and females attend more than males in this type of situation found in study area.

21. Primary care practices provide patients with ready access to their own personal physician. Health maintenance, health promotion and disease prevention, Counseling, Patient education, Diagnosis and treatment of acute and chronic illnesses are the primary health care practices are adopted in whole Solapur district. In the Solapur district percentage of user for immunization of children having a very high (89.2%), followed by delivery care and antenatal care service (51) per cent. In the public sector 82 percent user goes for immunization of children and only eighteen percent user goes in private sources. About 85 percent user prefers to private hospital for outpatient care services and only fifteen percent people go in public health centres for outpatient care.

22. As far as the accessibility of villages to sub-centers is concern, Malshiras tahsil records good situation and on the other hand tahsils namely Barshi and North Solapur represent less accessibility. The mean spacing of settlement with PHSC is estimated as 14.93 km. 33.95 percent of PHCs are located in the household size varies between 45000-54999. JSY programme was well functioning in the district. The total beneficiaries of all public health centres of the district increased from 9078 in 2005-2006 to 14087 in 2010-11. In order to assess the

extent of utilization of government health facilities by all eligible women and to find out whether ANM/health worker reach the household for providing RCH services, a separate section in the women's questionnaire and the opinion of women about the services provided by the government health workers. Among the Solapur district disease like Malnutrition, Anemia, Vitamin Deficiency, Viral fever, Sore Throat, Genital problem, Common cold are common disease in the study region. All these diseases come in to existence due to unfavorable food, water and polluted environmental aspect. At present, there is a pronounced awareness of the importance by understanding the geographic aspects of problems of human health.

23. Sangola and Mangalwedha tahsil have more deficit of PHC this districts have an urgent need of establishment of PHC. This district will have deficiency of more than 5 PHC for each tahsil in the year 2041. The tahsil Akkalkot and North Solapur shows threat of increase in the facility, which is more than the population. So, the existing population is deficient but the projected position shows the excess facility. So allotting new PHCs, more attention should be given except North Solapur tahsil. North Solapur tahsil only one tahsil in the year 2021 there is no required single PHC.

24. The primary health sub-centres are supportive facility for primary health centres in rural areas. Pandharpur and Mangalwedha tahsil show more deficiency of sub-centres. Pandharpur will have 39 and Mangalwedha will have 32 shortages of sub-centres in year 2041. The deficiency increases in Pandharpur, Mangalwedha tahsils, from 2011 whereas in Madha, South Solapur and Barshi deficiency is decreased. Pandharpur, Mangalwedha tahsil should establish the primacy health sub-centres quickly. Sangola tahsil will also experience should the serve shortage of the facility in future.

25. The highest surplus facility will be observed in South Solapur and Barshi tahsils will also surplus hospital, Mohol Sangola and Pandharpur tahsils will have depict hospital in the year 2041. The highest deficiency will be in Mohol, Sangola and Pandharpur tahsil. The projected situation of hospitals is different in the study region. Only three tahsil namely South Solapur, Barshi and Akkalkot tahsils will have one and two surplus hospital respectively in rural areas in 2041. This shows better situation here. So, the development probable additions of

hospital in the rural areas will be highly benefited while all other tahsil rural areas will be deprived of the facilities. Mohol, Sangola and pandharpur tahsil will require more attention of the planners.

### 8.3 Recommendation

In the context of the findings stated above, some recommendations for the improvement of primary health care service and whole rural public health care system in the study region

- There is need to tahsils having the facility as per the norms and the estimation of facility required in rural areas and it also shows the status of facility available in the study region. The tahsils identified by projected population study require attention while allotting the new PHCs. The threshold population for primary health sub-centres 5000 the projected facility and requirement as per the projected population, there is more difference hence government should take an initiatives for establishing new sub-centres.

- State Government or Zillah Parishad should appoint doctors at primary health sub centres. Several PHCs are without doctors and ambulance service. Both services should have an emergency for serious patient hence that would be urgently filled.

- Facility of mobile healthcare units and adequate quantity of essential medicines and drugs recommended providing by State Government to Solapur Civil hospital.

- Computer and all required lab equipment's should provided by government. Staff should have tried hard to create awareness about family planning and communicable disease amongst the people. HIV awareness camps should be conducted by Z.P. or State Government.

- The health workers such as MPW, ANM and Village Health Guides should visit the houses of the rural people at regular intervals and provide health care information required by them.

- They should be informed about the importance of health care information by health professionals, librarians, voluntary organizations and teachers then automatically lead to their socio-economic development.

- Establishment of the school of public health is recommended for patient as well as all type of beneficiaries. Women hospital at Solapur district recommended starting by government.

- The government should develop effective policy to adequately distribute rural public health centres throughout the district. Government should take an incentives action for health planning is an essential for progressive development. Development of effective policies to adequately distribute public health professionals across the district level and retain them in remote rural areas as well as increase the funding for public health services to augment the salaries of local public health professionals.

- The Government should give to the highest priority for elaboration of a national plan for human resource development within the public health system.

- The government also should an organize more number of health programmes through radio and television.

- The medical officers who are already providing health care information should be encouraged to provide information effectively.

- Medical officer getting the health care information from Department of Health and Family Welfare in the form of books, magazines, pamphlets, wall posters, Audio and Video cassettes and films. They should utilize the material supplied by the Department of Health and Family Welfare for providing health care information to rural people.

- Villages having no health library facilities. It is suggested that service should be provided in these villages through health library facilities.

- It is suggested that every Village Panchayat should subscribe at least to one or two regional newspapers so that the villagers can get an opportunity to read the newspapers and also read the information published on health care. As there are many illiterates in rural areas, surpanch of the Villages. Panchayat should make necessary arrangements for reading newspapers to illiterates for one or two hours in the evening.



## **CHAPTER IX**

### **COVID-19 AND INDIAN PUBLIC HEALTH CARE SYSTEM**

#### **Introduction**

The Indian rural health care system is a three-tier system comprising Sub-Centres, Primary Health Centres (PHC), and Community Health Centres (CHC). There is currently a shortfall in health facilities: 18% at the Sub-Centre level, 22% at the PHC level and 30% at the CHC level (as of March 2018). Although the number of facilities has increased over the years, the workforce availability is substantially below the recommended levels as suggested by the World Health Organization. Rural India has 3.2 government hospital beds per 10,000 people. Many states have a significantly lower number of rural beds than the national average. The state of Uttar Pradesh has 2.5 beds per 10,000 people in rural areas, whilst Rajasthan and Jharkhand have 2.4 and 2.3, respectively. Maharashtra, which has seen the largest number of COVID-19 cases, has 2.0 beds per 10,000 populations and Bihar has 0.6 beds per 10,000. Overall, there is a shortage of specialists working at the CHC level (81.9%). This includes a shortage of surgeons (84.6%), obstetricians & gynaecologists (74.7%), physicians (85.7%) and paediatricians (82.6%).

#### **9.1 Covid-19: Challenges and its Consequences for Rural Health Care**

The COVID-19 pandemic creates a special challenge due to the paucity of testing services, weak surveillance system and above all poor medical care India. The impacts of this pandemic, and especially the lockdown strategy, are multi-dimensional. The authors argue for the need to take immediate steps to control the spread and its aftereffects

and to use this opportunity to strengthen and improve its primary health care system in rural India. The rural health care system in India is not adequate or prepared to contain COVID-19 transmission, especially in many densely populated northern Indian States because of the shortage of doctors, hospital beds, and equipment.

The current global pandemic of COVID-19 necessitates a public health strategy with more emphasis on epidemiology, especially with regards to understanding the causes as well as identifying appropriate population-based behavioral and educational programs. It is important to realize that the pandemic of COVID-19 has initially happened in well-developed countries that have achieved the so-called health transition. However, the virus does not differentiate between rich-poor or rural-urban dichotomies. It is particularly a threat to a country like India, where 65–68% of the population lives in rural areas that also have the highest overall burden of disease globally.

The health care services and systems in India are still developing and have challenges of workforce shortages, absenteeism, poor infrastructure and quality of care. Despite the National Health Mission and Government's commitment, adequate and affordable healthcare is still a mirage. The healthcare system in rural India faces a chronic shortage of medical professionals which is detrimental to the rural health system in terms of the quality and availability of care for rural people. The State focus has been on curative care, whereas poor infrastructure and poor coordination between the line departments makes it difficult to tackle public health emergencies such as COVID-19. The health care system is not adequate or prepared to contain COVID-19 transmission in the rural areas, especially in many northern Indian States because of the shortage of doctors, hospital beds and equipment, especially in densely populated underserved states. We have failed to manage tragic medical emergencies in the past, such as the unfortunate death of over 150 children in Muzzafarpur in Bihar triggered by malnourishment. Public health challenges, including elimination of persisting communicable diseases like Tuberculosis and ensuring equitable health care, add to the challenges ahead, with the emergence of new pandemic.

We still do not know the real statistics of the epidemic in rural areas. The country is at a tipping point and we do not know what direction

it will take. The outbreak can head either way. COVID-19 creates a special challenge considering the poor testing services, surveillance system and above all poor medical care including shortages that were mentioned earlier. The lack of full understanding of the pathogen and the realization that there is no effective cure has played an important role in determining government strategies and this is evident when official actions are examined. The preventive strategy adopted in relation to COVID-19 does not appear to be very innovative. It follows the strategy devised by John Haygarth's 18th-century 'rules of prevention' for eradicating smallpox based on three principles: find every case, isolate the infected individual, and immunize all their contacts. In the case of COVID-19, vaccine is not yet available nor any drugs. However, the strategy has evolved further from a focus on individual patients and their contacts to the entire population. The shutdown and complete ban of normal activities for ordinary people seeks to stop community spread. But the obvious question is for how long? It is assumed that the spread of COVID-19 virus can be controlled by these actions. At the moment, these are only assumptions partly based on the experience of earlier outbreaks especially SARS or Ebola epidemics.

The impacts of this pandemic, especially the lockdown strategy in the social sphere is multi-dimensional. What could be important from a public health point of view is its impact on employment of millions of people in the rural areas who are migrant workers in many cities and educational opportunities. The emotional impacts of the strategies may add to this. The people are walking back to their villages in groups covering 500–1000 km after losing their jobs in the cities which is alarming and may exacerbate the problem as the chance of community transmission widens further. Apart from the economic suffering of the already famished society, this could disseminate or spread the disease in rural areas. We do not know about their exposure and status of infection of these population. It is a serious concern because if even one percent of them are infected, we will not be able to control the spread of the epidemic due to the resource limitations, poor health services in rural areas and other factors mentioned above.

It is a wakeup call and what is important at this moment is to use the lessons of this pandemic in the rural areas of many Indian states where the health care systems have to be improved considering the huge

population in rural areas, untrained staff in caring and handling of patients during an outbreak of infectious diseases, and a huge shortage of beds, and equipment. Despite these challenges, the government can take a three-pronged approach to stop the epidemic. These are to invest and prepare healthcare providers in rural areas for the epidemic; massive education programme to educate people; and to create a strong surveillance system that can help in reducing the spread and fatality. Besides, many health care providers in rural areas are unregistered and untrained and do not know what to do in such an emergency. Hence providing clinical guidelines, training and handholding may help.

WHO's Chief Scientist, Dr Soumya Swaminathan has expressed the concern and warned that rural India may become the next coronavirus hotbed and emphasized the need to use this opportunity to strengthen and improve its primary health care system. Although it is impossible to transform its primary health care in a day or a week or a month, the right steps in this direction will definitely help in the future. The coming weeks and months is challenging for India and it needs to take strong actions to meet this emergency and its aftereffects.

## **9.2 NEED: Proper Geographical Study of Health Facilities**

Covid-19 has posed a challenge to the health system in every country of the world. Until now, we would have thought that other developed countries, including Europe and the United States, have better health facilities, but even that country has been hit hard. The Indian health system is finding it difficult to care for 1.35 billion people with meager resources. Indian health system is now plagued by a deadly disease like Covid-19. Indian health system is big but very small in proportion to the population. Although both private and public health services in India have come under scrutiny, 100 per cent corona patients have been used, but many patients have been crippled. It has become necessary and challenging to make some improvements for the future, going beyond the situation created by Korona. And so the geographical study of the public health system that is needed is expected to be well done at the country level.

Public health is the most important area of human development. And unfortunately in modern India as well as in the field of medical studies, public health has been neglected in terms of geographical studies. India's healthcare system consists of two parts, the private healthcare

system and the public healthcare system. But a geographical study of the public health system is essential to maintain the public health of a growing population based on the total population area and medical standards. From the point of view of medical geography, local analysis of the medical system and behavioral analysis at the national level has become a need of the hour. Today the problem of Covid-19 disease is facing the whole world. The Indian health system is being neglected while taking care of the people with meager resources.

It would be desirable for geographers in India, known as rural and urban areas, to turn their attention to the study of medical geography. India has a large system of public health services. India's growing population needs medical facilities to maintain public health. Public health centers are the backbone of rural health. The government should give top priority to the expansion of the National Plan for Human Resource Development in the public health system. At present, the study of public health care systems has become a multilingual subject in healthcare systems around the world. Each district has its own public health care system.

When studying the geography of the public health system, it is necessary to conduct a spatial analysis and behavioral analysis of the medical system of study from a medical geography perspective. Availability of doctors, nurses, health workers, accessibility location, availability of distance infrastructure, regularity, attitude towards medical aspects, level of patient satisfaction, treatment of patients, treatment of patients by health workers, etc. Things seem important in it. As well as health equipment, operation theater, labor room, ambulance, observation ward, gynecologist, oxygen supply, ventilator, generator and water supply, public health care system etc. The medical system includes local analysis behavior analysis.

According to the Indian Public Health System (IPHS), a primary health care center is an integrated therapeutic and preventive healthcare service for as many rural people as possible. According to the Public Health Monitor (IPHS), there should be one primary health center for a population of 20,000 to 30,000 and a sub-center for a population of 5,000 to 10,000 is very low in India. There is one urban rural health center with an average population of sixty to sixty five thousand. Even in big cities, there are few civic health centers. This is very alarming

for the future of India. Significant in relation to primary health centers with geographical area, population and villages

According to the Public Health Standards, the number of health centers does not seem to have increased as the population grows. This growth is not enough to improve health services. Proper planning should be done by the health sector. There are 2709 district hospitals and 837. Even in Maharashtra, this number is very low in proportion to the population. Maharashtra has 1816 primary health centers, 10580 health sub-centers, 107 dispensaries, 14 rural hospitals, sub-district hospitals and district hospitals. The growing population in India is a matter of concern for maintaining public health. Healthcare in India is handicapped because it faces serious crises in terms of cost, quality of care and equitable delivery and service standards for the entire population.

Therefore, there is a need to study the real situation of rural public health facilities at the district level. In India, there are regional differences in district health care facilities. The study of health care system in the field of medical geography in the district is very limited. While checking the reality of primary health centers, on an average there are 7 primary health centers in each taluka of the district. There are 0.52 primary health centers per 100 sq km and an average of 7.13 primary health centers per 100 villages. This picture is very low compared to the population. Every village should have its own health center or sub-center, staff. However, in countries like India, it is not possible to provide health centers to every village. But a health center could ideally be provided to a community in a village, and there is also Susa for the health of that region. Unfortunately, health planning in India also seems to be plagued by political epidemics

A study of the quality of healthcare in India by a PHC study found that 46 per cent of the people were close to the PHC due to irregular staffing, lack of medical equipment, medication and diagnostic facilities. These include frequent shifts of doctors and health workers in the medical care process, their lack of dedication, and different attitudes towards people. Only 44.9 per cent of the substations have their own government building. The manpower situation is more worrisome for men's health care. Facilities for physicians, surgeons, pediatricians, dermatologists, orthopedic laboratories, X-ray facilities, ECGs, etc. are in short supply in the health care system for newborns

and children up to 14 years of age. Sterilization is of the instrument. Most people are not even aware that there are public health care centers in their community. Lack of bed facilities in PHCs and sub-centers serving the total population is a major problem.

The Central and State Governments are expected to make some changes in this overall situation. Kovid H. Income. V. Awareness Camps Z.P. Or should be organized by the state government. Mobile healthcare units should be set up to facilitate large scale scholarships for research in the health sector, state governments or Zilla Parishads should appoint doctors at primary health sub-centers. Many primary health centers are without doctor and ambulance services and should be admitted on time and move towards the future.

There is an urgent need to make some rules and improvements for the future, going beyond the emergency created by Corona Simple. The private sector should be regulated in such a way that it is more useful. It is a matter of great concern that 86 per cent of the rural population and 81 per cent still do not have health insurance. The number of doctors registered with the Medical Council of India is 12.5 lakh, the Health Minister said in a recent Parliament session. It means to the population

There are only 3 lakh specialist doctors and most of them are working in Maharashtra, Tamil Nadu and Karnataka. The number of 67,000 MBBS doctors graduating every year is insufficient. The government should now change the nature of the healthcare scheme with the help of digital technology. Even in rural areas, these healthcare facilities should be of good quality. Kovid will continue to be the future of technology in the medical field. Many doctors are using videoconferencing options to diagnose patients.

That is why there is a need in all of India for proper growth of health facilities by proper geographical study of health facilities, ease of distribution utility, study of physical facilities of health facilities, equipments in health centers, fulfillment of all manpower in health centers. The Indian public health system desperately needs to revise some the rules for the future by studying in time that the situation could escalate beyond the state of emergency created by the Corona outbreak in the future.





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