Spatial Analysis of Government Health Care Services in the State of Maharashtra, India

Dr. Sanjay Dagu Pagar
Associate Professor, Department of Geography, MVP Samaj's K.R.T. Arts, B.H. Commerce and A.M. Science (K.T.H.M.) College. Nashik-2
Affiliated to Savitribai Phule Pune University, Pune

Abstract:

Primary health care is a basic mechanism that brings healthcare as close as possible to the people. In India, most of health care facilities are provided by government, especially in rural and tribal part. There is a variation in development level of health care facilities in India.If we identify the regional disparity in development of health care services then planer can frame the plans for reducing such regional disparities.

Present paper is an attempt to find out the present condition of development of health care facilities in the Maharashtra State of India. For the study district is consider as a unit. Data about health care services are taken from the infrastructure statistics of Maharashtra State for the year 2018-19 and Economic Survey of Maharashtra State (2020-21).Variables like number of hospitals, dispensaries, primary health centers, sub primary centers, Primary health units, TB hospital & clinics and beds are taken into consideration. By using data about above seven indicators the Co-efficient Index were calculated for each district of the Maharashtra State with help Kendall's co-efficient Index methods. On the basis of co-efficient index, all the districts are grouped into very low, low, moderate ,high and very high development region as per available the health care facilities.

Development of the healthcare services in the Maharashtra state is not uniform. Pune, Nashik and Amravati districts are dominant in most health care services in the study area, whereas it is very less in Osmanabad, Bhandara, Washim & Hingoli districts of the Maharashtra State.

Keywords:*Health, Health care facilities, regional disparity, Co-efficient Index & Health Planning*

Introduction:-

Health is one of the important sustainable development goals in the developing countries like India.Health is an essential input for the development of human resource and quality of life, in turn, social and economic development of the nation (***Mahata & Sharma, 2017***).Health care delivery is one of the major concerns in the socio-economic development of an area (***Bhupendra Sing, 2004***). Public health is nothing but, the practice of preventing disease and promoting good health within groups of people, from small communities to entire countries (***De, 2014***). Primary health care is a basic mechanism that brings healthcare as close as possible to the people (***Kumar, 2019***).Availability and accessibility of health care infrastructure is related to well-being of population (***Devi, 2016***), There is a strong relation between the healthcare infrastructure and health index of any country (**Mann, 2020**). The biggest concern for the rural healthcare system is the lack adequate infrastructure (***Bholane, 2020***). In India, most of health care facilities are provided by the government, especially in rural and tribal part. But distribution of health care facilities are not evenly distributed. There is a variation in development level of health care facilities in India. If we identify the regional disparity in development of health care services then planer can frame the plans for reducing such regional disparities. Once we identify the problem region then it give to clue for government and planner to adopt proper remedial measures for correcting imbalances in development of health care services. In India, Maharashtra state also facing the problems of inadequate health care facilities, especially in the most rural and tribal part of the state.

Objectives:

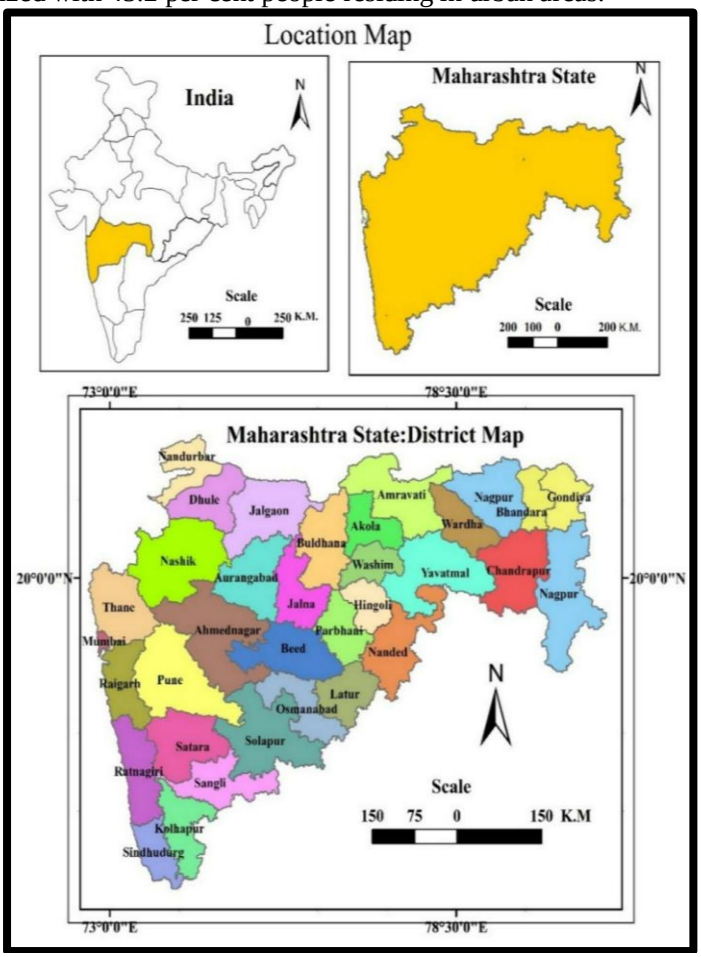
The main objectives of the present paper are as follows,

i) To find out the present distribution of government health care services in the Maharashtra State.
ii) To identify the development level of government health care in the Maharashtra State.

Study Area:

Maharashtra State is located in the western part of India. Maharashtra State came into existence on 1st May, 1960. It extends between 15° 33`46'' North latitudes to 22° 02`13'' N latitudes and 72° 38'45'' East Longitudes to 80° 53'17'' E Longitudes. It is India's second-most populous state and third-largest state by area. Total area of Maharashtra state is 307,713 sq. km. It is bordered by the Arabian Sea to the west and the Indian states of Karnataka, Telangana, Goa, Gujarat, Chhattisgarh, Madhya Pradesh and the Union territory of Dadra and Nagar Haveli. The Maharashtra State divided into three major physiographic divisions namely the Western Ghats (Sahyadri), the Deccan Plateau and the coastal lowland of Konkan. The Godavari is the principal river of Maharashtra. Maharashtra has typical monsoon climate, with hot, rainy and cold weather seasons. However, dew, frost and hail also occur sometimes, depending upon the seasonal weather .The hot scorching summer from March onwards is followed by monsoon in early June. The state receives rainfall from the southwest monsoon winds during the periods from June to September. In 2019 the recorded forest

area in the state was about 20.50 per cent of the state's geographical area. The location of the study area is showed in Map No.1. Maharashtra state consists of six administrative divisions, namely Amravati, Aurangabad, Konkan, Nashik, Nagpur and Pune. The state's six divisions are further divided into 36 districts, 109 sub-divisions and 357 talukas. There are 34 Zilla Parishads, 226 Nagar Parishads, 26 Municipal Corporations and 13 Nagar Parishads also provides health care facilities to the people in the study area. Maharashtra State has a population of 11.24 crore (Census 2011) which is 9.3 per cent of the total population of India and is highly urbanized with 45.2 per cent people residing in urban areas.



Map No.1 Location Map of Study Area

As per census 2011, population of scheduled castes was 11.8 per cent and the population of scheduled tribes was 9.4 per cent of the total population of the study area. The population density of Maharashtra state is 365 per sq.km. Sex Ratio in Maharashtra is 929 (female for) each 1000 male as per census 2011. As per Census 2011 there were 4.94 crore persons reported engaged in economic activities, among which 4.38 crore were main workers.

Data and Methodology:

The present study is based on the secondary source of data. Secondary data obtained from Infrastructure Statistics of Maharashtra State (2017-18 & 2018-19) and Economic Survey of Maharashtra State (2020-21). The district has been taken as a unit for analysis of the level of government health care facility development in the study area.

The **Kendall's ranking co-efficient index** method is used for the present work. The levels of government health care facility development have been determined on the basic of seven indictors. They are as follow.

X1= Number of hospitals.
X2=Number of Primary health centers
X3= Number of Sub- Primary health centers
X4= Number of Dispensaries
X5= Numbers of Primary Health Units
X6= Number of TB hospital and Clinics
X7= Number of Beds

By using data about above seven indictors the Co-efficient Index were calculated for each district of the Maharashtra state with help Kendall's co-efficient Index methods. For the calculation of co-efficient Index following formula of Kendall's is used.

$$\text{Kendall's Co-efficient Index} = \frac{\sum R}{N}$$

Where ∑R= Sum of rank, N=Numbers of variables.

The co-efficient index is inversely related to development i.e. lower the index the more development and higher the index low the development. Data is processed and represented with point and Choropleth map by using GIS software.

The variables for government health care facility development:

There are seven variables selected for determine the level of development in government health care facilities in the study area. Table No.1 indicates the statistical information about all variables in the study area during the year 2018-19.

i) Number of hospitals. (X1):

Hospital is a very important apex unit of health care infrastructure (***Nimase & Lokhande, 2014***).A hospital is an institution for health care providing patient treatment by specialized staff and equipment, and often, but not always providing for longer-term patient stays.This is an important variable to determine the levels of health care development in the region. Hospital plays an important role in providing the preventive, promotive and rehabilitative services to local community including training and research (***Agnihotri, R.C.1995***). High concentration of the hospital is observed in Pune (151) and Nashik (105) districts, whereas it is very less in the Hingoli (09), Parabhani (11) and Osmanabad (15) districts of the study region (Table No.1).

ii) Number of Primary health centers (X2):

In India, Primary Health Centers are the mile stone of rural health care. Primary health center plays an important role in determining the health of rural and tribal people as they cater to the basic health care facilities to them. Each primary health center commands over 4 or 5 sub-centers. The availability of primary health centers is not uniform in the study area. It is very good in Nashik (106), Pune (99) and Ahmednagar (98) districts, but it is very less in Hingoli (24), Washim (25), Wardha (27) and Akola (30) districts of the study area.

iii) Number of Sub- Primary Health centers (X3):

In the Indian rural health care system, the subcentre is the most peripheral and first contact point between the primary health care system and the community (***Khatun & Ghosh, 2019***).The sub primary center is provide only minor health care facilities to people, but it is very important in rural and tribal part of the study area. The availability of sub- primary health centers are good in Nashik (592), Nagar (565) and Pune (539) districts, but it is very less in Hingoli (132), Washim (153) ,Akola (179), Wardha (181) and Thane (190) districts of the study area.

iv) Number of Dispensaries (X4):

A dispensary is an office in a school, hospital or other organization that dispenses medications and medical supplies. It is also an important place to provide medical facilities to people. In case of study region, availability of dispensaries are not uniform. It is highly concentrated in Beed (681), Yavatmal (522) and Mumbai (334).But it is very less in Nandurbar (1), Palghar (4), Ratnagiri (8), Latur (9) and Osmanabad (9) districts of Maharashtra State.

v) Numbers of Primary Health Units (X5):

For providing quick health care facilities to rural and tribal peoples, the role of primary health is very is very vital. Overall availability of primary health units are not too much developed in the study area. Only few districts such as Gadchiroli (36), Amaravati (20), Palghar (18),

Table No.1.Maharashtra State: Distribution of Government Health Care Services- 2018-19

Sr.	District	Hospitals	PHC	Sub-Centres	Dispensaries	Primary Health Units	TB Hospital & Clinics	Beds
1	Mumbai City	64	00	00	334	00	1177	24056
2	Mumbai Suburban							
3	Thane	55	33	190	87	05	209	3,553

4	Palghar	27	46	314	04	18	40	3,170
5	Raigad	26	52	288	28	03	83	3,172
6	Ratnagiri	28	67	378	08	00	86	2,063
7	Sindhudurg	17	38	248	00	00	64	1,406
8	Nashik	105	106	592	31	09	230	4,283
9	Dhule	23	41	232	30	00	91	1,684
10	Nandurbar	83	58	292	01	09	81	1,368
11	Jalgaon	49	77	443	39	00	166	3,031
12	Ahmednagar	54	98	565	12	05	161	4,179
13	Pune	151	99	539	74	11	318	10,236
14	Satara	35	72	400	26	06	119	2,817
15	Sangli	39	59	320	29	02	118	3,590
16	Solapur	55	77	431	37	01	179	3,606
17	Kolhapur	33	74	413	103	06	163	3,544
18	Aurangabad	67	50	279	36	00	172	5,550
19	Jalna	44	40	218	40	02	74	3,072
20	Parbhani	11	31	215	37	04	73	1,067
21	Hingoli	09	24	132	00	05	55	1,048
22	Beed	25	51	296	681	04	98	3,750
23	Nanded	26	65	377	52	16	159	3,977
24	Osmanabad	15	42	210	09	00	94	1,221
25	Latur	21	46	252	09	06	87	2,410
26	Buldhana	23	52	280	152	00	129	2,002
27	Akola	34	30	179	50	00	73	2,120
28	Washim	20	25	153	10	01	64	813
29	Amravati	54	58	339	106	20	150	5,588
30	Yavatmal	27	63	435	522	05	129	3,158
31	Wardha	28	27	181	250	06	48	3,109
32	Nagpur	58	49	316	152	03	220	7,058
33	Bhandara	17	33	193	44	00	68	1,265
34	Gondia	22	40	253	42	08	74	1,204
35	Chandrapur	22	58	339	33	08	165	2,315
36	Gadchiroli	35	47	376	19	36	120	1,458
Maharashtra State		1,402	1,828	10,668	3,087	199	5,337	127,943

Source: Director of Health Service, GOM.2018-19,
Infrastructure Statistics of Maharashtra State-2017-18 & -2018-19

Nanded (16) and Pune (11) have numbers of primary health unit is more than 10, otherwise remaining all districts of the study area have very less availability of primary health units.

vi) Number of TB hospital and Clinics (X6):

TB hospital and Clinics are also very useful for providing health care facilities to people. The high concentration of both facilities are mainly observed in developed districts of the study area, especially in Mumbai (1177), Pune (318), Nashik (230) and Nagpur districts of the study area. The numbers of TB hospital and Clinics are very less in Palghar (40), Wardha (48) and Hingoli Districts of the Maharashtra state.

vii) Number of Beds (X7):

Beds in hospital are very important to provide psychological & physical comfort.

This facility is important for outdoor patients. Any region which having sufficient amount of beds consider as a well-developed in health care facilities. In case of study area, availability of beds is not uniform. It is very good in Mumbai (24,056), Pune (10,236), Nagpur (7,058), Amravati (5,588) and Aurangabad (5,550) districts but it is very less in Washim (813), Hingoli (1,048) & Parbhani (1,067) districts of the study area.

Level of Development of Government Health Care Services:

To control the spread of diseases as well as reduce the growing rates of mortality due to pandemic condition, special attention needs to be given to the health care facilities in rural and tribal areas.For measuring the level of government health care facilities development in the study region, seven variables has been taken into account collectively.On the basis of co-efficient index, all the districts are grouped in to, very low, low, moderate,high & very high development region as per as available the health care facilities. This groups are shown in the Table No. 3.

Very High Development:

The first category of very high development of health care facilities, consists of three districts that are Pune, Nashik & Amravati with co-efficient index is less than 10.These districts have achieved a considerable progress in providing good health care facilities to their population.In these districts availability of government hospital, primary health centers, sub centers and numbers of beds are good as compared to others districts of the study area therefore development of health care facilities are observed good.

High Development:

The districts recorded co-efficient index for development of health care facilities is between 10 and 15 included in this category. Kolhapur, Nagpur, Ahmednagar, Nanded,

Table No.2 Maharashtra State: Ranking Co-efficient Index for Government Health Care Services -2018-19

Sr.	District	X1	X2	X3	X4	X5	X6	X7	Co-efficient Index
1	Mumbai City	05	35	35	03	26	01	01	15.14
2	Mumbai Suburban								
3	Thane	7.5	28.5	30	09	15.5	05	12	15.36
4	Palghar	20.5	21.5	16	32	03	35	15	20.43
5	Raigad	21.5	13.5	19	24	20.5	24	14	19.50
6	Ratnagiri	18.5	08	09	31	27	23	24	20.07
7	Sindhudurg	31.5	08	09	31	27	23	24	21.93
8	Nashik	02	01	01	21	06	03	06	5.71
9	Dhule	25.5	24	25	22	29	21	26	24.64
10	Nandurbar	03	13.5	18	33	7.5	25	29	18.43
11	Jalgaon	11	4.5	04	16	30	08	07	11.50
12	Ahmednagar	9.5	03	02	27	15.5	11	07	10.71
13	Pune	01	02	03	10	05	05	02	4.00
14	Satara	14.5	07	08	25	11.5	17	20	14.71
15	Sangli	13	11	14	23	22.5	18	11	16.07
16	Solapur	7.5	4.5	6	17.5	24.5	6	10	10.86
17	Kolhapur	17	06	07	08	11.5	10	13	10.36
18	Aurangabad	04	18	21	19	31	07	05	15.00
19	Jalna	12	25.5	26	15	22.5	26.5	18	20.79
20	Parbhani	34	25.5	26	15	22.5	26.5	18	23.93
21	Hingoli	35	34	34	35	155	33	34	51.43
22	Beed	24	17	17	01	18.5	19	09	15.07
23	Nanded	21.5	9	10	11	04	12	08	10.79

24	Osmanabad	33	23	28	29.5	32	10	31	26.64
25	Latur	29	21.5	23	29.5	11.5	22	21	22.50
26	Buldhana	25.5	13.5	20	5	33	14.5	25	19.50
27	Akola	16	31	32	12	24.5	28.5	23	23.86
28	Washim	30	33	33	28	24.5	31.5	35	30.71
29	Amravati	9.5	13.5	12	07	02	13	04	8.71
30	Yavatmal	20.5	10	5	02	15.5	14.5	16	11.93
31	Wardha	18.5	32	31	04	11.5	34	17	21.14
32	Nagpur	06	19	15	06	20.5	04	03	10.50
33	Bhandara	31.5	28.5	29	13	33	30	30	27.86
34	Gondia	27.5	25.5	22	14	7.5	26.5	32	22.14
35	Chandrapur	27.5	13.5	13	20	09	09	22	16.29
36	Gadchiroli	14.5	20	11	26	01	16	27	16.50

Source: Compiled by Researcher, 2021

Solapur, Jalgaon, Yavatmal, Aurangabad & Satara districts have high development in the terms of to health care facilities. All these districts are developing rapidly during last 20 years with respects to health care facilities. Most districts of this group have good health care infrastructure of three to four variables, which are selected for determining the development of health care facilities, especially in rural and tribal part of the study areas.

Moderate Development:

The districts, which have recorded level of development in health care facilities co-efficient index, between 15 and 20 are included in this category. There are 10 districts included in this category namely Sangli, Chandrapur, Gadchiroli, Nandurbar, Raigad, Buldhana, Beed, Mumbai Suburban, Mumbai City & Thane. One important observation regarding health care facilities of this area that these facilities are well developed in areas, which is very close to major cities and towns of the region, but these facilities are not too much developed in region which is away from main cities and towns, therefore moderate types development of health care facilities is observed in this region of the study area.

Low Development:

The districts recorded co-efficient index of health care facilities development is between 20 and 25 are included in this category. There are 10 districts included in this category, namely Wardha, Sindhudurg, Gondia, Latur, Akola, Ratnagiri, Palghar, Jalna, Parbhani & Dhule. Most part of these region is tribal, where health care facilities are not well developed therefore here we observed less development of health care facilities.

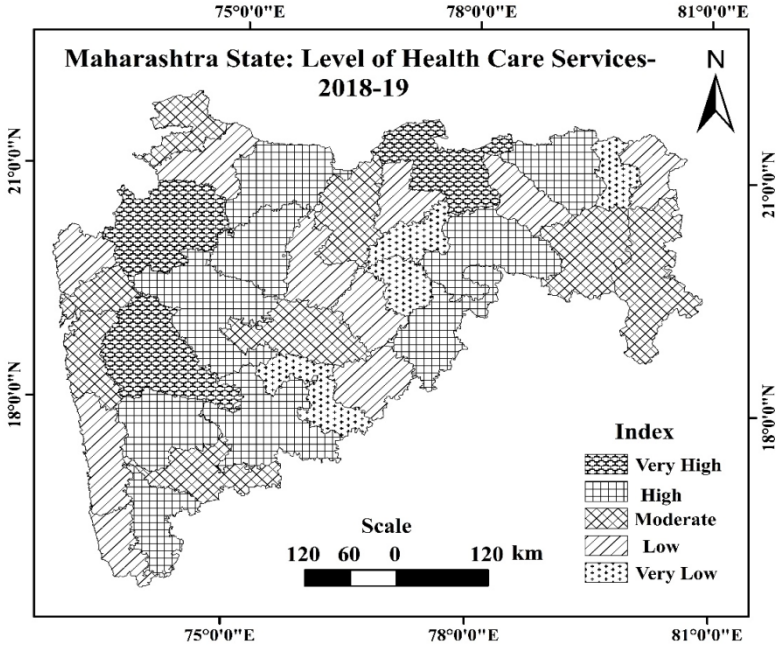
Table.3.Maharashtra State: Level of Government Health Care Services Development -2018-19

Sr. No.	Co-efficient Index	Level of Govt. Health Facility Development	Names of Districts
1	Less than 10	Very High	Pune , Nashik & Amravati
2	10-15	High	Kolhapur, Nagpur, Ahmednagar, Nanded, Solapur, Jalgaon, Yavatmal, Aurangabad & Satara
3	15-20	Moderate	Sangli, Chandrapur, Gadchiroli, Nandurbar, Raigad ,Buldhana, Beed, Mumbai Suburban , Mumbai City & Thane
4	20-25	Low	Wardha , Sindhudurg, Gondia , Latur , Akola ,Ratnagiri, Palghar , Jalna, Parbhani & Dhule
5	More Than 25	Very Low	Osmanabad , Bhandara , Washim & Hingoli

Source: Compiled by Researcher, 2021.

Very low Development:

Osmanabad, Bhandara, Washim & Hingoli districts are included in this category, where health care facilities are not too much developed. The co-efficient index for the level of health care facilities is more than 25.In these region only one or two variables of health care facilities are developed at some extents, otherwise remaining most of health care facilities are not developed too much. This is main reason for very low development of health care facilities in the study area.



Map No.2

Conclusions:

On the basis of analysis it is concluded that there is a wide range of spatial variation in level of health care facilities development among the districts of Maharashtra State. It means distribution of health care facilities is not proper in various districts of Maharashtra. The development of health care facilities are good in Pune, Nashik and Amravati districts, but these are not good in Osmanabad, Bhandara, Washim & Hingoli districts of Maharashtra State. Therefore government should pay more attention towards districts wherever development of health care facilities are very less, especially districts such as Wardha , Sindhudurg, Gondia, Latur, Akola , Ratnagiri, Palghar , Jalna, Parbhani, Dhule Osmanabad , Bhandara , Washim & Hingoli which have not too much developed with respects to health care services. For this purpose government must considered current population and norms that are suggested for hilly, tribal and plain areas by the World Health Organization and National Rural Health Mission of India (2005-12).

The availability of all the necessary health services and their use indicate the level standard of living and the level of health awareness. The development of the place also determined with the help of the availability of health and medical services and facilities. Therefore, government should be provided the health and medical services and facilities by taking into consideration the total population, social-economic status of the society.

References:

1. Agnihotri, R.C. (1995): "Geomedical Environment and Health Care", 'Rawat Publications', Jaipur, Pp.193-205.
2. Bholane Kishor (2020), "Current Status and Constraints of Rural Healthcare in Maharashtra", 'International Journal of Advance and Innovative Research', Volume 7, Issue 1 (II): January - March, 2020, Pp.93-95.
3. Bhupender Sing (2004) "A study of spatial variations of medical centers in Haryana, India", 'The Deccan Geographer', Vol.42, June 2004, Pp 1-11.
4. Dhanajay Wansod & M. Lingaraju (2009) "Health care utilization in Karnataka State: A regional perspective", 'The Deccan Geographer', Vol.48, December 2009, Pp 17-27.
5. Dipanwita De (2014), "Spatial Inequality in Health Care Infrastructure in Sundarban, West Bengal, India", 'International Research Journal of Social Sciences', Vol. 3(12), 15-22, December (2014), Pp.15-22.
6. Gazetteer of the Bombay presidency (1883) Nashik district volume No.19.

7. Khatun Yasmin & Shovan Ghosh (2019), "Spatial Disparities in health care infrastructure in south 24 parganas district of West Bengal, India". 'International Journal of Research in Humanities, Arts and Literature', Vol. 7, Issue 3, Mar 2019, Pp.169-180.
8. Kiran Mann (2020), "An Analysis of Healthcare Infrastructure in India", Indian Journal of Applied Research', Volume-10, Issue-2, February – 2020.Pp.32-34.
9. Kumar Saravana & Kumar Sunil (2019), "A geographical study of the spatial pattern of primary health care centers and health workforce in Coimbatore district, Tamilnadu, Thematic Journal of Geography', Vol.8 (4), October 2019,Pp.498-512.
10. MaharashtraState Gazetteer (1975) Govt. of Maharashtra, Nashik District.
11. Mahata Sangita and V. N. Sharma (2017), "Spatial Disparity in Status and performance of Health Care Services in Bardhaman District, W.B.", An International Refereed Journal', Vol. 63, No. 4, December, 2017, Pp.92-102.
12. Nimase & Lokhande (2014), "Spatial Distribution of Primary Health Centres in Solapur District of Maharashtra", 'European Academic Research', Vol. II, Issue 6/ September 2014, PP.7443-7453.
13. Savita Devi, Rajeshwari (2016), "Availability and Accessibility of Health Care Infrastructure in Haryana and Gujarat: A Comparative Study", 'Punjab Geographer, Volume 12, October 2016, Pp.43-59.

Websites:

1. https://apps.who.int/iris/handle/10665/206946 cited on 30/9/2021.
2. https://www.who.int/publications/who-guidelines cited on 28/9/2021.
3. https://arogya.maharashtra.gov.incitied on 28/09/2021.
4. https://nhm.gov.in/images/pdf/guidelines/iphs/iphs-revised-guidlines-2012/sub-centers.pdf cited on 30/09/2021.
5. https://en.wikipedia.org/wiki/Maharashtracitied on 28/09/2021.
6. https://mahades.maharashtra.gov.in/publications.do?pubId=HBSMcitiedon27/09/2021