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Disparities in Healthcare Facilities: A District-Level Study of Jammu and Kashmir

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Abstract

Jammu and Kashmir are seeing inter-district discrepancies in health infrastructure. Some districts in Jammu and Kashmir have superior health facilities compared to others. It is essential to analyze the distribution of health facilities such as district hospitals, health centers, medical beds, doctors, and nurses in Jammu and Kashmir to identify disparities and provide solutions. The current study aims to investigate the differences in health infrastructure among districts in Jammu and Kashmir. Nine indicators of health infrastructure are chosen for analysis, together with their coefficient of variation ratios and deprivation and development indicators. Initially, statistical analysis of the coefficient of variation reveals disparities in the distribution of health facilities across different districts of Jammu and Kashmir. Following medical staff and other facilities, the discrepancies are most noticeable in the number of doctors in medical institutions. The data show that in many districts, the ratios of health infrastructure indicators such as doctors, nurses, beds, district hospitals, primary health centers, community health centers, and dispensaries to population are minimal, revealing substantial imbalances. The health infrastructure deprivation and development indexes highlight the disparities in health infrastructure development between districts. The impoverished districts lacking in health facilities are seeking urgent government intervention with a specific action plan.

Key Words: Health Infrastructure, Variations in Health facilities, Development Index, Deprivation index.

1. Introduction

Health, as defined by the World Health Organization in 1948, is a condition of whole physical, mental, and social well-being rather than just the absence of disease or weakness. The health and well-being of human resources are crucial for the economic and social development of the country. A proper healthcare infrastructure is crucial for ensuring the improved health of the population. Insufficient infrastructure often results in low-quality health services, posing a significant risk to the overall health and well-being of the community. The health and wellbeing of a nation's population significantly rely on a well-established, easily accessible, and efficient healthcare system. Healthcare infrastructure is a crucial factor in evaluating healthcare policy and welfare measures in a country. Health infrastructure is crucial for human resource development, as widely acknowledged. The health sector in Jammu and Kashmir has challenges due to disparities in infrastructure resources such as hospitals, health centers, beds, physicians, and nurses among different districts. Health infrastructure availability significantly impacts health outcomes, including life expectancy, birth and death rates, infant mortality, and disease eradication such as malaria, leprosy, smallpox, polio, and tuberculosis. The presence and quality of health infrastructure in a region impact the well-being of the general population. Access to healthcare decreases when the availability of a region's health infrastructure increases. The quality of life in a country is shown by the advancement of fundamental needs like education and healthcare infrastructure. Enhancing a nation's health infrastructure is a crucial element for achieving economic prosperity. High-

quality and sufficient health facilities are crucial components of human growth. Adequate health infrastructure can help achieve social objectives such as economic growth and poverty alleviation. Governments must provide accessible, affordable, and high-quality healthcare to their citizens to acknowledge health as a fundamental human right. A robust health infrastructure is a crucial indicator of human growth. Health infrastructure includes physical healthcare facilities such as primary health centers (PHCs), community health centers (CHCs), district hospitals, sub-centers (SCs), beds, and healthcare professionals like doctors and nurses. Assessing the feasibility and allocation of healthcare resources among the population.

Table 1. Population norms

Healthcare Center	**Areas**	
	Plain	**Hilly/Tribal**
Sub Centers (SCs).	5000	3000
Primary Health Centers (PHCs).	30,000	20,000
Community Health Centers (CHCs).	1,20,000	80,000

Source: Rural Health Statistics-2015.

A sub-center (SC) is the primary health facility for the rural population at the periphery. It is the initial point where the primary healthcare system interacts with the rural community. Sub-centers serve a population of 3000 in hilly/tribal regions and 5000 in plain areas. Sub-centers are given responsibilities involving interpersonal communication to induce behavioral change and offer services related to maternity and child health, family welfare, nutrition, immunity, and the management of communicable diseases.

The Primary Health Centre (PHC) is a medical facility staffed by a single MBBS doctor. Additionally, 14 paramedical and other supporting staff members are essential components of the health care system in primary health centers (PHCs). The facility can accommodate 4-6 beds for patients and offers curative, preventive, promotional, and family welfare services. A standard primary health centers serves a population of 20,000 in challenging terrains and 30,000 in flat regions, equipped with six indoor or observation beds. It serves as a referral center for six sub- centers and transfers cases to a 30-bed hospital (CHC) and larger public hospitals at sub-district and district levels. Primary health care providers are responsible for delivering comprehensive healthcare services, such as medical treatment, maternity and child health services, family planning, nutrition, vaccination, and managing communicable diseases. A dispensary is a medical facility where a physician and a chemist offer medical care outdoors.

The Community Health Centre (CHC) is a health facility with 30 beds and a team of four specialists: a surgeon, a physician, a gynecologist, and a pediatrician. They are assisted by 21 paramedics and other staff members. The facility includes an operating theatre, an X-ray machine, a labor room, and laboratory facilities that offer specialized medical care in the fields of medicine, obstetrics, gynecology, surgery, and geriatrics. Community Health Centers (CHCs) act as a central hub for primary health care (PHC) referrals and offer services for obstetric and specialized

consultations. Based on population norms, a standard Community Health Centre (CHC) is expected to provide for a population of 80,000 in plain areas and 120,000 in mountainous and tribal regions.

Health Infrastructure in Jammu and Kashmir: An Overview

In the latest statistical report (2021–22), the number of medical facilities in Jammu and Kashmir has risen to 4330 (Digest of Statistics). This includes various types of health centers such as primary health centers (PHCs), new-type PHCs, community health centers (CHCs), sub-centers (SCs), AYUSH units, T.B. centers, family planning centers, leprosy sub-centers, leprosy control units, and S.T.D./T.B.V.D. clinics. This is a significant increase from the 1262 facilities reported in 1973–74. The nomenclature of allopathic dispensaries and medical aid centers has been altered to "New Type Primary Health Centers and Sub-Centers," respectively, by Government Order No. 345 HME of 2012, dated May 16, 2012.

In 1974–75, the whole medical personnel numbered 4893, with 1334 doctors and 466 nurses. By 2021–22, the total medical staff will have increased to 30810, with 6116 doctors and 3437 nurses. In 1973–74, Jammu and Kashmir had two medical institutes, but by 2021–22, the number had climbed to 12. In addition, Jammu & Kashmir has 256 Unani and 299 Ayurvedic dispensaries with a workforce of 2995, including Vaids, Hakims, and other personnel. Jammu and Kashmir has a total of 6116 doctors and specialists, 3473 staff nurses, 2995 chemists, 136 health inspectors, 3064 ANM nurses, 443 basic health workers, 110 sanitary inspectors, 102 lady health workers, 4931 nursing orderlies, and 9222 other health infrastructure people. (Directorate of Health Services in Kashmir and Jammu, Director of Indian System of Medicines in Jammu and Kashmir).

In 2020, the life expectancy for males and females was 74.3 years each. In 1971–73, the birth rate was 30.30 births per 1,000 people on a three-year moving average, whereas in 2018–20, it was 14.97. The state has made a substantial improvement in the infant mortality rate (IMR) over the specified period. The infant mortality rate (IMR) decreased from 52 in 2006 to 37 in 2014. The total fertility rate (TFR), representing the average number of children a woman gives birth to during her reproductive years, has decreased from 2.3 to 1.9 [9]. The death rate, measured as the number of deaths per 1,000 persons on a three-year moving average, decreased from 10.50 per thousand in 1971–73 to 4.70 in 2018–20.

The infant mortality rate, which is the number of newborns who die before their first birthday per one thousand live births in the same year, is projected to decrease to 17.0 per thousand in 2020. Although there has been progress, disparities in health facilities between regions remain a significant concern in the Union Territory of Jammu and Kashmir. Some districts have abundant health services, while others are lacking in this regard among the twenty districts. For instance, there is a shortage of doctors in government hospitals throughout all districts, with just one doctor assigned instead of the required two in each primary health center (PHC) in the district. Additionally, the regions of Reasi and Kathua are experiencing a shortage of doctors. In district Udhampur, there is a shortage of medical personnel, including doctors and nursing staff, in its general hospitals, CHCs, and PHCs. Under these conditions, achieving the social objective of 'Health for All' (HFA) by 2020 is challenging. Meeting the Millennium Development Goals, which involve decreasing infant mortality, improving maternal health, and addressing HIV/AIDS, necessitates an equitable expansion of healthcare infrastructure across all areas, including Jammu and Kashmir. This research attempts to pinpoint disparities in health facilities among districts in Jammu and Kashmir, enabling government officials and policymakers to tackle the issue.

Economists, researchers, and politicians in industrialized and developing countries are focusing on regional differences in health infrastructure. Many studies have been conducted worldwide on this matter. To support the necessity of this inquiry, the following studies have been examined:

2. Review of literature

Mohd Taqi et al. (2017) The report rigorously analyses and assesses differences in the presence and reach of health facilities in rural regions of India. The study revealed that healthcare infrastructure in India is generally inadequate, especially in rural areas, despite advancements made under the National Rural Health Mission initiated in 2005. The absence of physical infrastructure, personnel, and essential medications greatly contributes to this shortfall. Rural areas require major attention from planners, researchers, and healthcare staff to improve the availability and accessibility of health facilities and quality services.

The study conducted by Hamid and Showkat in 2018 This article analyses the state of health and healthcare accessibility in Jammu and Kashmir, India. The authors stress the significance of excellent health and education in economic growth, highlighting health as the most crucial social

service sector due to its direct impact on individual well-being. They acknowledge that Jammu and Kashmir has been successful in providing health and medical services to its residents, but there are still unresolved problems. The doctor-patient ratio in Jammu and Kashmir is currently 1:1880, which falls below the World Health Organization's recommended level of 1:1000.

Navneet Kaur and colleagues (2023) A study article called "An inter-district analysis of health infrastructure disparities in the Union Territory of Jammu and Kashmir" exists. The study examines differences in health facilities among districts in Jammu and Kashmir, a newly established Union Territory (UT). The study created a district-level health infrastructure index (HII) for 2018–19 using principal component analysis. The study demonstrates disparities in the health infrastructure between districts in the Union Territory, with the Jammu division outperforming the Kashmir division.

Ishu Garg and Kanika Gupta (2015) The study is titled "An Analysis of Disparities in Health Infrastructure Among Districts in Haryana, India". The research examines the accessibility of healthcare facilities in Haryana, revealing various discrepancies among different districts in the region. The analysis was done by the authors utilizing a range of health infrastructure variables, including the quantity of hospitals, health centres, medical institution beds, doctors, nurses, and more. Statistical tools were utilized to calculate ratios and indices to comprehend the extent of inequality and explore potential solutions.

Aabid and Muddasir (2018) This research examines the disparities in health infrastructure development across several districts of Kashmir. The study employs principal component analysis to create a health infrastructure development index for all districts, determining a notable disparity in health infrastructure across the districts of Kashmir.

Reena Kumara and Rakesh Raman (2011) This article examines the discrepancy in health and education in Uttar Pradesh, India, by utilizing principal component analysis to generate composite indices for assessing the inter-district gap in healthcare and educational achievement. The paper indicates that certain regions and districts excel in educational achievement but lag in health achievement, and vice versa. It proposes ideas to address the discrepancy issue.

The current study focuses on inter-district differences in health infrastructure in Jammu and Kashmir based on the existing literature.

Objectives

There is a notable disparity in the access to healthcare facilities in the districts of Jammu and Kashmir that requires more examination and intervention. This perspective centers on the following objectives:

1. To investigate inter-district disparities in the availability of health infrastructure.
2. To compare health infrastructure performance across districts using deprivation and development indices.

3. Data and Methodology

Selection of data and indicators of health infrastructure:

Secondary data from the digest of statistics 2021–22 (47th edition) from the Government of Jammu and Kashmir, Planning Development and Monitoring Department, Directorate of Economics and Statistics, J&K, and Rural Health Statistics 2021–22 has been used. Government of India, Ministry of Health, and Family Welfare. The Statistical Digest of Jammu and Kashmir 2021–2022 published by the Government of Jammu and Kashmir was the primary source of secondary data for the study. Nine health infrastructure indicators are utilized to accomplish the study's aims. The initial eight indicators pertain to allopathic medical establishments such as District Hospitals 1, Primary Health Centers (PHCs), Community Health Centers (CHCs), Sub Centers (SCs), Doctors, Nurses, Beds, and Other Medical Staff (comprising Pharmacists, Vaid/Hakims (AYUSH), and ANM Nurses/Paramedics) within these facilities, as well as dispensaries, encompassing Unani dispensaries and Ayurvedic dispensaries.

Research Methods

The coefficient of variation (CV) is determined by dividing the standard deviation by the mean and then multiplying the result by 100 to evaluate differences between districts in the listed indicators. The district's health infrastructure is assessed against certain requirements using a variety of ratios of key variables. Generate the deprivation and development indices for each district's health infrastructure by following these steps:

Step I: Calculation of Deprivation and Development Indices:

The first step is to measure the level of deprivation in a certain location using a chosen indicator or variable. The deprivation index (d) is calculated using equation 1:

$$d_{ij} = \frac{Max_i - X_{ij}}{Max_i - Min_i} \ldots\ldots\ldots\ldots 1$$

The formula calculates the deprivation index (d_{ij}) of the i_{th} variable (indicator of health infrastructure) for the j_{th} region using Maxi and Mini as the highest and minimum values of the i_{th} variable in the series, and X_{ij} as the actual value of the i_{th} variable for the j_{th} region. Equation (2) expresses the development index (D) of the i_{th} variable for the jth region in terms of the absence of deprivation, based on equation (1).

$$D_{ij} = 1 - d_{ij} \ldots\ldots\ldots\ldots\ldots\ldots 2$$

Step II: Calculate the Average Deprivation Index and Average Development Index. To get the average deprivation index for the j_{th} region, the equation (3) involves taking the simple average of the deprivation index of all indicators for the j_{th} region.

$$d_j = \sum_{i=1}^{n} \frac{d_{ij}}{n} \ldots\ldots\ldots\ldots\ldots 3$$

The average development index for the j_{th} region can be calculated if the average deprivation index for

the j_{th} region is known.

$$D_j = 1 - dj \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 4$$

The meaning of "dj" can be inferred from equation (3). One can create an average development index by calculating the simple average of the development index for all indicators in a certain region (j_{th} region).

$$D_j = \sum_{i=1}^{n} D_{ij}/n \ldots\ldots\ldots\ldots\ldots\ldots 5$$

Table 2. District Wise Availability of Health Infrastructure in Jammu and Kashmir During 2021-22

Districts	DHs	PHCs	CHCs	SCs	Doctors	Nurses	Beds	Other medical staff	Dispensaries
Anantnag	0	65	5	139	33	83	NA	358	32
Bandipora	1	27	3	71	20	31	NA	158	18
Baramulla	0	86	7	188	49	119	NA	458	40
Budgam	1	70	9	136	37	62	NA	392	36
Doda	0	42	3	163	14	55	622	289	34
Ganderbal	1	30	1	60	18	72	NA	142	19
Jammu	1	101	9	162	39	116	619	483	63
Kathua	0	53	5	185	4	61	398	364	52
Kishtwar	1	26	1	87	13	45	163	170	24
Kulgam	1	45	3	118	30	99	333	268	21
Kupwara	1	63	7	233	43	125	NA	444	28
Poonch	1	44	3	137	17	100	379	256	23
Pulwama	1	57	3	97	26	95	NA	216	17
Rajouri	0	45	7	197	14	44	663	359	33
Ramban	1	31	3	85	8	39	148	190	18
Reasi	1	33	2	103	4	78	197	203	18
Samba	1	21	3	82	7	42	211	177	13
Shopian	1	16	2	57	12	49	NA	124	1
Srinagar	1	69	1	25	16	120	NA	273	24
Udhampur	1	49	2	146	7	84	468	295	32
Total	15	973	79	2471	411	1519	3868	5619	555
Mean	0.7	48.6	3.9	123.5	20.5	75.9	386.8	280.9	27.7
S.D.	0.4	22.2	2.6	54.3	13.6	30.3	242.1	110.5	13.1
C.V	59.2	45.6	64.9	43.9	66.2	39.9	62.6	39.3	47.1

Source: Directorate of health services Kashmir/Jammu, Digest of statistic 2021-22, Directorate of Economics and Statistics, Govt. of Jammu and Kashmir, Planning Development and Monitoring Department

Note: (1) Dispensaries include Unani and Ayurvedic Dispensary

(2) Other Medical Staff includes Pharmacists, Vaid/Hakims (AYUSH), ANM Nurses/ Paramedics and others

3. NA means data which is not available

Districts such as Anantnag, Baramulla, Doda, Kathua, and Rajouri lack district hospitals, as seen in **Table 2**. Each of the districts, Anantnag, Baramulla, Doda, Kathua, and Rajouri, is linked to a single medical college. PHC numbers are lower in Samba, Bandipora, and Kishtwar districts compared to others. The C.V. is 45.6 percent for this indication. In Shopian district and Ganderbal district, the percentage of SCs is 43.9, however Srinagar district has fewer SCs due to the presence of other specialized hospitals. In Ganderbal, Kishtwar, and Srinagar, there is just one Community Health Centre (CHC) each, while Udhampur, Shopian, and Reasi have two CHCs in each district. The 64.9 percent CV emphasizes the disparities among the districts. Districts Shopian, Samba, Pulwama, Ramban, Poonch, Kulgam, and Bandipora have a limited number of dispensaries, including Unani and Ayurvedic ones, with a C.V. of 47.1 percent, indicating discrepancies in dispensary availability. Regional disparities are more pronounced in the availability of doctors (coefficient of variation = 66.2) compared to nurses (coefficient of variation = 39.9). Kathua, Reasi, Ramban, Samba, and Udhampur are experiencing shortages of doctors. Only districts in Jammu division have data on the number of beds available. In Kashmir division, data is only available on the availability of beds in district Kulgam. The bed availability rate in the C.V. is 62.6%, with Ramban and Kishtwar districts being disadvantaged. Jammu and Kashmir are facing inter-district inequalities in health infrastructure provision, regardless of whether the gaps are low or significant. Imbalances can occur due to differential population sizes in different districts, as population is considered a key factor in determining the allocation of government infrastructural resources. To draw significant conclusions, it is essential to evaluate if the districts meet the health infrastructure standards set by the Government of India and WHO.

District-wise Comparison of Health Infrastructure Based on Recommended Standards

Disparities in regional health infrastructure within an economy can be evaluated by utilizing government and WHO criteria. According to IPHS (2012), standards are the quality level that healthcare organizations strive to meet or accomplish. The Ministry of Health and Family Welfare in India establishes Indian Public Health Standards (IPHS) to ensure high-quality healthcare

facilities. According to IPHS guidelines, it is advised to have one sub-Centre (SC) for every 5,000 individuals, one primary health Centre (PHC) for every 30,000 people, and one community health Centre (CHC) for a population of 120,000 in flat regions. One sub-center (SC) should be supplied for every 3,000 people in tribal, hilly, and desert areas. Additionally, one primary health Centre (PHC) should be established for every 20,000 people and one community health Centre (CHC) for every 80,000 people. IPHS regulations mandate that each district must have a minimum of one hospital. The WHO also considers the qualitative element of health infrastructure by examining standardized major ratios such as doctor to nurse, doctor to population, bed to population, nurse to population, and others. The WHO states that the ideal doctor-to-nurse ratio is 1:3. The WHO recommends that there should be a minimum of three beds and one doctor per 1,000 people. WHO considered the ideal nurse/population ratio to be one

nurse for every 500 people. To compare health infrastructure across districts based on specified norms, ratios of key indicators are calculated and displayed in Table 2.

Table 3. ***District-Wise Major Ratios of Selected Indicators of Health Infrastructure in Jammu and Kashmir (2021-22).***

Name of Districts	Doctor/Nurse Ratio	Doctor/Population Ratio	Nurse/Population Ratio	Bed/ Population Ratio	District Hospital/ Population Ratio	CHCs/ Population Ratio	PHCs/ Population Ratio	SCs/ Population Ratio	Dispensary/ Population Ratio
Anantnag	1:2.5	1:32686.4	1:12995.8	Na	1:1078652	1:215730.4	1:16594.6	1:7760.1	1:33707.9
Bandipora	1:1.6	1:19611.6	1:12652.6	Na	1:392232	1:130744	1:14527.1	1:5524.4	1:21790.6
Baramulla	1:2.4	1:20572.2	1:8470.9	Na	1:1008039	1:144005.6	1:11721.4	1:5361.9	1:25200.9
Budgam	1:1.7	1:20371.5	1:12157.2	Na	1:753745	1:83749.4	1:10767.8	1:5542.2	1:20937.4
Doda	1:3.9	1:29281.1	1:7453.4	1:659.1	1:409936	1:136645.3	1:9760.4	1:2514.9	1:12056.9
Ganderbal	1:4.0	1:16524.8	1:4131.2	Na	1:297446	1:297446	1:9914.9	1:4957.4	1:15655.1
Jammu	1:2.9	1:39229.7	1:13189.3	1:2471.7	1:1529958	1:169995.3	1:15148.1	1:9444.2	1:24285.1
Kathua	1:15.3	1:154108.8	1:10105.5	1:1548.8	1:616435	1:123287	1:11630.8	1:3332.1	1:11854.5
Kishtwar	1:3.5	1:17745.8	1:5126.6	1:1415.3	1:230696	1:230696	1:8872.923	1:2651.678	1:9612.3
Kulgam	1:3.3	1:14149.4	1:4287.7	1: 1274.7	1:424483	1:141494.3	1:9432.9	1:3597.3	1:20213.5
Kupwara	1:2.9	1:20240.8	1:6962.8	Na	1:870354	1:124336.3	1:13815.1	1:3735.4	1:31084.1
Poonch	1:5.9	1:28049.1	1:4768.3	1:1258.1	1:476835	1:158945	1:10837.2	1:3480.5	1:20731.9
Pulwama	1:3.7	1:21555.4	1:5899.4	Na	1:560440	1:186813.3	1:11924.3	1:5777.7	1:32967.1
Rajouri	1:3.1	1:45886.8	1:14600.3	1:968.9	1:642415	1:91773.6	1:11680.3	1:3260.9	1:19467.1
Ramban	1:4.8	1:35464.1	1:7274.7	1:1916.9	1:283713	1:94571	1:9152.0	1:3337.8	1:15761.8
Reasi	1:19.5	1:78666.7	1:4034.2	1:1597.3	1:314667	1:157333.5	1:9535.364	1:3055.1	1:17481.5
Samba	1:7	1:45556.8	1:7592.8	1:1511.4	1:318898	1:106299.3	1:15185.6	1:3889	1:24530.6
Shopian	1:4.1	1:22184.6	1:5432.9	Na	1:266215	1:133107.5	1:16638.4	1:4670.4	1:26621.5
Srinagar	1:7.5	1:77301.8	1:10306.9	Na	1:1236829	1:1236829	1:17925.1	1:49473.2	1:51534.5
Udhampur	1:12	1:79283.6	1:6606.9	1:1185.9	1:554985	1:277492.5	1:11326.2	1:3801.3	1:17343.3

Source: Author's Calculations based on data in table 1 and Digest of Statistics Jammu and Kashmir 2021-22. **Note:** NA means data not available.

Table 3 indicates that the doctor/nurse ratio is generally favorable and exceeds the ideal ratio of 1:3 in many districts. However, the ratio is less satisfactory in the districts of Bandipora, Badgam, Kupwara, Samba, Anantnag, Baramulla, and Jammu. All districts in Jammu and Kashmir have insufficient ratios of doctors to the population and nurses to the population, with some districts experiencing the most severe shortage of doctors. In districts like Kathua, Udhampur, Reasi, and Shopian, the doctor-to-population ratio is 1:154108, 1:79283, 1:78666, and 1:77301, respectively. The nurse population ratio in all districts of Jammu and Kashmir is currently at its worst; however, it is relatively better than the doctor population ratio since it is far from the normal ratios. (1 physician per 1000 individuals and 1 nurse per 500 individuals). Insufficient data is available for around 9 districts regarding the bed/population ratio. District Doda has the most favorable ratio, with 1 bed per 659.1 people, close to the WHO's recommended ratio of 3 beds per 1000 people. Despite the poor conditions in various districts of Ramban, Reasi, Samba, Jammu, Kishtwar, Udhampur, and Kathua, the district hospital-to-population ratio is favorable in all districts, with each district having one district hospital serving the entire population. In contrast, the ratio is unfavorable in Anantnag, Baramulla, Jammu, and Srinagar, where one hospital is responsible for more than ten lakh people. The top hospitals, including Govt. Medical Colleges and affiliated hospitals, SKIMS Medical College, etc., are situated in Srinagar, Anantnag, Baramulla, Ganderbal, Jammu, Doda, Rajouri, and Kathua districts. All districts are in a better position in terms of the people served by primary health

care (PHC). As per IPHS guidelines, the ratio of primary health centers (PHCs) to population is 1 PHC for every 30,000 individuals in plains and 20,000 in hilly and tribal regions. Kishtwar has the highest ratio of dispensaries to population at 9612.3 persons, followed by Kathua at 11854 and Doda at 12056.5. Anantnag is facing a challenging circumstance where one dispensary is responsible for providing care to 33,707.9 individuals. Udhampur district has a population of 277492.5 people per Community Health Centre (CHC), which does not meet the recommended ratio of 120000 in plain regions and 80000 in hilly or tribal regions per CHC. In addition, the districts of Rajouri and Ramban have favourable conditions, with one Community Health Centre (CHC) catering to 91,773.6 individuals in Rajouri and 94,571 individuals in Ramban district. However, in districts such as Anantnag, Ganderbal, Kishtwar, and Udhampur, a single Community Health Centre (CHC) serves over 200,000 people. Disparities in the ratio of scheduled caste (SC) population to total population exist among districts, with Anantnag having a notably low ratio. The district is not meeting the statutory ratio of 1 SC per 5000 people in plains and 3000 people in hilly or tribal regions, as it is now serving 7760.1 persons per SC.

The discussion emphasizes differences in health infrastructure among districts in Jammu and Kashmir according to the necessary requirements. No district fulfilled all IPHS and WHO criteria. Many districts lack sufficient health facilities. Improving health infrastructure requires considering the development peculiar to each district.

Examination of Inter-District Disparities in the Development of Health Infrastructure

The deprivation and development indexes in the tables below show the variations in each district's overall performance about health infrastructure. Table 1 displays the categorization of districts based on their health and infrastructural advancement levels. All district hospitals have deprivation indices of zero and development indices of one, indicating full development. Jammu is either impoverished or well developed, with deprivation indices of zero for both primary health centers (PHCs) and community health centers (CHCs) and 0.341 for sub-centers (SCs). Ganderbal, Kishtwar, and Srinagar districts lack PHCs, CHCs, and SCs, resulting in a deprivation index score of one and a development index score of zero. In addition, Shopian is also experiencing a complete lack of primary health centers (PHCs).

Districts Shopian is the only district which have lowest number of dispensaries therefore, their deprivation index scores 1 and as opposite Jammu has no paucity due to highest number of dispensaries and has highest score that is 0 in deprivation index and 1in development index. Concerning beds in medical institutions, District Rajouri is without deprivation and can be considered as completely developed and districts of Jammu and Doda are at second and third places respectively in the values of development index. While Ramban is fully deprived with a score of 1.0 in deprivation index. In context of the number of doctors and nurses, District Baramulla and Kupwara is again wealthy (Deprivation Index = 0; Development Index = 1.0) while Bandipora, Kathua and Reasi is fully destitute (Deprivation Index = 1.0; Development Index = 0). For the availability of dispensaries (ayurvedic, Unani), the deprivation and development indices with low and high values once again shows Jammu district as developed and Shopian as deprived one respectively. However, the positions of district Jammu are developed in other medical staff and district Shopian is again deprived in this regard respectively.

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Table 4. District Wise Deprivation Index of Health Infrastructure in Jammu and Kashmir for 2021-22

		Deprivation Indices								
Name of Districts	**District Hospital**	**PHCs**	**CHCs**	**SCs**	**Doctors**	**Nurses**	**Beds**	**Other Medical Staff**	**Dispensaries**	**Average Deprivation Index**
Anantnag	0.00	0.423	0.500	0.452	0.355	0.447	NA	0.348	0.585	0.389
Bandipora	0.00	0.870	0.750	0.779	0.644	1.00	NA	0.905	0.849	0.725
Baramulla	0.00	0.176	0.250	0.216	0.00	0.064	NA	0.069	0.434	0.151
Budgam	0.00	0.365	0.00	0.466	0.267	0.670	NA	0.253	0.509	0.316
Doda	0.00	0.694	0.750	0.336	0.778	0.745	0.079	0.540	0.547	0.497
Ganderbal	0.00	0.835	1.00	0.832	0.689	0.564	NA	0.949	0.830	0.712
Jammu	0.00	0.000	0.00	0.341	0.222	0.096	0.085	0.00	0.00	0.082
Kathua	0.00	0.565	0.500	0.230	1.00	0.681	0.514	0.331	0.207	0.448
Kishtwar	0.00	0.882	1.00	0.701	0.800	0.851	0.970	0.872	0.736	0.757
Kulgam	0.00	0.659	0.750	0.552	0.422	0.276	NA	0.599	0.792	0.506
Kupwara	0.00	0.447	0.250	0.00	0.133	0.00	NA	0.108	0.660	0.199
Poonch	0.00	0.671	0.750	0.461	0.711	0.266	0.551	0.632	0.754	0.533
Pulwama	0.00	0.635	0.750	0.653	0.511	0.319	NA	0.743	0.868	0.560
Rajouri	0.00	0.541	0.250	0.173	0.778	0.862	0.00	0.345	0.566	0.391
Ramban	0.00	0.824	0.750	0.711	0.911	0.915	1.00	0.816	0.849	0.753
Reasi	0.00	0.800	0.875	0.625	1.00	0.500	0.905	0.779	0.849	0.703
Samba	0.00	0.941	0.750	0.726	0.933	0.883	0.878	0.852	0.943	0.767
Shopian	0.00	1.00	0.875	0.846	0.822	0.808	NA	1.00	1.00	0.794
Srinagar	0.00	0.376	1.00	1.00	0.733	0.053	NA	0.585	0.735	0.560
Udhampur	0.00	0.612	0.875	0.418	0.933	0.436	0.379	0.523	0.585	0.5290

Source: *Author's Calculations based on data in table 1.* ***Note:*** *NA means data not available.*

Table 5. District Wise Development Indices of Health Infrastructure in Jammu and Kashmir for 2021-22

		Development Indices								
Name of Districts	**District Hospital**	**PHCs**	**CHCs**	**SCs**	**Doctors**	**Nurses**	**Beds**	**Other Medical Staff**	**Dispensaries**	**Average Development Index**
Anantnag	1.00	0.576	0.500	0.548	0.644	0.553	NA	0.652	0.415	0.668
Bandipora	1.00	0.129	0.250	0.221	0.355	0.00	NA	0.095	0.150	0.355
Baramulla	1.00	0.824	0.750	0.784	1.00	0.936	NA	0.930	0.566	0.865
Budgam	1.00	0.635	1.00	0.534	0.733	0.329	NA	0.746	0.490	0.718
Doda	1.00	0.306	0.250	0.663	0.222	0.255	0.920	0.459	0.452	0.503
Ganderbal	1.00	0.165	0.00	0.168	0.311	0.436	NA	0.050	0.169	0.366
Jammu	1.00	1.00	1.00	0.659	0.778	0.904	0.914	1.00	1.00	0.917
Kathua	1.00	0.435	0.500	0.769	0.00	0.319	0.485	0.668	0.792	0.552
Kishtwar	1.00	0.118	0.00	0.298	0.200	0.149	0.029	0.128	0.264	0.242
Kulgam	1.00	0.341	0.250	0.447	0.578	0.723	NA	0.401	0.207	0.549
Kupwara	1.00	0.553	0.750	1.00	0.867	1.00	NA	0.891	0.339	0.822
Poonch	1.00	0.329	0.250	0.538	0.289	0.734	0.448	0.367	0.245	0.466
Pulwama	1.00	0.365	0.250	0.346	0.489	0.680	NA	0.256	0.132	0.502
Rajouri	1.00	0.459	0.750	0.827	0.222	0.138	1.00	0.654	0.434	0.609
Ramban	1.00	0.176	0.250	0.288	0.089	0.085	0.00	0.183	0.151	0.247
Reasi	1.00	0.200	0.125	0.375	0.00	0.500	0.095	0.220	0.151	0.296

Samba	1.00	0.059	0.250	0.274	0.067	0.117	0.122	0.147	0.056	0.232
Shopian	1.00	0.00	0.125	0.154	0.178	0.191	NA	0.00	0.00	0.294
Srinagar	1.00	0.623	0.00	0.00	0.267	0.946	NA	0.415	0.264	0.501
Udhampur	1.00	0.388	0.125	0.581	0.067	0.563	0.621	0.476	0.415	0.470

Source: *Author's Calculations based on data in table 1.* ***Note:*** *NA means data not available.*

Table 6: **Average deprivation index and Average development index**

Scores

Districts	**Development level**	**Average deprivation index**	**Average development index**
Anantnag, Baramulla, Budgam, Jammu, Kupwara and Rajouri	**High**	< 0.400	> 0.600
Doda, Kathua, Kulgam, Poonch, Pulwama, Srinagar and Udhampur	**Moderate**	0.400-0.600	
Bandipora, Ganderbal, Kishtwar, Ramban, Reasi, Samba and Shopian	**Poor**	> 0.600	< 0.400

Source: Based on Calculations in table 4 and 5

Next, it is evident that the values of deprivation and development indices are moderately high (between 0.400 - 0.600) for the districts of Doda, Kathua, Kulgam, Poonch, Pulwama, Srinagar and Udhampur. Therefore, with the hunches of development of health infrastructure, these are placed in the second category of moderately developed districts in table 4 and table 5 above.

Contrary to the above, deprivation is said to be very high in the districts having score above 0.600 in deprivation index is Bandipora, Ganderbal, Kishtwar, Ramban, Reasi, Samba and Shopian or less than 0.400 in development index. Similarly, districts include Anantnag, Baramulla, Budgam, Jammu, Kupwara and Rajouri in which deprivation is less than 0.004 and development index is greater than 0.006 are included in high development index respectively. Thus, the scores of deprivation and development indices vary among districts thereby highlight the inter-district disparity in the development of health infrastructure in Jammu and Kashmir

4. Conclusion

Overall, the survey found significant gaps in health infrastructure availability across districts of Jammu and Kashmir. The Coefficient of Variation values indicate inter-district imbalances, with medical institutes having the most available doctors, nurses, PHCs, CHCs, SCs and dispensaries. Second, inter-district comparisons of computed ratios of various variables indicate differences in health infrastructure facilities, while adhering to established norms. Along the ratios, Doctor-nurse in most of the districts is near to recommended standards but districts like Reasi, Kathua and Udhampur are on the bad stage in this case. However, population ratio with PHCs, CHCs and SCs also varies among districts in which a few districts are found to be comfortable while the majority of districts are tolerating the heavy burden of population. But, what so ever be the population pressure, the districts are fulfilling the norms of having at least one district hospital. Except the ratio of district hospital to population, the other ratios in all districts are not worth mentioning from the point of view of the Standards prescribed by Government and WHO.

Finally, to examine the differences in the overall performance of each district with reference to health infrastructure, deprivation and development indices are constructed. The scores of these indices confirm the wide discrepancies among districts in the development of health infrastructure. Also, on the basis of scores of these indices, the districts are classified into three categories. First category includes the districts of Anantnag, Baramulla, Budgam, Jammu, Kupwara and Rajouri having high level of health infrastructural development and are enjoying first rank respectively in this case. In second category districts of Doda, Kathua, Kulgam, Poonch, Pulwama, Srinagar and Udhampur with moderate level of development were kept. The third category comprises
Bandipora, Ganderbal, Kishtwar, Ramban, Reasi, Samba and Shopian which are underprivileged with regard to the development of health infrastructure.

5. Policy Implication

This study emphasizes that health infrastructure development in Jammu and Kashmir should be balanced and unbiased. New hospitals, health centers, healthcare facilities, and other institutions are being built in places where they are in insufficient supply. Filling vacant positions for doctors, nurses, and other medical workers in Jammu and Kashmir districts makes sense to increase availability for the population. To address the shortage of medical personnel in Jammu and Kashmir, the government may consider encouraging individuals working outside the state to return home. To address medical staff shortages in certain districts, the government may consider re- appointing retired medical personnel. Effective utilization of both human and financial resources is crucial for meeting health infrastructure standards across all domains.
The districts including Bandipora, Ganderbal, Kishtwar, Ramban, Reasi, Samba and Shopian are proved as backward in health infrastructure, call for concrete plan of action from the Government of Jammu and Kashmir. There should be separate programmes of health infrastructure development in each district

according to their requirement. To support it, the government should enhance budgetary allocations for health infrastructure in each district on an annual basis. Furthermore, the state must increase the amount of its GDP allocated to the health sector in order to achieve efficiency, sufficiency, and equity in this sector. Additionally, there is an urgent need to address cash leakages and unethical activities. To promote good governance, the state should create a legislative authority to supervise policies, programs, and processes aimed at minimizing gaps in health infrastructure between districts.

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