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An inter-district comparative analysis of KPI of Public health care services disparities in the Union Territory of Jammu and Kashmir.

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Abstract:

Introduction: Research regarding specific Key Performance Indicators (KPIs) related to healthcare utilization is lacking, particularly in assessing district hospitals across central, north, and south Kashmir. This research aims to fill this gap by focusing on KPI analysis, providing insights into healthcare delivery in the region. The ultimate goal is to facilitate informed decision-making and drive improvements in service delivery.

Methodology:This study explores healthcare dynamics in Kashmir's district hospitals, using selected Key Performance Indicators (KPIs,)to assess utilization performance. Rooted in the Donabedian model, the research employs a quantitative approach, combining cross-sectional surveys and retrospective data analysis.

Results:Findings highlight disparities in meeting IPHS-2012 standards, revealing fluctuating bed occupancy, admission rates, and disparities in outpatient consultations, , surgeries, and patient referrals. Notable observations include Pulwama extended patient stays, Bandipora's. The study identifies areas for targeted interventions to enhance service quality and satisfaction levels, guiding healthcare resource allocation and policy development.

Conclusion:The study highlighted changing healthcare demand and service utilization across different hospitals of the valley. Discrepancies were observed in various aspects of services provided by these hospitals emphasizing a need of improvements in delivering quality and timely services to the patients.

Keywords: Kashmir, district hospitals, healthcare utilization, Key Performance Indicators(KPIs,) Donabedian model, IPHS-2012, disparities, healthcare delivery, resource allocation, targeted interventions.

Introduction

Health is regarded as the most precious property since it affects every aspect of life. The World Health Organization (WHO) has established health as a condition of the whole physical, mental, and social well-being and not only the absence of sickness or disability[1],[2].Access to healthcare services is a fundamental human right, essential for maintaining and improving health outcomes. However, in many parts of the world, including the region of Kashmir, access to health care services remains a significant challenge. Geographical barriers, limited resources, and sociocultural factors can all contribute to disparities in healthcare access and utilization, particularly in rural and remote areas.[3]

District hospitals play a crucial role in bridging these gaps in care by providing a wide range of services, from primary healthcare to specialized treatments. Understanding the patterns of healthcare utilization in these hospitals is essential for identifying areas of improvement and ensuring that healthcare services are effectively reaching those in need. According to the National Sample Survey (NSS) from 2017-18, 77% of all OPD cases in rural areas and 51% in urban areas, as well as 96% of all IPD cases in rural areas and 78% in urban areas, were provided by public facilities.Under the National Rural Health Mission (NRHM), a significant advancement is seen as 506 districts are now equipped with both ambulances and Mobile Medical Units (MMUs), marking a substantial improvement in emergency medical services. The integration of emergency response services remains a focal point, with 102-type services operating in 9955 Union Territories (UTs) under the National Health Mission (NHM), and 104-type services available in 605 UTs. Notably, the 108-type emergency response services are operational in 140 UTs, signifying the efforts to enhance comprehensive healthcare provisions. The J&K UT has improved its healthcare services with a focus on primary and secondary care under the NHM program. According to a report NFHS 5, areas like Jammu, Kulgam, Kupwara, Pulwama, and Samba have been excellent in providing quality services especially in terms of prenatal care, but other regions of the UT like Budgam, Kathua, Rajouri, Udhampur, and Leh (Ladakh) have not been satisfactory. In J&K UT, there are 10 districts where Mobile Medical Units (MMUs) are available through the NRHM. The J&K UT has managed to fill 93.54% of the required Accredited Social Health Activists (ASHAs) positions under the NRHM(NHM) and 63.04% under the NUHM. The ratio of doctors to staff nurses is 1:1, and for every 10,000 people, there are 6 public health providers, including Medical Officers, specialists, staff nurses, and ANMs (Auxiliary Nurse Midwives).Despite the importance of district hospitals in the healthcare system of Kashmir, there is a lack of comprehensive studies assessing their utilization

patterns. Existing studies have primarily focused on specific aspects of healthcare utilization, such as utilization rates for specific services. A more comprehensive assessment is needed to provide a holistic understanding of how healthcare services are utilized in district hospitals and to identify areas for improvement.

This manuscript presents the findings of a study aimed at assessing the utilization of health services in three major district hospitals of Kashmir viz Pulwama, Ganderbal & Bandipora. The study aims to analyze various aspects of healthcare utilization, including service utilization trends, and barriers to access. By identifying patterns and trends in healthcare utilization, the study seeks to inform policies and interventions that can enhance healthcare delivery in district hospitals and improve health outcomes for the population of Kashmir.

Methodology

The conceptual foundation for this study is rooted in the Donabedian model, pioneered by Aveda's Donabedian, a physician and health services researcher at the University of Michigan in 1966. This framework serves to elucidate the factors influencing health services utilization.In this study, we employed an exploratory approach to systematically assess the utilization of selected public healthcare services within district hospitals across the Kashmir Valley. Utilizing a cross-sectional, retrospective survey, and observational design, we aimed to identify patterns of utilization of these services. Our research variable focused on the utilization of healthcare services through Key Performance Indicators (KPIs), while attribute variables encompassed various indicators of hospital performance. Mediating variables such as qquality of care, aaccess to sservices, eefficiency, and technological aadoption were considered alongside contextual variables specific to district hospitals in the Kashmir Valley. The study was conducted across three district hospitals in the Kashmir region of northern India, employing a multistage cluster sampling technique to ensure comprehensive representation across various healthcare facilities. Data collection involved the use of structured questionnaires, designed based on Indian Public Health Standards (IPHS) of 2012. These tools assessed the utilization of selected public health services from 2016 to 2021. Ethical considerations were paramount, with ethical clearance obtained from IEC IUST and permissions secured from relevant authorities and hospital management before data collection commenced. Additionally, rapport development with hospital management was emphasized to facilitate direct data collection by the investigator, ensuring adherence to ethical standards throughout the research process.

Statistical analysis

The Structured questionnaires were collected and coded in a MS Excel database and analysed by using the SPSS statistical package, version 26.0. Descriptive statistics and inferential statistics were used. Pearson's chi-square test, Annova, Regression Analysis were used to examine health services. The collected information has been compiled and put in the form of maps and tables for further analysis.

Results

This analysis examines the utilization of healthcare services across three district hospitals: Ganderbal, Bandipora, and Pulwama from 2016 to 2021.Key Performance Indicators (KPIs,) (Hospital Statistics) were analyzed to understand trends in healthcare utilization and inform strategic decision-making.

Utilization of Out-Patient Services

In terms of OPD consultations per 1000 Population, Ganderbal Hospital observed a peak in OPD consultations in 2020 (99.26 per 1000 population), while in Bandipora highest was in 2017 (24.24) and Pulwama hospital recorded highest consultations in 2019 (20.11). These fluctuations reflect changes in outpatient demand over time. We noted the patient load per doctor in Medicine OPD where we observed that Ganderbal hospital had a significant increase in Medicine OPD per doctor from 2016 to 2020, peaking at 62888 in 2020 before declining. Bandipora hospital showed fluctuating trends, with the highest utilization was observed in 2016 (50918) and a decrease thereafter. Pulwama hospital had a substantial increase in 2019, reaching a peak of 489746, followed by a decline in subsequent years. For patient load per doctor in Surgery OPD, we observed that the number of surgical outpatient consultations per doctor varies across the districts. Ganderbal: 29235, 29005, 36340, 35620, 38669, 15220, Bandipora: 12096, 13262, 14013, 15210, 6130, 4181, Pulwama: 54, 87, 34, 62, 87, 43, Ganderbal consistently shows higher values compared to Bandipora and Pulwama. The fluctuation in values across districts and over time can be further analyzed to understand the demand for surgical services and resource allocation. Similarly, the pediatric outpatient consultations per doctor differ across districts. Ganderbal: 38704, 35242, 37572, 38060, 40200 & 22060 and Bandipora: 26052, 27130, 27440, 28832, 9031, 5260 had higher values compared to Pulwama: 32, 199, 263, 271, 176, 223. Analyzing these values can provide insights into the pediatric healthcare needs in each district and the effectiveness of pediatric healthcare delivery. The OBG outpatient consultations per doctor also varied with Ganderbal showing higher values 28825, 32837, 32623, 36022, 38500,

25070 compared to Bandipora: 406, 464, 406, 542, 406, 254 and Pulwama: 345, 278, 876, 477, 234, 199. Understanding these variations can help in assessing the demand for maternal and reproductive healthcare services and the distribution of OBG specialists across districts. The number of dental outpatient consultations per doctor varied across districts and time periods with Ganderbal reporting 11158, 9221, 9523, 9064, 12768, 1095 cases while as Bandipora recorded 21968, 19284, 17482, 14275, 4777, 3417 cases and Pulwama recorded 44, 65, 78, 49, 37, 45 cases. Analyzing these values can shed light on the dental healthcare needs in each district and the availability of dental healthcare professionals. The ophthalmology outpatient consultations per doctor exhibit variability across districts and time periods with Ganderbal recording 18983, 5472, 17149, 19666, 25000, 11200 patients compared to Bandipora: 6215, 7388, 6710, 8039, 6474, 2329 and Pulwama: 128, 456, 345, 194, 332, 187. Understanding these variations can provide insights into the demand for eye care services and the distribution of ophthalmologists across districts. TB/DOT (Tuberculosis/Directly Observed Treatment) outpatient consultations per doctor vary across districts and time periods. TB/DOT OPD per doctor in Ganderbal was 1080, 900, 1200, 1514, 1950, 2600 compared to Bandipora: 52, 74, 49, 67, 55, and 29 and Pulwama: 43, 96, 129, 675, 125, and 165. Analyzing these values can help in assessing the demand for TB treatment services and the effectiveness of TB control programs. Ganderbal hospital excelled in TB/DOT OPD per doctor, surpassing Pulwama (second highest) then Bandipora hospital. Moreover, with respect to ENT (Ear, Nose, and Throat) OPD per doctor, Ganderbal hospital had limited data of 6500, 6800 available, Pulwama had 49, 8432, 543, 765, 287, 342 cases, while as the data for Bandipora hospital was not available. Analyzing available values can provide insights into the demand for ENT services and resource allocation for ENT healthcare. The number of immunization outpatient consultations per 1000 population fluctuated across districts and time periods. Ganderbal hospital showed a significant increase in Immunization OPD per 1000 from 2016 to 2017, peaking at 48,947, followed by a decline in subsequent years. The data for immunization in Pulwama &Bandipora hospitals was not available. Analyzing these values can provide insights into immunization coverage rates and the effectiveness of immunization programs in each district **(Fig. 1)**[Table 1]**.

Finally the AYUSH outpatient consultations per doctor varied across districts and time periods. Ganderbal Hospital had the highest AYUSH OPD per doctor with values of 15137, 16134, 9822, 16525, 17520, 570 compared to Bandipora: 3430, 4197, 6614, 6175, 4752, 1985, and Pulwama: 13464, 13923, 7401, 8197, 6582, 5645. Analyzing these values can help in assessing the

demand for alternative medicine services and the availability of AYUSH practitioners in each district **[Table 1]**.

Proportion of Follow-up Patients

The proportion of follow-up patients varied across the three district hospitals and time periods. Pulwama hospital had the highest numbers of patients on follow-up 3558, 2876, 2345, 7865, 4547, 2864 followed by Ganderbal: 2%, 2.50%, 2.50%, 3.10%, 5.50%, 6.20%, while as no data was available from Bandipora district hospital. Understanding these proportions can help in assessing patient retention rates, treatment adherence, and the quality of follow-up care provided in each district **[Table 1]**.
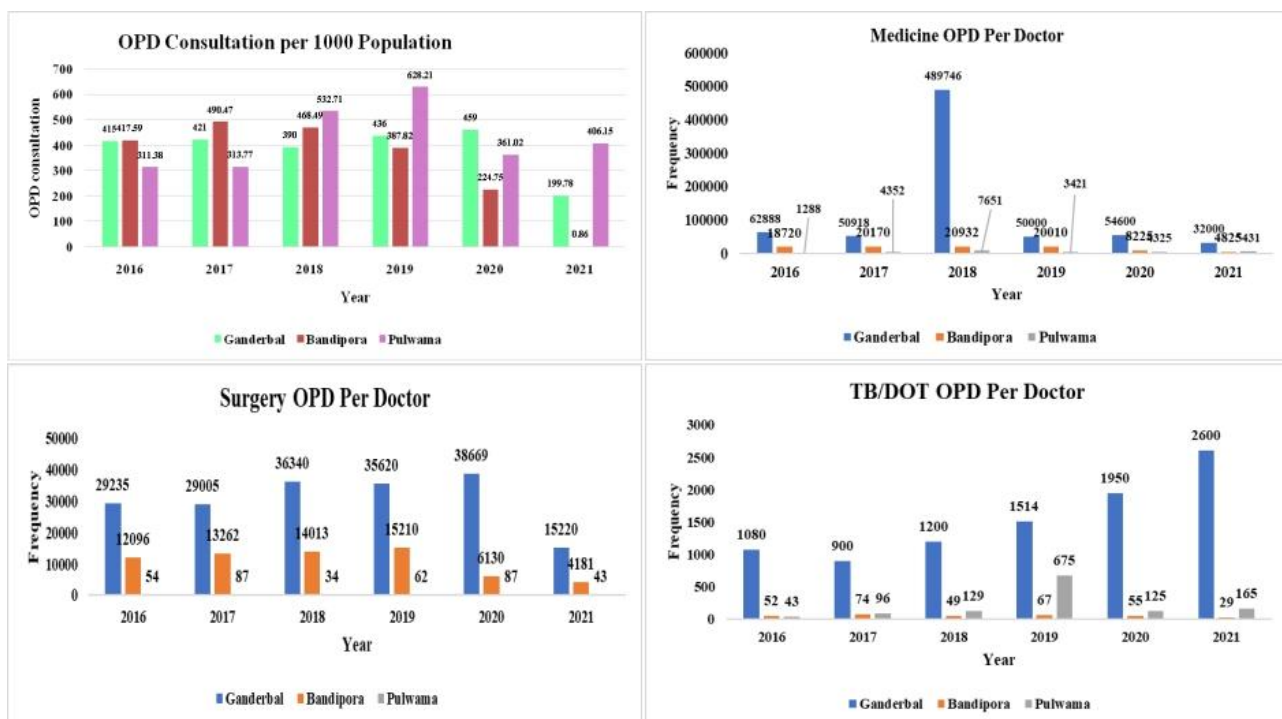

Fig.1: OPD Consultation, Medicine OPD, Surgery OPD, TB/DOT OPD per doctor per 1000 population across three hospitals.

Utilization of In-Patient Services

In terms of total admissions per 1000 Population, Ganderbal hospital recorded highest numbers of 24.93 admissions per 1000 population in 2018, while Bandipora and Pulwama recorded their respective highest admissions of 100.20 and 103.97 per 1000 population in 2021. These numbers indicate the demand for in-patient services over time. For Bed Occupancy Rate (BOR), Ganderbal hospital recorded highest BOR of 91.10% in 2019, while Bandipora and Pulwama

hospitals recorded highest rates of 68% and 80.80% in 2021 and 2018, respectively. These figures reflect the efficient utilization of hospital beds. In terms of average length of stay, Ganderbal and Bandipora Hospitals maintained short average lengths of stay (around 2 days), indicating efficient patient turnover. Pulwama Hospital had a longer average stay, averaging about one week, potentially indicating more complex cases. Moreover, for inpatient department (IPD) Admissions per 1000 Population, Ganderbal hospital recorded highest IPD admissions in 2018 (26.58 per 1000 population), Bandipora in 2017 (21.88 per 1000 population), and Pulwama in 2019 (20.92 per 1000 population). These numbers suggest variations in in-patient healthcare demand over the years. With respect to bed availability, Ganderbal and Bandipora district hospitals consistently had 0.34 beds available per 10,000 population whereas Pulwama hospital showed variable bed availability rates with figures ranging from 0.18 to 0.67 beds per 10,000 population.The number of beds per 10000 populations was constant up to 2019 and then showed an increase during 2020 and 2021 in Ganderbal and Bandipora hospitals. On the other hand, the number of beds per 10000 populations remained constant up to 2018 and then showed an increase during the years of 2019-2021 in Pulwama district hospital. Furthermore, the patient discharge rate was lowest during the year 2018 in Pulwama hospital whereas it was higher and constant during the years of 2016-2021 in Bandipora district. Ganderbal district was having a varying rate of 70-90% during 2016-2021. Discharge rates remained relatively stable, indicating consistent patient management practices. Also, referral rate fluctuated over the years, with Bandipora experiencing the highest rate in 2017 (944) and Ganderbal the lowest in 2020 (319). Similarly, for bed turnover rate, Pulwama district hospital had the highest rate in 2019 (16.225) and Bandipora the lowest in 2020 (6.17). Lastly, regarding hospital-acquired infection rate, Ganderbal hospital consistently maintained a lower infection rate, with the lowest being 1% in 2016. The infection rate at Bandipora district hospital remained consistently above 5%, peaking at 10% in 2020 and 2021whileas Pulwama hospital infection rate ranged from 1% to 10% (**Fig. 2**)[**Table 2**].
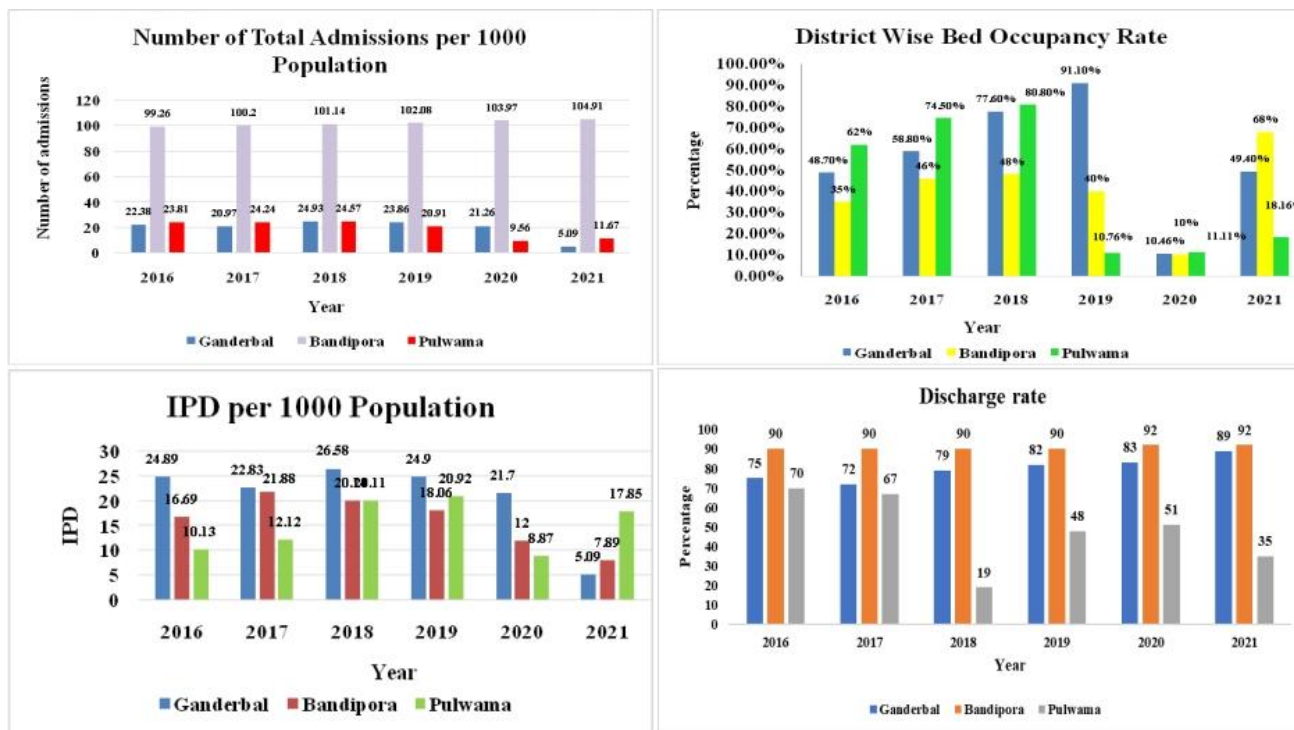
Fig.2:IPD Consultation, Total number of admissions, Bed occupancy rate, and discharge rate per 1000 population across three hospitals.

Table-1: Utilization of outdoor Patient Services across three district hospitals.

Outdoor Patients	Ganderbal						Bandipora						Pulwama					
	2016	2017	2018	2019	2020	2021	2016	2017	2018	2019	2020	2021	2016	2017	2018	2019	2020	2021

Proportion of Follow up patients	2%	2.50%	2.50%	3.10%	5.50%	6.20%	No Ans	No Ans	No Ans	No Ans	No Ans	No Ans	3558	2876	2345	7865	4547	2864
Immunization OPD per 1000	10384	13337	48947	12371	13108	7615		No Ans	No Ans	No Ans	No Ans	No Ans	2776	2438	3101	3193	2712	2613
Medicine OPD Per Doctor	62888	50918	489746	50000	54600	32000	18720	20170	20932	20010	8225	4825	1288	4352	7651	3421	4325	5431
Surgery OPD Per Doctor	29235	29005	36340	35620	38669	15220	12096	13262	14013	15210	6130	4181	54	87	34	62	87	43
Paediatric OPD Per Doctor	38704	35242	37572	38060	40200	22060	26052	27130	27440	28832	9031	5260	32	199	263	271	176	223
OBG OPD per Doctor	28825	32837	32623	36022	38500	25070	406	464	406	542	406	254	345	278	876	477	234	199
Dental OPD Per Doctor	11158	9221	9523	9064	12768	1095	21968	19284	17482	14275	4777	3417	44	65	78	49	37	45
Ophthalmology OPD Per Doctor	18983	5472	17149	19666	25000	11200	6215	7388	6710	8039	6474	2329	128	456	345	194	332	187
TB/DOT OPD Per Doctor	1080	900	1200	1514	1950	2600	52	74	49	67	55	29	43	96	129	675	125	165
ENT OPD Per Doctor / per year	Nil	Nil	Nil	Nil	6500	6800	No Ans	No Ans	No Ans	No Ans	No Ans	No Ans	49	8432	543	765	287	342
Psychiatry OPD Per Doctor	1065	3044	7849	6360	7015	8156	No Ans	No Ans	No Ans	No Ans	No Ans	No Ans	34	75	45	88	39	38
AYUSH OPD Per Doctor	15137	16134	9822	16525	17520	570	3430	4197	6614	6175	4752	1985	13464	13923	7401	8197	6582	5645

Table-2: Utilization of outdoor Patient Services across three district hospitals.

Indoor Patients	Ganderbal District Hospital						Bandipora District Hospital						Pulwama District Hospital					
	2016	2017	2018	2019	2020	2021	2016	2017	2018	2019	2020	2021	2016	2017	2018	2019	2020	2021

Number of Total Admissions per 1000 Population	22.38	20.97	24.93	23.86	21.26	5.09	99.26	100.20	101.14	102.08	103.97	104.91	23.81	24.24	24.57	20.91	9.56	11.67
IPD per 1000 Population	24.89	22.83	26.58	24.9	21.7	5.09	16.69	21.88	20.14	18.06	12.00	7.89	10.13	12.12	20.11	20.92	8.87	17.85
Referral Rate	703	944	681	359	319	157	673	722	743	702	712	345	50.6516	42.3439	25.5123	24.533	57.8788	28.7542
Discharge Rate	75%	72%	79%	82%	83%	89%	90	90	90	90	92	92	70.2184	67.2261	18.877	47.9485	50.9962	34.753
Bed Turnover rate	No Ans	No Ans	No Ans	No Ans	No Ans	No Ans	No Ans	No Ans	No Ans	No Ans	No Ans	No Ans	9.61	11.93	16.225	9.47	6.17	12.745
Hospital acquired infection rate	2%	2.50%	1.90%	1%	1%	1%	6%	5.20%	5.80%	5%	10%	10%	10%	10%	5%	3%	5%	5%
Bed Occupancy Rate (BOR)	48.70%	58.80%	77.60%	91.10%	10.46%	49.40%	35%	46%	48%	40%	10%	68%	62.00%	74.50%	80.80%	10.76%	11.11%	18.16%
Number of Total Admissions per 1000 Population	22.38	20.97	24.93	23.86	21.26	5.09	99.26	100.20	101.14	102.08	103.97	104.91	23.81	24.24	24.57	20.91	9.56	11.67
Number of beds per 10000 population	0.34	0.34	0.34	0.34	0.67	0.67	0.25	0.25	0.25	0.25	0.38	0.38	0.18	0.18	0.18	0.36	0.36	0.36
Average length of stay	1.2 days	1.2 days	1.5 days	1.7 days	2 days	1.5 days	2 days	2 days	2 days	2 days	2 days	2 days	7 days	6 days	5 days	5 days	5 days	5 days

Discussion

Utilization of OPD Services: Looking at outpatient department (OPD) consultations per 1000 population, it varied among Ganderbal, Bandipora, and Pulwama hospitals over the years. Ganderbal Hospital saw its peak in 2020 with 99.26 consultations per 1000 population, followed by a decline to 87.64 in 2021. Bandipora Hospital recorded its highest rate in 2017 with 24.24

consultations per 1000 population, which decreased to 0.86 in 2021. Pulwama Hospital's peak occurred in 2019 with 20.11 consultations per 1000 population, with fluctuations over time indicating shifts in outpatient demand. By assessing the patient-to-doctor ratio in outpatient departments (OPDs) of district hospitals, we can facilitate inter-district comparisons, accounting for variables such as population density and hospital accessibility. This data-driven approach will offer valuable insights into resource allocation and enable more informed decision-making processes aimed at optimizing healthcare delivery and improving patient outcomes.

The Study conducted bySoumitra Ghosh where the author examined horizontal inequities in healthcare utilization across rural and urban populations in 15 major states, the North-east region, and India as a whole. He also investigated the relationship between horizontal inequity in hospital admission and per capita public spending on health. The findings revealed that current levels of healthcare utilization were notably low in most states, with substantial intra-state rural-urban differences in those where utilization was relatively better. Interestingly, urban populations consistently showed higher utilization rates across all healthcare indicators, despite the rural population requiring greater medical attention. Moreover, the study highlighted that healthcare utilization, both outpatient and inpatient care, was closely associated with income at the country level. This implies that individuals with similar healthcare needs receive varying levels of care based on their income, indicating pro-rich inequity. However, there were variations in income-related differences in outpatient care utilization among states. Only Punjab, Kerala, and the North-east region achieved horizontal equity in outpatient care utilization. Importantly, while both rural and urban areas exhibited pro-rich inequity, outpatient care utilization was less inequitable in urban areas than in rural areas in many states This is noteworthy considering that urban populations constitute only 28% of India's total population. These findings underscore the urgent need for policy interventions to address horizontal inequities in healthcare utilization, particularly for outpatient care patients. Efforts should focus on improving access to healthcare services, reducing financial barriers, and ensuring equitable distribution of healthcare resources across rural and urban areas.[4]

Even WHO standards, have come out with the fact that the doctor-to-patient ratio in India falls short, with one doctor serving approximately 1,445 individuals, compared to the recommended ratio of one doctor for every 1,000 people and this deficiency is particularly pronounced in tertiary care facilities (like PGI, Chandigarh), where the daily influx of about 500 new patients strains existing resources. Ideally, each patient should receive between 15 to 30 minutes of consultation time, ensuring quality care. However, super specialty clinics in government

hospitals often grapple with overwhelming patient loads and insufficient staffing. It is imperative to address this issue to uphold patients' fundamental right to receive adequate time and quality treatment from healthcare providers.[5]

Utilization of Specialized OPDs: The analysis across various specialties indicates fluctuations in outpatient consultations per 1000 population, highlighting variations in healthcare demand over time. Diverse trends were observed in outpatient consultations per doctor across districts and years, reflecting shifts in patient needs and service priorities. For instance, Medicine OPD per doctor ranged from 32,000 to 62,888 across hospitals. Understanding these variations is crucial for optimizing healthcare delivery. Additionally, data gaps in areas like Bandipora underscore the importance of comprehensive data collection for informed decision-making.The study's findings align with those of NITI Ayog, showing variations in OPD utilization across different hospitals and districts. Among 707 hospitals analysed, 177 fell within the upper quartile, with Uttar Pradesh having the highest proportion at 49.2%. Notably, Balarampur Hospital in Lucknow, Malkhan Singh District Hospital in Aligarh, and Rajnarayan Maheshwari Government Hospital in Firozabad experience high patient loads, contributing to their significant OPD per doctor ratios. These findings highlight the need for targeted interventions to manage patient influx and improve healthcare services in high-utilization hospitals.[5]

Sumitra Ghosh's study highlights the disparity in outpatient care between rural and urban areas across various states in India, with a consistent trend favoring the wealthy, particularly evident in rural settings[4]. Anand Sharma's research emphasizes the overwhelming burden on health institutions in Jammu and Baramula districts, where a significant number of patients from surrounding districts seek care due to inadequate infrastructure elsewhere[..6] This underscores the need for improved healthcare facilities beyond major urban centers. Furthermore, Ghosh's findings reveal a pro-rich bias in both outpatient and inpatient care across rural and urban areas in India. Inequities are more pronounced in rural populations, with high per capita government health spending associated with reduced disparities in inpatient care utilization[4]. This underscores the importance of targeted investment in healthcare infrastructure to address inequities and ensure access to quality care for all.

As already discussed supra, the NITI Aayog's observations regarding healthcare infrastructure and service delivery in district hospitals across India, disparities in OPD patient load per doctor was seen with (Uttar Pradesh) having the highest proportion of hospitals with heavy patient

loads. Moreover, it underscored the variability in bed availability across districts, with less populated areas often performing better in infrastructure-related metrics.[5]

Utilization of IPD Services: Hospital bed capacity is a critical aspect of healthcare infrastructure, influencing patient care and staff workload. This key performance indicator (KPI) falls under the structural domain and is primarily managed by the state policies and hospital administrative decisions as per need and demand. It pertains to regularly maintained and staffed hospital beds that are readily available for admitted patients. Specifically, it reflects the number of functional hospital beds per 1 lakh people in a district, excluding floor beds, trolley beds, and beds in specific areas like labour rooms and operation theatres. This metric is calculated by dividing the number of functional hospital beds by the district's population and multiplying by 100,000. The study is consistent with Md. Mustaquim etal, where he mentioned populations post-2019 and 2018, respectively, indicating efforts to meet growing healthcare needs. Insufficient bed capacity relative to the size of population. Hospital infrastructure of rural Murshidabad is not very good. In the study area, bed capacity is very low according to the size of population of every block.[7]

Utilization of In-patients services: In the present study we assessed data on following KPI utilization of In-patients services.Total Admissions per 1000 Population, Bed occupancy rate, average length stay: Ganderbal Hospital peaked at 24.93 admissions per 1000 population in 2018, while Bandipora and Pulwama reached their highest admissions at 100.20 and 103.97 per 1000 population in 2021, respectively. The analysis of total admissions per 1000 population across Ganderbal, Bandipora, and Pulwama hospitals reveals varying trends over time. Ganderbal Hospital peaked in 2018, whereas Bandipora and Pulwama showed their highest admissions in 2021. These figures underscore the evolving demand for in-patient services and highlight the need for continuous monitoring and resource allocation to meet patient needs effectively. Ganderbal Hospital's BOR peaked at 91.10% in 2019, while Bandipora and Pulwama reached their highest rates at 68% and 80.80% in 2021 and 2018, respectively. These findings indicate efficient utilization of hospital beds across the districts, reflecting the hospitals' ability to accommodate patient demand while maintaining operational efficiency. Ganderbal and Bandipora Hospitals maintained short average lengths of stay (around 2 days) indicating efficient patient turnover. Ganderbal and Bandipora hospitals maintained short average lengths of stay, suggesting efficient patient turnover and management practices. In contrast, Pulwama Hospital exhibited a longer average stay, potentially indicating the treatment of more complex cases.

Understanding these variations in average length of stay is essential for optimizing resource allocation and improving patient flow within hospital settings.The World Health Organization's global standards recommend 5 hospital beds per 1000 people, yet India falls significantly short with only 0.5 beds per 1000 people, inclusive of both public and private hospitals. The report specifically focuses on the availability of functional hospital beds in district hospitals, these supportive studies underscore the critical need for efficient utilization of hospital resources and the importance of aligning with international standards to ensure optimal healthcare delivery for the population.[5]

Study from Soumitra Ghosh has revealed that the average length of stay was longer in rural areas (9.5 days) compared to urban areas (8.6 days). This difference may be attributed to disparities in access to quality healthcare, with poorer individuals requiring longer hospital stays due to financial constraints[4]. Another study by Dr. Harshal More and Dr. Shashikant Sharma (2019) revealed consistent trends in hospital utilization indicators across multiple years, with an average length of stay ranging from 9 to 10 days and a bed occupancy rate of 70 to 75 percent. Their findings suggest optimal functioning of hospitals in terms of bed occupancy and bed turnover rates, with values for average length of stay and bed turnover interval exceeding the average.[8]According to the IPHS 2012 guidelines, district hospitals serving a population of 10 lakhs should maintain a bed occupancy rate of at least 80%, corresponding to a bed requirement of 220 beds. However, the national average bed occupancy rate in small and mid-sized hospitals stands at 39.49% and 33.89%, respectively.[5] At the primary healthcare level, very low bed occupancy rates (below 42%) signal significant challenges such as a shortage of medically trained personnel, irregular supply of medications and other essential medical supplies, and breakdowns in the transfer and referral systems. Conversely, high bed occupancy rates indicate a health system under strain. While hospitals cannot operate at 100% occupancy due to the need for spare bed capacity to accommodate fluctuations in demand, bed occupancy rates exceeding 90% present operational challenges. These include delays in emergency departments, inappropriate placement of patients on wards, increased risks of hospital-acquired infections, and heightened pressure on staff to free up beds, potentially compromising patient safety. Among the 707 hospitals surveyed, 182 had bed occupancy rates of 90% or higher. Uttar Pradesh had the highest proportion of such hospitals at 14.8%, followed by Madhya Pradesh (10.9%), Maharashtra (8.2%), Odisha (8.2%), West Bengal (7.1%), and Andhra Pradesh (5.5%). These

findings underscore the pressing need for strategies to manage bed occupancy effectively and improve healthcare delivery across states and union territories.[5] .

Referral rate, Discharge, infection rate: Referral rates fluctuated over the years, with Bandipora experiencing the highest rate in 2017 (944) and Ganderbal the lowest in 2020 (319). Discharge rates remained relatively stable, indicating consistent patient management practices. While data was unavailable for some years, the bed turnover rate varied, with Pulwama Hospital having the highest rate in 2019 (16.225) and Bandipora the lowest in 2020 (6.17). Ganderbal consistently maintained a lower infection rate, with the lowest being 1% in 2016. As reported by NITI Aayog to adequately serve an 80% annual bed occupancy rate, a district hospital should ideally have a minimum of 22 beds for every 1 lakh population. Puducherry leads the nation with an average of 222 beds per 1 lakh population in its district hospitals, while Bihar has the lowest average of 6 beds per 1 lakh population. On a national scale, district hospitals in India maintain an average of 24 beds per 1 lakh population. State/UT-wise averages for the number of functional beds per 1 lakh population vary across small, mid-sized, and large district hospitals, reflecting disparities in healthcare infrastructure distribution.Balarampur Hospital in Lucknow district is Uttar Pradesh's largest and most renowned hospital. Owing to variety of specialties and super-specialties available, many complex cases are referred from different districts of the state.[5]

Conclusion

The comprehensive analysis of outpatient and inpatient services utilization across various district hospitals in India reveals significant variations in healthcare demand, resource allocation, and operational efficiency. The findings underscore the critical importance of efficient utilization of hospital resources to meet the evolving healthcare needs of the population. Disparities in patient loads per doctor, average length of stay, bed occupancy rates, and bed availability highlight the complex challenges faced by healthcare systems, particularly in addressing the needs of diverse populations across different regions. Efforts to align with international standards, such as those recommended by the World Health Organization and NITI Aayog, are crucial for optimizing healthcare delivery and ensuring equitable access to quality care for all individuals. Addressing disparities in healthcare infrastructure distribution, enhancing staffing levels, and implementing strategies to manage bed occupancy effectively are essential steps toward improving healthcare

outcomes and patient satisfaction. Furthermore, the studies underscore the need for targeted investment in healthcare infrastructure, particularly in rural and underserved areas, to address inequities and ensure access to quality care for all segments of the population. By adopting a data-driven approach and implementing evidence-based interventions, healthcare stakeholders can work toward enhancing the efficiency, effectiveness, and accessibility of healthcare services, ultimately contributing to improved health outcomes and well-being for communities across the nation.

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