



Geographical Distribution of Healthcare Facilities in Poonch District: An Evaluation through GIS

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Abstract: The aim of this study is to depict the geographical distribution of Health Centers in the Poonch district using a GIS-based Health Information System. The study also focuses on the generating baseline information for the development, maintenance, and planning of these health centers. The GIS-based Health Information System was applied to collect data on health facilities in the study area. The collected data were categorized into various groups such as District Hospital, Community Health Centers, Primary Health Centre, and Sub Centers. The GIS database was then used to manage the collected data more efficiently. A total of 160 Health Centers were mapped in the Poonch district: 1 District Hospital, 3 Community Health Centers, 17 Primary Health Centers, and 139 are Sub Centers. The collected data include information such as the name, location, category, number of beds, number of doctors, population-doctor ratio, patients nurse ratio, patient-doctor ratio, doctor-nurse ratio, bed population ratio, institution-population ratio, doctor-institution ratio, and block-wise vaccination administered. The utilization of the GIS-based health information helped with the mapping of the geographical distribution of healthcare facilities and the collection of data concerning the management of healthcare facilities. This information is highly anticipated to aid in the programming of various developmental policies and work. The availability of baseline data can help in the efficient allocation of resources, identification of gaps in health services, and improved decision-making in the health sector. This study provides a useful framework for the use of GIS in the health sector, which can be replicated in other regions to improve the delivery of health services.

Keywords: geographical • distribution • accessibility • health centers • geographic information system • health centers

Introduction

Health is a basic necessity and a right for all people, and it is a significant concern both politically and socially. In the 1970s, it was acknowledged that poverty and health deficiencies were interconnected (Peters et al 2008). In response, developing countries initiated the 'Health-for-All' strategic, which was strengthened by the Alma Ata Declaration of 1978 (Hall & Taylor 2003). Despite the efforts of governments and international aid to enhance healthcare access, many individuals in

developing countries still lack access to adequate healthcare services (Atuoye et al 2015; O'Donnell 2007; Strasser et al 2016).

The issue of healthcare access in developing countries exists in two dimensions. On the supply side, healthcare provisions may not be available, or, when present, may not deliver quality and effective services due to insufficient stocks. On the demand side, individuals may be unable to obtain the health services that they require (Mooney 1983). In reality, these two aspects are interconnected.



In the context of health planning, geographical distribution can be defined in different ways, but generally, it includes four aspects of distribution: availability, affordability, accessibility, and the geographical dimension (Mcintyre et al 2009). The geographical dimension refers to the physical location of healthcare facilities and the ease of reaching them from the patients' origin, which is commonly known as geographic accessibility (Agbenyo et al 2017; Lotfi & Koohsar 2009; Brabyn & Sutton 2013). The concept of accessibility considers the physical distance and time required to travel from one location to another (Garrod & Fennell 2023). When it comes to healthcare, access refers to the ability to recognize healthcare requirements, search for and access healthcare services, receive necessary treatment, and have healthcare needs met (Lovejoy et al 2023).

To facilitate health planning, this study has mapped each health center in the Poonch district in an extensive Geodatabase format. The Geodatabase allows for easy access to information such as name of health facility, location, number of doctors, in charge and available facilities, with a single click of a mouse. This study holds significant value for our health department as it will assist in executing several projects regarding development and maintenance of health facilities.

The condition of roads in the border district of Poonch plays a vital role in ensuring accessibility to healthcare services for the residents. A Good transport system is crucial for accessing healthcare and for the well-organized allotment of supplies and drugs to health facilities, especially in rural areas where it is often lacking (Kenneth 2023; Ahmad et al 2023). Thus, this paper aims to estimate the accessibility of healthcare services in the Poonch district. To achieve this, we analyze the spatial distribution of health facilities in the Poonch district using ArcGIS. Additionally, we explore

the challenges faced by the health infrastructure in Poonch district, particularly concerning population access to healthcare facilities.

The paper is structured into six sections. In Section two, the geographical location and description of the study area are provided. Section three details the research methodology and setting. A general overview of the healthcare system in Poonch at the district level is presented in Section four. The analysis of the study findings is presented in Section five. Finally, Section six includes the discussion of the results and concluding remarks.

Materials and Methods

Study Area: The study is conducted in the Poonch District located in the Union Territory of Jammu and Kashmir, India. It is one of the 20 districts in the region and covers an area of approximately 1,674 square kilometers. The district is situated between longitudes 73°58'E and 74°35'E and latitudes 33°25' N and 34°01' N. It is located in the northeastern region of Kashmir Valley, bordered by Rajouri in the south and Pakistan-administered Kashmir in the west (as shown in Figure 1).

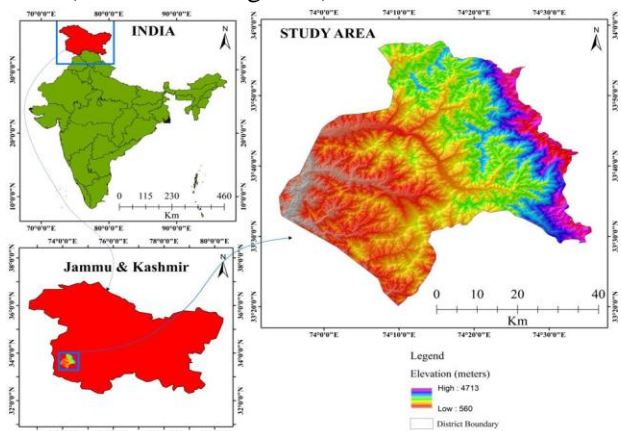


Fig 1: Location of the study area.

The altitude in the area ranges from 567 to 4713 meters above sea level, and it is prone to severe weather conditions, particularly during winters when there is snow cover. Forests cover more than half (56.81%) of the total area in the



district, while the wetlands mainly consist of the Poonch river and its tributaries.

As per the 2011 census, the district has a population of 476,820 with a population density of 285 per square kilometer. The literacy rate in the region is 68.60%, with more than one-third of the population belonging to tribal communities. The district is also relatively underprivileged, with approximately one-third of the population living below the poverty line. The local economy of the district is largely based on agriculture, with a majority of the population being subsistence farmers. The district also has some small-scale industries that include carpet weaving, embroidery, and handicrafts.

The region faces several challenges, including inadequate healthcare facilities with poor infrastructure, and limited access to education. The road network in the area is underdeveloped, and the condition of roads is often poor, especially during the monsoon season. This makes it difficult for residents to travel to nearby towns and cities to access better healthcare services and facilities. Additionally, the district faces a shortage of medical professionals, and health facilities are often understaffed and under-resourced.

The district is also experiencing low health indicators. It has been categorized as a district of high priority by the Government of India because of its substandard execution in the health sector (MOHFW India, 2015).

Methodology: The methodology of this study involved obtaining geographic coordinates of several health centers using GPS technology (see Figure 2). These coordinates were overlaid onto a high-resolution GeoEye-1 image. The health-related data of these facilities were then classified into different thematic maps or layers using ArcGis software. These classifications include the District Hospital, Community Health Center, Primary Health Center, Sub-Center.

The process of creating the ultimate geospatial database of Health Centers in the Poonch district involved saving the thematic maps mentioned earlier in the Geodatabase format.

Data Sets: The study utilized the following datasets:

GPS Data Collection: The Poonch district was thoroughly surveyed using GPSMAP 64s devices to establish a geospatial database of Health Centres in this study.

Ancillary Data: The supplemental information was obtained from the Chief Medical Officer and initially in hard copy format. To create a database of the health centers in the Poonch district, which includes their names and locations, the data was converted to an Excel file.

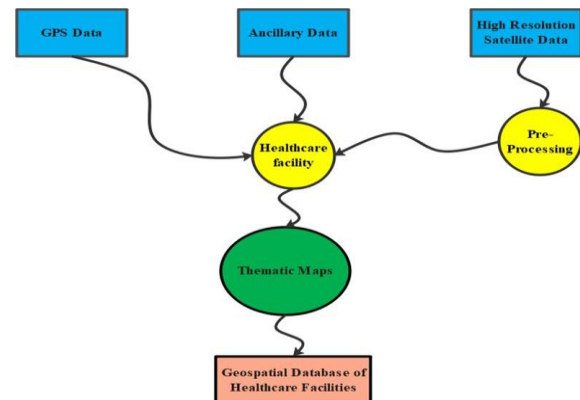


Figure 2. Flow chart of the methodology.

GeoEye-1: The GeoEye-1 satellite was successfully launched on September 6, 2008, and separated from its Delta II launch vehicle 58 minutes and 56 seconds after the launch, as reported by Justin Ray in 2008. This satellite has the capability to capture high-resolution panchromatic imagery at a resolution of 41 centimeters (16 inches) and multispectral imagery at a resolution of 1.65 meters, with a swath width of 15.2 kilometers. It operates in a sun-synchronous orbit with an altitude of 681 kilometers (423 miles) and an inclination of 98 degrees, crossing the equator at 10:30 am. The satellite is capable of capturing imagery up to 60



degrees off-nadir and is controlled from Herndon, Virginia. The GeoEye-1 was built by General Dynamics Advanced Information

Results

Mapping of Different Health Facilities: As part of the study, an extensive field survey was carried out in the Poonch district to locate and map health centers using GPS. The survey identified a total of 160 health facilities, including one district hospital, three community health centers, 17 primary health centers, and 139 sub-centers. The mapping data was used to create a geodatabase that contains both spatial and non-spatial information about each site. In addition to location data, the field survey also collected further information to develop a comprehensive health information system. The collected information includes details on the facilities available, infrastructure, number of beds, number of doctors, population-doctor ratio, patient-doctor ratio, patient nurse ratio, doctor-nurse ratio, doctor-institution ratio, bed population ratio, institution-population ratio, block-wise vaccination administered.

Healthcare System in Poonch District : The healthcare facilities of Poonch district come under the government of the Indian union territory of Jammu and Kashmir. The healthcare system in the union territory is primarily funded and managed by the government through the Department of Medical and Health Education. The department is responsible for the execution, implementation, and monitoring of healthcare programs and services in the area. Within the district, the healthcare facilities are managed by various levels of government health institutions, such as the Chief Medical Officer (CMO) and the district health department.

The study primarily focuses on the publicly-funded rural healthcare system in Poonch district. It presents a comprehensive account of the hierarchical structure of healthcare institutions in the study area. Additionally, it

Systems, located in Arizona (<https://en.wikipedia.org/wiki/GeoEye>).

provides a thorough portrayal of rural healthcare facilities, their development, regulations, and staffing procedures.

The GIS-based Health Information System helped in the collection of data on health facilities in the study area. The collected data were categorized into various group such as District Hospital, Community Health Center, Primary Health Centre, and Sub Health Center.

Poonch district comprises 10 blocks, which include Poonch, NSSB, Sathra, Loran, Mandi, Lassana, Bufliaz, Surankote, Mankote, and Balakote with the district headquarters situated in Poonch. Table. 1, provides a block-wise geographical distribution of healthcare facilities, total population and tribal population in the district.

Community Health Centre: A CHC is a healthcare facility that is established and maintained by the State Government under the Minimum Needs Program, with the primary objective of functioning as a referral center for four PHC while also meeting the healthcare needs of the rural population as a hospital. The norm for a CHC is to serve a population of 80,000 to 120,000 individuals in rural areas. To achieve this objective, each CHC should have four specialists in the areas of surgery, pediatrics, gynecology, and other necessary fields. Additionally, a CHC should be equipped with 30 beds for inpatient care, a laboratory, an X-ray machine, and other essential facilities.

The CHCs are responsible for providing a wide range of healthcare services, both as regular outpatient services and inpatient care. They offer comprehensive family welfare services, including obstetric and gynecological care, as well as specialized services for high-risk pregnancies in their labor rooms.



Table 1. Number of Health Facilities and Population Distribution in Poonch.

S.No.	Name of the Block	Distt. Hospital	Sub Distt. Hospital	PHC	Sub Centers	Total Health Centre	Total population	ST Population
1	Poonch	1	-	2	14	17	80710	26639
2	NSSB	-	-	2	7	9	27969	14336
3	Sathra	-	-	-	7	7	21152	9308
4	Loran	-	-	1	10	11	22236	5238
5	Mandi	-	1	1	11	13	36771	5019
6	Lassana	-	-	1	15	16	35500	17140
7	Bufliaz	-	-	3	20	23	50027	13903
8	Surankote	-	1	1	12	14	61104	29760
9	Mendhar	-	1	2	15	18	80049	30543
10	Mankote	-	-	1	14	15	31890	16744
11	Balakote	-	-	3	14	17	29427	7471
Total		1	3	17	139	160	476835	176101

Source: Census of India, 2011; and Chief Medical Officer, Poonch, 2022.

Additionally, they provide surgical services, medical and pediatric care, laboratory diagnostics, X-ray facilities, and support for national health programs. Their focus on maternal and child healthcare is reflected in the immunization and other specialized services they provide.

The Poonch district's CHCs were located and identified by utilizing GPS and recording the points in a Geodatabase. Three CHCs were mapped, but some of them suffer from shortages in staffing, equipment, facilities, medicine, etc. However, the majority of the CHCs are in a satisfactory state. The location of these health facilities can be seen in (Figure 3). The geographical distribution of Community Health Centers (CHCs) in the Poonch district is uneven and poses significant challenges to the provision of healthcare services to the local population. The district has only 3 CHCs, 1 in Mendhar, 1 in Mandi, and 1 in Surankote. This leads to a lack of accessibility to basic healthcare services, particularly in the more isolated and underdeveloped parts of the district. Furthermore, several other challenges faced by the people of Poonch district have been

identified. These include in- adequate healthcare infrastructure, shortage of medical staff, low public health awareness, and limited access to essential medicines.

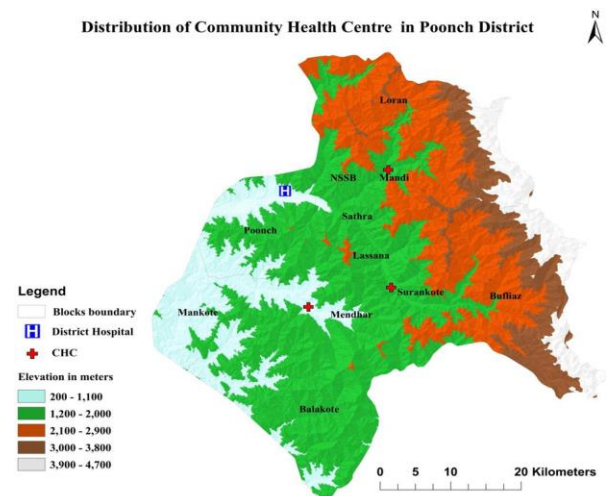


Figure 3. Geographical distribution of Community Health Centre.

“One respondent mentioned that even though the health center compound is closer, the nurse there gives only paracetamol whatever the situation. Some of them are forced to treat themselves and that brings complications sometimes” (Male respondent, July, 2023).

In addition, the district’s difficult terrain and harsh weather conditions make it difficult to



transport patients to health facilities in case of emergencies. *“Discussions with local people revealed that some people are inaccessible in the rainy seasons due to the poor conditions of the road. Some respondents recounted the challenges they encountered in moving sick persons to health center compounds which in most cases is the nearest health facility”*.

These factors contribute to poor health outcomes and low life expectancy in the district. Therefore, addressing these challenges is crucial for improving the healthcare system in Poonch and ensuring better health outcomes for the local population.

Primary Health Centre: The Primary Health Centre (PHC) is a crucial element in terms of the hierarchy of public healthcare services in India, situated second from the bottom. According to the Indian Public Health Standards (IPHS 2012), they are considered the foundation of health services in rural areas and are often the first point of contact for those seeking medical attention in rural areas. They provide curative, preventive, and promotive healthcare services for patients, who may be referred from Health Sub-Centers.

In the Poonch district, 17 PHCs have been identified and mapped using GPS technology and their locations have been stored in a Geodatabase. While most of these facilities are in satisfactory condition, some lack essential staff, equipment, facilities, and medicines. Figure 4 illustrates the distribution of these health facilities.

The geographical distribution of Primary Health Centers (PHCs) in Poonch district is uneven and inadequate, creating significant challenges for the local population's access to healthcare services. Despite the government's efforts to expand healthcare infrastructure in the district, many villages and remote areas lack access to basic healthcare facilities. The residents of these regions often face the challenge of having to

travel significant distances to access medical care, which not only consumes a lot of time but also incurs significant expenses.

Moreover, the standard of healthcare facilities in Poonch district is often substandard due to the inadequacy of healthcare personnel, medical supplies, equipment, and facilities. This results in long waiting times, inadequate treatment, and a high level of dissatisfaction among patients.

The shortage of doctors and nurses in the district is particularly severe. *One male respondent mentioned that his father was a heart patient, and to treat his health condition he had to take him to a hospital that was far away from his place due to the lack of doctors and nurses with specialization in the nearby hospital (Male discussant, July, 2023).*

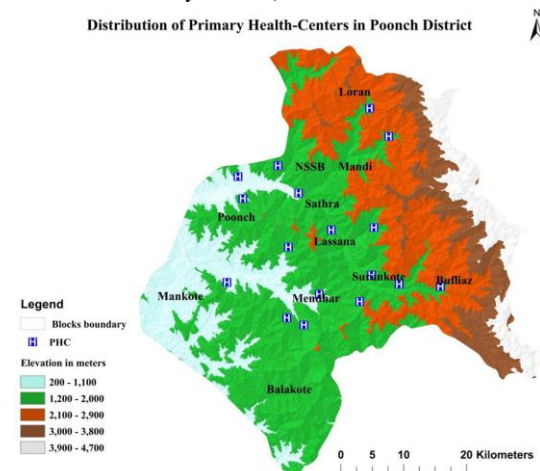


Figure 4. Geographical distribution of Primary Health Centre in Poonch district.

Sub-Centre: The Health Sub-Centre (HSC) acts as the first point of contact between the community and the public healthcare system in India, playing a critical role in the effectiveness of the overall healthcare system. As the most peripheral unit of the primary healthcare system, the performance of these facilities is essential.

The primary goal of Sub Health Centers (HSCs) is to provide preventive and promotive healthcare services, including antenatal, natal, and postnatal care, family planning counseling,



and treatment for common ailments like respiratory infections, diarrhea, fever, and worm infestations. In addition to basic curative care, HSCs take proactive measures to combat malnutrition and implement various health programs at the national and state levels, with the help of frontline workers such as Auxiliary Nurse Midwives (ANMs), Accredited Social Health Activists (ASHAs), Aanganwadi Workers (AWWs), and Male Health Workers (MHWs). The Poonch district has a total of 139 Sub Health Centers, which can be located on the map displayed in (Figure 5).

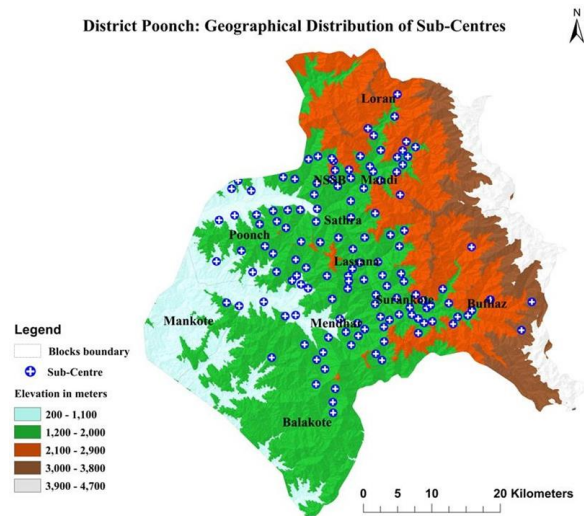


Figure 5. Geographical distribution of sub-center in Poonch district.

However, despite the significant number of Sub Centers, there are still concerns about the accessibility and quality of healthcare in the district. The rugged terrain and difficult conditions in many areas make it challenging for people to access healthcare services. There is a shortage of healthcare professionals and facilities in the district, leading to a heavy workload for the available staff. This can lead to inadequate attention and care for patients, which can have serious consequences. Additionally, some people in the district may have limited awareness of the importance of seeking medical

care, which can lead to delayed treatment and worsening health conditions.

Geographical Distribution of Road Connectivity and Health Facilities:

The analysis of road connectivity and geographical distribution of health facilities in the Poonch district reveals significant disparity in access to healthcare. Figure 6 shows that, while there is a relatively good distribution of health facilities across the district, there are still areas with limited access to healthcare. These areas are often located in remote or mountainous regions where road connectivity is poor, making them difficult to reach during the monsoon season when roads are often washed out or impassable. This lack of accessibility poses a significant problem for the local population, who often must travel long distances to receive medical care, or worse, go without treatment altogether.

“A resident of the Mankote block described the situation in their community as dire, stating that they are closer to their graves than to any healthcare facility. The main issue, as they explained, is the lack of roads in the area. As you may have witnessed, they have to cross rivers to reach the nearby Health Centre” (Male discussant, July, 2023).

“One female respondent added that lack of transportation is a significant barrier to accessing healthcare, particularly during emergencies. She shared a personal experience regarding the challenges of giving birth to her child. She expressed that while every woman loves children, childbirth in her community is a matter of life and death due to the distance of the hospital and poor road conditions. She explained that during her last delivery, she was referred to a district hospital due to excessive bleeding, and although an ambulance was requested for the 25 km journey, none was available. Consequently, her husband had to transport her on his bike, and she gave birth in the middle of the road behind a bush before



being taken back home” (Female discussant, July, 2023).

There is a clear need for targeted interventions to improve road connectivity and ensure that health facilities are strategically located to maximize accessibility and impact. Failure to address this issue risks exacerbating existing health disparities and undermining efforts to improve health outcomes in the region. By overlaying road network data with health facility locations, it becomes clear that improving road connectivity is essential for improving healthcare access in these underserved areas. The analysis also reveals that there are opportunities to improve healthcare delivery by strategically placing new health facilities along major roads and highways, which can serve as hubs for outreach programs and mobile clinics.

Road Connectivity and Geographical Distribution of Health Facilities

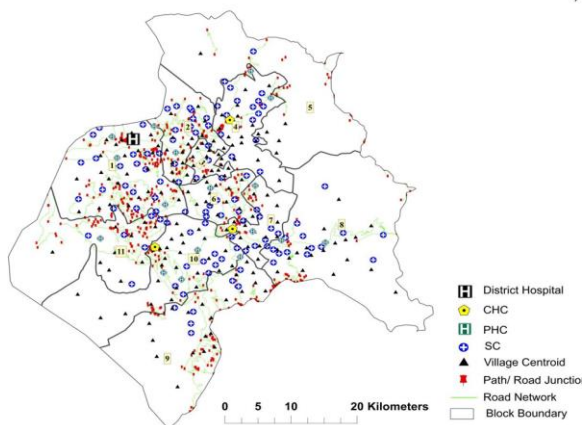


Figure 6. Road connectivity and geographical distribution of health facilities in the Poonch district.

Utilizing GIS in the development of Health Information Systems (HIS) in Poonch district:

The Health Information System in Poonch district is a digital information system that leverages GIS technology to store essential data about health facilities. This include their name, location, classification, bed count, doctor count, patient-doctor ratio, population-doctor ratio, patient-nurse ratio, doctor-nurse ratio, institution-population ratio, bed-population ratio,

and doctor-institution ratio. The HIS preserves health facility information in a digital format, facilitating easier analysis and connection of different types of data. Additionally, the system enables digital documentation of health facilities, which can support efforts to improve them. Block-wise vaccination administered data is also collected and stored in the HIS.

GIS plays a crucial role in determining when and where to intervene, enhancing the standard of care and availability of services, identifying the most economical delivery modes, and safeguarding patient privacy while meeting the research community's demand for data availability (Dada et al 2023). GIS can efficiently plan the routes that healthcare practitioners should take, considering various relevant factors (Mengüç et al 2023). Strategic planning, research and evaluation, emergency readiness and response, and healthcare service location can all benefit from GIS technology (Hoff et al 2023).

GIS technology offers significant advantages to healthcare providers for managing and organizing healthcare services (Quamar et al 2023). By utilizing GIS and spatial data analysis, professionals in public health and decision-making can quickly and efficiently draw conclusions regarding various health issues (Carbajales-Dale et al 2023). This enables healthcare providers to coordinate and organize services more effectively, ensuring that patients receive appropriate and timely healthcare services (Chow et al 2023).

The aim of this study was to underscore the role of GIS as a decision-making tool in healthcare and its contribution to formulating policies related to the health section in the Poonch district. The table below (Tables 2 to 6) shows the Geo Database prepared for different healthcare facilities, including block-wise hospital beds available, patients-doctor ratio, population-doctor ratio, institution-population



ratio, block-wise vaccination administered, and number of doctors.

Table 2, provides valuable information on the availability of hospital beds in each block of the Poonch district. The table shows that Block Poonch has the highest number of hospital beds

Table 2. Block wise Hospital Beds Available.

S.No	Hospital			Allopathic Dispensaries	PHC	Ayurvedic/Unani Dispensaries	AYUSH/DTC	Total
	Blocks	DH	CHC					
1	Poonch	220	-	2	10	4	4	240
2	Mandi	-	30	2	5	2	1	40
3	Surankote	-	30	4	5	1	1	41
4	Bufliaz	-	-	2	15	1	-	18
5	Mendhar	-	30	2	10	4	1	47
6	Balakote	-	-	4	15	2	0	21
7	Sathra	-	-	2	-	2	-	4
8	Loran	-	-	2	5	-	-	7
9	Saibaba nangali	-	-		10	1	-	11
10	Lassana	-	-	6	5	2	-	13
11	Mankote	-	-	4	5	1	-	10

Source: District Statistics & Evaluation Officer, Poonch, 2022.

This data highlights the significant disparities in the availability of hospital beds across different blocks in Poonch district. In particular, blocks with lower hospital bed availability may struggle to meet the healthcare needs of their populations, potentially resulting in poorer health outcomes.

It is worth noting that hospital bed availability alone may not be a sufficient indicator of the quality of healthcare services provided in a given block. Other factors such as the quality of

available, with a total of 240. This is followed by Block Mendhar, which has 47 hospital beds. In contrast, Blocks Sathra, Loran, and Sai Baba Nangali have the lowest number of hospital beds available, with totals of 4, 7, and 11 beds respectively.

medical staff, equipment, and supplies should also be taken into account when evaluating the effectiveness of healthcare delivery systems.

Table 2 provides critical information for policymakers and public health officials seeking to improve access to healthcare services in Poonch district. By identifying areas with lower hospital bed availability, it becomes possible to develop targeted interventions and allocate resources more effectively to improve overall healthcare outcomes in the region.

Table 3. Patients-Doctor, Population-Doctor ratio, and Institution-Population Ratio.

Year	Hospitals	Patients Doctor ratio	Population Doctor Ratio	Patient Nurse ratio	Doctor nurse ratio	Institution population ratio	Bed population ratio	Doctor instt. ratio
2015-16	Allo+Ayu	369:01:00	2337:01:00	10174:1	1:03	1.1619	2.2772	1:2
2016-17	Allo+Ayu	369:01:00	2337:01:00	10174:1	1:03	1.1619	2.2770	1:2
2017-18	Allo+Ayu	369:01:00	2337:1	10174:1	1:03	1.1619	2.2772	1:2
2018-19	Allo+Ayu	369:01:00	2337:1	10174:1	1:03	1.1619	2.2772	1:2
2019-20	Allo+Ayu	13842:1	653:01:00	21965:1	2:01	252:01:00	1207:01:00	3:1

Source: District Statistics & Evaluation Officer, Poonch, 2022.



Table 3, presents information on the Patients-Doctor ratio, Population-Doctor ratio, Institution-Population Ratio, and other related ratios for the Poonch district of Jammu and Kashmir for the years 2015-16 to 2019-20.

The data reveals that the Patients-Doctor ratio in the Poonch district remained constant over the five-year period, with a ratio of 369:1:00 for Allopathic and Ayurvedic hospitals. However, the Population-Doctor ratio decreased from 2337:1:00 in 2015-16 to 653:1:00 in 2019-20, indicating an increase in the availability of doctors per population. Similarly, the Institution-Population ratio also improved from 1.1619 to 252:1:00 during the same period, indicating an increase in the availability of healthcare institutions per population.

Table 4. Vaccination Administered.

S.No.	Year	BCG	Polio	T-Oxide	Measles	Others (Penta+HepB)	Total
1	2015-16	10669	10682	11163	21307	17016	70840
2	2016-17	10313	10903	11992	10224	19358	62829
3	2017-18	10462	10370	16291	18994	19221	75338
4	2018-19	10795	48600	-	15790	37687	112872
5	2019-20	11264	47518	-	20512	37261	116555

Source: District Statistics & Evaluation Officer, Poonch, 2022.

Table 4 provides data on vaccination coverage in a particular region over a period of five years. The data shows an increasing trend in the total number of vaccinations administered each year, peaking at 116,555 vaccinations in 2019-20.

Among the specific vaccinations, BCG and Polio have been administered consistently across all five years, with 10,000-11,000 BCG vaccinations and 10,000-11,000 Polio vaccinations each year. However, there has been significant variation in the administration of other vaccines. For example, the number of Measles vaccinations administered in 2015-16 was 21,307 but dropped to 10,224 in 2016-17, before increasing again in 2017-18 and 2019-20. Similarly, the number of Tetanus Toxoid vaccinations administered in 2017-18 was significantly higher than in other years.

However, the Patients-Nurse ratio remained constant at 10174:1 over the five-year period, while the Doctor-Nurse ratio improved slightly from 1:3 to 2:1. This indicates that while the availability of doctors has increased, there has been no corresponding increase in the availability of nurses. The data suggests that while there has been some improvement in the availability of doctors and healthcare institutions in the Poonch district over the five-year period, the availability of nurses has remained constant. There is a need for further research to understand the reasons behind this disparity and to develop targeted interventions to improve the availability of healthcare professionals in the district.

The data also highlights a significant increase in the number of "Others" vaccinations, which includes Penta+HepB vaccinations. In 2015-16, only 17,016 "Others" vaccinations were administered, but this increased to 37,261 in 2019-20. This suggests a growing emphasis on administering combination vaccines that protect against multiple diseases.

Table 4 provides valuable information for policymakers and public health officials seeking to improve vaccination coverage in the region. By identifying trends and variations in vaccination coverage over time, it becomes possible to identify areas where interventions may be needed and to target resources and interventions more effectively to improve overall vaccination coverage and ultimately improve public health outcomes in the region.



BLOCKWISE VACCINATION ADMINISTERED : DISTRICT POONCH

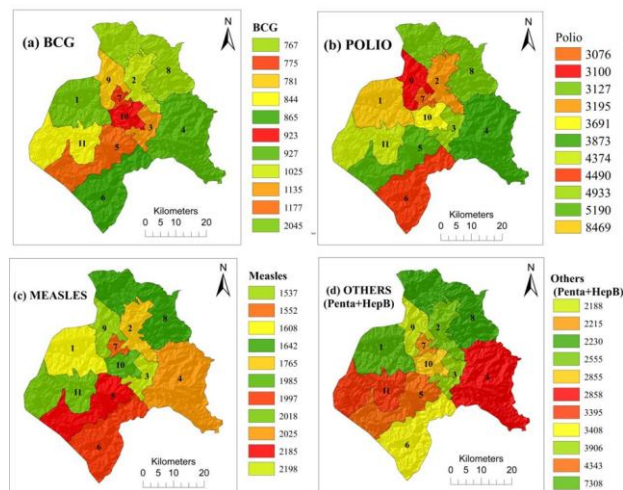


Figure 7. Block-wise Vaccination Administered; Block name; 1. Poonch, 2. Mandi, 3. Surankote, 4. Buffleaz, 5. Mendhar, 6. Balakote, 7. Sathra, 8. Loran, 9. Sai baba nangali, 10. Lassana, 11. Mankote.

Figure 7(a) shows the number of BCG vaccinations administered in each block of the Poonch district. BCG vaccination is primarily used against tuberculosis, and its administration is an important public health measure to prevent the spread of the disease. According to the data, the block of Poonch had the highest number of BCG vaccinations administered, with a total of 2045. The blocks of Mendhar and Surankote also had relatively high numbers of vaccinations, with 1177 and 1135 respectively. Mandi, Buffleaz, Balakote, Sathra, Loran, Sai Baba Nangali, Lassana, and Mankote had varying numbers of vaccinations administered, ranging from 767 to 1025. The data suggest that efforts to administer BCG vaccinations in the Poonch district are ongoing and that most blocks have received some level of coverage. However, there is still some variability in the number of vaccinations administered between different blocks, which may reflect differences in population density or access to healthcare services.

Figure 7(b) provides data on the block-wise administration of polio vaccinations in the Poonch district. The total number of polio vaccinations administered in the district was 47,518. The block-wise distribution shows that the Poonch block had the highest number of vaccinations, with 8,469 vaccinations. This was followed by the Mendhar block with 5,190 vaccinations and the Buffleaz block with 3,873 vaccinations. The lowest number of vaccinations was administered in the Sathra block, with 3,076 vaccinations. These numbers suggest that while there has been significant progress in administering polio vaccinations in the district, disparities in vaccination coverage across the blocks persist. Further analysis of factors contributing to these disparities, such as differences in population density, healthcare access, and community attitudes towards vaccinations, is necessary to identify effective strategies to improve vaccination coverage and protect all children in the district from polio.

Figure 7(c) shows the number of measles vaccinations administered in each block of the Poonch district. The total number of vaccinations administered is 20,512. The highest number of vaccinations was administered in the Surankote block, with a total of 2,198 vaccinations. Mandi and Mendhar blocks also had high vaccination rates, with 1,765 and 2,185 vaccinations respectively. Sathra and Sai Baba Nangali blocks had the lowest vaccination rates, with 1,552 and 1,537 vaccinations respectively. The data suggests disparities in vaccination coverage across different blocks in the Poonch district. These disparities may be due to factors such as differences in access to healthcare services, variations in vaccine awareness and acceptance, and differences in outreach efforts by health workers. Identifying and addressing these disparities is crucial to ensure all children in the district are protected against measles and



other vaccine-preventable diseases. Figure 7(d) provides data on the block-wise administration of Penta+HepB vaccinations in the Poonch district. The total number of vaccinations administered across all blocks is 37,261. The highest number of vaccinations was administered in the Poonch block with 7,308 vaccinations, followed by Mendhar with 4,343 vaccinations and Surankote with 3,906 vaccinations. The lowest number of vaccinations was administered in the Sai Baba Nangali block, with 2,188 vaccinations. This data highlights the need for targeted interventions to improve vaccination coverage in blocks with lower vaccination rates, such as Sai Baba Nangali, Sathra, Loran, and Balakote. Additionally, there may be opportunities to replicate successful

vaccination strategies from blocks with higher vaccination rates, such as Poonch and Mendhar, in blocks with lower vaccination rates. Figure 7 provides valuable information for policymakers and public health officials seeking to improve vaccination coverage in Poonch district. By identifying areas with lower vaccination rates, it becomes possible to develop targeted interventions and allocate resources more effectively to improve overall vaccination coverage and ultimately public health outcomes in the region. Table 6 provides data on the number of doctors working in various healthcare institutions in the Poonch district. The total number of doctors across all institutions is 85, with the highest number of doctors working at D.H. Poonch, which has 35 doctors.

Table 5. Block-wise Vaccination Administered.

S.No	Blocks	BCG	Polio	Measles	Others (Penta+HepB)	Total
1	Poonch	2045	8469	1608	7308	19430
2	Mandi	1025	3195	1765	2555	8540
3	Surankote	1135	4933	2198	3906	12172
4	Bufliaz	927	3873	2025	2858	9683
5	Mendhar	1177	5190	2185	4343	12895
6	Balakote	865	4490	1997	3408	10760
7	Sathra	775	3076	1552	2215	7618
8	Loran	767	3127	1642	2230	7766
9	Sai baba nangali	781	3100	1537	2188	7606
10	Lassana	923	3691	1985	2855	9454
11	Mankote	844	4374	2018	3395	10631
	Total	11264	47518	20512	37261	116555

Source: District Statistics & Evaluation Officer, Poonch, 2022.

The data suggests that there may be a shortage of doctors in some of the block-level healthcare institutions. For example, Block Mandi, Block Mendhar, and Block Surankote each have 14-18 doctors, which may be inadequate to meet the healthcare needs of the local population. This shortage of doctors could contribute to disparities in healthcare access and quality across different areas of the district.

To address this issue, policymakers and public health officials may consider increasing the number of doctors in block-level healthcare

institutions and implementing targeted interventions to improve the retention and recruitment of healthcare professionals in underserved areas. Additionally, there may be opportunities to leverage technology and telemedicine to improve access to specialized care in remote areas where there may be a shortage of doctors.



Table 6. Name of the Institution and Number of Doctors.

S.No	Name of the institution	No. of doctors
1	D.H.Poonch	35
2	Block Mandi	14
3	Block Mendhar	18
4	Block Surankote	18
	Total	85

Source: District Statistics & Evaluation Officer, Poonch, 2022.

Overall, Table 6 provides valuable insights into the distribution of doctors across different healthcare institutions in the Poonch district. By identifying areas with shortages of healthcare professionals, it becomes possible to develop targeted interventions to improve healthcare access and quality, ultimately leading to better health outcomes for the local population.

Discussion and conclusion

One of the biggest issues today is the growing rate of diseases and inadequate healthcare for people. In this research, a thorough field survey was conducted using GIS for the mapping of health centers in the Poonch district. A total of 160 health centers were mapped, including 1 district hospital, 3 community health centers, 17 primary health centers, and 139 sub-centers. However, it was found that most of these health institutions, particularly community health centers, primary health centers, and sub-centers, lack basic infrastructure and are situated in rented spaces. There are concerns that the funds allocated by union territories and central agencies are not being utilized effectively, resulting in shortages of staff, medicines, equipment, and laboratory facilities. It is crucial to address these issues to ensure that adequate resources are available to meet the healthcare needs of the population. The insufficiency of skilled medical professionals and their supporting staff, the disproportionate numbers of patients in relation to doctors, challenges in management, regulations

surrounding medication, and instances of corruption within healthcare facilities have resulted in significant negative consequences for numerous individuals. The reluctance of doctors to serve in rural areas has led to overburdening of these health institutes, resulting in chaos at times. In Poonch district, there is a critical need to increase the number of specialized doctors and nurses available to provide healthcare services to the rural and underprivileged population. The district has a high poverty rate and limited access to healthcare facilities and equipment. Therefore, the government must prioritize the provision of proper facilities and equipment for all kinds of diseases, including but not limited to maternal and child health, infectious diseases, and chronic illnesses. By increasing the number of specialized healthcare professionals and improving facilities, the government can help reduce the incidence of preventable illnesses and improve the overall health outcomes of the community in Poonch district.

Despite the extensive efforts of the government to improve healthcare facilities and provide various schemes and policies such as Janani Suraksha Yojana (JSY), Janani Shishu Suraksha Karyakram (JSSK), Rashtriya Swasthya Bima Yojana (RSBY), National Vector Borne Disease Control Programme (NVBDCP), and the Golden Card (ABPM-JAY Sehat scheme), many individuals have not yet been able to avail themselves of these benefits.

For instance, one respondent from Khanater Village, Poonch Block (July 2023) mentioned that he had the Golden Card provided under the ABPM-JAY Sehat scheme. He was a heart patient and needed surgery immediately. Due to the lack of equipment, facilities, and specialists in the government hospital, he had to consult a doctor in a private hospital. He hoped to use his insurance, but the private hospital denied it. Consequently, he had to pay the entire cost out of pocket, which was very difficult for him.



Another respondent from Muhurat Village, Surankote Block (July 2023) shared the story of his handicapped son who can't get up, eat, or walk. The family has been taking care of the son for the last 17 years but has not received any type of government healthcare facilities for him. Due to a lack of education, the family is unaware of any government schemes.

These situations highlight the need for schemes and policies to be easily accessible to all individuals, particularly those who are underprivileged. Additionally, the government should take measures to increase awareness and reduce illiteracy rates among the population. Moreover, the government should create more policies and programs to provide better and more accessible healthcare to the weaker sections of society. Despite these challenges, Poonch district is a region with immense potential for growth and development. With the right investments in infrastructure, healthcare, and education, the district can improve the quality of life for its residents and contribute to the economic development of the region.

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