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Service Centres and Rural Development: A Case Study of Karnaprayag Block, Chamoli District

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ABSTRACT

The service centres in the Karnaprayag block of the Chamoli district are especially important for different rural development, in Uttarakhand. This study investigates the functional and spatial hierarchies of the service centres in the block and their effects on the social and economic development. Using both primary and secondary resources, fifteen potential service centres were identified based on size and availability of functions. The Centres were analysed using the Functional Centrality Index (FCI) on key sectors such as education, healthcare, communication, transport, trade, and administration to understand their relative importance. The analysis shows that, while there is a relative spread of lower-level services such as primary schools, dispensaries, and basic communication centres, the build-up services such as degree colleges, ITIs, advanced healthcare institutions and administrative offices are limited to a few nodal villages, most notably Bagoli and Jasyara. This uneven distribution reinforces the dynamics of Central Place Theory, where core settlements emerge as dominant service hubs while peripheral villages face persistent challenges of accessibility. Regardless of these inequalities, service centres contribute greatly to improving living conditions by providing basic services, supporting informal markets, creating jobs, and narrowing the rural–urban gap. Nonetheless, regional imbalances are made worse, and service deficiencies are created, because of the overdependence on a small number of higher-order centres. The research indicates the importance of strategic decentralisation, the reallocation of resources, and upgrading the infrastructure of the lower-order centres in order to have balanced and inclusive rural development. Enhanced service centres can serve as growth hubs for empowerment and sustainable development in the rural areas such as Karnaprayag.

Keywords: Service Centres, Rural Development, Functional Centrality Index, Hierarchy

INTRODUCTION

Rural development is typically understood to be the policies, investments and institutional arrangements that seek to enhance the economic and social well-being of rural people, with a focus on sustainable livelihoods, service accessibility and responsible natural resource management (World Bank, 1975; SDG, 2024). The concept of a service centre is central to understanding settlement systems and regional planning. A service centre is defined as a settlement that provides goods, services, and administrative facilities to its surrounding hinterland, functioning as a nodal point for socio-economic interaction (Haggett, 2001). Service centres attract growth and stimulate economic activity and create jobs in nearby rural areas while improving access to public services. These centres connect isolated villages to urban regions, helping bridge the gap in growth and ensuring rural communities are part of national development. This is particularly important in regions with challenging geography and slow development, such as hilly areas. Development is not uniform across regions. It typically begins with development poles that contain certain economic activities, acting as catalysts for renewal and growth (Perroux, 1955). The theoretical foundation lies in Christaller's Central Place Theory (1933), which explains

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how settlements are arranged hierarchically based on the range and threshold of services they offer. Higher-order centres provide specialized functions such as higher education, advanced healthcare, and administrative offices, serving a larger population. In contrast, lower-order centres are limited to basic needs such as primary education, groceries, and dispensaries, catering mainly to local communities (Singh, 1994).

Service centres (also referred to as rural service centres, facility centres or central places in the literature) have an important role as growth poles and the intermediary between the providers of services and the rural household. They concentrate education, health, market, administrative, and increasingly digital services (e.g., Common Service Centres), as a result they decrease travel time and transaction costs for rural users, while at the same time increase the market for local producers (Sarkar, 2018; Mishra and Sahu, 2020). The conceptual framing acknowledges that rural spaces are heterogeneous, they are not merely 'backward' places – and there are important aspects of connectivity (both physical and digital), accessibility to services, and local agency that influence development outcomes Internationally, more recent spatial analyses suggest that a considerable proportion of rural populations rely on small and intermediate town-based services and employment; therefore, investing in urban–rural linkages and service-centre hierarchies offers a greater degree of inclusion than concentrating resources in megacities (Cattaneo *et al.,* 2021). Rural service centres are often described as both physical and functional nodes. They are an important centre of physical services (which include locations for administrative, economic, social and more recently, digital services) that reduce spatial exclusion, aggregate demand, and decrease the cost-of-service delivery for widespread rural populations (World Bank, 1975; SDG, 2024; Cattaneo *et al.*, 2021). In all regions, there has been a tremendous improvement in rural service provision, since the late 1960s, especially in smaller sized settlements. The changes in rural service provision are further examined in the context of decentralized service centre planning in India (Islam, 1995). The hierarchy and distribution of service centres have important implications for regional development and accessibility. Uneven concentration of functions often leads to dependency on a few dominant centres, creating disparities across rural areas (Tiwari, 2011).

This study focuses on understanding the functional status of service centers in the Karnaprayag Block of Chamoli District, Uttarakhand. In a developing country like India, around 70 per cent of the population is rural. Many rural areas experience limited access to resources, resulting in insufficient healthcare and education facilities (Akhtar *et al.,* 2023). Scholars like Haggerstrand (1952), Berry (1967), Christler (1933), Loss (1954), Perroux (1950), and Mishra (1972, 1974) have discussed the concept of growth foci based on central place theory. Rural development in India is essential for the country's economic growth. Rural development aims to enhance productivity in rural economies that face significant poverty challenges. Improving living standards and financial stability for rural residents defines this process. According to the 2011 Census, 68.84% of the population lives in rural areas. Slow development in this sector significantly hampers national economic growth. Rural development is critical for a nation's economic progress, supporting sustained growth (Ahlawat and Ahlawat, 2021).

Study Area :

Chamoli is one of the 13 districts of Uttarakhand state. This district was adjacent to Pauri Garhwal in 1960. At that time, it had four tehsils, one of which was Karnaprayag. Karnaprayag is one of the famous religious places of Uttarakhand. It is in the Chamoli district of Uttarakhand. Karnaprayag is situated between 30° 16' 12.00" north latitude and 79° 15' 0.00" east longitude. The area of the Karnaprayag development block is 163-48 km. There are a total of 219 villages in the Karnaprayag development block and 9292 families. The population of the Karnaprayag development block is 39,232. In which the male population is 18,278, and the female population is 20,954. Karnaprayag is one of the five Prayags of the Alaknanda River, which is situated at the confluence of the Alaknanda and Pinder rivers. It is situated on the western side of the Sangam, and in the form of a rock, there is a penance and temple of Karna here in the mythological times. There was a thriving market, and business opportunities were available here, due to which people from other parts of the country started residing here. Due to these activities, the ancient Uma Devi temple located here also got damaged. The culture of Karnaprayag is related to the most mythological and amazing Nanda Raj Jat Yatra of Uttarakhand. Karn Prayag has been named after Karna. According to tradition, this place was once under water. And one tip

of the Karna Shaila stone was inside the water.

Table 1: Population of Karnaprayag Block	
Total population	39232
Male	18278
Female	20954
ST population	513
SC population	7805
Total literacy	82.72%
No. of household	9292
(0-6) child population	4886
Working population	17375

Total population of Karnaprayag development block as per census 2011 is 39232 in which male population is 18378, tribal population is 20954, Scheduled Caste population is 513, Scheduled Caste population is 780 and population of 0-6 age group is 4886. The total literacy rate of the development block is 82.77% and the total working population is 17375.

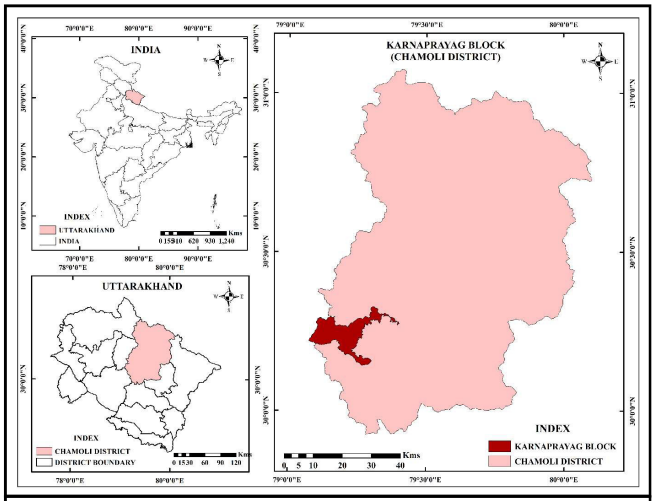

Fig. 1 : Location Map of Karnaprayag Block, Chamoli

METHODOLOGY

The present study is based primary and secondary data sources. Primary data collected through Secondary data has been collected from District Statistics Annual Magazine Commission Report District Chamoli 2018, Research Papers, Census Hand Book, Village Development Officer, Office and Municipal Council.

Identification of Service Centres:

In the present study, 15 potential service centres have been selected out of 219 service centres of Karnaprayag development block. These service centres have been selected on the basis of population, in which population base is 500 or above and functionality. To identify the service centres in the study area, five groups have been selected considering education, health, transport and communication, administrative services as the priority. To identify the service centres in Karnaprayag development block, information was collected by the surveyor through questionnaire and schedule. And in determining the service centre, education, health services, transportation, financial services, agricultural facilities have been selected as the basis.

Measurement of Centrality:

A number of Indian academics have also calculated a service center's centrality based on the number of people working in retail, business, or tertiary services (Singh, 1966; Singh 1971; Singh, 1977). Bhatt (1976) calculated the centrality of service hubs using a weighting technique. Some researchers have used people's choice of centers to meet their requirements to gauge the functional hierarchy of settlements (Sen *et al.,* 1971; Kayastha and Mishra, 1981; Mishra, 1985). In this study, the hierarchy of service centres has been derived by using Functional Centrality Index.

Functional Centrality Index Value (FCI):

Any centre's functional availability is measured by its FCI. It has been calculated by dividing the total weightage of all chosen centres by the sum of the weightages of all available functions for each center.

This may be calculated as:

$$FCI = \sum_{i}^{n} \frac{wid}{w} \times 100$$

FCI = Functional centrality index

W_{id} =Weightage for d_{th} centre

W=Total Weightage of all the centres.

A number of Indian scholars have also examined a center's centrality based on the number of people working in tertiary services, retail, or commercial sectors (Singh, 1966; Singh, 1971; Singh, 1977). Bhatt (1976) calculated the centrality of service centers using a weighting technique. Some academics have Based on people's preferences for centers to meet their needs, the functional hierarchy of settlements was calculated (Sen *et al.,* 1971; Kayastha and Mishra, 1981; Mishra, 1985). A settlement's composite index value was often determined using the

weighted indexing method (Sinha and Singh, 1995), which takes into account all of the functions present in the area. The weighting technique is used to calculate the centrality because not all functions can be considered equally.

$$Wi = \frac{N}{Fi}$$

where,
Wi =Weightage of i_{th} function
N =Total number of settlements
Fi =No. of settlements having that function

RESULTS AND DISCUSSION

Calculation of Weighted Score:

The weighted score analysis of selected functions in the Karnaprayag block highlights the uneven distribution of essential services across different functional groups. In the education sector, primary and pre-primary schools are relatively well-distributed, with 15 institutions each, though their weighted scores remain minimal (1), reflecting limited higher-order significance. As the level of education advances, the number of institutions decreases substantially, with only seven higher secondary schools and a single degree college and ITI. The latter two, despite their scarcity, hold the highest weighted scores (15 each), emphasizing their centrality and importance for the region. This indicates a concentration of higher educational opportunities in specific localities, creating potential issues of accessibility for peripheral villages. The health sector also follows a similar pattern, where the availability of basic facilities such as dispensaries (9, weighted score 1.66) is relatively better, but advanced healthcare services such as community health centres, family welfare centres, and primary health sub-centres are available only in single units, each with a weighted score of 15. This suggests a heavy dependency on very few higher-order facilities, which can create service gaps and overburden existing infrastructure. In the case of postal and communication services, the presence of 15 telephone connections (weighted score 1) indicates improved communication outreach, but the low number of post offices (2, weighted score 7.5) shows limited institutional coverage in this domain. The transport and trade facilities are represented only by government grocery stores (15, weighted score 1), highlighting limited diversity in formal trade and market-related services within the block. Administrative services carry disproportionately high weighted scores due to their central role in governance and regulation. Tehsil and block headquarters, police stations, and village-level officers, each with a weighted score of 15, represent the concentration of political-administrative functions in select nodal centres.

Table 2 : Weighted Score for the Selected Services

Functional group	Sr. No.	Selected services	Number of services	Weighted score
Education	1.	Pre-primary school	15	1
	2.	Primary school	15	1
	3.	Middle school	12	1.25
	4.	secondary school	8	1.87
	5.	High secondary school	7	2.47
	6.	Degree collage	1	15
	7.	ITI	1	15
Health	8.	Primary health sub centre	1	15
	9.	Community health centre	1	15
	10.	Family Welfare and Mother Child Welfare Centre	1	15
	11.	Dispensary	9	1.66
	12.	Veterinary hospital	3	5
Postal and communication	13.	Post office	2	7.5
services	14.	Telephone connection	15	1
Transport and trade facilities	15.	Government grocery store	15	1
Administrative services	16.	Tehsil headquarter	1	15
	17.	Block headquarter	1	15
	18.	Justice council	2	7.5
	19.	Village-level officer	1	15
	20.	Police station	1	15

Table 3 : Total number of Service Centres, Weightage Score, Functional Centrality Index, and Hierarchy order

Sr. No.	Name of Service Centres	Population	No of Functions	Weightage score	Functional Centrality Index	Hirerachy Order
1.	Bagoli	506	14	1.07	24.74	I
2.	Jasyara	503	13	1.15	23.02	I
3.	Jakh	603	12	1.25	21.18	I
4.	Siren	501	12	1.25	21.18	I
5.	Bainoli	702	11	1.36	19.47	I
6.	Nauti	793	10	1.5	17.65	II
7.	Khadgali	533	10	1.5	17.65	II
8.	Dimar	1109	9	1.66	15.95	II
9.	Top	629	9	1.66	15.95	II
10.	Kandara	651	8	1.8	14.71	III
11.	Pudiyani	600	7	2.14	12.37	III
12.	Kaldu Kaleshwar	569	7	2.14	12.37	III
13.	Uttararau	636	6	2.5	10.59	III
14.	Koti	539	6	2.5	10.59	III
15.	Kand Maikhura	577	5	3	8.82	III

Functional Centrality Index and Hierarchy Order

First Order Service Centers:

At the top of the hierarchy (Order I) are Bagoli, Jasyara, Jakh, Siren, and Bainoli, which collectively function as the most significant service centres. They provide between 11–14 functions, with functional centrality index values ranging from 19.47 to 24.74. Bagoli, with 14 functions and the highest centrality index (24.74), emerges as the most dominant service centre in the block. These settlements serve as nodal points where higher-order services concentrate, reflecting their importance in meeting both local and surrounding villages' needs.

Second Order Service Centers:

The second-order centres (Order II) include Nauti, Khadgali, Dimar, and Top. They provide 9–10 functions with centrality indices between 15.95 and 17.65. These settlements act as intermediate centres, complementing higher-order centres by ensuring access to moderately diversified services. They play a vital role in reducing pressure on the primary centres while catering to medium-sized populations such as Dimar (1109) and Nauti (793).

Third Order Service Centers:

The third-order centres (Order III), including Kandara, Pudiyani, Kaldu Kaleshwar, Uttararau, Koti, and Kand Maikhura, are characterized by limited functions (5–8) and comparatively lower centrality indices ranging from 8.82 to 14.71. Despite serving moderate populations (500–650 range), these centres function primarily as local-level service providers, offering only basic facilities to their immediate surroundings. Kand Maikhura, at the lowest end with only 5 functions and a centrality index of 8.82, represents the least developed service centre in the block.

Conclusion:

The analysis of service centres in the Karnaprayag block emphasizes their central role in carving out rural development plans. The functional hierarchy indicates an imbalance. While primary-level services like primary schooling, healthcare, and communication are reasonably well distributed, tertiary-level services such as degree colleges, ITIs, advanced health care, and administrative institutions are restricted to a few major centres, notably Bagoli and Jasyara. This is a different threat of Central Place Theory, in which core settlements become service centres while outlying villages continue to struggle with the lack of accessibility and basic limited services. The ability of service centres to drastically improve the rural livelihood is evident in terms of access to basic facilities, government schemes, transportation, and communication networks. Moreover, the service centres acts as a catalyst to local markets, employment, and socio-economic interactions, thereby bridging the urban and rural gap. Nevertheless, the slower pace of development in services and in service centres highlights the inefficiencies of the few higher order service centres, which further increases the socio-spatial inequality. To achieve sustainable and balanced rural development, it's important to reinforce the lower-order centers by improving infrastructure,

ensuring equitable resource allocation, and decentralizing services in a strategic manner. Villages in distant areas can be ensured services and development opportunities through regular monitoring and integrated planning. Service centers can become catalysts for transformation and bridging gaps in areas such as Karnaprayag, with the opportunity to empower communities and create a sustainable path for self-reliance and inclusive rural growth.

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