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Spatial Disparities in the Quality of Education: An Empirical Study of Kargil District, Ladakh

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ABSTRACT

This study assesses the quality of education among the native ethnic tribes of Kargil district in the cold desert region of Ladakh, with a focus on spatial disparities across nine administrative blocks. Using a composite index derived from ten indicators—including literacy rates, enrolment levels, school density, and teacher–infrastructure ratios—the analysis reveals that most blocks fall under "Medium" and "Low" quality categories. While Kargil and Shargole exhibit relatively better educational outcomes, blocks such as Taifsuru, Zanskar, and Lungnak continue to lag due to geographic isolation, inadequate infrastructure, and pronounced gender disparities in literacy. The study underscores the need for targeted interventions such as residential schools, infrastructure development, and gender-sensitive educational policies to promote equitable and inclusive educational development in this remote Himalayan region.

Keywords: *Quality of Education; Composite Index; Cold Desert; Ethnic Tribes; Kargil; Ladakh.*

1.1 Introduction

1.1.1 Conceptual Framework

Education is universally acknowledged as a foundational pillar of human development, essential not only for individual empowerment but also for the broader socioeconomic advancement of societies [1]. It functions as both an intrinsic human right and a fundamental means of achieving a wide array of other rights. Through education, individuals gain the ability to acquire knowledge, develop critical thinking, and participate meaningfully in economic, social, and political life. Education helps individuals unlock their potential, make informed choices, and lead more productive, satisfying lives [2].

The role of education in shaping human capital is widely emphasized in developmental literature. It is central to enhancing labour productivity, spurring innovation, and driving inclusive economic growth. In the context of rural and tribal communities, such as those in Kargil, education becomes even more vital due to the challenges of remoteness, cultural marginalization, and limited access to public services [3]. Quality education can serve as a transformative tool, breaking intergenerational cycles of poverty and inequality, and enabling local populations to assert their rights and preserve their identities within a rapidly changing world [4].

In the formal sense, education refers to the structured process by which societies transmit accumulated knowledge, skills, customs, and values from one generation to the next through institutions such as schools, colleges, and universities. Informal and non-formal channels also contribute significantly to educational development, especially in contexts where institutional infrastructure is inadequate. Formal education, however, remains the primary mode through which societies aim to achieve national development goals, social cohesion, and citizen empowerment.

Education also contributes significantly to social well-being, a multidimensional concept encompassing economic security, health, participation, and subjective well-being. Education plays a pivotal role in shaping the quality of life by enhancing personal agency and social integration. Educated individuals are more likely to access better employment opportunities, enjoy improved health outcomes, and engage more actively in civic and community affairs [5]. They are also more resilient in adapting to economic, social, and environmental changes.

The United Nations Educational, Scientific and Cultural Organization (UNESCO) underscores education as both a fundamental right and a global public good. The 2011 UNESCO framework classifies education into multiple levels, from pre-primary to tertiary, emphasizing its critical role in achieving sustainable development and equity. The Sustainable Development Goal 4 (SDG 4) of the 2030 Agenda further reinforces this by calling for inclusive, equitable, and quality education for all. Quality education, in this sense, is not just about enrolment and infrastructure, but also about relevance, equity, effectiveness, and the development of core competencies.

In geographically isolated regions like Kargil, the educational process faces numerous structural and systemic barriers. Harsh climatic conditions, poor connectivity, and lack of trained teachers often result in poor learning outcomes and high dropout rates, particularly among girls and marginalized communities [6]. In such contexts, it is crucial to adopt a contextualized understanding of educational quality—one that goes beyond international metrics and reflects the lived realities of local populations.

A place-based approach to educational development highlights how geographic, cultural, and socio-political factors intersect to shape educational outcomes. The unique cultural heritage, language, and socio-economic structures of Kargil's native ethnic tribes necessitate educational interventions that are sensitive to local needs [7]. Culturally relevant pedagogy, mother-tongue instruction, and community participation in

school governance are examples of how education can be localized to improve both access and quality.

Furthermore, education fosters the ability to question, to innovate, and to envision alternatives, thereby nurturing the democratic ethos and civic responsibility. It creates informed citizens who can actively contribute to nation-building and uphold democratic values. Education not only transmits knowledge but also cultivates values such as tolerance, mutual respect, and gender equality—all essential for peaceful coexistence and social harmony in a diverse country like India [8].

Education is not merely a tool for economic betterment; it is a powerful agent of social transformation. For the tribal populations of Kargil, who face structural inequalities and geographic isolation, education represents a vital pathway to empowerment and sustainable development. A comprehensive understanding of its conceptual framework, therefore, provides the foundation for designing meaningful policies and programs aimed at achieving equitable and inclusive education outcomes.

1.1.2 Criteria for Quality of Education Evaluation

To assess the quality of education in a structured and comprehensive manner, this study adopts the International Standard Classification of Education (ISCED) developed by the United Nations Educational, Scientific and Cultural Organization (UNESCO). ISCED provides a globally recognized framework that classifies educational programs and related qualifications by levels and fields, facilitating international comparability of education statistics and policies. The ISCED framework encompasses seven levels of education: pre-primary, primary, lower secondary, upper secondary, post-secondary non-tertiary, short-cycle tertiary, and bachelor's, master's, and doctoral or equivalent levels.

In the context of this research, which focuses on tribal populations in the cold desert region of Kargil, these levels are aggregated into key stages most relevant to the local education system: pre-primary, primary (classes 1–5), middle (classes 6–8), secondary (classes 9–10), senior secondary (classes 11–12), undergraduate (college-level), and postgraduate education (including professional and doctoral programs). This classification helps in capturing the progression of learners through the education system and in identifying bottlenecks and drop-out points.

The criteria for evaluating the quality of education in Kargil have been developed by selecting seven core variables that reflect both access to education and its outcomes. These include:

1. Total Literacy Rate (X1): Indicates the overall percentage of the population that can read and write with comprehension. It is a direct measure of educational attainment.

2. Male Literacy Rate (X2): Highlights gender-specific access and success in education. Higher male literacy often correlates with better employment opportunities and social mobility.

3. Female Literacy Rate (X3): Serves as a crucial indicator of gender equity in education. In patriarchal and remote settings, female literacy is often low, which reflects deeper social inequalities.

4. School Density (X4): Measured as the number of schools per lakh population, this variable reflects the accessibility of educational institutions within a geographical area.

5. Enrolment in Classes 1–10 (X5): Captures participation at the foundational and middle levels of schooling. High enrolment at this stage is indicative of awareness and availability of basic educational services.

6. Enrolment in Classes 11–12 (X6): Reflects continuation into senior secondary education, which is often where dropouts increase due to socio-economic and infrastructural challenges.

7. Enrolment Above Class 12 (X7): This includes college and university-level education and reflects the aspiration and capacity of the population to pursue higher education.

8. Teacher- Institute Ratio(X8): This ratio refers to the average number of teachers available per educational institution (e.g., school or college). A higher teacher–institute ratio generally indicates better staffing levels, enabling more subject-specific teaching and improved academic support for students.

9. Pupil -Teacher Ratio(X9): This ratio measures the average number of students assigned to one teacher in a given institution or area. A lower pupil–teacher ratio is considered desirable, as it allows for more individualized attention, better classroom management, and improved learning outcomes.

10. Pupil -Institute Ratio(X10): This ratio indicates the average number of students enrolled per educational institution. It reflects the capacity load on each school. A high pupil–institute ratio may suggest overcrowding or a shortage of educational facilities, whereas a very low ratio might indicate underutilization of infrastructure.

These variables collectively form the basis of a composite index to rank and classify different blocks within Kargil district according to their educational performance. Each variable is converted into a rank score to neutralize differences in scale, and composite scores are computed to categorize blocks into levels ranging from High to Low quality of education. This method, as used in similar studies [9], provides a multidimensional and scalable approach to assessing educational development in geographically and culturally distinct regions like Kargil.

1.1.3 Significance of the Study

The significance of this study lies in its focus on region-specific, locally grounded educational assessment in one of the most remote and underserved regions of India- Kargil in the Union Territory of Ladakh [10]. While Leh has historically garnered more attention in research and policy due to its higher visibility as a tourist and administrative hub, Kargil continues to face a multitude of developmental challenges that have not received adequate scholarly or governmental focus. These include geographic isolation, harsh climatic conditions, seasonal inaccessibility, low population density, and cultural marginalization [11] —all of which severely impact the delivery and quality of public services, especially education.

The tribal communities of Kargil, comprising Brokpas, Baltis, and Dards, inhabit some of the most inaccessible and mountainous regions of the district [12]. These populations are characterized by lower socio-economic indicators, minimal infrastructure, and limited access to quality educational institutions. For these communities, education is not just a tool for individual development, but a lifeline to social inclusion,

economic participation, and cultural preservation. Despite national efforts toward universal education under schemes like the Right to Education Act (2009) and Samagra Shiksha Abhiyan, the ground realities in Kargil remain starkly different.

This study is significant as it attempts to document and analyze these realities through a comprehensive empirical investigation [13]. By adopting a block-wise approach and creating a composite index based on key educational indicators, the study provides a nuanced understanding of spatial variations in educational quality. Such disaggregated, bottom-up data is critical for informing targeted policy interventions and for advocating resource allocation based on actual need rather than uniform metrics.

Moreover, the findings of this research contribute to the broader discourse on the geography of education and quality of life. It echoes the argument made by Jha and Tripathi [14] that quality of life, including educational well-being, has a distinct spatial dimension that is often overlooked in national and international assessments. Through its methodological approach and contextual relevance, the study bridges the gap between macro-policy frameworks and local developmental needs.

The significance also extends to its potential policy implications. The results of this study can aid local administration, NGOs, and national agencies in designing education programs that are sensitive to the unique socio-cultural and geographic contexts of tribal communities in Kargil. It also serves as a benchmark for future comparative studies across the Ladakh region, thereby encouraging a more balanced and inclusive regional development approach.

In essence, this research is not just an academic exercise but a step toward educational justice. By highlighting the disparities and proposing concrete strategies for improvement, the study aims to empower communities that have long remained on the periphery of mainstream development narratives.

1.1.4 Review of Literature

A robust body of literature exists linking education with the broader concept of quality of life (QoL), highlighting its centrality in promoting human welfare, economic development, and social justice. The field of social indicators research gained momentum in the 1970s, with scholars such as Land [15] and Smith [16] pioneering studies that introduced education as a key dimension in evaluating individual and community well-being. Their work emphasized education not just as an outcome of development, but also as a process that actively shapes economic mobility, civic participation, and personal fulfilment.

Smith (1977), in his seminal work on welfare geography, posited that spatial disparities in education were both a symptom and a cause of broader inequalities in society. Land (1983) expanded this perspective by proposing composite indices of social development that incorporated literacy and school enrolment as fundamental indicators. Over time, these approaches evolved into more nuanced frameworks that considered educational quality, gender parity, and access to higher education as central to development planning [17].

The social indicators movement led to a proliferation of studies in both urban and rural contexts. Notable contributions in the Indian context include those by Fakhruddin [18], who explored urban educational disparities; Friebe & Schmidt-Hertha [19], who focused on educational access among the elderly; and Ghadge [20], who assessed educational outcomes among marginalized populations in Maharashtra. These studies collectively underscore the importance of localized assessments and the limitations of using generalized national indicators to evaluate educational progress.

More recently, Jha and Tripathi [14] provided a methodological advancement by applying spatial analysis to assess educational quality in slum areas of Varanasi. Their block-level comparative approach and use of composite indices inspired the methodological framework adopted in this study. The use of primary data combined with secondary sources enabled them to highlight intra-urban disparities that are often obscured in large-scale surveys.

Despite these advancements, there remains a significant research gap when it comes to high-altitude, remote, and geopolitically sensitive regions such as Ladakh—and more specifically, Kargil. Existing studies on education in Ladakh have largely concentrated on Leh district, focusing on its Buddhist-majority communities and urban settlements. Little academic attention has been given to the tribal and Muslim-majority populations of Kargil, whose educational challenges are exacerbated by isolation, poor infrastructure, and socio-political marginalization.

This study seeks to fill that gap by adapting the frameworks used in Leh-based and urban studies to the unique socio-spatial realities of Kargil. It also contributes to the emerging discourse on the intersection of geography, ethnicity, and educational inequality. By focusing on tribal communities and using a mixed-methods approach, the study not only builds on prior research but also expands the frontier of quality-of-life studies into underrepresented geographies.

In doing so, it aligns with the growing recognition within development literature that context matters. Educational outcomes are shaped not only by policy interventions but also by the cultural, economic, and environmental contexts in which communities exist. This literature review thus establishes the foundation for a regionally tailored, empirically grounded, and policy-relevant assessment of educational quality in Kargil.

1.2 Study Area

Kargil district lies between 32°30'N and 34°N latitude and 75°E to 77°E longitude, covering an area of 14,036 km^2 [21]. The district comprises remote blocks such as Zanskar and Drass, which experience sub-zero winters and are cut off for several months. Major ethnic groups include Brokpas, Baltis, and Dards. According to Census 2011, Kargil has a population of approximately 1.4 lakhs, predominantly rural and tribal.

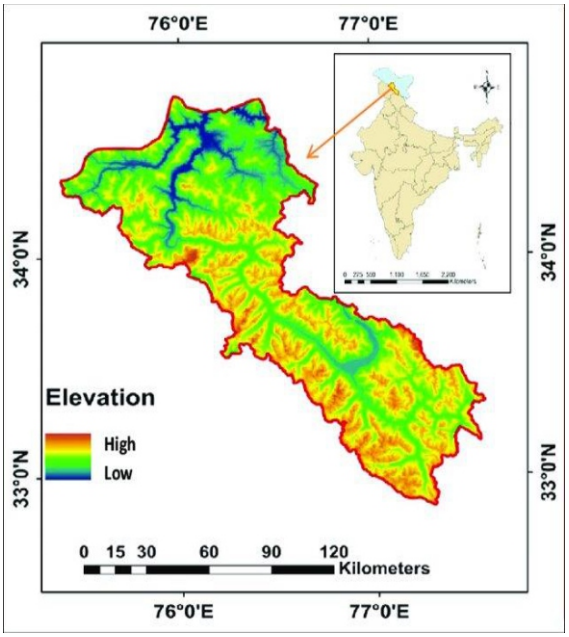

Figure 1: Location map of Study area

1.3 Data base and Methodology

This study used both primary and secondary sources. Primary data were collected through structured household surveys in all blocks. Secondary data were sourced from the Census of India, District Education Office, and school registers. All blocks were analyzed using a Composite Index based on seven educational indicators:

- X1: Percentage of Total Literacy
- X2: Percentage of Male Literacy
- X3: Percentage of Female Literacy
- X4: Schools per thousand population
- X5: % of students enrolled (1st–10th)
- X6: % of students enrolled (11th–12th)
- X7: % of students enrolled (above 12th
- X8: Teacher- Institute Ratio
- X9: Pupil -Teacher Ratio
- X10: Pupil -Institute Ratio

Each variable was ranked, and the total rank score was used to classify the blocks into High, Medium, and Low-quality categories.

1.4 Results and Discussion

Figure 1: Location map of Study area

S. No	Block	Composite Score	Quality of Education
1	Drass	60.5	Low
2	Kargil	31.5	High
3	G.M. Pore-Trespone	50.5	Medium
4	Sankoo	54.5	Medium
5	Shankar- Chiktan	42.5	Medium
6	Shargole	34.0	High
7	Taifsuru	61.5	Low
8	Zanskar	58.0	Low
9	Lungnak	62.5	Low

Source: *Computed from field survey*

The composite index analysis of educational quality across nine blocks of Kargil district reveals significant inter-block disparities. Blocks such as Shargole and Kargil rank highest, categorized as having High educational quality. These areas benefit from better infrastructure, high literacy rates (with Shargole recording the highest female literacy at 62.23%), and favourable pupil–teacher ratios. Their central location and administrative importance provide easier access to educational facilities and greater awareness, contributing to their strong performance.

In contrast, Shankar Chiktan, GM Pore-Trespone, and Drass fall into the medium quality group. These blocks show moderate literacy and enrolment rates but lag in infrastructure availability or gender parity in education. For example, while GM Pore-Trespone excels in female literacy (69.92%), it underperforms in higher education enrolment and school density. Meanwhile, Drass, despite a high senior secondary enrolment (44.54%), suffers from overall low literacy levels.

The Low-quality category includes Sankoo, Zanskar, Lungnak, and Taifsuru, which are largely remote and underserved. These blocks exhibit weak female literacy, low school density, and poor enrolment in post-secondary education. Taifsuru, in particular, has the lowest composite performance, reflecting persistent structural and spatial constraints such as difficult terrain, inadequate transport, and sociocultural barriers. These findings underline the need for targeted interventions in infrastructure, teacher deployment, and gender-sensitive policies in these lagging blocks.

1.5 Conclusion and Suggestions

The educational scenario in Kargil district presents a complex picture shaped by a range of geographical, socio-cultural, and institutional factors. While efforts have been made to expand educational access across the region, the study reveals that substantial disparities persist—particularly in infrastructure quality, gender parity, and block-wise educational development. These challenges are especially pronounced in remote and tribal-dominated areas such as Zanskar and Drass, where physical isolation, limited institutional presence, and socio-economic backwardness continue to hinder educational outcomes.

The overall literacy levels and enrolment rates, though improving, mask deep-rooted inequalities in terms of resource distribution, availability of trained educators, and the presence of higher educational institutions. Gender-based disparities remain a critical concern, as cultural norms, early marriage, and restricted mobility often limit girls' participation, particularly at the secondary and higher levels. Moreover, the mismatch between teacher deployment and student needs, as well as inadequate facilities such as libraries, laboratories, and digital access, contributes to a suboptimal learning environment in many schools.

To address these issues, there is a pressing need for a sustained, multi-dimensional approach that considers both systemic reforms and community-specific interventions. Educational planning in Kargil must be responsive to its unique topography and demographic composition, emphasizing not only physical infrastructure but also pedagogical quality, equity, and inclusion. Empowering local communities, especially women and tribal groups, through education can play a transformative role in enhancing overall quality of life and ensuring sustainable development in the region. Bridging these educational gaps is thus not merely a developmental imperative but a fundamental step toward achieving social justice and regional equity in Ladakh.

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