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CHANGING DIMENSIONS OF SOCIAL INFRASTRUCTURE DEVELOPMENT IN INDIA: A STATISTICAL PERSPECTIVE

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Abstract

Social infrastructure constitutes a vital component of overall infrastructure, as it encompasses facilities and services that directly enhance the quality of human life. The present study seeks to identify and analyse the key components of social infrastructural development in India over the period from 1971 to 2011, using secondary data sources. The assessment of social infrastructural development is carried out across three major dimensions i.e. education, health and financial infrastructure represented by a total of 27 indicators. The standardised composite index was calculated using Principal Components Analysis (PCA). The study reveals that in 1971, the education and health sectors jointly accounted for the greatest spatial variation in the development of social infrastructure in India. By 2011, however, the health sector and its associated indicators emerged as the dominant contributors to spatial disparities, leading to a relative decline in the influence of the education sector. Although the number of districts classified under very low and low levels of social infrastructural development declined over the study period, nearly two-thirds of the country continued to exhibit low or very low levels of development in 2011, underscoring the need for greater attention from regional planners and policymakers.

Keywords: Social Infrastructure, Regional Development, Principal Components Analysis (PCA), Spatial Inequality, India

Introduction

Social infrastructure generally encompasses facilities and services that contribute to improving the overall quality of human life. Its significance in promoting economic growth and advancing public welfare is particularly evident in developing economies, where the indivisible nature of social overhead capital has been recognised as a major constraint on the development of underdeveloped countries (Rosenstein, 1943). Investment in social infrastructure leads to human capital formation and socio-economic development (Joshi 1990; Sharma, 1995; Thakur and Sharma, 2010). Since, these infrastructural facilities have institutional arrangements therefore social development is also being called as synonymous to institutional development (Mishra et al., 1991). The World Economic Forum (WEF) emphasises that infrastructure is a cornerstone of both economic and social development and plays a decisive role in shaping the quality of life of individuals and societies. In a developing economy such as India, the advancement of the social sector assumes particular importance, as it is closely linked to the development of human resources through investments in education and health.

After independence, regional disparities emerged as a major challenge for Indian democracy. From the outset of the planning process in 1951, the reduction of regional imbalances in development has remained a central objective of national planning. While the issue was acknowledged in the First and Second Five-Year Plans, it received more explicit and comprehensive attention in the Third Plan. Despite these efforts, the economic gap between the most advanced and the least developed states has continued to widen over time (Singh, 2009). Even after the implementation of eleven Five-Year Plans, India has yet to fully resolve persistent problems such as poverty, unemployment, illiteracy, poor health, and overall underdevelopment. The government continues to face the formidable challenge of mobilising adequate resources to promote development and improve the living standards of the population (Kapil, 2010; Parthasarathy, 1997). In this context, the present study undertakes a statistical examination of the components of social infrastructure in India.

Objectives of the Study

The present study seeks to achieve the following objectives:

a. To identify the key factors influencing the development of social infrastructure in the study area.

b. To assess the extent and magnitude of spatial variations in social infrastructural development across India.

Data Base and Methods

The study aims to analyse the major components of social infrastructural development in India over the period from 1971 to 2011. The year 1971 has been adopted as the reference year because district-level data for several infrastructure-related indicators are not consistently available for earlier periods. The analysis is based exclusively on secondary data obtained from the Population Censuses of 1971 and 2011, supplemented by publications released by various central and state government agencies and public corporations. District-wise, multi-period data on social infrastructure indices and associated variables were compiled from diverse secondary sources, including the Directorates of Census Operations, District Census Handbooks, Planning Departments, Directorates of Economics and Statistics, Directorates of Land Records, and the Departments of Health and Family Welfare across all States and Union Territories of India. The methodological framework adopted in this study is consistent with that employed in our earlier work (Kumar et al., 2022). The assessment of social infrastructural development has been carried out with reference to three major components, each represented by a different number of indicators.

Educational Infrastructure (12)

i. No. of primary schools per 1000 sq km of area

ii. No. of primary schools per 10000 of population

iii. No. of enrolled students per 10000 of population at primary level

iv. No. of teachers at primary schools per 1000 of students

v. No. of middle schools per 1000 sq km of area

vi. No. of middle schools per 10000 of population

vii. No. of enrolled students per 10000 of population at middle level

viii. No. of teachers at middle schools per 1000 of students

ix. No. of high/senior secondary schools per 1000 sq km of area

x. No. of high/senior secondary schools per 10000 of population

xi. No. of enrolled students per 10000 of population at high/senior secondary schools

xii. No. of teachers at high/senior secondary schools per 1000 of students

Health Infrastructure (11)

i. No. of health institutions per 1000 sq km of area

ii. No. of health institutions per 10000 of population

iii. No. of hospital beds per 10000 of population

iv. No. of hospitals per 1000 sq km of area

v. No. of hospitals per 10000 of population

vi. No. of primary health centres per 1000 sq km of area

vii. No. of primary health centres per 10000 of population

viii. No. of health sub-centres/dispensaries per 1000 sq km of area

ix. No. of health sub-centres/dispensaries per 10000 of population

x. No. of veterinary institutions per 1000 sq km of area

xi. No. of veterinary institutions per 10000 of livestock population

Institutional Infrastructure (4)

i. No. of banks per 1000 sq km of area

ii. No. of banks per 10000 of population

iii. No. of cooperative societies per 1000 sq km of area

iv. No. of cooperative societies per 10000 of population

To evaluate the extent of social infrastructural development in the study area, a set of 27 indicators was initially identified. In order to make these variables comparable, all data were normalised using the Z-score method, expressed as:

$$Z = \frac{X - \bar{X}}{\sigma}$$

where X denotes the observed value of the ith variable in time period j, X¯\bar{X}X¯ represents its corresponding mean, and σ\sigmaσ indicates the standard deviation.

The construction of the composite infrastructural development index was based on Principal Components Analysis (PCA), originally introduced by Hotelling (1933) and widely employed in multivariate research within the social sciences, including geographical studies. PCA was applied to reduce the dimensionality of the dataset by summarising the information contained in multiple correlated variables into a smaller number of components, while retaining the maximum possible variance. Prior to implementation, the suitability of PCA was assessed through several diagnostic checks, including standardisation of variables, visual inspection of the correlation matrix, and the Kaiser–Meyer–Olkin (KMO) measure of sampling adequacy. As the indicators were measured in different units, standardisation using Z-scores was undertaken as a prerequisite. On the basis of the correlation matrix, only variables with correlation coefficients of 0.30 or higher were retained for further analysis, resulting in the selection of 20 variables for 1971 and 24 variables for 2011 from the original pool of 27. In all cases, KMO values exceeded the acceptable threshold of 0.50, indicating the appropriateness of PCA for the dataset. (Kumar et al., 2022).

In this study, principal components were extracted and retained according to four criteria: eigenvalues greater than 1.0, interpretation of the scree plot, a cumulative variance explanation of at least 80 per cent, and factor loadings exceeding 0.50 in the rotated component matrix. Acknowledging that the extracted factors do not contribute equally to infrastructural development, a Non-Standardised Index (NSI) was first computed for each district to support spatial representation and interpretation of individual components. The NSI was obtained by weighting the factor scores according to the proportion of variance explained by each component (Kumar et al., 2022).

The NSI for each district was calculated using the following expression:

NSI = *(% variance explained by Factor 1 / total variance) (Factor 1 score)* + *(% variance explained by Factor 2 /total variance)* × *(Factor 2 score)* + *(% variance explained by Factor n / total variance)(Factor n score).*

This index reflects the relative level of

infrastructural development of a district on a linear scale. However, as the resulting values may be either positive or negative, interpretation becomes less intuitive. To address this limitation, a Standardised Index (SI) ranging from 0 to 100 was subsequently developed using an appropriate transformation formula.

$$\text{Standardised Index} = \frac{(\text{NSI of District 1 - Min NSI})}{(\text{MaxNSI - MinNSI})} \times 100$$

To facilitate easier interpretation, the index scores were subsequently reversed so that higher values indicate a higher level of infrastructural development. The district-level Standardised Index (SI) of infrastructural development was then classified into five categories representing varying levels of development.

Standardised Index	Level of Development
More than Mean + 2 S.D	Very High
Mean + 1 S.D to Mean + 2 S.D.	High
Mean to Mean + 1 S.D.	Moderate
Mean -1 S.D to Mean	Low
Less than Mean - 1 S.D	Very Low

Results and Discussion

Components of Social Infrastructure, 1971

It is evident from table 1 that six dimensions of social infrastructural development have been identified by rotating the principal component matrix with varimax rotation. The study shows that first factor explained 27.21% of the total variance. The second and third factors accounted for 13.79% and 11.55% of the total variance respectively. Similarly, the fourth factor accounts for 10.54% of total variance followed by fifth factor (9.80%) and sixth factor (8.59%) of the total variance. Collectively, the six extracted factors accounted for 81.49 per cent of the total variance in social infrastructural development. Moreover, the communality values (h^2) were consistently high, ranging from 0.568 to 0.974, indicating that each variable included in the analysis was strongly correlated with the overall set of variables.

Factor-I: Education and Health Infrastructure

Table 1 shows that first principal component alone explained 27.21% of total variance. The study reveals that the first factor is based on six variables namely number of primary, middle, high/senior secondary schools, hospitals, health institutions and health sub-centres/dispensaries per size of area. All these variables were positively and significantly correlated with first component. Therefore, factor I has been named as education and health infrastructure. The study also reveals that in 1971, availability of education and health facilities per unit of area were responsible for maximum spatial variation in social infrastructure in India.

Factor-II: Health Infrastructure

The second most important factor accounts for 13.79% of total variance. It has positive correlation with four variables namely health institutions (0.95), health sub-centres/dispensaries (0.89), primary health centres and hospitals per size of population (Table 1). An examination of the factor loadings reveals that all the associated variables pertain to the health sector; accordingly, this factor has been designated as health infrastructure. The consistently positive loadings of the four health-related variables suggest that the availability of these facilities exerted a strong influence on social infrastructural development during the early 1970s.

Factor-III: Health and Upper Middle School Provisions

Table 1 indicates that in 1971, third factor explained 11.55% of the total variance in social infrastructure. This factor has been named as health and upper middle school provisions. The study reveals that four variables namely enrolment of students at high/senior secondary schools in relation to population (0.77), veterinary institutions in relation to area (0.75), availability of beds in health institutions and hospitals per size of population were positively associated with third factor.

Table 1:Rotated Components Matrix of Social Infrastructure, 1971

Variables	Components						Comm unalities
	Factor I	Factor II	Factor III	Factor IV	Factor V	Factor VI	(h^2)
Primary Schools No./1000 Sq Km	**0.97**	0.00	0.05	0.02	0.07	-0.05	.959
Middle Schools No./1000 Sq. Km	**0.85**	-0.07	0.29	0.05	-0.11	-0.02	.824
High School/Sen. Sec. Schools No./1000 Sq Km	**0.97**	0.02	0.03	-0.02	0.12	0.11	.974
High School/Sen. Sec. Schools No./10000 Population	0.04	0.01	0.10	-0.19	0.03	**0.88**	.828
High School/Sen. Sec. School Enrolment No./10000 Population	0.18	-0.03	**0.77**	-0.15	0.22	-0.01	.689
Primary School Teachers per 1000 students	0.04	-0.02	0.10	**0.82**	0.04	-0.15	.713
Middle School Teachers per 1000 students	0.08	0.00	-0.04	**0.86**	-0.01	-0.13	.761
High School/Sen. Sec. School Teachers per 1000 students	-0.04	0.07	-0.23	**0.79**	-0.08	0.00	.687
Health Institutions No./1000 Sq Km	**0.95**	0.02	0.21	0.02	0.17	0.01	.984
Health Institutions No./10,000 Population	-0.01	**0.95**	0.10	-0.01	-0.03	0.02	.920
Health Institutions Beds No./10,000 Population	0.32	0.37	**0.68**	-0.03	0.06	0.08	.718
Hospitals No./1000 Sq Km	**0.97**	0.02	0.08	0.01	0.15	-0.01	.964
Hospitals No./10,000 Population	0.04	**0.58**	**0.56**	0.01	0.02	0.06	.654
Primary Health Centre No./10000 Population	0.02	**0.75**	-0.05	0.04	0.02	-0.05	.568
Health Sub-Centres and Dispensaries No./1000 Sq Km	**0.84**	0.01	0.37	0.04	0.19	0.03	.882
Health Sub-Centres and Dispensaries No./10000 Population	-0.04	**0.89**	0.07	0.01	-0.02	-0.01	.802
Veterinary Institutions No./1000 Sq Km	0.24	-0.02	**0.75**	-0.03	-0.04	0.13	.643
Banks No./1000 Sq Km	0.18	0.00	0.05	-0.02	**0.95**	-0.02	.940
Cooperative Societies No./1000 Sq Km	0.18	-0.02	0.13	-0.03	**0.93**	0.19	.943
Cooperative Societies No./10000 Population	-0.01	-0.02	0.06	-0.08	0.11	**0.91**	.842
Eigen Value	**5.44**	**2.76**	**2.31**	**2.11**	**1.96**	**1.72**	
% of Variance	**27.21**	**13.79**	**11.55**	**10.54**	**9.80**	**8.59**	
Cumulative Variance	**27.21**	**41.00**	**52.55**	**63.09**	**72.89**	**81.49**	

Extraction Method: Principal Components Analysis.

Rotation Method: Varimax with Kaiser Normalization. A. Rotation converged in 5 iterations

Factor-IV: Teacher-Pupil Nexus

Table 1 shows that fourth factor explained 10.54% of the total variance and has been termed as teacher-pupil nexus. It also indicates that high positive loading for teacher-pupil ratio at middle school (0.86), primary school (0.82) and high/senior secondary school levels (0.79) (Table 1).

Factor-V: Banking Facilities

The table 1indicates that fifth factor accounts for 9.80% of the total variation in social infrastructure. The rotated factor matrix indicates that banks and cooperative societies per unit of geographical area exhibit the highest positive loadings, at 0.95 and 0.93 respectively. The strong association of these variables supports the designation of this factor as banking facilities.

Factor-VI: Secondary Schools and Cooperative Societies Nexus

The sixth interaction factor representing 8.59% of the total variance has been entitled as secondary schools and cooperative societies nexus. Table 1 reveals that co-operative societies exhibit the highest positive loading (0.91), closely followed by secondary schools per size of population (0.88), indicating their significant contribution to the underlying factor.

Components of Social Infrastructure, 2011

Table 2 shows that, in 2011, 24 variables exhibited significant correlations, ranging from high to moderate levels (0.90 to 0.50). The table points out a state of very high intercorrelations or inter-associations among different variables showing the presence of multicollinearity in the data. Hence, this inter-correlation matrix has been further transformed into a principal components matrix (Table 2). The study reveals that in 2011, seven principal components have been retained which taken together explained 82.02% of the total variance. Furthermore, the communalities for all variables were notably high, ranging from 0.663 to 0.951, indicating that each variable included in the analysis was strongly correlated with the underlying factor structure. The detailed description of each factor along with spatial disparities in factor scoresis discussed as under:

Factor-I: Health and Educational Provisions and Population Nexus

It is evident from table 2 that first factor explained 21% of total variance in social infrastructure in India in 2011. The study reveals that eight variables out of 27 were significantly and positively associated with the first principal component. Table 2 indicates that highest positive loading has been recorded for teacher-pupil ratio at middle schools (0.87) followed by primary health centres (0.84), health institutions (0.82), health sub-centres/dispensaries (0.79), teacher-pupil ratio at high school/senior secondary schools (0.78) and primary schools (0.72). The study further reveals that moderate positive loading has been registered for availability of primary (0.68) and high school/senior secondary schools (0.59) in relation to population. aken together, these significant variables broadly justify labeling this factor as representing the nexus of health and educational provisions and population.

Factor-II: Schooling, Health and Banking Facilities

The second factor explained 17.86% of the total variance in social infrastructure and has been termed as schooling, health and banking facilities. It is evident from table 2 that six variables namely primary schools, high schools/senior secondary schools, banks, hospitals, health institutions and middle schools all in relation to geographic area have witnessed high factor loading for second factor.

Factor-III: Veterinary Institutions and Cooperative Societies

The third factor accounts for 14.10% of total variations in social infrastructural development in 2011 and has been entitled as veterinary institutions and cooperative societies. It is evident from table 2 that very high positive loading has been recorded for veterinary institution both in relation to livestock population (0.93) and geographic area (0.91) and cooperative societies in relation to geographic area (0.88).

Table 2: Rotated Components Matrix of Social Infrastructure, 2011

Variables	Components							Communalities ($h^{2)}$
	Factor I	Factor II	Factor III	Factor IV	Factor V	Factor VI	Factor VII	
Primary Schools No./1000 Sq km	-0.10	**0.93**	0.04	-0.01	0.27	0.02	-0.02	.939
Primary SchoolsTeachers/1000 Students	**0.72**	-0.03	0.03	-0.35	-0.03	0.18	-0.02	.669
Primary Schools No./10000 Population	**0.68**	-0.04	-0.10	0.37	-0.16	-0.16	-0.08	.663
Enrolment at Primary Schools No./10000 Population	0.05	-0.02	-0.14	**0.63**	-0.04	-0.55	0.11	.733
Middle Schools No./1000 Sq. Km	-0.18	**0.54**	0.48	0.33	0.36	-0.05	-0.17	.829
Middle School Teachers/1000 Students	**0.87**	-0.06	0.03	0.00	0.01	0.03	-0.10	.766
Middle Schools No./10000 Population	0.47	-0.03	-0.06	**0.73**	-0.13	-0.05	-0.28	.860
Enrolment at Middle Schools No./10000 Population	-0.01	-0.13	0.01	**0.75**	-0.09	0.10	0.26	.668
High Schools/Sen. Sec. Schools No./1000 Sq km	-0.04	**0.90**	0.09	-0.07	0.10	0.14	-0.09	.868
High Schools/Sen. Sec. SchoolsTeachers/1000 Students	**0.78**	-0.04	0.07	0.08	-0.04	-0.01	-0.17	.654
High Schools/Sen. Sec. Schools No./10000 Population	**0.59**	0.00	0.05	0.22	-0.10	**0.66**	-0.21	.887
Enrolment at High Schools/Sen. Sec. Schools No./10000 Population	-0.18	0.10	0.04	-0.08	0.08	**0.83**	0.19	.785
Health Institutions No./1000 Sq Km	-0.06	**0.71**	0.47	-0.09	0.30	0.00	0.27	.893
Health Institutions No./10,000	**0.82**	-0.09	-0.08	0.15	-0.07	-0.06	0.43	.907
Hospitals No./1000 Sq Km	-0.01	**0.79**	0.32	-0.06	-0.08	-0.01	0.29	.822
Hospitals No./10,000 Population	0.06	0.17	0.27	0.13	0.01	0.08	**0.81**	.785
Primary Health Centres No./1000 Sq km	-0.05	0.10	0.01	-0.10	**0.94**	0.04	0.01	.913
Primary Health Centres No./10000 Population	**0.84**	-0.01	-0.01	-0.01	0.03	-0.04	0.07	.708
Health Sub-Centresand Dispensaries No./1000 Sq km	-0.15	0.32	0.35	-0.12	**0.79**	0.02	0.00	.890
Health Sub-Centre and Dispensaries No./10000 Population	**0.79**	-0.07	-0.08	0.16	-0.11	-0.11	0.27	.760
Veterinary Institutions No./1000 Sq km	-0.05	0.19	**0.91**	-0.10	0.13	0.13	0.04	.907
Veterinary Institutions No./10,000 Live Stock Population	0.10	0.21	**0.93**	-0.05	0.10	0.05	0.13	.951
Banks No./1000 Sq km	-0.03	**0.89**	0.32	-0.08	-0.02	0.00	0.05	.900
Cooperative Societies No./1000 Sq km	-0.03	0.37	**0.88**	0.02	0.00	-0.03	0.14	.926
Eigen Value	**5.04**	**4.29**	**3.38**	**2.05**	**1.94**	**1.57**	**1.42**	
% of Variance	**21.00**	**17.86**	**14.10**	**8.53**	**8.06**	**6.55**	**5.93**	
Cumulative Variance	**21.00**	**38.85**	**52.95**	**61.48**	**69.55**	**76.10**	**82.02**	

Extraction Method: Principal Component Analysis.

Rotation Method: Varimax with Kaiser Normalization. Rotation converged in 6 iterations.

Factor–IV: Elementary Education Provisions and Population Nexus

It is evident from table 2 that fourth factor explained 8.53% of the total variance in social infrastructure. The study indicates that three variable namely enrolment of students at primary and middle schools, availability of middle schoolsin relation to population were positively related with fourth factor. This justifies the title of the fourth factor as elementary education provisions and population nexus.

Factor-V: Basic Health Care

Table 2 shows that the fifth factor accounted for 8.06% of the total variance and primarily encompasses health-related variables, hence it has been designated as Basic Health Care. This factor exhibits very high positive loadings for primary health centres (0.94) and health sub-centres/dispensaries in relation to geographic area (0.79).

Factor-VI: Secondary Education Provisions and Population Nexus

The sixth factor explained 6.55% of the total variance in social infrastructure and two variabls namely enrolment of students (0.83) and availability of high schools/senior secondary schools (0.66) in relation to population have recorded high factor loadings. The sixth factor has been labeled as secondary education provisions and population nexus.

Factor-VII: Hospitals and Population Nexus

Table 2 indicates that the seventh factor accounted for 5.93% of the total variance and exhibited a high positive loading for hospitals relative to population. Accordingly, this factor has been labeled as the "Hospitals and Population Nexus.

Social Infrastructural Development in India, 1971-2011

Table 3 reveals that in 1971, 21 districts (approximately 6% of the total) exhibited very high or high levels of social infrastructural development, which increased to 48 districts (around 8%) by 2011. Over the study period, the number of districts classified under very low and low levels of social infrastructural development showed a notable decline. Specifically, the proportion of districts in these categories decreased from 73.11% in 1971 to 67.34% in 2011.

As shown in Table 4, Kolkata ranked first in social infrastructural development in 1971, followed by Mumbai, Mahe, Lahaul-Spiti, Delhi, and Yanam. By 1991, Mumbai had surpassed Kolkata to attain the top position, with Hyderabad, Chandel, and Kolkata occupying the next ranks. The 2011 data reveal that Mumbai maintained its leading position, while the other districts, in descending order, were Lahaul-Spiti, Kolkata, Hyderabad, Mahe, Dibang Valley, Lakshadweep, and Chennai. The study brings out that very high development of social infrastructural development has been mostly confined to state headquarters only or to those areas where population pressure is less and

Table 3: Levels of Social Infrastructural Development in India, 1971-2011

Level of Development	Reference Years			
	1971		2011	
	Total Number of Districts	Per cent of Total Districts	Total Number of Districts	Per cent of Total Districts
Very High	12	3.36	14	2.19
High	9	2.52	34	5.31
Moderate	75	21.01	161	25.16
Low	257	71.99	421	65.78
Very Low	4	1.12	10	1.56
Total	**357**	**100.00**	**640**	**100.00**

Source: Computed by authors based on data.

village settlements are far away from each other having availability of basic educational and medical facilities. The case of Lahaul-Spiti district stands out as a typical example in this regard. Given the benefit of being the administrative headquarters, balanced urbanization, early start of development processes, historical and political factors and socio-economic background of these districts play dominant role leading to very high level of social infrastructural development.

Table 5 indicates that in 1971, Jalor district ranked lowest in the availability and development of social infrastructural facilities, followed by Kottayam, Barmer, Ahmednagar, Chittor, and Damoh. Similarly, Raichur occupied the bottom

Table 4:Top 10 Districts by Social Infrastructural Development in India, 1971-2011

Reference Years			
1971		2011	
Districts	**Standardised Index**	**Districts**	**Standardised Index**
Kolkata	100.00	Mumbai	100.00
Mumbai	57.70	Lahaul-Spiti	74.64
Mahe	47.84	Kolkata	54.31
Lahaul-Spiti	30.98	Hyderabad	44.30
Delhi	29.10	Mahe	43.78
Yanam	26.49	Dibang Valley	35.00
Kamrup	26.38	Lakshyadweep	34.02
Nagaon	25.28	Chennai	29.61
Chandigarh	24.45	Kinnaur	29.51
Kohima	23.85	Saiha	27.32

Source: Computed by Authors based on Data.

Table 5: Bottom 10 Districts by Social Infrastructural Development in India, 1971-2011

Reference Years			
1971		2011	
Districts	**Standardised Index**	**Districts**	**Standardised Index**
Jalor	0.01	Hingoli	0.01
Kottayam	0.03	Kodarma	0.26
Barmer	0.19	Indore	0.29
Ahmednagar	0.56	Garhwa	0.55
Chittor	0.71	Uttar Dinajpur	0.56
Damoh	1.25	Bellary	0.78
Anantapur	1.29	South Twenty Four Parganas	0.80
Durg	1.32	Jalpaiguri	0.89
Osmanabad	1.42	Chatra	0.96
Mandla	1.44	Burhanpur	0.97

Source: Computed by Authors based on Data.

position, followed by Gulbarga, Lalitpur, Bellary, Anantapur, and Pilibhit districts. By 2011, Hingoli district exhibited very low levels of social infrastructural development, followed by Kodarma, Indore, Garhwa, and Uttar Dinajpur. The slow pace of development in these districts, coupled with high population pressure, appears to have outpaced the expansion of social infrastructure. Conversely, districts such as Kolkata, Mumbai, Hyderabad, Mahe, Lahaul-Spiti, Delhi, Lakshadweep, Chennai, and Yanam consistently recorded very high to high levels of social infrastructural development. This pattern can be attributed to their roles as administrative headquarters, rapid urbanization, early initiation of development programs, and the influence of historical and political factors.

Conclusions

The foregoing analysis of the social infrastructure reveals that there have been variations in the number of factors extracted during the three reference periods. The study reveals that in 1971, six factors together explained 81.49% of the total variance in 1971 social infrastructure. Similarly, in 2011, seven factors were retained by principal components analysis and these factors together were responsible for 82.02% of the total variance in social infrastructural development in India. The study finds out that in 1971, education and health sectors together were responsible for maximum spatial variations in development of social infrastructure in India. After four decades in 2011, health sector got momentum in social infrastructural development causing maximum spatial variations followed by education sector. The study reveals that although the study areas has witnessed notable decrease in number of districts with very low and low level of social infrastructural development during the study period. But, still about two third area of the country has observed low and very low development of social infrastructure and needs closer attentions of regional planners and policy makers.

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