

Original Article

Performance of Selected Indian States in Higher Education during the Last Decade: An Empirical Analysis Based on Secondary Data

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Abstract: In order to increase India's Gross Enrolment Rate (GER) in higher education from the current 26 percent to 50 percent by 2030 and make our students globally competitive, the New National Education Policy was launched on 29th July 2020. To fulfil these objectives, it is necessary to build well-organized and modern educational institutions. From this perspective, it is essential to understand the current state of higher education in various states across our country. The paper attempts to explore, based on some key indicators, the higher educational performance of 23 selected states of India from 2010-11 to 2020-21. For this purpose, data from the All-India Survey on Higher Education (published annually by the Department of Higher Education under the Ministry of Education, India) has been used. Firstly, in this paper, the Compound Annual Growth Rate (CAGR) of each indicator is calculated separately for each state using data from AISHE. After standardisation of each of the indicator's CAGR values, a rank has been assigned to each state. This rank indicates the performance of a particular state for a specific parameter. Secondly, the Higher Educational Development Index (EDI_HE) is constructed based on these parameters using Principal Component Analysis (PCA) to explore the relative position of the 23 states. This analysis reveals that Arunachal Pradesh is the most consistent state in terms of CAGR for most indicators. Finally, the Performance of some advanced states, such as Kerala, West Bengal, and Karnataka, is on the lower side during this time period, mainly because they already have a good infrastructure in higher education.

Keywords: NEP, Higher Education, Gross Enrolment Rate, GPI, PCA, CAGR.

I. INTRODUCTION

To increase India's Gross Enrolment Rate (GER) in higher education from the current 26 percent to 50 percent by 2030 and make our students globally competitive, the New National Education Policy (NEP 2020), launched on 29th July 2020, planned to develop some important changes in the existing strategies in higher studies. The primary objectives of NEP 2020 in higher education are to offer students a flexible curriculum through an interdisciplinary approach, provide multiple exit points, introduce four-year undergraduate programs, promote research activities, enhance faculty support, and internationalise education. To fulfil these objectives, it is a prerequisite to increase the size of the institutional capacity of the higher educational system. This size is in turn determined by three important indicators: number of educational institutions (both universities and colleges), number of teachers and number of students (UGC, 2008). Fortunately, India already has this infrastructure in place in higher education. Since 2000, the number of universities and colleges has increased considerably. According to the latest report of the All India Survey on Higher Education (AISHE, 2020-21), more than 55,000 higher education institutions are functioning in India, and the current number of colleges per lakh eligible students (18-23 age group) is 31. The Ministry of Education is trying to increase this number further across the country so that more students can have access to higher studies. From this survey, it is also observed that in 2020-21, more than 15 lakh teachers are employed in different government as well as private aided/unaided universities and colleges. In this respect, it is worth noting that due to the higher appointment of educational instructors in various educational institutions, the pupil-teacher ratio (PTR) has also drastically decreased over the years (currently, this ratio is 24) in India. On the other hand, it is also observed from AISHE reports that enrolment in various disciplines as well as among different communities has increased considerably over the last 10 years.

However, beneath this impressive scale lies a stark reality: a significant and often widening disparity in higher education access, quality and opportunities across its diverse states. The expansion of the higher education sector has helped the country reach a 'stage of inclusiveness'; however, it is equally important to understand the actual positions of the participants in this journey. Has the expansion of this system increased access to higher education among underrepresented groups and regions, or has it exacerbated inequality? A major concern often raised in research and policy debates is unequal access to and participation in higher education among different socioeconomic groups and regions of our country. More specifically, it is often observed that there is a significant and often wide disparity in access, quality and opportunities for higher education across different states.



This state-wise disparity paints a complex and uneven canvas, reflecting broader socio-economic inequalities and historical legacies. While some states boast numerous prestigious institutions, extensive infrastructure and higher gross enrolment ratios, others lag significantly behind. Factors such as historical investment patterns, economic development levels, population density, government policy priorities, and the presence or absence of central and state-funded institutions play crucial roles in shaping these regional variations. This disparity not only limits individual potential and exacerbates regional inequalities but also poses challenges for equitable national development and the optimal utilization of India's vast human resources.

These interstate regional performances can best be observed from three different perspectives, namely infrastructure, accessibility, and outcomes. A prerequisite for the development of higher education in a country is high infrastructural development in terms of the number of universities and colleges; otherwise, it is not possible to admit potential students interested in enrolling in this field. Secondly, accessibility indicates how easy it is for students to find suitable institutions for higher education. For example, a larger number of higher education institutions per lakh population and a lower enrollment rate per college create a better and quality learning environment in higher education. Finally, and most importantly, a state's 'outcome' in terms of a high gross enrolment rate and gender parity reflects its actual performance in the field of higher studies.

Against this backdrop, the present paper attempts to explore the performance of some selected Indian states in higher education during the period from 2010 to 2020, which is the period just before the launch of the new education policy. Essentially, through this effort, the present article not only attempts to analyze the inter-state growth performance of higher education, but also attempts to capture whether each state is sufficient to implement the NEP in higher education.

The rest of the paper is organised as follows. The major objectives of this study are mentioned in Section 2. Furthermore, the data and methodological parts are discussed in the next section. In the third section, the major findings of this study are described. The concluding part of this paper with policy implications is given in the last section.

II. OBJECTIVES

This paper attempts to explore the inter-state performance of higher education in India from 2010 to 2021 based on six parameters, which are categorized under three indicators: Infrastructure (Number of Universities & Colleges), Accessibility (Number of colleges per lakh population & Average Enrolment Rate per college) and Outcome (Gross Enrolment Rate & Gender Parity Index). Specifically, the two basic objectives of this paper are:

- To examine the higher educational performance of 23 selected states in India based on the aforementioned parameters from 2010-11 to 2020-21.
- To construct the Higher Educational Development Index (EDI_HE) based on these parameters by using Principal Component Analysis (PCA) to explore the relative position of these 23 states.

III. DATA AND METHODOLOGY

A) Data Description

For analytical purposes, the paper uses secondary data from the All India Survey of Higher Education (AISHE). This report is published annually by the Department of Higher Education under the Ministry of Education, providing detailed state-wise information on various higher education indicators, including the number of universities and colleges, PTR, GER, GPI, and enrolment in different streams as well as among different communities. But due to the lack of data from some states and union territories over the years, this paper uses data from 23 major states out of the 36 states and union territories of India.

Based on the above-mentioned objectives, the six variables used in this study are given below:

INDICATORS	VARIABLES	DESCRIPTION
Infrastructure	Number of Universities	It includes privately owned, open, and deemed universities along with various central & state government universities.
	Number of Colleges	Only affiliated and constituent institutions of Central and State Public Universities have been counted as colleges*.
Accessibility	Number of colleges per lakh population	Indicates college density (population aged 18-23) varies 7 in Bihar & 59 in Karnataka*
	Average Enrolment Rate	Indicates the number of students enrolled in higher education institutions, reflecting the accessibility & popularity of higher educational institutions
Outcome	Gross Enrolment Ratio (GER)	Gross Enrolment Ratio (GER) is a statistical tool that is used to measure the student enrolment in higher education. GER is calculated by dividing the number of students enrolled in higher education by the total population in the relevant age group of 18-23 years.

	Gender Parity Index (GPI)	The Gender Parity Index (GPI) is the ratio of the number of females to the number of males enrolled in a given stage of education. A GPI of greater than one signifies education access in favor of female students.
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B) Methodology

Firstly, Compound Annual Growth Rate (CAGR) for the time period 2010-11 to 2020-21 for each of the above-mentioned variables is calculated with the formula given below:

$$CAGR_{ij} = \{(V^{FINAL}/V^{BEGIN})^{1/t} - 1\} \times 100 \text{-----(1)}$$

Where CAGR_{ij} is the compound annual growth rate of these variables for the jth index.

V^{FINAL} is the value of the final year of the variable (i.e 2020-21 value)

V^{BEGIN} is the starting value of the variable (i.e 2010-11 value)

t = time in years (= 11, from 2010-11 to 2020-21).

After computing the CAGR, each of these variables is standardised with the formula mentioned below:

$$SV_{ij} = \frac{(Observed\ X_{ij} - Minimum\ X_{ij})}{(Maximum\ X_{ij} - Minimum\ X_{ij})} \text{----- (2)}$$

where SV_{ij} is the standardised value of the ith variable belonging to the jth state.

Observed X_{ij} is the value of the ith variable for a particular state.

The minimum X_{ij} is the minimum value of the variable across all states combined.

Maximum X_{ij} is the maximum value of the variable across all states combined.

After completion of the calculation of SV_s for each of the variables for each state separately, finally, the composite Higher Education Index (EDI_HE) is calculated with the formula given below:

$$• \quad EDI_HE = \frac{\sum_{i=1}^n X_i W_{mi}}{\sum_{i=1}^n W_{mi}} \text{----- (3)}$$

Where X_i is the standardised value of the ith variable, where $i = 1, \dots, 6$

& w_i is the weight generated through PCA.

We get **EDI_HE** for each state separately.

Principal Component Analysis (PCA) has been used to find the above weights. The PCA calculation is done with the help of SPSS software. In PCA calculation, firstly, we have computed the Eigen values of the variables. Then we identify those Principal /Components whose eigenvalues are greater than one. After that, we have computed the loading value of each variable on the selected components. To find out the variable-specific weight, we have multiplied the absolute value of the loading by its respective Eigen Value. Finally, **EDI_HE** is calculated for each state with the formula given in equation 3 above. Based on this higher education index, we can finally rank the states in terms of their higher education performance during the period mentioned above.

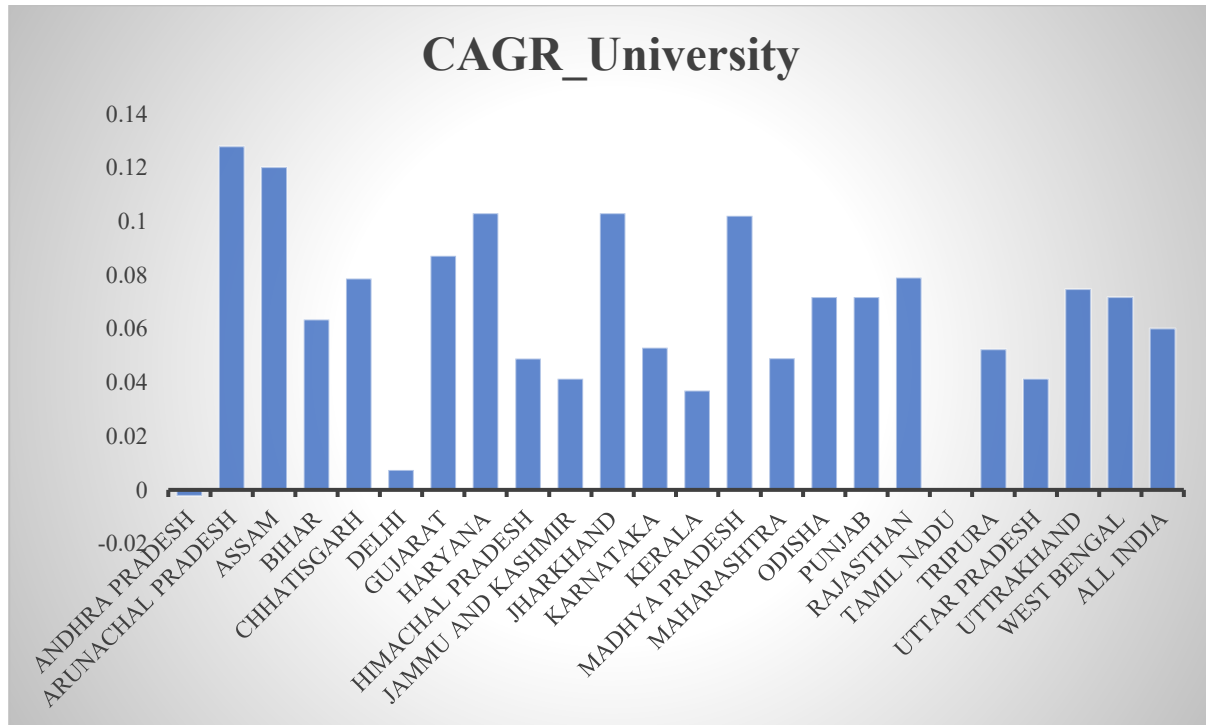
IV. RESULT AND DISCUSSION

A) Growth Rate of Universities

Table 1 shows that the number of universities in India increased from 621 to 1,113 over 11 years (2010-2021), achieving an annual growth rate of more than 6%. This growth is quite impressive, especially before the beginning of the new education policies. During this phase, new public and private universities have been established across India to meet the higher education needs of young people. However, a state-wise comparison reveals that two northeastern states, Arunachal Pradesh and Assam, took the first two positions in terms of the compound annual growth rate of universities during this time period. On the contrary, in states like Delhi, Tamil Nadu and Andhra Pradesh, this growth rate is quite low or negative. The primary reason for this is that these states already have a robust infrastructure in higher education, with a high number of universities; hence, the government is more inclined to invest in those states where the need is most pressing. Moreover, this table also shows that Rajasthan (83) has the highest number of universities among all the selected states in 2020-21.

Table-1 Change in Total Number of Universities from 2010-11 to 2020-21														
State	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	CAGR Unive rsity	STAND UNIVERSITY	Rank University
Andhra Pradesh	46	47	27	27	28	28	33	34	41	41	45	-0.002195477	0	23
Arunachal Pradesh	3	3	3	7	8	9	9	9	10	10	10	0.127944873	1	1
Assam	9	9	12	18	19	21	21	21	22	26	28	0.120189641	0.940408705	2
Bihar	20	20	20	21	22	22	23	24	33	35	37	0.063450238	0.504422458	13
Chhatisgarh	15	17	19	21	22	22	24	24	28	28	32	0.078712899	0.621700925	8
Delhi	26	25	25	26	26	26	27	27	27	28	28	0.007438325	0.074026251	21
Gujarat	36	38	41	44	49	57	62	65	72	76	83	0.087120184	0.686302604	6
Haryana	21	22	25	31	37	39	39	40	48	53	56	0.103054252	0.808740175	3
Himachal Pradesh	18	18	22	23	24	25	25	25	26	27	29	0.048847988	0.392218591	17
Jammu and Kashmir	10	11	11	11	11	11	12	14	15	15	15	0.041379744	0.334832518	18
Jharkhand	12	12	12	12	13	14	18	21	25	32	32	0.103054252	0.808740175	3
Karnataka	43	43	45	45	51	52	55	60	65	69	72	0.052898251	0.423340859	14
Kerala	16	17	17	18	18	20	21	22	23	23	23	0.03695709	0.300848791	20
Madhya Pradesh	28	33	36	39	41	43	48	52	65	66	74	0.102065403	0.801141844	5
Maharashtra	44	44	45	45	45	45	49	54	62	65	71	0.049012268	0.393480923	16
Odisha	18	19	19	21	21	21	24	25	28	32	36	0.071773463	0.568378213	10
Punjab	17	19	20	22	24	26	28	31	32	32	34	0.071773463	0.568378213	10
Rajasthan	43	45	47	63	64	70	78	79	83	89	92	0.079026069	0.624107326	7
Tamil Nadu	59	59	56	58	58	58	58	58	59	59	59	0	0.016870072	22
Tripura	3	3	3	3	3	3	5	4	4	4	5	0.052409779	0.419587439	15
Uttar Pradesh	56	57	59	62	63	67	72	76	79	81	84	0.041379744	0.334832518	18
Uttarakhand	18	20	22	24	26	28	28	33	36	36	37	0.074714038	0.590973634	9
West Bengal	26	26	26	27	31	34	41	43	45	47	52	0.071773463	0.568378213	10
All India	621	642	667	723	760	799	864	903	993	1043	1113	0.060084187	0.478557683	
Source: Author's own calculation from AISHE data set														

Source: Author's own calculation from AISHE data set



B) Compound Annual Growth of Colleges

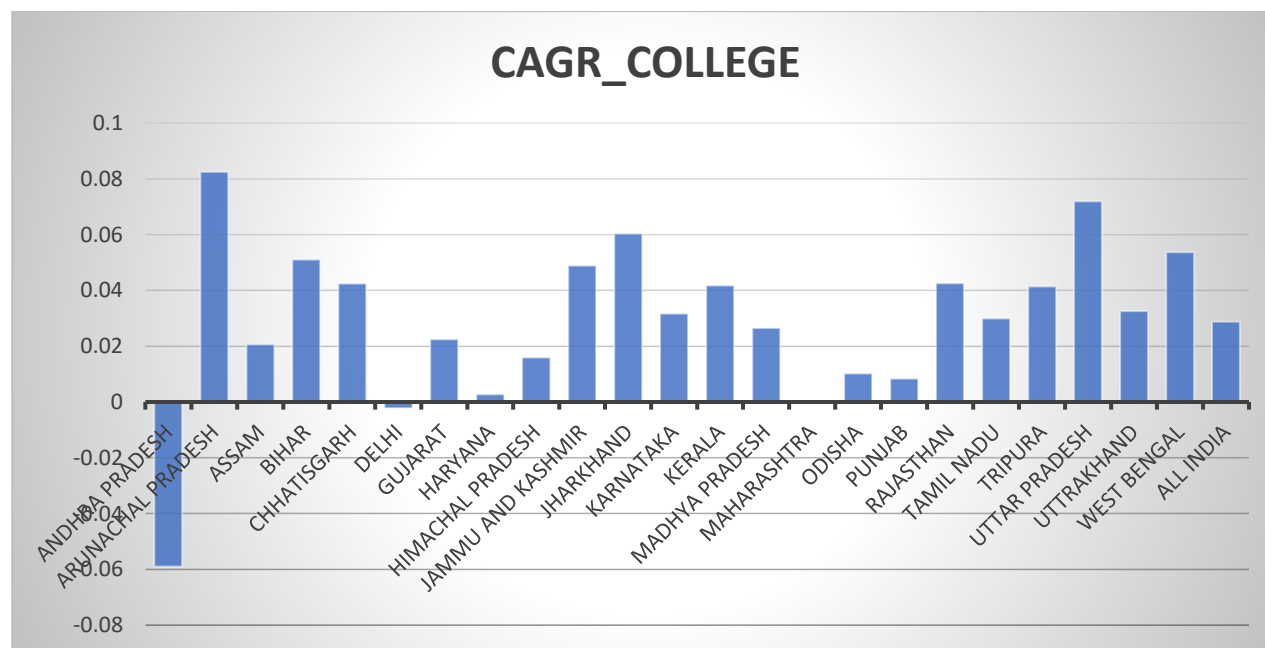
Table 2 shows that over ten thousand new colleges were established across India during these 10 years, indicating an increase of over 2% in the number of colleges every year. In fact, the increase in the number of colleges enhances India's infrastructural capacity in higher education, facilitating students who aspire to pursue higher education. However, the growth rate is unequal among the selected 21 states. Interestingly, Arunachal Pradesh again takes the first position in this aspect, even though the number of colleges is low (42 in 2020-21) compared to other North-Eastern states of India. Furthermore, the study has also observed that Uttar Pradesh holds the second position in terms of high growth performance, with colleges registering a compound annual growth rate of more than 7%. During this period, in Uttar Pradesh, more than 4,000 new colleges have been established. On the other hand, it is surprisingly observed that the number of colleges has been continuously decreasing over the

years in Andhra Pradesh, registering a more than 5% negative growth rate during the specified time period. Nevertheless, it has also been observed from the study that the number of colleges in 2020-21 is highest in Uttar Pradesh (8114).

Table-2 Change in Total Number of Colleges from 2010-11 to 2020-21

State	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	CAGR_C OLLEGE	RANK COLLEGE	STAND COLLEGE
Andhra Pradesh	4780	4815	2527	2568	2673	2532	2663	2624	2678	2750	2601	-0.05904	23	0
Arunachal Pradesh	19	26	26	26	27	28	31	30	37	39	42	0.082554	1	1
Assam	485	485	529	536	538	539	541	512	544	558	595	0.020652	16	0.562817109
Bihar	629	650	675	704	732	744	756	770	840	874	1035	0.051064	5	0.777600026
Chhatisgarh	574	589	602	671	702	706	725	741	760	810	870	0.042463	8	0.716860577
Delhi	184	184	187	188	190	191	178	178	180	179	180	-0.0022	22	0.401460618
Gujarat	1815	1780	1880	1944	1989	2019	2116	2196	2232	2275	2267	0.022486	15	0.575774419
Haryana	1054	1061	1072	1098	1113	1113	1155	964	1038	1087	1083	0.002718	20	0.436161397
Himachal Pradesh	297	289	293	296	321	348	374	327	336	344	348	0.015973	17	0.529776539
Jammu and Kashmir	216	306	329	327	325	329	316	297	293	316	348	0.048848	6	0.7619528
Jharkhand	187	234	267	284	302	328	307	309	313	323	336	0.060351	3	0.843194323
Karnataka	3098	3068	3205	3310	3492	3555	3753	3593	3670	4047	4233	0.031708	12	0.640900516
Kerala	962	1033	1064	1151	1259	1302	1334	1306	1348	1417	1448	0.04174	9	0.711753105
Madhya Pradesh	2009	2172	2280	2136	2292	2260	2173	2124	2191	2411	2610	0.026517	14	0.604239715
Maharashtra	4512	4566	4369	4498	4646	4569	4286	4314	4340	4494	4532	0.000442	21	0.420090371
Odisha	1089	1090	1096	1067	1070	1076	1067	1042	1062	1087	1206	0.010257	18	0.489406903
Punjab	956	958	973	997	1006	1050	1068	1053	1063	1079	1039	0.00836	19	0.476010759
Rajasthan	2435	2670	2669	2774	2892	3050	3203	2957	3156	3380	3694	0.042557	7	0.71752271
Tamil Nadu	1985	2302	2372	2460	2477	2368	2368	2472	2466	2610	2667	0.029974	13	0.628655918
Tripura	36	39	46	47	48	51	52	52	52	53	54	0.04138	10	0.709208664
Uttar Pradesh	4049	4828	5048	5445	6026	6491	7073	6922	7078	7788	8114	0.071985	2	0.925357161
Uttarakhand	346	395	390	410	429	439	468	440	438	454	477	0.032629	11	0.647405425
West Bengal	857	901	955	985	1051	1082	1208	1341	1371	1411	1446	0.053704	4	0.796250199
All India	32974	34852	35525	36634	38498	39071	40026	39050	39931	42343	43796	0.028789		

Source: Author's own calculation from AISHE data set



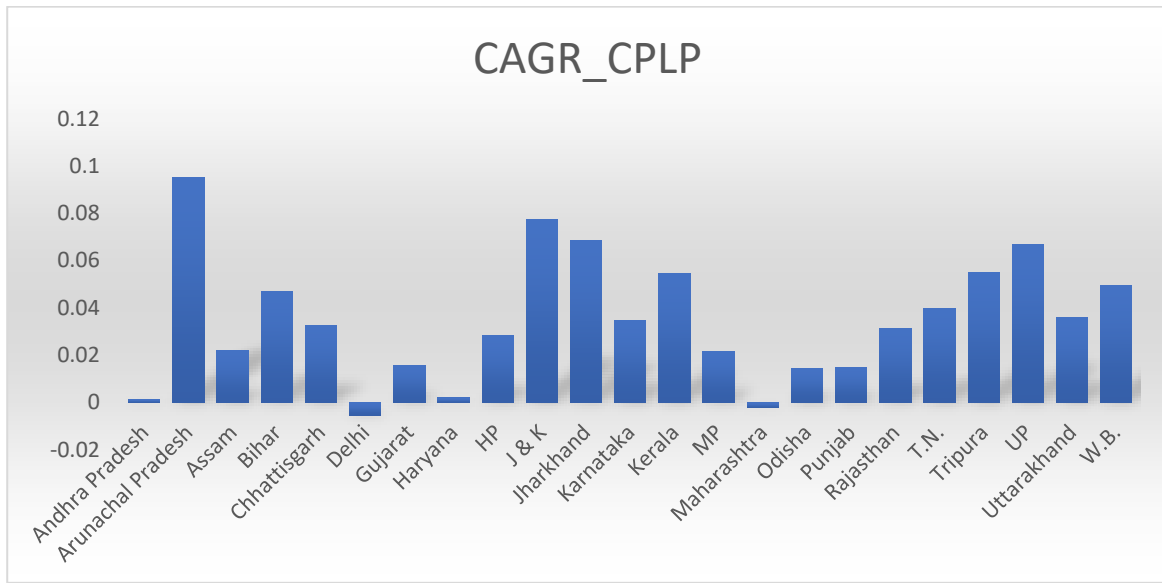
C) Compound Annual Growth Rate of College Per Lakh Population

The compound annual growth rate of colleges per lakh population of the selected states of India is reported in Table 3. The table shows that the number of colleges in India increased moderately from 23 to 31 (nearly 2% per annum) during the study period. In fact, the high number of colleges per lakh population is a reflection of the ease of access to higher education for students. It is not very surprising from Table 3 that the least developed states of India, such as Arunachal Pradesh, Jammu and Kashmir, and Jharkhand, have recorded higher growth in this category, especially due to the vision of the Government of India's Higher Education Development Programme, which is specifically designed for the least developed regions. It is also noted from

this table that in some large states, such as Andhra Pradesh, Haryana, and Gujarat, the growth rate of colleges per lakh population has not increased significantly. As a result, these states rank lower in this category.

Table-3: College per lakh population from 2010-11 to 2020-21

State	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	CAGR CPLP	RANK CPLP	STAND CPLP
Andhra Pradesh	48	48	44	45	47	45	48	48	49	51	49	0.001384004	21	0.06895
Arunachal Pradesh	11	16	16	16	17	17	19	19	23	25	27	0.095080472	1	1
Assam	13	13	15	15	15	15	15	14	15	15	16	0.021792763	15	0.27175
Bihar	5	6	6	7	7	7	7	7	7	7	8	0.04704961	8	0.52272
Chhattisgarh	20	20	20	22	23	23	23	24	24	26	27	0.032518788	12	0.37833
Delhi	8	9	9	9	9	9	8	8	8	8	8	-0.005555089	23	0
Gujarat	27	25	26	27	28	28	29	30	31	31	31	0.015536438	17	0.20958
Haryana	33	33	34	34	35	35	36	30	33	34	34	0.001988531	20	0.07496
HP	38	37	38	39	43	47	51	45	47	49	50	0.028137344	14	0.3348
J & K	14	21	23	24	24	25	24	23	23	26	29	0.077353811	2	0.82385
Jharkhand	5	7	7	8	8	9	8	8	8	8	9	0.068623456	3	0.7371
Karnataka	44	41	44	46	49	50	53	51	53	59	62	0.03481153	11	0.40112
Kerala	29	33	34	37	41	43	44	44	45	48	50	0.054317406	6	0.59494
MP	23	25	26	25	26	26	25	24	24	27	29	0.021660107	16	0.27043
Maharashtra	35	34	33	34	35	34	32	33	33	34	34	-0.002358049	22	0.03177
Odisha	23	23	23	23	23	23	23	23	23	24	26	0.014446433	19	0.19875
Punjab	29	28	29	30	31	32	33	33	34	35	34	0.014751862	18	0.20179
Rajasthan	29	32	32	33	34	35	36	33	35	37	40	0.031281328	13	0.36604
T.N.	27	30	31	33	33	32	33	35	35	38	40	0.039731307	9	0.45
Tripura	8	9	10	11	11	12	12	12	12	12	13	0.054774382	5	0.59948
UP	17	20	21	23	25	26	29	28	28	31	32	0.066804083	4	0.71902
Uttarakhand	28	32	31	33	35	36	39	37	37	38	40	0.035703842	10	0.40998
W.B.	8	8	9	9	10	10	11	12	13	13	13	0.049476136	7	0.54684
All India	23	25	25	26	27	28	28	28	28	30	31	0.029082972		



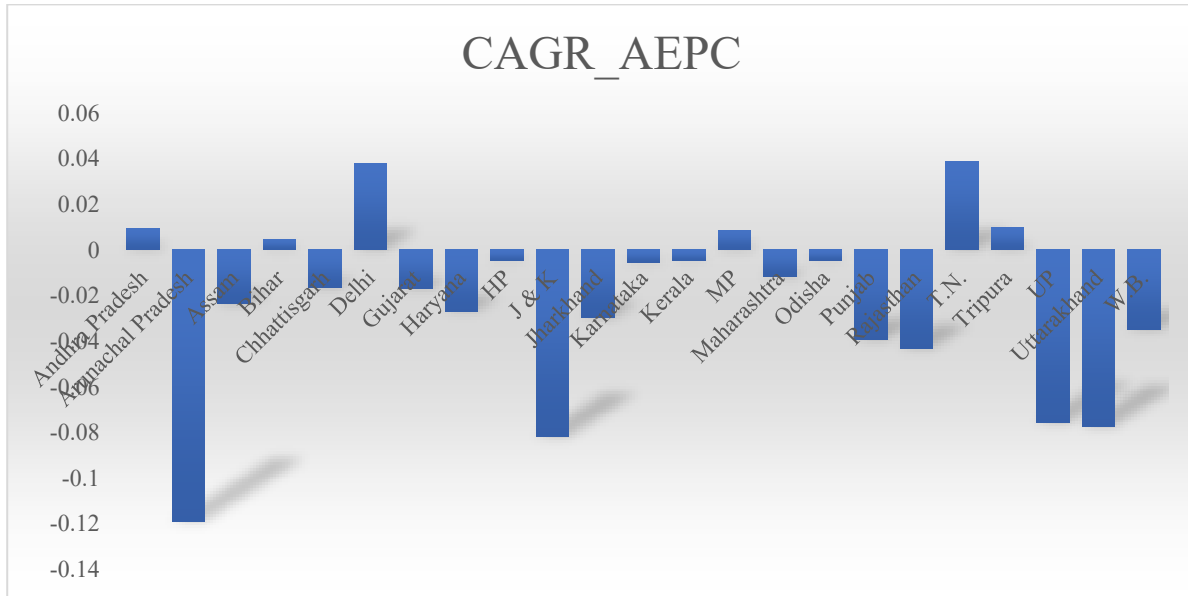
D) Change in Average Enrolment Rate Per College

Table 4 deals with the compound change in average enrolment rate per college. This indicator can be interpreted from two different standpoints. For example, a higher enrolment rate per college may indicate an increase in demand for higher education among young people wishing to enrol in higher education. But this view is sometimes misleading because high intake capacity per college can increase the student-teacher ratio, which can reduce students' learning opportunities. On the other hand, the low intake capacity per college may be due to the greater availability of higher education institutions for students wishing to enrol in higher education closest to their area. Therefore, the two opposing arguments have some merit in their own right, but in the Indian educational environment, the second view is more relevant than the first. Fortunately, in India, it has been observed that the average enrolment rate per college in most states decreases over the years. However, at the all-India level, this rate decreased slightly (by less than 1%) during the reference period. This may be because in some large states like Bihar, Tamil Nadu, and Andhra Pradesh, the average enrollment rate per college has slightly decreased, and in some cases, it has even increased over the years. Therefore, the high rate of decline in some states, such as Arunachal Pradesh, Jammu and Kashmir, West Bengal,

and Uttar Pradesh, and the high rate of increase in other states mentioned earlier, are the result of a moderate rate of overall decline at the all-India level.

Table-4: Average Enrolment per College from 2010-11 to 2020-21

State	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	CAGR_AEPC	STAND_AEPC	RANK_AEPC
Andhra Pradesh	493	490	473	526	516	494	469	493	524	547	541	0.00931	0.185709	20
Arunachal Pradesh	1943	1227	1041	1322	1538	1356	695	810	551	553	547	-0.119	1	1
Assam	1009	950	908	883	908	942	917	983	971	870	795	-0.0236	0.39442	10
Bihar	1794	1929	2018	2060	2081	2142	1801	1686	1616	1703	1881	0.00473	0.214808	18
Chhattisgarh	646	474	509	510	511	527	531	550	565	557	546	-0.0166	0.350392	12
Delhi	1081	1292	1311	1440	1506	1527	1501	1531	1562	1620	1567	0.03778	0.005097	22
Gujarat	624	599	604	626	611	585	536	519	513	528	526	-0.0169	0.352188	11
Haryana	766	785	730	698	683	646	514	611	610	590	584	-0.0268	0.414831	9
HP	535	513	484	528	549	520	471	553	558	541	510	-0.0048	0.275066	16
J & K	1392	1019	947	745	683	644	646	720	799	721	594	-0.0816	0.762801	2
Jharkhand	2376	2298	1934	1924	2025	1716	1786	1786	1875	1938	1761	-0.0295	0.432115	8
Karnataka	414	401	436	438	434	438	381	416	426	415	392	-0.0055	0.27974	14
Kerala	557	538	555	585	517	521	510	554	568	575	531	-0.0048	0.275342	15
MP	611	551	568	582	576	589	575	646	734	771	666	0.00863	0.19004	19
Maharashtra	756	650	489	540	591	628	646	678	681	670	672	-0.0117	0.318864	13
Odisha	600	589	616	565	606	661	682	685	682	659	573	-0.0046	0.273944	17
Punjab	724	730	763	708	668	633	580	576	546	521	484	-0.0394	0.494862	6
Rajasthan	725	638	661	665	562	551	443	526	521	517	467	-0.043	0.517704	5
T.N.	574	772	816	831	854	895	922	919	924	872	838	0.03858	0	23
Tripura	1086	1036	1003	1009	1134	1097	1207	1156	1153	1175	1198	0.00991	0.181948	21
UP	1351	1029	1119	1143	1011	920	776	816	743	692	614	-0.0758	0.725988	4
Uttarakhand	1224	1061	1029	842	726	684	508	621	641	634	546	-0.0775	0.736791	3
W.B.	1655	1463	1498	1487	1455	1427	1323	1170	1170	1179	1161	-0.0348	0.465878	7
All India	700	703	715	742	731	721	659	698	693	680	646	-0.008		



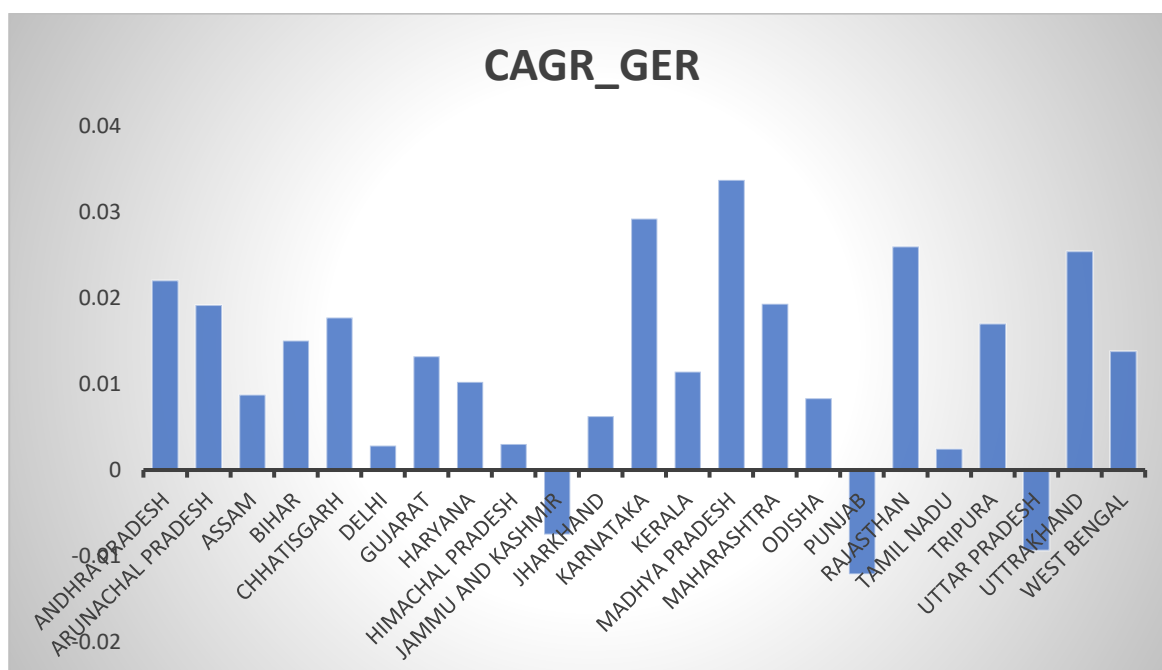
E) Compound Annual Growth of Gross Enrolment Rate

It has been observed from Table 5 that India's Gross Enrolment Rate [1] (GER) has improved moderately (less than 1% per annum) during the study period. However, three Indian states, viz, Punjab, Uttar Pradesh, and Jammu and Kashmir, have registered negative growth in terms of GER. In contrast, Madhya Pradesh, Karnataka and Rajasthan occupy the top three spots in the ranking of compound annual growth in GER. Moreover, it is also clear from this table that in 2020-21, this rate is more than 40% in states like Delhi, Tamil Nadu and Uttarakhand. On the other hand, in Assam, Bihar, Jharkhand, and Tripura, this rate in 2020-21 is relatively much lower than in other states in India.

Table-5: Change in Gross Enrolment Rate (GER) of higher Education from 2010-11 to 2020-21

State	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	CAGR GER	Rank GER	STAND GER
Andhra Pradesh	30.8	31.2	30.8	27.3	29.9	28.4	35.1	33.3	34.3	36.6	38.3	0.022032734	5	0.75
Arunachal Pradesh	28.7	28.3	26.1	19	21.3	26.9	26.5	28.2	26.4	31.9	34.7	0.019165603	7	0.68
Assam	15.4	14.8	15.8	13.8	14.7	13.4	16.6	17.1	17.4	15.7	16.8	0.008739103	15	0.46
Bihar	14.3	13.9	13	13.1	12.5	10.5	13.7	12.1	12.4	12.7	16.6	0.015026089	10	0.59
Chhattisgarh	15.1	14.6	14	12.4	10.5	13.6	15.5	17.5	17.1	16.3	18	0.017722921	8	0.65
Delhi	45.4	43.5	43.1	39.6	38.9	32.5	44.4	47.1	45.7	48	46.7	0.002827195	19	0.33
Gujarat	20.7	20	19.5	18.3	16.5	21.3	22.1	21	21.1	21.8	23.6	0.013197631	12	0.55
Haryana	26.1	27.6	27.5	27.8	28	24.1	27.5	26	25.5	25.7	28.9	0.010242729	14	0.49
Himachal Pradesh	32.5	31.2	29.3	25.8	24.8	26	31.2	31.9	32.3	35.7	33.5	0.003035132	18	0.33
Jammu and Kashmir	24.8	24.8	25.6	25.6	22.8	16.8	20.4	22	23.9	24.1	23	-0.007506627	21	0.10
Jharkhand	15.5	15.4	13.1	12.1	9.9	8.1	16	15.8	16.5	17.5	16.5	0.00627162	17	0.40
Karnataka	26.1	26.4	26.2	25.4	23.8	25.5	26.2	26.9	27.8	30.7	34.8	0.029186009	2	0.90
Kerala	30.8	28.7	24.9	22.1	21.8	21.9	26.4	29.6	28.2	29.8	34.5	0.011409056	13	0.51
Madhya Pradesh	19.6	19.6	19.6	19.2	18.5	13.6	20.1	20.8	20.8	22.9	27.3	0.033690816	1	1.00
Maharashtra	29.9	27.9	26.3	22.9	26.3	27.6	31.9	32.5	33.5	33.5	36.2	0.019304023	6	0.69
Odisha	19.6	17.7	16.4	16.3	16.6	16.1	21.9	22.6	22.8	21.6	21.3	0.008352439	16	0.45
Punjab	27	27.1	25.4	23.9	23	19.4	25.9	26.5	24.4	24.1	23.9	-0.012121773	23	0.00
Rajasthan	20.2	20	19.7	18.3	18.2	18.2	20.9	22	22.4	23.7	26.1	0.025956421	3	0.83
Tamil Nadu	44.3	45.2	43	42	40	32.9	45.7	46.2	46.6	48.1	45.4	0.002455753	20	0.32
Tripura	16.9	16.8	15.4	14.1	12.4	13.6	19.3	21	18.5	19.5	20	0.016984489	9	0.64
Uttar Pradesh	24.5	25	21.6	19.5	17.4	16.3	21.9	22.3	21.3	20.8	22.3	-0.009364521	22	0.06
Uttarakhand	33.3	33.9	33.8	33.3	31.1	27.8	29.8	31.8	34	35	42.8	0.025415679	4	0.82
West Bengal	17.7	17.4	16.3	15.1	13.6	12.4	19.2	19.4	19.4	19.8	20.3	0.013799977	11	0.57
India	24.5	24.3	23	21.5	20.8	19.4	24.3	24.5	24.4	24.8	26.7	0.008636123		

Source: Author's Own Calculation from AISHE data

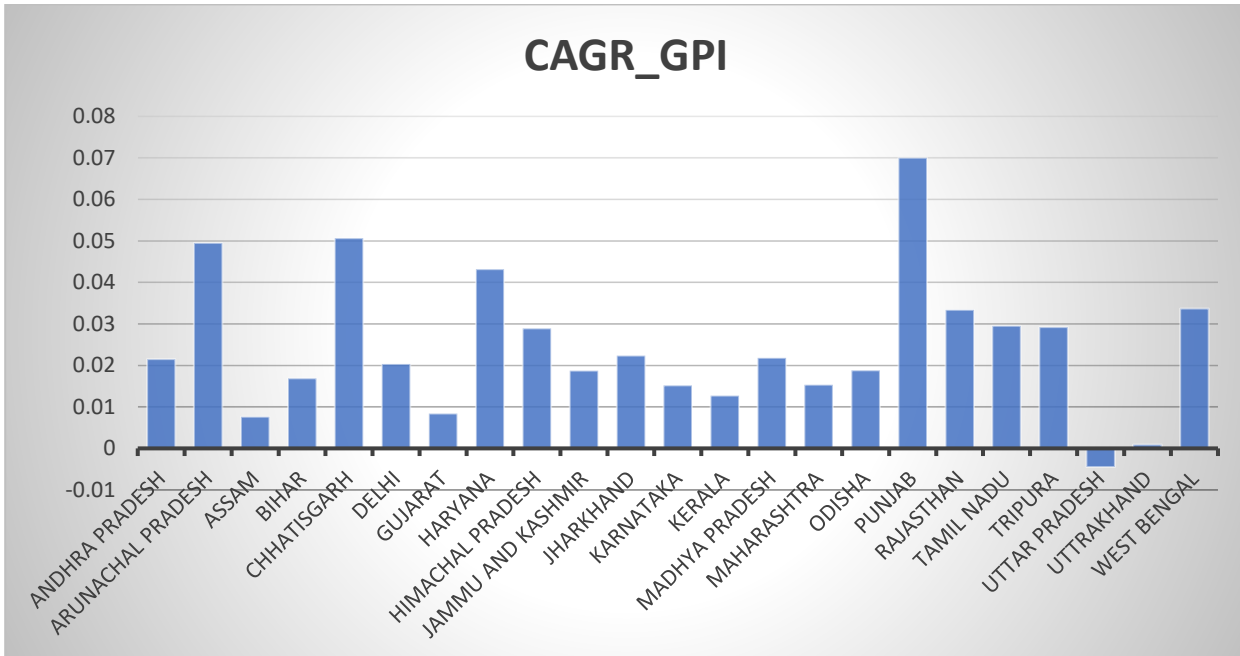
**F) Change in Gender Parity Index (GPI)**

Compound annual growth of GPI is shown in Table 6. From this table, it has been observed that rapid growth in this respect has been registered by three Indian states, viz. Arunachal Pradesh, Punjab and Chhattisgarh during the study period. Notably, the GPI in all these states was around 0.5 but has now increased by more than 1 over these 11 years. At the all-India level, the compound annual growth rate of this indicator is more than 2%, indicating that girls' participation in higher education has improved in recent years. Another interesting fact emerging from this table is that Kerala, one of the educationally empowered states in India, ranks lower (18th) than other states. In fact, the ranking alone does not accurately reflect the true characteristics

of Kerala in this regard, as the GPI of this state has been significantly higher than that of its counterparts (around 1.4 per year) during the period discussed in this paper.

States	2010-11	2011-12	2012-13	2013-14	2014-15	2015-16	2016-17	2017-18	2018-19	2019-20	2020-21	CAGR GPI	RANK GPI	STAND GPI
Andhra Pradesh	0.76	0.79	0.76	0.76	0.78	0.77	0.84	0.84	0.88	0.9	0.94	0.021484	12	0.35
Arunachal Pradesh	0.58	0.89	1.08	1.04	0.97	0.99	1.01	0.92	1.03	1	0.94	0.04947	3	0.72
Assam	1.01	1.01	0.97	0.92	0.93	0.9	1.03	1.07	1.07	1.1	1.09	0.007652	21	0.16
Bihar	0.77	0.77	0.8	0.81	0.82	0.8	0.87	0.86	0.86	0.9	0.91	0.016846	16	0.29
Chhatisgarh	0.72	0.92	0.88	0.88	0.91	0.93	0.99	1.02	1.1	1.2	1.18	0.050642	2	0.74
Delhi	0.85	1	1.05	1.07	1.08	1.12	1.04	0.98	1.06	1	1.04	0.020379	13	0.33
Gujarat	0.8	0.81	0.8	0.8	0.79	0.8	0.78	0.86	0.89	0.9	0.87	0.008423	20	0.17
Haryana	0.76	0.98	0.92	0.9	1	1.02	1.04	1.13	1.22	1.2	1.16	0.043192	4	0.64
Himachal Pradesh	1	1.02	1.04	0.97	1.14	1.2	1.28	1.28	1.34	1.3	1.33	0.028928	9	0.45
Jammu and Kashmir	0.98	1.1	1.12	1.09	1.06	1.12	1.2	1.13	1.12	1.1	1.18	0.018745	15	0.31
Jharkhand	0.85	0.93	0.98	0.91	0.93	0.92	0.98	1.02	1.02	1.1	1.06	0.022324	10	0.36
Karnataka	0.92	0.91	0.94	0.96	0.97	0.99	1.04	1.08	1.08	1.1	1.07	0.015219	18	0.26
Kerala	1.34	1.44	1.39	1.36	1.38	1.32	1.47	1.31	1.46	1.4	1.52	0.012684	19	0.23
Madhya Pradesh	0.79	0.67	0.67	0.8	0.8	0.85	0.91	0.94	0.97	1	0.98	0.021786	11	0.35
Maharashtra	0.79	0.86	0.83	0.85	0.86	0.86	0.89	0.92	0.92	0.9	0.92	0.015351	17	0.27
Odisha	0.78	0.82	0.76	0.82	0.81	0.83	0.84	0.87	0.85	0.9	0.94	0.018834	14	0.31
Punjab	0.62	1.05	1.14	1.16	1.09	1.1	1.15	1.23	1.35	1.3	1.22	0.070032	1	1
Rajasthan	0.72	0.75	0.69	0.83	0.82	0.85	0.91	0.93	1.03	1	1	0.033396	6	0.51
Tamil Nadu	0.8	0.85	0.85	0.89	0.92	0.92	0.99	1.03	1.02	1	1.07	0.029507	7	0.46
Tripura	0.69	0.7	0.71	0.72	0.67	0.7	0.81	0.83	0.86	0.8	0.92	0.029186	8	0.45
Uttar Pradesh	1.14	0.98	1.09	1.13	1.04	1.03	1.05	1.09	1.17	1.2	1.09	-0.00448	23	0
Uttarakhand	1.13	1.07	1.04	1.06	0.94	0.98	1	1.03	1.03	1.1	1.14	0.000881	22	0.07
West Bengal	0.79	0.76	0.77	0.79	0.83	0.85	0.95	0.97	1.04	1.1	1.1	0.033657	5	0.51
India	0.86	0.88	0.89	0.92	0.92	0.92	0.98	1.01	1.05	1.1	1.05	0.020162		

Source: Author's own calculation from AISHE data set



G) Higher Education Development Index (EDI_HE)

As discussed in the methodological part of this paper, to construct a state-specific higher educational development index, Principal Component Analysis (PCA) is conducted by incorporating all six variables that were discussed earlier. Firstly, three components whose Eigen are greater than one are selected (Shown in Table 7). After that, the weights of the standardised components have been calculated using the eigenvalues (shown in Table 8), and finally, these weights are used to form EDI_HE

with the help of Equation 3 for each state separately. The state-specific ranking of EDI_HE is reported in Table 9. As seen from this table, Arunachal Pradesh, Jharkhand, and Jammu and Kashmir occupy the top three positions in the EDI_HE ranking. On the contrary, Andhra Pradesh, Delhi and Tamil Nadu take the last three spots. In particular, it is clear from this composite index of higher education that, during the time span of 11 years (2010-2021), most of the less developed states achieved faster growth in higher education than states that already had a good infrastructure. Essentially, the Ministry of Higher Education's efforts to spread higher education grants nationwide have greatly assisted educationally backwards regions, especially in terms of higher education infrastructure and enrolment. Moreover, it is evident from this table that the EDI_HE scores of developed states, such as Kerala, Gujarat, and West Bengal, are relatively low during the study period, as these states have already achieved a strong position.

Table-7: Calculation of Eigen values by PCA									
Total Variance Explained									
Component	Initial Eigenvalues			Extraction Sums of Squared Loadings					
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	2.605	43.421	43.421	2.605	43.421	43.421	2.561	42.677	42.677
2	1.23	20.498	63.919	1.23	20.498	63.919	1.223	20.38	63.057
3	1.105	18.413	82.332	1.105	18.413	82.332	1.156	19.275	82.332
4	0.59	9.833	92.165						
5	0.378	6.305	98.469						
6	0.092	1.531	100						
Extraction Method: Principal Component Analysis.									

Table-8: Generation of Weights					
Rotated Component Matrixa					
Eigen Values	2.605	1.23	1.105		Weights
Components	1	2	3		
STAND_University	0.48	0.622	0.441	1.2504	2.7934
STAND_COLLEGE	0.919	0.02	-0.05	2.393995	3.282995
STAND_AEPC	0.793	0.078	0.204	2.065765	3.140765
STAND_CPLP	0.911	-0.139	-0.105	2.373155	3.040155
STAND_GER	-0.164	0.896	-0.181	0.42722	0.97822
STAND_GPI	-0.04	-0.087	0.935	0.1042	0.9122
Extraction Method: Principal Component Analysis.				Total Weight	14.14774
Rotation Method: Varimax with Kaiser Normalization.					
a Rotation converged in 5 iterations.					
Source: Author's own calculation from AISHE data set					

Table-9: Formation of EDI HE & Ranks									
Weight		2.7934	3.282995	3.140765	3.04016	0.97822	0.9122	14.1	
Sl. No	State	STAND_University	STAND_COLLEGE	STAND_AEPC	STAND_CPLP	STAND_GER	STAND_GPI	EDI	RANK EDI HE
1	Andhra Pradesh	0.00	0.00	0.19	0.07	0.75	0.35	0.13	23
2	Arunachal Pradesh	1.00	1.00	1.00	1.00	0.68	0.72	0.96	1
3	Assam	0.94	0.56	0.39	0.27	0.46	0.16	0.5	9
4	Bihar	0.50	0.78	0.21	0.52	0.59	0.29	0.5	10
5	Chhatisgarh	0.62	0.72	0.35	0.38	0.65	0.74	0.54	8
6	Delhi	0.07	0.40	0.01	0.00	0.33	0.33	0.15	22
7	Gujarat	0.69	0.58	0.35	0.21	0.55	0.17	0.44	16
8	Haryana	0.81	0.44	0.41	0.07	0.49	0.64	0.44	15
9	Himachal Pradesh	0.39	0.53	0.28	0.33	0.33	0.45	0.39	18
10	Jammu and Kashmir	0.33	0.76	0.76	0.82	0.10	0.31	0.62	3
11	Jharkhand	0.81	0.84	0.43	0.74	0.40	0.36	0.66	2
12	Karnataka	0.42	0.64	0.28	0.40	0.90	0.26	0.46	14
13	Kerala	0.30	0.71	0.28	0.59	0.51	0.23	0.46	13
14	Madhya Pradesh	0.80	0.60	0.19	0.27	1.00	0.35	0.49	11
15	Maharashtra	0.39	0.42	0.32	0.03	0.69	0.27	0.32	20
16	Odisha	0.57	0.49	0.27	0.20	0.45	0.31	0.38	19
17	Punjab	0.57	0.48	0.49	0.20	0.00	1.00	0.44	17
18	Rajasthan	0.62	0.72	0.52	0.37	0.83	0.51	0.57	7
19	Tamil Nadu	0.02	0.63	0.00	0.45	0.32	0.46	0.3	21
21	Tripura	0.42	0.71	0.18	0.60	0.64	0.45	0.49	12
22	Uttar Pradesh	0.33	0.93	0.73	0.72	0.06	0.00	0.6	4
23	Uttarakhand	0.59	0.65	0.74	0.41	0.82	0.07	0.58	6
24	West Bengal	0.57	0.80	0.47	0.55	0.57	0.51	0.59	5

Source: Author's own calculation from AISHE data set

V. CONCLUSION

The present study attempts to explore the performance of higher education in 23 selected Indian states in terms of infrastructure, access, and enrolment during the period 2010-11 to 2020-21. In fact, this period is very important for higher education in India, as it was the period just before the implementation of the new education policy that would come into effect after 2020. In particular, this paper helps us understand the relative position of different Indian states in higher education. It indicates whether each state is sufficiently well-equipped to adopt a new education policy approach independently.

Firstly, the study found that India's infrastructure in terms of the number of universities and colleges grew rapidly during the study period. Moreover, in terms of accessibility, it has been observed that college density at the all-India level (measured by the number of colleges per 1 lakh population) has improved significantly in the last few years. On the other hand, the average enrolment rate per college has declined during this period, indicating that due to the increase in higher education institutions, Indian youth interested in enrolling in higher education are now getting more opportunities. Moreover, in terms of higher education outcomes, it is also clear from this paper that the performance of two indicators, GER and GPI, at the all-India level has increased quite strongly in the last few years, reflecting the improvement in higher education enrolment rates, especially for girls. Lastly, it is evident from the study that Arunachal Pradesh is the most consistent state in terms of CAGR for most of the indicators. In fact, the EDI_HE value of Arunachal Pradesh is much higher (0.96) compared to other states. Basically, it is found that growth performances of other states are not consistent & they vary with different indicators. Particularly, the performance of some advanced states, such as Kerala, West Bengal, and Karnataka, is on the lower side during this time period, mainly because they already have well-established infrastructure. In conclusion, it can be safely argued that the growth performance of the past decade reveals that smaller states are rapidly catching up with larger states in the field of higher studies.

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