

## Change in Enrolment of Higher Education Across the Districts and States of India – AISHE Data Analysis

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### ABSTRACT

The states in India are diverse in educational pattern. The access scenario of higher education across the states may be compared based on certain parameters like number of Ph D enrolment, number of post-graduate enrolment, number of under-graduate enrolment, etc. This communication has considered increase rate, elasticity of higher education on the parameters. It has used Wilcoxon signed rank test for comparing the three mid-years across the states of India. The data of AISHE for the period 2012-13 to 2018-19 have been used.

**Key Words :** Elasticity of education, Wilcoxon signed rank test, AISHE

### INTRODUCTION

The witness of regional disparities exist in many sphere of socio- economic development in India. The main objective of the Eleventh Plan was faster and inclusive growth and it is going to emphasis in the forthcoming Twelfth Plan also. As the approach paper of the Twelfth Plan said that expanding educational facilities and improving quality of education are key instruments and reducing poverty is a key element for achieving faster and inclusive growth.

Poverty by any means is a problem. The worst aspects of poverty are hunger, poor health, illiteracy, malnutrition, poor housing condition etc. Education develops a country more swiftly. It is the key determinant of nation's income and growth. It gives more productive work force to the society. Science and technology require educated people. Education is one of the most powerful instrument that societies have for reducing deprivation and vulnerability. It increases earning potential, expands labour mobility, promotes the health of parents and children, reduces fertility and child mortality. The relationship between education and poverty reduction is thus quite straight and linear. Education enables the person

to participate in the development process (WHO 2002).

Various studies proved that there is a strong correlation between poverty and education and many more international studies revealed that improvement in education reducing poverty resulted in regional balanced development. The elasticity concept has used to study the relationship between poverty reduction and educational advancement. The equation for education elasticity of poverty model is

$$\frac{\Delta Pov}{Pov} \times \left( \frac{\Delta Edu}{Edu} \right)$$

where  $\Delta Pov$  is change in poverty ratio,  $Pov$  is poverty ratio,  $\Delta Edu$  is change in education and  $Edu$  is education. We may define elasticity of education is the proportion of the ratio of educational attainment to its change. *i.e.* proportional to  $\Delta Edu/Edu$ .

Educational attainment is an important indicator to monitor the development of a nation. Improving education and knowledge not only improves wellbeing but it also leads to better health outcomes and to higher income. Inclusive growth should result in lower incidence of poverty, broad-based and significant improvement in health outcomes, universal access for children to school, increased access to higher education and improved standards of education, including skill development

(Planning Commission 2006). This communication is focusing on the 'increased access to higher education for female. Improvement of females is also large in the wellbeing of the mankind.

## METHODOLOGY

All India Survey on Higher Education (AISHE) has built a strong database for the states in India covering all higher educational institutes. The survey for the years 2011-12 to 2018-19 have been closed and the reports for 2018-19 is about to publish. I have used AISHE data for three years 2012-13, 2015-16 and 2018-19 (unpublished). The variables considered number of female undergraduate enrolment (UGF), the number of female post-graduate enrolment (PGF), number of female Ph.D. enrolment (PHDF) and total enrolment for females (TOTF). Thus, there are 3 sets of variables for the years 2012-13, 2015-16 and 2018-19 as UGF12, PGF12, PHDF12, TOTF12; UGF15, PGF15, PHDF15, TOTF15 and UGF18, PGF18, PHDF18, TOTF18. The change of 2015-16 from 2012-13 are UGF1512, PGF1512, PHDF1512, TOTF1512 and similarly of 2018-19 from 2015-16 are UGF1815, PGF1815, PHDF1815,

TOTF1815. The elasticity for 2015-16 are ETF15, EUF15, EPF15 and EHF15 corresponding to TOTF, UGF, PGF and PHDF, respectively. The same for 2018-19 are ETF18, EUF18, EPF18 and EHF18 corresponding to TOTF, UGF, PGF and PHDF, respectively.

## RESULTS AND DISCUSSION

The data calculated based on the published reports for 2012-13 and 2015-16 along with unpublished for 2018-19 at district levels for 22 the states - Andhra Pradesh, Assam, Bihar, Chhattisgarh, Delhi, Gujarat, Haryana, Himachal Pradesh, Jammu and Kashmir, Jharkhand, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Odisha, Punjab, Rajasthan, Tamil Nadu, Telangana, Uttar Pradesh, Uttarakhand and West Bengal are given in Table 2 and 3.

It is healthy to have positive change for all the states and districts of the states. We have considered 634 districts across the country which are common for all 3 years. The negative change for district/state means there are decrease in enrolment. More number of districts with negatives change indicate sharp fall in enrolment corresponding to that state. The count of districts with

**Table 1 : Showing the values of the variables for the year 2012-13 and 2015-16**

State	No. of districts	UGF12	PGF12	PHDF12	TOTF12	UGF15	PGF15	PHDF15	TOTF15
Andhra Pradesh	13	407027	87919	1116	533663	564712	106044	1017	731977
Assam	27	190075	24077	933	225700	223572	42506	1556	277792
Bihar	37	402068	41925	850	450306	573786	55952	975	641345
Chhattisgarh	20	136417	20854	427	175966	162963	29431	284	222939
Delhi	9	312597	57106	6091	392041	386336	75884	3829	485660
Gujarat	29	428262	62072	821	543132	463234	96634	1883	618829
Haryana	21	196405	35190	1136	249850	249284	51795	1735	323573
Himachal Pradesh	12	75546	12919	460	94524	121548	23834	682	168368
Jammu and Kashmir	21	123057	29773	327	155190	119749	39692	819	164682
Jharkhand	23	163957	20672	172	187222	224801	30972	688	263291
Karnataka	30	655035	118272	2628	873555	700106	101843	4342	880620
Kerala	14	252200	54138	2084	343342	416584	75945	2675	529372
Madhya Pradesh	50	405505	76235	1115	502914	488315	89512	1450	689986
Maharashtra	35	973889	135215	1963	1235856	1279932	187111	3446	1598025
Odisha	30	230949	19501	766	267615	352290	29694	1277	416572
Punjab	20	173007	42535	1072	241918	283994	74186	2630	407417
Rajasthan	36	299578	44538	2806	361017	739087	101710	2253	872087
Tamil Nadu	32	1094629	265520	6502	1478853	1163824	266691	8363	1544130
Telangana	10	340661	64835	1643	432361	475766	85652	1423	595612
Uttar Pradesh	73	1488887	170365	2966	1732160	2266804	291217	3463	2650774
Uttarakhand	13	113554	22745	759	144477	136706	29434	1255	178208
West Bengal	19	619329	81307	948	719313	751371	103027	1945	892386
India	634	9273798	1525202	39374	11583802	12361525	2042359	50398	15440357

**Table 2 : Showing the values of the variables for the year 2015-16 and 2018-19**

State	No. of districts	UGF15	PGF15	PHDF15	TOTF15	UGF18	PGF18	PHDF18	TOTF18
Andhra Pradesh	13	564712	106044	1017	731977	579755	94934	1898	736821
Assam	27	223572	42506	1556	277792	268967	32096	1215	317163
Bihar	37	573786	55952	975	641345	584679	47394	1123	653011
Chhattisgarh	20	162963	29431	284	222939	198520	34425	509	281911
Delhi	9	386336	75884	3829	485660	352292	22514	3456	397819
Gujarat	29	463234	96634	1883	618829	484357	79635	2312	625817
Haryana	21	249284	51795	1735	323573	337097	63636	1960	433077
Himachal Pradesh	12	121548	23834	682	168368	139363	23029	1070	200870
Jammu and Kashmir	21	119749	39692	819	164682	130739	16967	1291	155755
Jharkhand	23	224801	30972	688	263291	279144	33827	791	324547
Karnataka	30	700106	101843	4342	880620	775081	111836	5225	968774
Kerala	14	416584	75945	2675	529372	480457	75479	4183	594783
Madhya Pradesh	50	488315	89512	1450	689986	638043	110657	1549	805820
Maharashtra	35	1279932	187111	3446	1598025	1441695	225931	3842	1823694
Odisha	30	352290	29694	1277	416572	346997	32686	1670	426439
Punjab	20	283994	74186	2630	407417	273440	61008	4654	380382
Rajasthan	36	739087	101710	2253	872087	794265	103633	5028	948278
Tamil Nadu	32	1163824	266691	8363	1544130	1286880	273224	12121	1673856
Telangana	10	475766	85652	1423	595612	488418	90554	1239	626176
Uttar Pradesh	73	2266804	291217	3463	2650774	1966084	266738	5357	2350222
Uttarakhand	13	136706	29434	1255	178208	168330	37061	1759	217931
West Bengal	19	751371	103027	1945	892386	850966	84511	4570	1005431
India	634	12361525	2042359	50398	15440357	13099377	1966488	70076	16247074

positive(P) and negative(N) change/s have been shown in Table 2 for each of 22 states.

It is interesting to note that in India, there is a decrease in enrolment in female under-graduate, female post-graduate and female total enrolment in 2018-19 as compared to 2015-16. There is increase of female Ph D

enrolment in India. There are decrease in all the variables for West Bengal.

There are increasing trend in female Ph D enrolment in the states like Andhra Pradesh, Chhattisgarh, Gujarat, Kerala, Madhya Pradesh, Maharashtra, Odisha, Rajasthan, Tamil Nadu, Telangana and Uttar Pradesh.

**Table 2 : Showing the number of districts in the states with positive (P) and negative(N) on the difference of the respective variables**

State	TOTF1512		PHDF1512		PGF1512		UGF1512		TOTF1815		PHDF1815		PGF1815		UGF1815	
	N	P	N	P	N	P	N	P	N	P	N	P	N	P	N	P
Andhra Pradesh	0	13	5	8	1	12	0	13	5	8	3	10	6	7	4	9
Assam	4	23	1	26	2	25	4	23	5	22	4	23	8	19	4	23
Bihar	4	33	2	35	8	29	4	33	19	18	4	33	19	18	20	17
Chhattisgarh	1	19	2	18	1	19	1	19	2	18	1	19	5	15	2	18
Delhi	2	7	1	8	4	5	2	7	5	4	4	5	5	4	5	4
Gujarat	9	20	6	23	3	26	10	19	8	21	4	25	7	22	9	20
Haryana	2	19	3	18	0	21	1	20	3	18	6	15	6	15	3	18
Himachal Pradesh	0	12	1	11	2	10	1	11	2	10	1	11	3	9	1	11
Jammu and Kashmir	3	18	1	20	1	20	3	18	4	17	1	20	3	18	3	18
Jharkhand	4	19	2	21	1	22	3	20	6	17	2	21	3	20	5	18
Karnataka	6	24	12	18	17	13	3	27	5	25	7	23	5	25	6	24
Kerala	0	14	3	11	1	13	0	14	2	12	1	13	3	11	2	12
Madhya Pradesh	3	47	7	43	5	45	6	44	10	40	10	40	9	41	6	44
Maharashtra	3	32	8	27	9	26	2	33	4	31	6	29	5	30	5	30

Table 2 contd.,

Contd... Table 2

Odisha	0	30	3	27	3	27	30	9	21	2	28	3	27	12	18	
Punjab	1	19		20	1	19	1	19	13	7	2	18	13	7	13	7
Rajasthan	0	36	6	30	5	31		36	4	32	5	31	13	23	4	32
Tamil Nadu	8	24	9	23	12	20	6	26	5	27	7	25	7	25	3	29
Telangana	0	10	3	7	2	8	1	9	4	6	1	9	3	7	6	4
Uttar Pradesh	3	70	18	55	5	68	5	68	49	24	8	65	42	31	49	24
Uttarakhand	4	9	4	9	4	9	4	9	1	12	7	6	2	11	1	12
West Bengal	1	18	2	17	5	14	1	18	3	16	4	15	7	12	3	16
Total	76	558	103	531	100	534	81	553	191	443	93	541	192	442	184	450

There are increasing trend in female post-graduate enrolment in the states like Karnataka, Maharastra, Tamil Nadu and Uttarakhand.

There are increasing trend in female under-graduate enrolment in the states like Uttarakhand, Tamil Nadu and Gujarat. In all other situations, there are decreasing trend in enrolment in the variables under consideration.

Let n be the sample size *i.e.* the number of pairs. Thus, 2n data points are there as  $x_{1i}$  and  $x_{2i}$ ;  $i=1,2,\dots,n$ . The hypotheses are H0: the difference between the pairs follows a symmetric distribution about zero against H1: the difference between the pairs does not follow a symmetric distribution about zero. We calculate for  $i=1,2,\dots,n$ ;  $|x_{2i} - x_{1i}|$  and  $\text{sign}(x_{2i} - x_{1i})$ . Giving rank for

ith pair  $|x_{2i} - x_{1i}|$  as  $R_i$ (1 to the smallest one).

Wilcoxon Signed Rank test statistic is

$$W = \sum_{i=1}^n R_i \text{sign}(x_{2i} - x_{1i})$$

W has mean 0 and variance  $(\sigma_w^2)$  as  $n(n+1)(2n+1)/24$ . As n increases ( $\geq 20$ ), W converges to the standard normal distribution as  $Z = W/\sigma_w$ . The critical region for both sided alternative is  $|z| \geq z_{\text{critical}(0.05)}$ .

Wilcoxon Statistics values are for comparing the districts of the states. The number of districts(n) are 634.

For all the districts, there are significant difference in the variables for both the years with respect to the previous year.

Wilcoxon Statistics values are for comparing the

**Table 4 : Showing the Wilcoxon statistics for the years 2015-16 and 2018-19**

Variable	TOTF15	PHDF15	PGF15	UGF15	TOTF18	PHDF18	PGF18	UGF18
W-value	172633	106421	141257	170539	80793	116943	55525	84163
$\sigma_w$	22602.80	22602.80	22602.80	22602.80	22602.80	22602.80	22602.80	22602.80
z-value	7.64	4.71	6.25	7.55	3.57	5.17	2.46	3.72

**Table 5 : Showing the Wilcoxon statistics for the years 2015-16 and 2018-19**

Variable	TOTF15	PHDF15	PGF15	UGF15	TOTF18	PHDF18	PGF18	UGF18
W-value	253	169	233	251	161	215	-41	183
$\sigma_w$	30.80	30.80	30.80	30.80	30.80	30.80	30.80	30.80
z-value	8.21	5.49	7.56	8.15	5.23	6.98	-1.33	5.94

**Table 6 : Showing proportion of elasticity in Higher Education of variables for the states**

State	ETF15	EUF15	EPF15	EHF15	ETF18	EUF18	EPF18	EHF18
Andhra Pradesh	0.271	0.279	0.171	-0.097	0.007	0.026	-0.117	0.465
Assam	0.188	0.150	0.433	0.400	0.124	0.169	-0.325	-0.281
Bihar	0.298	0.299	0.251	0.128	0.018	0.019	-0.181	0.132
Chhattisgarh	0.211	0.163	0.292	-0.503	0.209	0.179	0.145	0.442
Delhi	0.193	0.191	0.248	-0.592	-0.221	-0.097	-2.381	-0.108
Gujarat	0.122	0.075	0.357	0.565	0.011	0.044	-0.214	0.186
Haryana	0.228	0.212	0.321	0.345	0.253	0.260	0.186	0.115
Himachal Pradesh	0.439	0.379	0.459	0.326	0.162	0.128	-0.035	0.362
Jammu and Kashmir	0.058	-0.028	0.25	0.602	-0.057	0.084	-1.333	0.365

Table 6 contd...

Contd... Table 6

Jharkhand	0.289	0.271	0.332	0.752	0.189	0.195	0.084	0.13
Karnataka	0.008	0.064	-0.161	0.395	0.091	0.097	0.089	0.169
Kerala	0.351	0.395	0.287	0.221	0.110	0.133	-0.006	0.361
Madhya Pradesh	0.271	0.169	0.148	0.231	0.144	0.235	0.191	0.064
Maharashtra	0.227	0.239	0.277	0.431	0.124	0.112	0.172	0.103
Odisha	0.357	0.345	0.344	0.400	0.023	-0.015	0.092	0.235
Punjab	0.407	0.391	0.427	0.592	-0.071	-0.039	-0.216	0.435
Rajasthan	0.585	0.595	0.562	-0.246	0.080	0.069	0.019	0.552
Tamil Nadu	0.042	0.059	0.004	0.223	0.078	0.096	0.024	0.31
Telangana	0.274	0.284	0.243	-0.155	0.049	0.026	0.054	-0.149
Uttar Pradesh	0.346	0.344	0.415	0.143	-0.128	-0.153	-0.092	0.353
Uttarakhand	0.189	0.169	0.227	0.395	0.182	0.188	0.206	0.287
West Bengal	0.194	0.176	0.211	0.513	0.112	0.117	-0.219	0.575

states. The number of states(n) are 22.

For all the states, there are significant difference in the variables for both the years with respect to the previous year except the post-graduate female enrolment in the year 2018-19 with respect to 2015-16.

Educational elasticity is measured by the ratio of  $\Delta Edu$ - is change in education and  $Edu$ - is education.

It has been measured for 2 mid-years 2015-16 with respect to 2012-13 and 2018-19 with respect to 2015-16.

In terms of elasticity, the most alarming situation is for the state of Kerala in female post-graduate enrolment.

### Conclusion:

The disparity or diversity measurement do not have unique key indicator. In terms of the variables under consideration, the states are diverse. The Indian higher education diversity is there and it is now a subject to think for policy makers to improve the enrolment special female enrolment in under-graduate and post-graduate level in all the states. The enrolment in Ph D or other courses may have an added factor for better job prospects and opportunity. More privatization attraction may a look into the better enrolment who are already have post-graduate level of education. The district level analysis may be more path-breaking for the states separately.

### REFERENCES

- Abhiman Das (1999). Socio-Economic Development in India: A Regional Analysis, *Development and Society*, Volume 28 Number 2, December 1999.
- Bhattacharya, B.B. and Sakthivel (2004). "Regional Growth and

Disparity in India: A Comparison of Pre and Post- Reform Decades", New Delhi, Institute of Economic Growth Government of India (2001): "National Human Development Report 2001, New Delhi, Planning Commission of India.

Derrick, B. and White, P. (2017). "Comparing Two Samples from an Individual Likert Question". *Internat. J. Mathematics & Statistics*, 18 (3): 1–13.

Government of India (2006). "Towards Faster and More Inclusive Growth: An Approach to the 11th Five Year Plan", New Delhi, Planning Commission of India.

Government of India (2011). "Faster, Sustainable and More Inclusive Growth: An Approach to the 12th Five Year Plan", New Delhi, Planning Commission of India.

Kerby, Dave S. (2014). "The simple difference formula: An approach to teaching nonparametric correlation.", *Comprehensive Psychology*, 3: 11.IT.3.1, doi:10.2466/11.IT.3.1

PRSP Source Book (2002). "Poverty Measurement and Analysis", Washington DC, World Bank.

Pratt, J. (1959). "Remarks on zeros and ties in the Wilcoxon signed rank procedures". *J. American Statistical Association*, 54 (287): 655–667. doi:10.1080/01621459.1959.10501526.

Siegel, Sidney (1956). *Non-parametric statistics for the behavioral sciences*. New York: McGraw-Hill. pp. 75–83.

WHO (2002). "Health, Economic Growth and Poverty Reduction", Commission on Macroeconomics and Health, Geneva, World Health Organization.

Wilcoxon, Frank (1945). "Individual comparisons by ranking methods" (PDF). *Biometrics Bulletin*, 1 (6): 80–83. doi:10.2307/3001968. JSTOR 3001968.

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