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DETERMINANTS OF GENDER DISPARITY IN HIGHER EDUCATION IN INDIA-STATEWISE ANALYSIS

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ABSTRACT

Higher education is a very important sector for the growth and development of human resource which can take responsibility for social, economic and scientific development of the country. At the time of Independence of India, there were only 20 Universities and 500 Colleges in the country with 2.1 lakhs students in higher education. The total enrolment in the higher education system increased from 0.17 million in 1950-51 to 20.4 percent in 2011-12. Total enrolment at higher education level increased at an average annual growth rate of 9.50 percent. In this context the research study on **"Determinants of Gender Disparity in Higher Education in India-Statewise Analysis"** was formulated with the objectives to estimate gender disparity index in higher education, to find out course wise gender disparity in higher education and to identify the determinants of gender disparity in higher education. The study was related to 16 major states of India for 2008-09 and 2009-10 the required data were compiled from annual report of ministry of human resource development report 2008-09 and 2009-10, Women statistics in India 2010. The study estimated Sopher's disparity index and Discriminant analysis. As per the study in the reference period the average percentage of women enrolled in higher education was lower (39.67 percent) than that of men (60.33). In the Sopher's disparity index in enrolment in higher education was found to be the highest in Orissa and lowest in Gujarat and Punjab. The estimated discriminant function was statistically valid as indicated by Mahalanobis 'D' squared value of 4.51. To reduce gender disparity in higher education the study recommends that the scholarships can be given to women for motivating them to enter into higher education and Special efforts should be formulated to create awareness among the girls students about the benefits of higher education.

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Education is an important component of economic development and a driving force for economic growth. Higher education is a very important sector for the growth and development of human resource which can take responsibility for social, economic and scientific development of the country. In developing societies higher education is considered a speedy vehicle for upward social mobility especially for the socially and economically deprived people. Higher education is of vital importance for the country, as it is powerful tool to build knowledge based society for the 21st century. In India higher education has been an integral part of educational system.

Realizing the importance of higher education, the Government of India has increased the outlay of higher education from Rs.15 crores in First Five Year Plan to Rs. 82 crores in Third Five Year Plan to Rs. 292 crores in Sixth Five Year Plan to Rs. 500 crores in Eighth Five Year Plan to Rs. 39,804 crores in Eleventh Five Year Plan and to Rs. 1,10,700 crores in Twelfth Five Year Plan. India has the third largest higher education system in the World, next only to China and the United States. India made intensive efforts to improve access to higher education and it grew rapidly after independence. The Government supported higher education by setting up universities and colleges. At the time of Independence of India, there were only 20 Universities and 500 Colleges in the country with 2.1 lakhs students in higher education. The total enrolment in the higher education system increased from 0.17 million in 1950-51 to 2.75 million in 1980-81, to 4.92 million in 1990-91 and to 25 million in 2011-12. In relative terms the gross enrolment ratio in higher education increased from 0.7 percent in 1950-51 to 8 percent in 2000-01and to 20.4 percent in 2011-12. Total enrolment at higher education level increased at an average annual growth rate of 9.50 percent. (Ministry of Human Resource Development Report, 2011-12).

Though the vision of higher education in India is to realize the country's human resource potential to its fullest with equity and inclusion, there exists gender disparity in higher education. The number of women students enrolled per hundred men students enrolled at all levels was 74 in 2011-12. Access is generally lower for girls as compared to the boys – the gross enrolment ratio being 12.42 per cent for the males and 9.11 per cent for the females. (Ministry of Human Resource Development Report, 2010-11). In absolute numbers, Uttar Pradesh was on the top with 12.01 lakhs women enrolment, followed by Maharashtra (10.60 lakhs) and Tamil Nadu (8.61 lakhs), etc. In terms of percentage, the women enrolment was the highest in Goa (60.31 percent), followed by Kerala (58.62 percent), Meghalaya (54.19 percent), Himachal Pradesh (51.16 percent), etc. and Arunachal Pradesh had the lowest enrolment of 36.69 percent. The women enrolment was the highest in the faculty of Arts (41.91 percent), followed by Science (19.17 percent) and Commerce (16.31 percent), constituting 77.39 percent in the three faculties. The remaining 22.61 percent was in various professional faculties.

In India few researchers like Deepti Gupta and Navneet Gupta (2012) have analysed gender disparity in higher education. But little attempt have been formulated on identifying the determinants of gender disparity in higher education for different states of India. Hence the research study on **'Determinants of Gender Disparity in Higher Education in India-Statewise Analysis'** was formulated with the following **objectives.**

1. To estimate gender disparity index in higher education.
2. To find out course wise gender disparity in higher education and
3. To identify the determinants of gender disparity in higher education.

Methodology:

The study was related to 16 major States of India- Andhra Pradesh, Assam, Bihar, Gujarat, Haryana, Jammu and Kashmir, Karnataka, Kerala, Madhya Pradesh, Maharashtra, Orissa, Punjab, Rajasthan, Tamilnadu, Uttar Pradesh, and West Bengal. These states were selected since they accounted for 92 percent of total population of India. The study was related to 2008-09 and 2009-2010. This period was chosen since it was the latest year for which the required data were available. The related information on Statewise number of students enrolled in different courses, number of universities, number of colleges, number of teachers, population of men and women in the age group of 18-23 years and plan and non-plan expenditure on higher education were compiled from the following sources:

1. Annual report of Ministry of Human Resource Development Report, 2008-09 and 2009-10 and
2. Women statistics in India 2010. Published by National institute of public corporation and child development, New Delhi.

Hypothesis formulated:

1. There no gender disparity in enrolment in higher education and
2. There is no difference in percentage of men and women enrolled in different courses of higher education.

Quantitative tools used:

1. Sopher's disparity index:

The study tries to calculate the Sopher's disparity index in gross enrolment in higher education by using the following formula.

Sopher's disparity

$$\text{index}=\log(X_2/X_1)+\log[(Q-x_1)/(Q-x_2)]^3$$

$$Q=200$$

Where,

X_1=Gross enrolment rate of women in higher education and

X_2= Gross enrolment rate of men in higher education

The value ranges from 0 to 1.

2. Discriminant analysis:

The study applied discriminant analysis to find out the factors causing interstate variations in gender disparity in education. On the basis of gender disparity index, the states were classified into two groups. The states having gender disparity index higher than the average comprises of Group I. Group II comprises of the states having gender disparity below the national average. The estimated discriminant function is of the form.

$$Y=b_1X_1+b_2X_2+b_3X_3+b_4X_4$$

Where,

Y=Disparity in higher education

X_1= Percentage of total expenditure on higher education

X_2= Number of universities

X_3=Number of colleges and

X_4=Number of teachers

When Group I was compared with Group II on the basis of measurement of several variables a discriminant co-efficient function which can discriminate between the two groups significantly was derived. To test whether there exists difference between the two groups, the following F-test was used. The formula used was

$$F = \frac{N1+N2(P-1)}{P} \quad \frac{N1+N2}{(N1+N2)(N1+N2-1)} \times D^2$$

where,

N_1=Number of cases in Group I

N_2=Number of cases in Group II and

D^2=Mahalanobis D square statistics

In order to find the relative importance of variables that discriminate between the two groups, the relative share of each variable was calculated. The relative state of each variable was calculated as follows:

$$DP^2 = \lambda_1 d_1 + \lambda_2 d_2 + \lambda_3 d_3 + \lambda_4 d_4 \ldots\ldots \lambda_i d_i$$

λ_1 is the co-efficient of the first variable in the discriminant function form representing the two groups,d_1 is the difference in the mean value of the two groups for the first variable. In DP^2, $\lambda_i d_i$ gave the contribution of i^{th} variable to the total distance. Total distance between each variable has been calculated to find out the relatively more important variables that discriminate the two groups. The discriminant function was estimated by using SPSS 16.00 version.

Findings of the study:

A. State wise gross enrolment of men and women in higher education:

There exist gender disparity in enrolment in higher education in various states Table-I represent the State wise gross enrolment of men and women in higher education.

Table-I

State wise gross enrolment of me women in higher education (in

States	2008-09		2009-10		
	Men	Women	Men	Women	M n
Andhra Pradesh	11.03 (66.89)	5.46 (33.11)	10.68 (64.60)	5.85 (35.40)	10. 6 (65 75)
Assam	2.10 (66.73)	1.04 (33.27)	2.17 (66.42)	1.09 (33.58)	2.1 (66 72)
Bihar	6.57 (69.98)	2.82 (30.02)	8.93 (68.75)	4.06 (31.25)	7.75 (69. 26)
Gujarat	5.75 (60.82)	3.70 (39.18)	6.51 (60.82)	4.19 (39.15)	6.13 (60. 8)
Haryana	3.44 (59.80)	2.31 (40.20)	3.52 (59.39)	2.41 (40.61)	3.48 (59. 59)
Jammu and Kashmir	1.40 (56.15)	1.09 (43.85)	1.49 (53.84)	1.28 (46.16)	1.45 (54. 94)
Karnataka	8.01 (56.38)	6.20 (43.62)	7.13 (56.63)	5.46 (43.57)	7.57 (56. 49)
Kerala	1.90 (45.11)	2.31 (54.89)	1.99 (45.84)	2.36 (54.16)	1.95 (45. 44)
Madhya Pradesh	5.35 (57.48)	3.96 (42.52)	7.27 (58.68)	5.12 (41.32)	6.31 (58. 16)
Maharashtra	14.92 (59.82)	10.02 (40.18)	17.16 (62.71)	10.20 (37.29)	16.8 4 (61. 34)
Orissa	3.39 (76.92)	1.01 (23.08)	3.97 (74.13)	1.38 (25.87)	3.68 (75. 49)
Punjab	1.76 534 (51.71)	1.64 (48.29)	1.85 (53.11)	1.63 (46.89)	1.81 (52. 51)
Rajasthan	4.68 (61.98)	2.87 (38.02)	4.88 (63.68)	2.78 (36.32)	4.78 (62. 85)
Tamilnadu	7.29 (55.48)	5.85 (44.52)	7.71 (55.67)	6.14 (44.33)	7.50 (55. 58)
Uttar Pradesh	14.59 (62.20)	8.86 (37.80)	15.11 (59.59)	10.24 (40.41)	14.8 5 (60. 86)
West Bengal	6.87 (59.46)	4.68 (40.54)	7.36 (58.92)	5.13 (41.08)	7.12 (59. 19)
India	112.27 (60.69)	72.72 (39.31)	124.44 (60.00)	82.96 (40.00)	118. 36 (60. 33)

Source: Annual Report of Ministry of Human Resource Development 2008-09 to 2009-10.

Figures in bracket indicate the percentage to total enrolment.

In the reference period the number of men enrolled in higher education increased from 112.27 lakhs to 124.44 lakhs, while the number of women students enrolled increased from 72.72 lakhs to 82.96 lakhs. In all the States the percentage of women enrolled was lower than that of men. The average percentage of women enrolled in higher education was lower (39.67 percent) than that of men (60.33). However, at the all India level in the reference period percentage of women enrolled in higher education increased from 39.31 percent to 40.00 percent.

B. Statewise gross enrolment ratio of men and women in higher education:

Table-II represents the state wise gross enrolment ratio of men and women in higher education.

Table-II

State wise gross enrolment ratio of men and women in higher education

(in percent)

States	2008-09		2009-10		Average	
	Men	Women	Men	Women	Men	Women
Andhra Pradesh	22.2	11.7	21.2	12.3	21.70	12.00
Assam	11.4	6.1	11.5	6.2	11.45	6.15
Bihar	11	5.5	14.1	7.5	12.55	6.50
Gujarat	16.4	11.9	18.3	13.2	17.35	12.55
Haryana	21	16.5	21.2	16.8	21.10	16.65
Jammu and Kashmir	18.1	15.4	18.7	17.6	18.40	16.50
Karnataka	22.6	18.8	19.8	16.3	21.20	17.55
Kerala	11.2	13.7	12	14.2	11.60	13.95
Madhya Pradesh	12.4	10.5	16.5	13.1	14.45	11.80
Maharashtra	22.2	16.9	25.3	16.9	23.75	16.90
Orissa	14.5	4.5	16.6	5.9	15.55	5.20
Punjab	10.2	11.1	10.6	10.9	10.40	11.00
Rajasthan	11.4	7.9	11.5	7.4	11.45	7.65
Tamilnadu	19.7	16.5	20.7	17.2	20.20	16.85
Uttar Pradesh	11.9	8.6	12	9.5	11.95	9.05
West Bengal	12.9	9.5	13.6	10.2	13.25	9.85
India	15.08	11.04	17.01	12.07	16.05	11.56

Source: Annual Report of Ministry of Human Resource Development 2008-09 to 2009-10.

Table-II implies that in the reference period the gross enrolment ratio of men increased from 15.08 percent to 17.01 percent, while that of women increased from 11.04 percent to 12.07 percent. In all the States the gross enrolment ratio of women was lower than that of men. The average gross enrolment ratio of women was only 11.56 percent as compared to that of men-16.05 percent.

C. Estimated Sopher's disparity index in enrolment in higher education in various States of India:

The study tried to analyse gender disparity in enrolment in higher education for the selected States by calculating Sopher's disparity index and table-III presents the same information.

Table-III

Estimated Sopher's disparity index in enrolment in higher education in various states of India

States	2008-09	2009-10	Average
Andhra Pradesh	0.35	0.30	0.33
Assam	0.15	0.15	0.15
Bihar	0.34	0.32	0.33
Gujarat	0.03	0.03	0.03
Haryana	0.14	0.13	0.14
Jammu and Kashmir	0.09	0.03	0.06
Karnataka	0.11	0.11	0.11
Kerala	0.10	0.09	0.10
Madhya Pradesh	0.09	0.12	0.11
Maharashtra	0.17	0.17	0.17
Orissa	0.58	0.52	0.55
Punjab	0.04	0.01	0.03
Rajasthan	0.18	0.22	0.20
Tamilnadu	0.10	0.11	0.11
Uttar Pradesh	0.16	0.12	0.14
West Bengal	0.16	0.15	0.16
India	0.16	0.18	0.17

Source: Calculated figures based on the data compiled

Table-III makes it evident that in majority of the States in the reference period there had been decline in gender disparity since there was a decline in the estimated Sopher's disparity index in all the states. On an average the gender disparity in higher education was found to be highest in the state of Orissa since estimated Sopher's disparity index was found to be higher for the State of Orissa (0.55). However, there exist lowest gender disparity in Gujarat and Punjab as indicated by the low Sopher's disparity index (0.03).

D. State wise average percentage of men and women students enrolled in different courses of study in higher educational institutions

Table-V represents the state wise average percentage of men and women students enrolled in different courses of study in higher educational institutions.

Table-V

State wise average percentage of students enrolled in different courses of study in higher educational institutions

States	Under Graduate Courses		Post Graduate Courses		Professional courses		Polytechnic courses		Open and distance learning courses		Ph.D/M.Phil courses	
	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women	Men	Women
Andhra Pradesh	31.77	14.20	4.43	3.62	18.14	9.11	1.21	2.16	8.28	5.42	0.30	0.12
Assam	40.30	20.03	2.54	3.56	1.97	3.61	1.72	0.47	28.70	9.22	0.16	0.12
Bihar	42.35	20.24	3.24	3.34	2.10	0.88	1.22	0.36	15.91	1.25	0.13	0.20
Gujarat	28.74	16.47	4.37	4.17	15.10	5.80	12.50	4.20	6.41	4.33	0.16	0.13
Haryana	26.85	20.17	[illegible]	[illegible]	29.12	16.93	12.24	2.96	2.57	1.37	0.17	0.17
Jammu and Kashmir	21.76	18.96	2.31	3.33	11.40	8.66	0.74	0.28	17.82	12.13	0.17	0.14
Karnataka	26.42	24.70	5.52	0.07	22.80	8.79	7.66	2.86	7.76	5.04	0.16	0.17
Kerala	16.40	27.34	1.17	3.30	17.48	12.16	4.11	2.92	10.98	3.53	2.23	0.23
Madhya Pradesh	30.30	24.20	6.03	5.98	6.13	2.74	3.34	1.38	10.74	7.37	0.27	0.40
Maharashtra	24.77	18.71	4.32	3.54	10.66	8.47	3.16	2.70	7.32	4.05	0.21	0.13
Orissa	31.56	8.84	2.25	1.82	17.80	6.05	3.60	0.82	14.06	4.76	0.00	0.06
Punjab	30.48	27.80	1.82	5.33	16.70	7.95	3.43	1.30	6.82	3.20	0.29	0.20
Rajasthan	28.86	19.30	3.02	3.35	16.30	6.18	5.55	1.47	12.75	7.16	0.08	0.11
Tamilnadu	20.86	22.07	4.37	3.06	26.04	14.00	6.33	0.76	7.36	5.99	0.06	0.17
Uttar Pradesh	40.87	28.20	3.04	4.36	4.25	2.17	0.76	0.05	6.03	3.14	0.27	0.18
West Bengal	26.15	20.08	2.71	2.35	7.32	2.29	1.70	0.42	17.36	4.73	0.23	0.28
India	28.42	21.30	3.63	3.18	10.61	5.45	5.24	8.72	8.23	4.14	0.27	0.18

Source: Calculated figures based on data compiled.

Table-V indicates that at the All India level, in the reference period the number of men enrolled in under graduate courses was 28.42 percent and women was 21.30, post graduate courses men enrolled was 3.63 percent and women was 3.18 percent, professional courses men enrolled was 10.61 percent and women was 5.45 percent, polytechnic courses men enrolled was 5.24 percent and women was 8.72 percent, open and distance learning courses men enrolled was 8.23 percent and women was 4.14 percent and Ph.D/M.Phil courses men enrolled was 0.27 percent and women was 0.18 percent.

E. Interstate disparity in the number of higher educational institutions and teachers:

The current study tried to find out variations among the States with regard to number of universities, colleges and teachers. Table-IV represents the number of universities, colleges and teachers in various States of India.

Table-IV

Number of universities, colleges and teachers in various States of India-2008-09 to 2009-10

States	Universities			Colleges			Teachers		
	2008-09	2009-10	Average	2008-09	2009-10	Average	2008-09	2009-10	Average
Andhra Pradesh	33	31	32	3648	4473	4061	79361	79517	79439
Assam	6	8	7	481	546	514	15726	15885	15806
Bihar	17	20	19	1271	1301	1286	34411	34567	34489
Gujarat	24	26	25	1420	1618	1519	20519	20675	20597
Haryana	12	12	12	851	1002	927	19864	20020	19942
Jammu and Kashmir	8	10	9	340	403	382	5194	5350	5272
Karnataka	32	36	34	2765	2979	2872	64056	64211	64133
Kerala	10	11	11	947	1448	1198	26506	26421	26464
Madhya Pradesh	19	21	20	1871	1911	1891	25440	25596	25518
Maharashtra	42	42	42	3849	4446	4148	76914	77070	76992
Orissa	13	15	14	954	974	964	22398	22554	22476
Punjab	13	14	14	659	876	774	21179	21336	21257
Rajasthan	22	24	23	1456	1610	1533	27939	28095	28017
Tamilnadu	50	53	52	1437	1736	1587	77682	77856	77769
Uttar Pradesh	36	45	41	2881	3104	2993	67319	68521	67920
West Bengal	20	20	20	819	841	830	28962	29118	29040
India	501	584	543	24882	25936	25410	725487	785126	755457

Source: Annual Report of Ministry of Human Resource Development 2008-09 to 2009-10.

All India level, the number of ies had increased from 501 in to 584 in 2009-10. In all the here had been increase in the of universities. In the reference n an average, Tamilnadu had the number of universities (52), while had got the lowest number of ties (7). At the all India level there ncrease in the number of colleges 08-09 to 2009-10. In the reference on an average, Maharashtra had hest number of colleges (4148), he lowest number of colleges was n Jammu and Kashmir (382). At the a level there had been an increase number of teachers from 725487 in 9 to 785426 in 2009-10. In the ce period, on an average, Andhra h had got highest number of s (79439), while the lowest number chers was found in Jammu and ir (5272).

ntification of determinants of parities in higher education:

ing discriminant analysis the study to identify the significant factors g disparity in higher education. -VI represents the estimated inant function coefficients of r disparity in higher education as d to the selected variables.

Table-VI

mated Discriminant function co-cient of gender disparity in higher ucation as related to the selected variables in all categories

	Group I Mean	Group II Mean	Mean difference (xi)	Discriminant co-efficient (bi)	bi X xi	Relative Discriminating power (in percent)
[illegible]	[illegible]	14.05	6.98	2.3633	2.32	0.05
[illegible]	22.6	21.67	0.89	3.0197	2.51	0.05
[illegible]	[illegible] 67	[illegible]	123.07	4.6017	512 60	10.44
[illegible]	[illegible] 35	[illegible]	360417	1.2151	4392 .67	89.46

ce: Calculated figures based on compiled.

From table-VI it is evident that number of teachers is a causing gender disparity in higher education significant factor since it is accounted for 89.46 percent change in gender disparity, number of colleges has contributed for 10.44 percent, Percentage of total expenditure on higher education and number of universities has contributed for 0.50 percent of change in gender disparity in higher education. The estimated discriminant function was statistically valid as indicated by Mahalanobis 'D' squared value of 4.51.

Conclusion:

1. In the reference period, at the all India level, there was an increase in gender disparity index. On an average the gender disparity in higher education was found to be highest in the state of Orissa since estimated Sopher's disparity index was found to be higher for the State of Orissa. However, there exist lowest gender disparity in Gujarat and Punjab.
2. The significant factors causing gender disparity in higher education are plan and non-plan expenditure in higher education and number of colleges.

Recommendation:

To reduce gender disparity in higher education the study recommends the following measures:

1. Scholarships can be given to women for motivating them to enter into higher education.
2. In higher education job oriented courses can be introduced as a part of the curriculum to make women suitable for employment and
3. Special efforts should be formulated to create awareness among the girls students about the benefits of higher education.

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