

Educational Sex Segregation in Rajasthan

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Abstract

Sex segregation in education is an important factor, responsible for occupational sex segregation and further wage gap. The origin of the occupational sex segregation must be sought in the school system's first branching point. It is hypothesized that the educational opportunities, choices and attainment for girls differ significantly from those of boys. The analysis is based on secondary data obtained from Census of India, Board of Secondary Education and Directorate of College Education. It is found, that illiteracy among the female population is higher. As expected the level of completed education of female population is much lower than the level attained by male population. Female population prefers arts while males prefer science and commerce. Share of girls is higher in non-technical courses. Among professional and technical courses, teaching is most popular among females.

During the past few decades, women have entered in labour market in large number but there is still wide gender segregation in work participation, employment and occupational pattern all over the world. Educational sex segregation is an important factor, responsible for sex segregation in occupation (Jonsson 1999; Stolezenber 1978; Le Grand 1991) because education of a person decides the type of opportunities he can explore and further responsible for wage gap. Filer (1983) found that discrimination against women is significantly greater among less educated groups. It is hypothesized that the educational opportunities, choices and attainment for girls differ significantly from those of boys. More boys are enrolled in schools and colleges than girls. Female students choose or are forced to choose some specific type of courses e.g. Humanities, Home Science, History, Sociology, Fashion Designing, Typing, Stenographer etc while boys choose some other type of courses e.g. Engineering, Veterinary, Science, Medicine etc (Jonsson 1999; Kapoor 2003). Thus educational fields seem to be clearly gender segregated. Some support for this hypothesis is provided by Damont and Andrisant (1984). They found that after leaving school, young men and women prepared themselves differently for the world of work by choosing quite different fields of study in college. For example, men were more likely to major in business, engineering and professional fields, while women were more likely to major in humanities, health or biology, and education. Sex segregation in education is hypothesized to decline with economic development because of expansion of education facilities. Thus segregation in rural areas should be greater than segregation in urban areas, as they are more developed than rural areas.

The analysis is based on secondary data obtained from Census of India, Board of Secondary Education and Directorate of College Education.

I. Sex Segregation In Level Of Education:

1. Literacy

Illiteracy among the female population is higher than the male population. In 1981, 11.42 percent of female population was literate. This percentage increased to 16.31 in 1991, 36.20 percent in 2001 and further to 65.46 percent in 2011. In contrary, in 1981 28.74 percent of male population was literate. The percentage jumped to 43.96 in 1991, 62.21 in 2001 and further to 82.14 percent in 2011.

2. Rural Areas

Table 1: Distribution of Population by Education Level and Sex- 1991 (Rural Rajasthan)

<i>Education level</i>	Male	C.f.	Female	C.f.
<i>Illiterate</i>	64.18	100.00	94.87	100.00
<i>Literate</i>	7.35	35.82	1.36	5.13
<i>Primary</i>	11.45	28.46	2.30	3.77
<i>Middle</i>	8.09	17.01	0.83	1.47
<i>Secondary</i>	4.07	8.92	0.30	0.64
<i>Senior secondary</i>	2.52	4.86	0.15	0.34
<i>Non technical diploma not equal to degree</i>	0.07	2.34	0.01	0.19
<i>Technical diploma not equal to degree</i>	0.11	2.27	0.01	0.18
<i>Graduate and above</i>	2.16	2.16	0.17	0.17
<i>Total</i>	100		100	
<i>(Dissimilarity Indexⁱ) D</i>	30.69			

As expected the level of completed education of female population is much lower than the level attained by male population - Only 0.17 percent females have completed some college education in comparison to 2.16 percent of male population. About 0.15 percent of female population has done at least senior secondary, judged against 02.52 percent of male population and 02.30 percent females has obtained at least middle school education while 11.45 percent males has obtained at least middle school education. Among females 94.87 percent population was illiterate while only 64.18 percent males were illiterate. Dissimilarity index (D) shows a reasonable level of segregation. About 30.69 percent of men or women would have to change their education level to be distributed same as other group's education level distribution. (Table 1)

Has there been no sex discrimination or segregation in education. Educational attainments of both sexes, who have entered in education stream, are shown to be broadly similar. However, the level of sex segregation is much lower, if judged against the level of total population. Only 18.82 percent men or women would have to change their level before both sexes would have the same educational level (Table 2).

Table 2: Distribution of Literate Population by Education Level and Sex – 1991 (Rural Rajasthan)

Education level	Male	Female
Below middle	52.49	71.31
Middle	22.59	16.23
Secondary	11.35	5.76
Senior secondary	7.03	2.94
Non technical diploma not equal to degree	0.19	0.17
Technical diploma not equal to degree	0.31	0.21
Graduate and above	6.04	3.37
Total	100	100
D	18.82	

It can be seen in Table 3, the share of male population is high in all education levels. This represents that more boys are enrolled for education. As we move to higher education level, e.g. up to senior secondary, the share of women was decreasing and share of male was increasing. But the trend was reverse for college education because in spite of remaining ideal and waiting for marriage, girls continue their studies until they got married while boys leave education earlier than girls to go for or their traditional image of main-breadwinner force them to go for marketed work. Among the diploma courses share of girls was higher in non-technical courses.

Table 3 Share of At Least Literate Male and Female by Education Level – 1991 (Rural Rajasthan)

<i>Education level</i>	<i>Male</i>	<i>Female</i>	<i>Total</i>
<i>Below middle</i>	84.56	15.44	100
<i>Middle</i>	91.19	8.81	100
<i>Secondary</i>	93.62	6.38	100
<i>Senior secondary</i>	94.68	5.32	100
<i>Non technical diploma not equal to degree</i>	88.97	11.03	100
<i>Technical diploma not equal to degree</i>	91.43	8.57	100
<i>Graduate and above</i>	93.02	6.98	100
<i>All courses</i>	88.15	11.85	100

3. Urban Areas

In case of urban areas broader classification of educational categories is available. It can be seen in Table 4, about 1.90 percent males have obtained some technical education in comparison of 0.69 percent of females, which is reasonably low. Almost 15.63 percent males have completed at least some college education against a quite low level of 5.73 percent females. About 9.06 percent of female has done at least senior secondary in comparison of 25.55 percent males and 22.36 percent of females has obtained at least middle school education while 53.03 percent males has obtained at least middle school education. About 61.46 percent of female population was illiterate while only 25.77 percent of male population was illiterate.

Dissimilarity was 35.68 percent, i.e. 35.68 percent men or women would have to change their educational attainment to be distributed in same manner.

Table 4: Distribution of Population by Education Level and Sex – 1991 (Rajasthan Urban)

<i>Education level</i>	<i>Male</i>	<i>C.f.</i>	<i>Female</i>	<i>C.f.</i>
<i>Illiterate</i>	25.77	100.00	61.46	100.00
<i>Literate</i>	7.68	74.22	5.31	38.54
<i>Primary</i>	13.52	66.55	10.86	33.23
<i>Middle</i>	13.74	53.03	8.01	22.36
<i>Secondary</i>	13.74	39.29	5.29	14.36
<i>Senior secondary</i>	9.22	25.55	3.16	9.06
<i>Non technical diploma not equal to degree</i>	0.15	16.33	0.08	5.90
<i>Technical diploma not equal to degree</i>	0.56	16.19	0.09	5.82
<i>Graduated degree other than technical degree</i>	9.43	15.62	3.03	5.73
<i>Post graduate degree other than technical degree</i>	4.30	6.19	2.02	2.71
<i>Engineering technology</i>	0.64	1.90	0.05	0.69
<i>Medicine</i>	0.42	1.26	0.10	0.63
<i>Agriculture and dairying</i>	0.04	0.84	0.01	0.53
<i>Veterinary</i>	0.02	0.80	0.00	0.52
<i>Teaching</i>	0.78	0.79	0.52	0.52
<i>Others</i>	0.01	0.01	0.01	0.00
<i>Total</i>	100		100	
<i>D</i>	35.68			

Table 5, shows the educational attainment of those persons who entered in education stream. Picture is parallel to the picture, of total population. However Duncan & Duncan's index of dissimilarity (15.99%) is less than half of the previous classification which includes illiterate population.

Table 6, shows the distribution of males and females who attained post school education. Results show that simple graduation and post graduation are most popular courses among both male and female but higher courses are bit more popular among females. Among professional and technical Courses, teaching is most popular among females, having 8.83 percent of female population while only 4.75% of male population opt teaching course. Among rest technical courses position of males are better than females. Level of segregation is significantly low (12.42%) as maximum value can be 100.

Table 5 Distribution of Literate Population by Education Level and Sex – Urban Rajasthan (1991)

<i>Education level</i>	<i>Male</i>	<i>Female</i>
<i>Below middle</i>	28.55	41.97
<i>Middle</i>	18.51	20.78
<i>Secondary</i>	18.51	13.73
<i>Senior secondary</i>	12.42	8.21
<i>Non technical diploma not equal to degree</i>	0.20	0.20
<i>Technical diploma not equal to degree</i>	0.76	0.23
<i>Graduated degree other than technical degree</i>	12.70	7.86
<i>Post graduate degree other than technical degree</i>	5.79	5.24
<i>Engineering technology</i>	0.86	0.14
<i>Medicine</i>	0.57	0.26
<i>Agriculture and dairying</i>	0.05	0.01
<i>Veterinary</i>	0.02	0.00
<i>Teaching</i>	1.05	1.35
<i>Others</i>	0.01	0.01
<i>Total</i>	100	100
D	15.99	

Table 6 Distribution of Diploma Holder and Graduates of Both Sexes by Courses – Urban Rajasthan (1991)

<i>Education level</i>	<i>Male</i>	<i>C.f.</i>	<i>Female</i>	<i>C.f.</i>
<i>Non technical diploma not equal to degree</i>	0.91	100.00	1.30	100.00
<i>Technical diploma not equal to degree</i>	3.44	99.09	1.48	98.70
<i>Graduated degree other than technical degree</i>	57.73	95.65	51.32	97.22
<i>Post graduate degree other than technical degree</i>	26.31	37.92	34.22	45.90
<i>Engineering technology</i>	3.91	11.61	0.92	11.68
<i>Medicine</i>	2.58	7.70	1.73	10.76
<i>Agriculture and dairying</i>	0.22	5.12	0.10	9.03
<i>Veterinary</i>	0.10	4.90	0.02	8.93
<i>Teaching</i>	4.75	4.80	8.83	8.92
<i>Others</i>	0.05	0.05	0.09	0.09
<i>Total</i>	100		100	
D	12.42			

It can be seen in Table 7 that according to DC1 all post school courses are male dominated and according to DC2, Teaching and Other courses are in the category of integrated courses and rest are male dominated. Among technical degrees, share of females was the highest in Teaching (37.00%) followed by other courses (33.33%); Medicine (17.49%);

Agriculture and Dairying (12.22%); Engineering, Technology (6.93%); and veterinary (5.13%). Among diploma courses female share was higher in non-technical courses.

Table 7 Share of Male and Female by Education Level – 1991 (Urban Rajasthan)

<i>Education level</i>	<i>Male</i>	<i>Female</i>	<i>Total</i>
<i>Non technical diploma not equal to degree</i>	68.81	31.19	100
<i>Technical diploma not equal to degree</i>	88.04	11.96	100
<i>Graduated degree other than technical degree</i>	78.06	21.94	100
<i>Post graduate degree other than technical degree</i>	70.85	29.15	100
<i>Engineering technology</i>	93.07	6.93	100
<i>Medicine</i>	82.51	17.49	100
<i>Agriculture and dairying</i>	87.78	12.22	100
<i>Veterinary</i>	94.87	5.13	100
<i>Teaching</i>	63.00	37.00	100
<i>Others</i>	66.67	33.33	100
<i>All areas</i>	46.67	53.33	100

II. Age Wise Sex Segregation In Level Of Education:

It can be seen in Table 8 in rural areas, as move to older age-group, sex segregation has been decreased drastically from 23.08 percent in 25-29 age-group to 2.79 percent in 60+ age-group, specially from age group 35-59 (20.90%) to 60+ (2.79%). Data of literate population gives similar picture, whereas in urban areas as there is no trend in segregation level. Level of segregation has increased as move to older age-group but has been decreased in last age-group i.e. 60+. Though level of education has increased in younger age-group but the difference between male and female has also increased.

Table 8: Age-Wise Dissimilarity Index (D)-1991 (Rajasthan)

<i>Age group</i>	25-29	30-34	35-59	60+
<i>Total – rural</i>	41.37	37.43	29.32	2.08
<i>Literate - rural</i>	23.08	21.63	20.90	2.79
<i>Total – urban</i>	31.16	32.23	36.96	34.81
<i>Literate – urban</i>	11.06	14.83	21.83	19.86
<i>Diploma holder and graduates – urban</i>	11.82	13.71	13.84	15.53

III. More On Sex Segregation In School Education And College Education:

Census data gives only the stock of education level. To capture the trends of flow or enrollments in courses and subjects, school level data, obtained from board of secondary education and college level data, obtained from directorate of college education, has been used.

1. School Education: Choice of Subjects

As expected, it can be seen in Table 9, that in 1991, 46.50 percent of male population and 69.55 percent of females population opted arts while in other faculties like science and

commerce percentage of males was higher than that of females. Nearly 12.16 percent of females opted commerce, and 18.29 percent science whereas 24.57 percent of males opted commerce and 28.93 percent science. The pattern is quite similar in 2015. However percentage of arts students has increased for both sexes. About 78.39 percent of females have chosen arts, 8.22 percent commerce and 13.99 percent have chosen science, While 66.17 percent of male population opted arts, 12.16 percent commerce and 21.67 percent science.

Duncan and Duncan's dissimilarity index shows a significant decrease in segregation in choice of subjects among girls and boys. In 2015, only 12.22 percent boys or girls would have to change their subject, to be distributed in same manner instead of 23.05 percent in 1991.

Table 9: Percentage of Faculty Wise Enrolment-Senior Secondary (Rajasthan)

Faculty	1991		2015	
	Male	Female	Male	Female
Arts	46.50	69.55	66.17	78.39
Commerce	24.57	12.16	12.16	8.22
Science	28.93	18.29	21.67	13.39
Total	100	100	100	100
D	23.05		12.22	

Table 10 shows the share of male and female in different faculties. According to DC1 science and commerce are male dominated faculties in 1991 as well as in 2015 and arts was female dominated in 1991 and shifted to integrated in 2015. According to DC2 males dominate all faculties in both 1991 as well as in 2015 because of less education in females in comparison of males. But it should be noted that share of female was increasing in all faculties during the period which demonstrates increasing education level among females. In 1991 female share was the highest in arts faculty (26.93%) followed by science (13.48), and commerce (10.87%) faculty whereas in 2015, female share was the highest in arts faculty (30.55%) followed by commerce (20.07%) and science (18.66%) faculty.

Table 10: Faculty Wise Share Of Male and Female Students-Senior Secondary

Faculty	1991			2015		
	Male	Female	Total	Male	Female	Total
Arts	73.07	26.93	100	69.45	30.55	100
Commerce	89.13	10.87	100	79.93	20.07	100
Science	86.52	13.48	100	81.34	18.66	100
All	80.23	19.77	100	72.92	27.08	100

2. College Education: Choice of Subjects

Details of college education are clear from Table 11 and Table 12. Among all undergraduate courses B. A. is the most popular course among both males and females but a bit extra popular among females in 1994-95 as well as in 2015-16. One possible reason for the highest

percentage of students in this course might be a liberal eligibility criterion for admission. Jonsson (1999) also enlighten this concept that all educational alternatives are not always within reach. In 1994-95, B.Sc. was at second position in respect of popularity. About 20.69 percent of males and 17.00 percent of females enrolled for B.Sc. but in 2015-16 this course was shifted to third position (13.11% of male, 12.26% of female) and B.Com occupied second position (14.39% of male, 12.42% of female), which was at third position in 1994-95 (15.92% of male, 11.60% of female).

Among males law was the fourth most popular stream (1994 - 4.89%, 2000 - 6.04%) followed by B.Sc. agriculture (1994 - 1.21%, 2000 - 0.74%) during the period. Not a single male student opt home science in 1994-95 as well as in 2015-16. At the same time among females, in 1994-95, B.Sc. home science (1.99%), LLB (1.08%) and B.Sc. agriculture (0.02%) were at fourth, fifth and sixth position respectively. In 2015-16, LLB (1.05%) B.Sc. agriculture (0.08%) and B.Sc. home science (0.06%), were at fourth, fifth and sixth position respectively.

Table 11: Percentage of Faculty Wise Enrolment-College Education

Faculty	1994-95		2015-16	
	Male	Female	Male	Female
B.A.	48.87	59.93	57.90	62.77
B.Sc	20.69	17.00	13.11	12.26
B.Com	15.92	11.60	14.39	12.42
B.Sc.(Agri)	1.21	0.02	0.74	0.08
B.Sc.(H.Sc)	0.00	1.99	0.00	0.06
Law	5.49	1.08	4.83	1.05
M.A	4.89	5.26	6.04	6.96
M.Sc	1.26	1.68	0.97	1.89
M.Com	1.30	0.87	1.17	1.10
. M.Sc. (H.Sc)	NA	NA	0.00	0.84
L.L.M	0.00	0.00	0.04	0.00
M.Phil/Ph.D	0.06	0.07	0.07	0.13
Diploma	0.32	0.50	0.54	0.23
Others	0.00	0.00	0.20	0.20
Total	100	100	100	100
D	14.05		7.67	

Pattern of post-graduate courses is parallel to under-graduate courses. B.A., B.Sc. Home Science, M.A., M. Sc., M.Sc. Home Science, M.Phil / P.HD and diploma are the courses which were more popular among female students than male students.

Dissimilarity index shows a significant decrease in segregation in choice of subjects between females and males. D was changed from 14.05 percent to 7.67 percent during the period.

It can be seen in Table 12 that among under-graduate courses as well as post graduate courses female share was highest in home science with 100% female students. Arts was at second number while male share was highest in agriculture followed by law, commerce and

science. This represents that female often go for simple courses rather than technical or professional and if they go for professional courses than they+ choose the subjects which suites to her traditional image of homemaker. In 1994-95, B.Sc. (H.Sc.), M.Sc., M.Phil. / Ph.D. and diploma seems to be female dominated courses, B.A., B.Sc., and M.A. were integrated, B.Com., B.Sc. agriculture, law and M.Com. were male dominated courses. Whereas in 2015-16, B.Sc. (H.Sc.), M.Sc., M.Phil. / Ph.D and Others seems to be female dominated, B.Sc. agriculture, law and diploma were male dominated and rest were integrated courses. Bu this criterion is not suitable for overtime comparisons as discussed in chapter 2, section 2.5.6. At the same time according to DC2 in 1994-95, B.Sc. (H.Sc.), seems to be female dominated, B.A, M.Sc., M.Phil. / Ph.D and diploma were integrated and rest were male dominated. In 2015-16, B.Sc. (H.Sc.), and M.Sc. (H.Sc.), were female dominated courses, B.A., B.Sc., M.A., M.Sc, M.Com., M.Phil. / Ph.D and Others were integrated and rest were male dominated.

Table 12: Faculty Wise Percent Share Of Male And Female (Rajasthan)

	1994-95			2015-16		
	<i>Male</i>	<i>Female</i>	<i>Total</i>	<i>Male</i>	<i>Female</i>	<i>Total</i>
<i>vBA.</i>	65.85	34.15	100	63.19	36.81	100
<i>B.Sc</i>	74.22	25.78	100	66.56	33.44	100
<i>B.Com</i>	76.44	23.56	100	68.31	31.69	100
<i>B.Sc.agri</i>	99.37	0.63	100	94.55	5.45	100
<i>B.Sc. (h.sc)</i>	0.00	100.00	100	0.00	100.00	100
<i>Law</i>	92.32	7.68	100	89.51	10.49	100
<i>MA</i>	68.71	31.29	100	61.75	38.25	100
<i>M.Sc</i>	63.84	36.16	100	48.83	51.17	100
<i>M.Com</i>	77.98	22.02	100	66.40	33.60	100
<i>. M.Sc. (H.Sc.)</i>	NA	NA	NA	0.00	100.00	100
<i>L.LM</i>	0.00	0.00	100	93.44	6.56	100
<i>M.Phil/Ph.D</i>	66.25	33.75	100	51.35	48.65	100
<i>Diploma</i>	59.92	40.08	100	81.75	18.25	100
	0.00	0.00	100	65.01	34.99	100
<i>All</i>	70.28	29.72	100	65.05	34.95	100

Coconclusions And Policy Implications

Main objective of this study is to document and analyze the sex segregation in education in Rajasthan. Focus is on finding out level, trends and structure of sex segregation in education.

The results suggest that, there are three staged of segregation – firstly whether one should go for education or not, secondly if go for education then up to which level and thirdly what will be the choice of subjects and courses.

1. literacy rate among female is very low. However, women are coming to attained higher education to the same extend as men but educational fields are still seem to be clearly gender segregated and difference in education attainment are greater in rural areas than in urban areas.

2. More boys are enrolled for education than girls. As we move to higher education level, e.g. up to senior secondary, the share of women decreases and share of male increases. But the trend is reverse for college education because in spite of remaining ideal and waiting for marriage, girls continue their studies until they got married while boys leave education earlier than girls to go for, or their traditional image of main-breadwinner force them to go for marketed work.
3. Female population prefers arts while in other faculties like science and commerce percentage of males was higher than that of females. In recent years percentage of arts students has increased for both sexes. Further in science discipline mathematics, Physics, Chemistry, are bit more popular among males, while Botany, Zoology, Medical science, Computer science are more popular among females. Level of segregation in choice of subjects among girls and boy is decreasing.
4. Girls were higher in non-technical courses. Among post school courses simple graduation and post graduation are most popular among both males and females but higher courses are bit more popular among females. Males prefer technical courses while females prefer non-technical courses. Among professional and technical Courses, teaching is most popular among females, whereas engineering technology is male's favorite. Dissimilarity in choosing course and subjects is higher in urban areas than in rural areas.
5. In rural areas sex segregation in education decreases as move to older age group while in urban areas level of segregation in education by gender increases as move to older age group but decreases in the last age group (60+).

An important requirement is the attitudinal change of not only society and family but also women themselves. Infrastructure has to be created in rural areas To Educate women in new fields so that they can get higher paid employment. Parents, teachers and guidance counselor should encourage girls to go for nontraditional streams, which are in demand in market.

To make women empowered of making choice, quality higher education and opportunity to get training in skills and professions in demand in market should be provided them.

women are less mobile than men parents would not like to send them far from their home for education thus higher education and training of most demanding professions must be assessable to all even in remote areas.

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DUNCAN AND DUNCAN DISSIMILARITY INDEX (D)

Most research on sex segregation has the index of dissimilarity (D), proposed by *DUNCAN & DUNCAN (1955)*. It compares male and female along all categories. This index (D) measures the main dimensions of segregation: the degree to which two groups are dissimilarly distributed over a set of categories i.e. it represents the proportion of women who would have to change occupations if women were to be distributed in the same manner as men. The value assumed by D varies from 0 to 100. The value 0 means no differences between occupational distribution of men and women and the value 100 means there is no overlap between the occupational distributions of the two groups. This index can be expressed through equation (i):

$$D_{ik} = \frac{1}{2} \sum_{j=1}^N | P_{ij} - P_{kj} |$$

Where P_{ij} is the percentage of group i in the category j and P_{kj} is the percentage of group k in category j, N is total number of categories