

An Analysis of Gender Disparity in Education in Indian States

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“If you educate a man you educate an individual, but if you educate a woman you educate a family.” ~Mahatma Gandhi

Abstract

When a woman is educated, she becomes empowered to change not only her own life, but also the lives of many around her: her children, her family, her friends, her community. This research paper gives a glance to the status of females literacy in India. According to Census of India, 2011, the overall literacy rate of India is 74.04 per cent; and that of males and females is 82.14 per cent and 65.46 per cent respectively indicating a wide gap. The paper firstly attempts to analyse gender disparity in education and then further aims at evaluating the different possible factors for the gender gaps in education in Indian states. The paper lastly concludes with the major findings of the study.

Key Words: literacy rate, gender, urban, below poverty line, per capita income, sex ratio.

Introduction

Although gender disparity in India exists in many forms; however, gender disparity in education is a matter of concern as females literacy is a force multiplier for the social development of the country. Literacy is a very powerful tool in uplifting women because with literacy comes the empowerment which helps in reducing gender inequality in other social dimensions as well. If women are kept illiterate, then a large amount of asset in the form of human resource will go unused. Another negative effect of the same is the cyclical nature of the issue, an uneducated/illiterate woman would be raised with the same orthodox notions that hampered her development as an individual and any offspring, especially girl-children are likely to also be brought up devoid of a formal education with the belief that their social role and cultural burdens

are their priority and those don't need formal education. This includes child-bearing, cooking, house-keeping etc. This outlook has been jaded for decades now but is still prevalent in large sections of the country especially rural and semi-urban India.

Literature Review

Kumar, N., et. al. (2016) in their paper presented an empirical analysis of gender disparity in literacy of three of the Indian states (Haryana, Punjab and Rajasthan) with highest gender disparity in literacy. Their study was based upon Sopher's method to calculate disparity in literacy. The districts that stand at the bottom are Mahendergarh in Haryana, Rupnagar in Punjab and Madhopur in Rajasthan. Many studies show that illiterate women generally have poor nutritional status, high levels of maternal mortality, low earning potential and little autonomy within the household. A woman's lack of education also has a negative impact on the health and wellbeing of her children. Therefore, it becomes necessary to study the factors determining women's literacy rate.

Objectives of the Study

1. To test for the disparity in literacy rate between males and females in Indian states.
2. To test for the disparity in females literacy rate in rural and urban regions in Indian states.
3. To analyse the factors that impact women's opportunities in education:
 - (a) To check if urban population of a state is a determining factor in females literacy rate.
 - (b) To check if sex ratio of a state is a determining factor in females literacy rate.
 - (c) To check if BPL population (rural, urban and total) of a state (taken as a proxy variable for poverty) is a determining factor in females literacy rate.
 - (d) To check if per capita income of a state is a determining factor in females literacy rate.

Hypotheses of the Study

1. There is no significant difference in the literacy rates of the males and females in Indian states.
2. There is no significant difference in the literacy rates of females in urban and rural regions in Indian states.
3. There is no significant relationship between the literacy rates of females and sex ratio in Indian states.

4. There is no significant relationship between the literacy rates of females and BPL population (taken as a proxy variable for poverty) in all three categories (rural, urban and total) of Indian states.
5. There is no significant relationship between the literacy rates of females and log of per capita income in Indian states.

Research Methodology

The study has taken the following variables to fulfil the objectives of the paper.

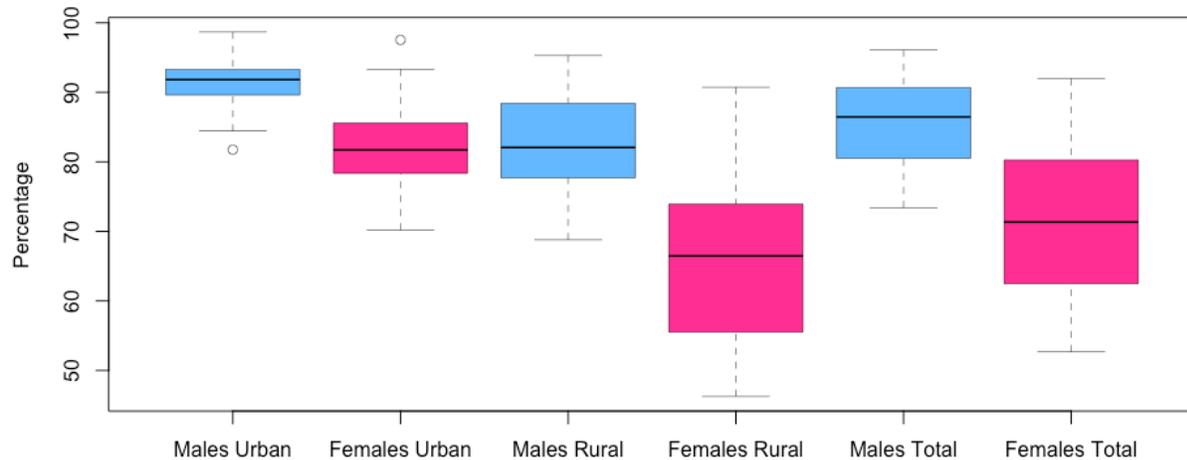
Name of Variables	Unit	Year	Source of Data
Males LR Total	Percentage	2011	Census of India, 2011
Males LR Rural	Percentage	2011	Census of India, 2011
Males LR Urban	Percentage	2011	Census of India, 2011
Females LR Total	Percentage	2011	Census of India, 2011
Females LR Rural	Percentage	2011	Census of India, 2011
Females LR Urban	Percentage	2011	Census of India, 2011
Urban Population	Percentage	2011	Census of India, 2011
BPL Total	Percentage	2011-12	RBI Publications
BPL Rural	Percentage	2011-12	RBI Publications
BPL Urban	Percentage	2011-12	RBI Publications
Sex Ratio	females per 1,000 males	2011	Census of India, 2011
Per Capita Income	Rupees	2011-12	Handbook of Statistics, RBI

Note: Data on BPL population is based on MRP Consumption.

Data has been collected from the various sources for the year 2011 (or 2011-12). Statistical tools like paired t-test, Pearson's correlation, linear regression model are used to draw the results. R software is used for statistical computing and graphics.

FINDINGS

Figure 1: Boxplot Showing Percentage of Literacy Rates for Different Combinations of Gender and Regions



The above diagram is a boxplot showing the distribution of percentage of literacy rate for the different combinations of gender and regions. Out of total 29 states and 7 union territories in India, the minimum and maximum females literacy rates in rural region are of Rajasthan (46.25 per cent) and Kerala (90.74 per cent) respectively; in urban region are of Jammu & Kashmir (70.19 per cent) and Mizoram (97.54 per cent) respectively; and in total are of Rajasthan (52.66 per cent) and Kerala (91.98 per cent) respectively according to Census of India, 2011. The outlier in the category of 'males urban' is Uttar Pradesh and that in the category of 'females urban' is Mizoram. However, the minimum and maximum gaps between males literacy rate and females literacy rate are those of Meghalaya (3.39 percentage points) and Rajasthan (27.85 percentage points).

The dark line in the middle of boxes represents the value of median for the respective categories. It is clear from the diagram that the males have higher literacy rate than the females in all the three categories (urban, rural and total). Also, the literacy rate is higher in urban regions in comparison to rural regions for both males and females separately.

However, to check if the figures for males literacy rate and urban literacy rate are statistically greater than females literacy rate and rural literacy rate respectively; hypothesis testing is done using paired t-test.

To test for the disparity in literacy rate between males and females; following hypothesis is formulated:

H_0 : There is no significant difference in the literacy rates of the males and females in Indian states.

H_A : Literacy rate of the males is greater than the females in Indian states.

Paired t-test

data: **Males LR Total and Females LR Total**

t = 14.236, df = 34, p-value = 3.459e-16

Alternative Hypothesis: true difference in means is > 0

95 percent confidence interval:

12.16434 Inf

mean of the differences = 13.804

A high t-statistic and low p-value from the above results show that literacy rate of the males is statistically greater than the females in Indian states.

Now, to test for the disparity in females literacy rate in rural and urban regions; following hypothesis is formulated:

H_0 : There is no significant difference in the literacy rates females in in rural and urban regions in Indian states.

H_A : Literacy rate of the females in urban regions is greater than that in rural regions in Indian states.

Paired t-test

data: **Females LR Urban and Females LR Rural**

t = 13.081, df = 34, p-value = 3.981e-15

Alternative Hypothesis: true difference in means is > 0

95 percent confidence interval:

14.03031 Inf

mean of the differences = 16.11314

Again a high t-statistic and low p-value from the above results show that literacy rate of the females in urban regions is statistically greater than the females literacy rate in rural regions in Indian states.

Also, when females literacy rate is regressed upon the percentage of urban population, then following are the results:

lm(formula = Females LR Total ~ Urban Population)

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	60.56911	2.94301	20.581	< 2e-16	***
Urban Population	0.28099	0.06608	4.252	0.000164	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1					

Residual standard error: 8.557 on 33 degrees of freedom

Multiple R-squared: 0.354, Adjusted R-squared: 0.3344

F-statistic: 18.08 on 1 and 33 DF, p-value: 0.0001636

Here as well the regression coefficient corresponding to the variable urban population (0.28099) is statistically significant as revealed by p-value (0.000164) less than 0.05. Therefore, it can be concluded from here that “region” (urban / rural) is a significant factor for females literacy rate.

Next, the focus is to determine other factors impacting women’s opportunities in education.

To see if sex ratio of a region affects females literacy rate of that region, Pearson’s correlation test is used. The hypothesis for the same is:

H_0 : There is no significant relationship between the literacy rates of females and sex ratio in Indian states.

H_A : There is significant relationship between the literacy rates of females and sex ratio in Indian states.

Pearson's product-moment correlation

data: **Females Total and Sex Ratio**

t = 0.37783, df = 33, p-value = 0.708

Alternative Hypothesis: true correlation is not equal to 0

95 percent confidence interval:

-0.2736012 0.3903388

sample estimates:

cor = 0.06562925

The results display that the coefficient of correlation between females literacy rate and sex ratio is very low (0.065) which is an insignificant relation as indicated by low t-statistic and a high p-value.

Also, again if females literacy rate is regressed on the sex ratio, then following are the results:

lm(formula = Females Total ~ Sex Ratio)

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)
(Intercept)	63.440444	21.321697	2.975	0.00544 **
Sex Ratio	0.008638	0.022863	0.378	0.70798

 Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
 Multiple R-squared: 0.004307, Adjusted R-squared: -0.02587
 F-statistic: 0.1428 on 1 and 33 DF, p-value: 0.708

Here as well the results convey the same fact. The regression coefficient corresponding to the variable sex ratio (0.008638) is statistically insignificant as revealed by p-value (0.708) greater than 0.05. Hence, it can be deduced from here that “sex ratio” (number of females per 1,000 males) cannot be said to be a determining factor for females literacy rate.

Now, to see if BPL population of a region affects females literacy rate of that region, Pearson’s correlation test is used separately for rural, urban and total population of Indian states.

H_0 : There is no significant relationship between the literacy rates of females and BPL population (taken as a proxy variable for poverty) in all three categories (rural, urban and total) of Indian states.

H_A : There exists a significant relationship between the literacy rates of females and BPL population in Indian states.

(i) Pearson's product-moment correlation

data: **Females LR Rural and BPL Rural**

t = -3.9074, df = 33, p-value = 0.0004372

Alternative Hypothesis: true correlation is not equal to 0

95 percent confidence interval:

-0.7542942 -0.2820351
 cor = -0.5624212

(ii) Pearson's product-moment correlation

data: **Females LR Urban and BPL Urban**

t = -3.0976, df = 33, p-value = 0.003968

Alternative Hypothesis: true correlation is not equal to 0

95 percent confidence interval:

-0.6975372 -0.1679300
 cor = -0.474616

(iii) Pearson's product-moment correlation

data: **Females LR Total and BPL Total**

t = -4.0116, df = 33, p-value = 0.0003256

Alternative Hypothesis: true correlation is not equal to 0

95 percent confidence interval:

-0.7606553 -0.2957141
 cor = -0.5725393

The above results exhibit that a significant negative relationship holds between the females literacy rate and the BPL population in all three cases (rural, urban and total) which conveys that the states with high BPL population have low females literacy rate.

As done previously, if females literacy rate is regressed on the BPL population, then following are the results:

lm(formula = Females Total ~ BPL Total)

Coefficients:

	Estimate	Std. Error	t value	Pr(> t)	
(Intercept)	81.0454	2.8066	28.877	< 2e-16	***
`BPL Total`	-0.5182	0.1292	-4.012	0.000326	***

Signif. codes: 0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1

Multiple R-squared: 0.3278, Adjusted R-squared: 0.3074

F-statistic: 16.09 on 1 and 33 DF, p-value: 0.0003256

Here also the results convey the same fact. The regression coefficient corresponding to the variable BPL Total (0.0.1292) is statistically significant as implied by very low p-value. Hence, it can be drawn from here that “BPL population” (taken as a proxy variable for poverty) is a determining factor for females literacy rate.

Next, the relationship between females literacy rate and log PCI is tested.

H_0 : There is no significant relationship between the literacy rates of females and log of per capita income in Indian states.

H_A : There exists a significant relationship between the literacy rates of females and log of per capita income in Indian states.

```
Pearson's product-moment correlation
data: Females Total and Log PCI
t = 3.9312, df = 30, p-value = 0.0004612
Alternative Hypothesis: true correlation is not equal to 0
95 percent confidence interval:
 0.2942184 0.7743454
   cor = 0.5830917
```

A low p-value here too signifies that the coefficient of correlation (0.583) is statistically significant. Now, females literacy rate is regressed on log PCI to establish the relationship between the two.

```
lm(formula = Females LR Total ~ log PCI)
```

Coefficients:

```
      Estimate Std. Error t value Pr(>|t|)
(Intercept)  -61.280     33.648  -1.821 0.078563 .
`Log PCI`    27.424      6.976   3.931 0.000461 ***
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Signif. codes:  0 '***' 0.001 '**' 0.01 '*' 0.05 '.' 0.1 ' ' 1
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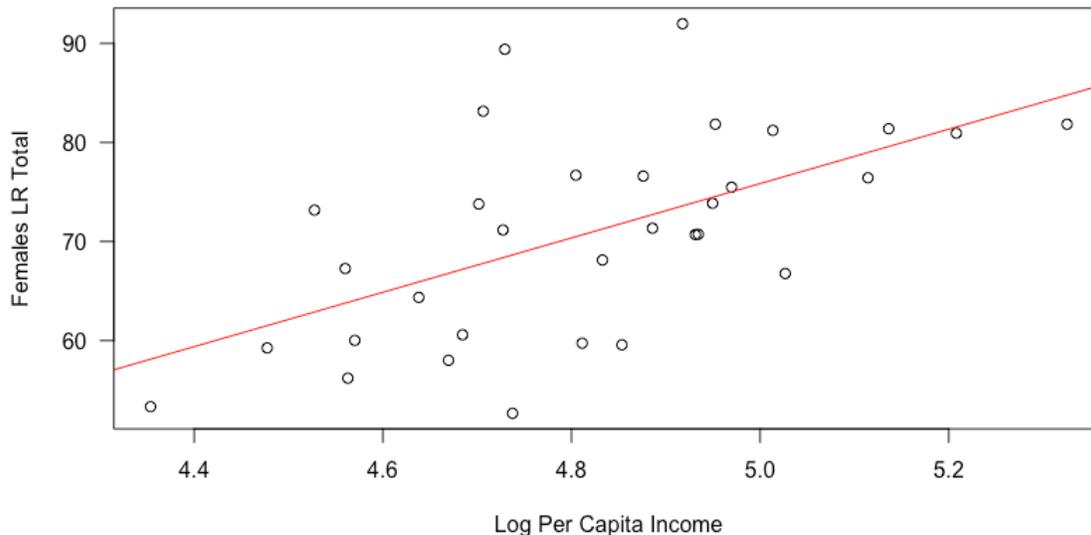
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(3 observations deleted due to missingness)
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Multiple R-squared:  0.34,    Adjusted R-squared:  0.318
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F-statistic: 15.45 on 1 and 30 DF, p-value: 0.0004612

The regression coefficient corresponding to the log PCI (6.976) is statistically significant as indicated by p-value (0.000164) less than 0.05. Therefore, it can be concluded from here that per capita income is a significant factor for females literacy rate.

Figure 2: Scatterplot of Females Literacy Rate and Log Per Capita Income



Limitations of the Study

Data for per capita income of three of the union territories (Daman and Diu, Dadar and Nagar Haveli and Lakshadweep) is not available for the year 2011-12.

Conclusion

From the above discussion, it can be concluded that males literacy rate is statistically higher than that of females and literacy rate in urban regions is statistically higher than that in rural regions. The major finding from the study is that urban population, BPL population (taken as a proxy variable for poverty) and per capita income have a significant relationship with females literacy rate in Indian states. Whereas, sex ratio has no significant relationship with females literacy rate. Among all the Indian states and union territories, Rajasthan has the least females literacy rate, whereas, Kerala has the highest females literacy rate.

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