

Breaking Barriers: Exploring the Impact of Socioeconomic Factors on Gender Discrimination in Education - A Panel Regression Analysis in India

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Abstract

Introduction: For the overall growth and development of the economy, it is important to focus on the education of society as a whole (UNDP, 2020). Despite various initiatives to remove gender discrimination in education, it is still a persistent and significant problem. A report states that about 15 million girls will never be literate as compared to 10 million boys which shows the intensity of the difference between the educational priorities of the society towards boys and girls. Also, about 132 million girls worldwide are out of the education system (UNESCO, 2020). Socioeconomic status is the economic and social status of the individual or organisation within the society. The multifaceted feature of Socioeconomic status made it an important factor in education opportunities (Sirin, 2005).

Objectives: To study the impact of parental education, female access to ICT, malnutrition, and average household income on gender discrimination at different levels of education.

Methodology: As data is collected for each state and Union territory of India which is cross-sectional in nature and the time period from 2016 to 2020 is considered which is time series in nature so the combination of both, the model of panel regression analysis, has been used in the study.

Results: The study highlights the importance of educating mothers to achieve gender parity in education, emphasises the need to address hunger and malnutrition as barriers to equitable education, and underscores the significance of closing the gender gap in access to digital resources for schooling.

Keywords: Gender Discrimination; Socioeconomic status; Education; Women's empowerment; Panel regression.

Introduction

“When you invest in a girl's education, she feeds herself, her children, her community and her nation” - Former Prime Minister Erna Solberg of Norway

Education is considered a basic human right and a key towards achieving sustainable growth. For the overall growth and development of the economy, it is important to focus on the education of society as a whole (UNDP, 2020). Education is required to promote social inclusion, empowerment of the different sections of society, equality and removing poverty (UNESCO, 2020). There are various international organisations and agreements like Sustainable Development Goals by the UN, and the Convention on Removing Any Kind of Prejudice against women that focus on equal educational opportunities for all irrespective of gender (UN, 2015). Education is divided into three (MHRD, 1968):

- Primary Education It includes education from class 1 till class 8h
- Secondary Education It includes education from class 9 till class 12h
- Tertiary Education It includes education beyond

school level that is undergraduation, post graduation and others.

- Despite various initiatives to remove gender discrimination in education, it is still a persistent and significant problem. A report states that about 15 million girls will never be literate as compared to 10 million boys which explicitly exhibits the intensity of the difference between the educational priorities of the society towards boys and girls. Around 132 million girls worldwide are out of the education system (UNESCO, 2020). Discrimination against female education includes limited access, insufficient resources, unjust policies and biased social norms (UNESCO, 2019). All these determinants cause higher dropout of female students, less enrolment at different levels of education and scarce educational opportunities for females in various parts of the world as shown in table number 1 (World Bank, 2018).

Table No. 1: Female Dropout Rate and Enrolment Rate in Different Countries in 2023

SN	Country	Female Dropout Rate	Female Enrolment Rate (Primary)	Female Enrolment Rate (Secondary)	Female Enrolment Rate (Tertiary)
1	India	12.20%	97.90%	94.30%	23.70%
2	China	4.40%	100%	100%	43.20%
3	United States	4.30%	99.60%	98.70%	57.40%
4	Canada	3.80%	99.90%	99.80%	59.60%
5	Sweden	2.90%	100%	100%	62.30%

Source: World Bank, 2023

Socioeconomic status is the economic and social status of the individual or organisation within the society. It comprises various factors like income, occupation, education, health and access to opportunities (D'Souza, 2019). The multifaceted feature of socioeconomic status made it an important factor in education opportunities (Sirin, 2005). There exists a strong relationship between socioeconomic status and educational attainment (Reardon, 2011). There are instances which show that socioeconomic status and gender discrimination in education intersect with each other (Aikman, 2013). This intersection creates a disadvantageous position for some

sections of society. There are many challenges like poverty, social norms and insufficient resources faced by girls with lower Socioeconomic status that leads to lower educational opportunities (UNESCO, 2020). Establishing a relationship between socioeconomic status and gender discrimination in education at multiple levels is important. A study shows that lower socioeconomic status leads to poor access to quality of education in early childhood (Fuller, 2010). Girls with lower socioeconomic standing face more barriers like gender stereotypes, gender norms and biases to access STEM education (UNESCO, 2017). A study reveals that gender discrimination in reading and

writing is influenced by socioeconomic background. The reading ability of girls with lower socioeconomic status is significantly lower as compared to that of boys with similar status (Hauw, 2018). A study on higher educational institutions shows that it is significantly difficult for a woman with a lower socioeconomic background to reach a leadership position in higher educational institutions which contributes to gender discrimination in higher education (Alkadry, 2018). As stated by the definition of

socioeconomic status that it is a multivariable concept. There are studies which focus on various variables of socioeconomic status.

Parental education is considered one of the significant variables which explain the socioeconomic status of the individual or family (Jeynes, 2012). The table number 2 shows the situation of parental education in India from 2016 till 2020.

Table No. 2: Parental Education in India

Year	Mother's Education	Father's Education
2016	48.1% Secondary or higher	53.8% Secondary or higher
2017	49.2% Secondary or higher	54.9% Secondary or higher
2018	50.2% Secondary or higher	56.0% Secondary or higher
2019	51.3% Secondary or higher	57.1% Secondary or higher
2020	52.3% Secondary or higher	58.1% Secondary or higher

Source: World Bank, 2023

A multi-analysis shows that parental education is a strong variable that can influence the education of a child. The result shows that better education opportunities are linked with higher education levels of the parents (Sirin, 2005). Educational disparities among families with higher and with lower socioeconomic status by taking parental education as a proxy. The study finds out a strong correlation between parental education and disparities in education (Reardon, 2011). These studies show the importance of parental education in determining the discrimination and opportunities in education. There are studies which focus on individual components of parental education, which is considered one of the significant variables which explain the socioeconomic status and their relationship with education and gender discrimination in it. Parental education can be further divided into mother and father education (NSSO, 2020). Both fathers' and mothers' education has a positive impact on removing the gender gap in education and employment. The mother's education has a slight edge over the father's education in removing gender discrimination in education (Klasen, 2009). Some studies show that there is a difference between the impact of mother

and father education on gender discrimination in education. A comprehensive review article shows that there is a positive impact of mother's education on reducing gender bias in education. Particularly, the access towards education for girls increases if their mother is educated (Duflo, 2012). A mother's education has a significant impact on the educational attainment of girls but the father's education has limited or no impact (Khanam, 2018).

There are other variables as well to measure socioeconomic status. The average household income is a key determinant of socioeconomic status and it helps to provide better opportunities in society (Chetty, 2014). Even the average household income has a significant impact on cognitive development and educational achievement in society (Duncan, 2013). Average household income can be considered a proxy to measure socioeconomic status and to analyse the impact on children's education (Evans, 2013). Table number 3 shows that average household income of India is increases but with gap in male and female income.

Table No. 3: Average Household Income and its bifurcation into male and female

Year	Average household income (INR)	Male (INR)	Female (INR)
2016	1,21,700	1,11,200	1,32,200
2017	1,27,200	1,16,500	1,37,900
2018	1,32,700	1,21,800	1,43,600
2019	1,38,200	1,27,100	1,49,300
2020	1,43,700	1,32,400	1,55,000

Source: NSSO, 2020

A higher average household income ensures better educational opportunities for girls (World Bank, 2012). For primary education, lower household income implies lower primary education for girls as households are not in the financial position to provide them with the education (Lloyd, 1993). Even after attaining primary education, there are chances that lower household income induces the girls to engage in child labour and stop them attain secondary education (Hossain, 2005). A paper established that higher average household income can provide greater access to opportunities for females and enable them to attain higher education (Alkadry, 2018).

Health and gender discrimination in education are closely interlinked with each other (UNESCO, 2017). The

interplay between these variables induces the studies to focus on their relationship. A study focusing on adolescent health and its impact on education stated that if an adolescent is facing negative nutritional health then it can have negative results on a girl's education (Dyson, 2016). A child's nutritional health has a direct impact on a child's ability to access education and perform (Engle, 2018). Stunting is a variable of the nutritional health of a child in the country and it can have an impact on gender discrimination in education (UNICEF, 2019). As shown in table number 4, The prevalence of stunting in India is still relatively high, but it is declining at a faster rate than the population growth rate. The gender gap in stunting is narrowing, but it is still significant.

Table No. 4: Prevalence of stunting in India

Year	Prevalence of stunting (%)	Male (%)	Female (%)
2016	38	39.6	36.4
2017	35.5	37.1	34
2018	33	34.5	31.5
2019	31.5	32.9	30.1
2020	29.5	30.9	28.2

Source: NFHS 5 (2020)

Stunted girls may face additional barriers to accessing education (Crookston, 2013). Stunting may have a long-term impact on a child's cognitive abilities and educational performance (Crookston, 2013). There are various problems associated with stunting:

- It leads to slow cognitive and intellectual development (Walker, 2007).
- It causes difficulty in the language development of the child (Black, 2008).
- It leads to reduced attendance in educational institutions (Menon, 2016).

- It causes a reduction in energy levels and stamina (Dewey, 2011).
- Lower academic achievement as compared to non-stunted children (Walker, 2007).

The significant impact of malnutrition and stunting on school attendance, enrolment and participation in various activities shows the importance of studying these variables.

In today's digital era, access to information and communication technologies (ICT) plays an important role in education. Access to technology creates opportunities and access to education. According to a report, Digitalisation empowers the marginalised section of the society to access resources and content related to education (UNESCO, 2020). Digit access enhances the teaching and learning experience and raises the learning opportunities (Khan, 2021). Girls with access to information and communication technologies have better results related to education like increased school attendance, better academic performance and a fall in Gender discrimination in education (Ssewamala, 2009). Inequality in access to information and communication technologies in developing nations promoted gender discrimination within education as well (Guru-Murthy, 2017). If laptops are provided to boys and girls then the girl's participation increases by more as compared to boys in STEM subjects (Bebell, 2010). Access to information and communication technology will help to bridge the gender gap in education and provide equal opportunities to each and every child (Huyer, 2018). An exposure to ICT can be a significant factor in explaining gender discrimination in education at different levels. It can help to overcome barriers like accessibility, affordability and societal biases to ensure equal opportunities for all genders in Society.

Considering the reports and studies that are already conducted on socioeconomic factors and gender discrimination in education, the current study focuses on finding out the impact of Socioeconomic status on gender discrimination in education at different levels.

The current study will try to achieve the following objectives:

- To study the relationship between parental education

and gender discrimination at different levels of education.

- To review the impact of malnutrition on gender discrimination at different levels of education.
- To assess the relevance of women's access to information and communication technology on gender discrimination at different levels of education
- To analyse the impact of the average household income on gender discrimination at different levels of education.
- To suggest measures to reduce gender discrimination at different levels of education.

Research Methodology

The study focuses on secondary data of all the states & union territories from India for the period 2016 to 2020. The data for variables of Socioeconomic status is extracted from different rounds of the National Sample Survey Office (NSSO) which is a part of the Ministry of Statistics and programme implementation in India. The data on the gender parity index at different levels of education is extracted from a report "Educational Statistics at a Glance" published by the Ministry of Human Resource Development in India. The most recent data provided by both of these ministries is till 2020.

The independent variables are the mother's education (Jeynes, 2012), the father's education (Jeynes, 2012), access to information and communication technology by females (World Bank, 2016), malnutrition (UNICEF, 2019) and average household income (World Bank, 2019). These are the proxies to know the socioeconomic status. The dependent variables are values of the gender parity index at the primary level, secondary level and tertiary level. The listed dependent variables help to understand gender discrimination at different levels of education.

$$GPIP_{it} = (\beta_0) + (\beta_1)(ME)_{it} + (\beta_2)(FE)_{it} + (\beta_3)(ST)_{it} + (\beta_4)(IT)_{it} + (\beta_5)(I)_{it} \dots \dots \dots (1)$$

$$GPIS_{it} = (\beta_0) + (\beta_1)(ME)_{it} + (\beta_2)(FE)_{it} + (\beta_3)(ST)_{it} + (\beta_4)(IT)_{it} + (\beta_5)(I)_{it} \dots \dots \dots (2)$$

$$GPIT_{it} = (\beta_0) + (\beta_1)(ME)_{it} + (\beta_2)(FE)_{it} + (\beta_3)(ST)_{it} + (\beta_4)(IT)_{it} + (\beta_5)(I)_{it} \dots \dots \dots (3)$$

Where, i = state or union territory, t = time period = constant, ME = mother's education, FE = father's education, ST = malnutrition, IT = female access to information and communication technology and I = average household income, $GPIP$ = gross parity index in primary education, $GPIS$ = gross parity index in secondary education, $GPIT$ = gross parity index in tertiary education

As data is collected for each state and Union Territory of India which is cross sectional in nature and time period from 2016 to 2020 is considered which is time series in nature so the combination of both, the model of panel regression analysis, has been used in the study. The techniques of fixed effects and random effects will be used to analyse the impact of independent variables on each dependent variable. The Hausman test is used to analyse out of fixed effect and random effect models which is more appropriate and consistent.

Finding and Analysis

The panel fixed effect model suggests that the mother's education, malnutrition and female access to information and communication technology have a significant effect on the gender parity index in primary education while the father's education and average household income have an insignificant impact on the dependent variable. In fig 1, The value of 0.58 implies that a unit increase in the mother's education will cause a 0.58 unit increase in the value of the gender parity index at primary education. Educated mothers are more able to understand the needs of their children and promote their primary education (Fulmer, 2009). The result implies that malnutrition has a negative impact on the gender parity index in primary, that is if the value of malnutrition increases by 1 unit then it will cause the value of $GPIP$ to fall by 0.12 units. This shows that malnourished girl children are more likely to have reduced or less cognitive ability (Bundy, 2009). The result stated that there is a negative relationship between female access to ICT and the gender parity index in primary education. The value of - 0.09 implies that a unit increase in IT will cause a 0.09 fall in the value of $GPIP$. The reason is that most of the online resources are still more relevant for boys (International Telecommunication Union, 2017).

$$GPIP = (0.69) + (0.58)(ME) - (0.12)(ST) - (0.09)(IT)$$

Fig 1. Panel fixed effect model for primary education

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. xtreg genderparityindexgpiiprimaryedu me fe it st i, fe
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Fixed-effects (within) regression              Number of obs   =    180
Group variable: state                          Number of groups =    36

R-sq:  within = 0.1738                          Obs per group:  min =     5
        between = 0.7155                          avg   =    5.0
        overall  = 0.4853                          max   =     5

corr(u_i, Xb) = -0.9860                          F(5,139)        =    5.85
                                                Prob > F        =    0.0001
    
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genderpari-u	Coef.	Std. Err.	t	P> t	[95% Conf. Interval]
me	.5768541	.1924319	3.00	0.003	.196382 .9573262
fe	-.0991547	.1110148	-0.89	0.373	-.3166506 .1164412
it	-.086718	.0188528	-4.60	0.000	-.1239933 -.0494427
st	-.1180122	.0395524	-2.98	0.003	-.1962142 -.0398101
i	-.0008946	.0024297	-0.34	0.769	-.0048985 .0047093
_cons	.6877649	.1174202	5.86	0.000	.4556064 .9199275
sigma_u	.06405394				
sigma_e	.01364375				
rho	.95659841	(fraction of variance due to u_i)			

F test that all u_i=0: F(35, 139) = 2.44 Prob > F = 0.0001

The panel random effect model suggests that a mother's education, malnutrition and female access to ICT have a significant effect on the gender parity index in secondary education while the father's education and average household income have an insignificant impact on the dependent variable. In the fig 2, The value of 0.05 implies that a unit increase in the mother's education will cause a 0.05 unit increase in the value of the gender parity index in primary education. The study indicated that educated mothers are more keen towards the education of their daughters and they can promote gender equality (Wodon, 2018). The Result implies that malnutrition has a negative impact on the gender parity index in secondary education, that is if the value of malnutrition increases by 1 unit then it will cause the value of $GPIS$ to fall by 1.12 units. This shows that malnourished children remain absent or less attentive in their primary education which continues into secondary education and hampers their involvement (Smith, 2015). The result stated that there is a negative relationship between female access to ICT and the gender parity index in primary education. The value of - 0.02 implies that a unit increase in IT will cause a 0.02 fall in the value of $GPIS$. The reason can be that they do not have enough knowledge to use digital tools which is why even after having access to ICT they are not able to use it for increasing their opportunities and involvement in education (Huyer, 2016).

$$GPIS = (1.02) + (0.05)(ME) - (1.12)(ST) - (0.02)(IT)$$

Fig 2. Panel random effect model for secondary education

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. xtreg genderparityindexsecondary me fe it st i, re
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Random-effects GLS regression		Number of obs =	100
Group variable: state		Number of groups =	36
R-sq: within =	0.0137	Obs per group: min =	5
between =	0.7025	avg =	5.0
overall =	0.4239	max =	5
corr(u_i, X) = 0 (assumed)		Wald chi2(5) =	128.05
		Prob > chi2 =	0.0000

genderpari-e	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
me	.0450641	.0235492	1.91	0.056	-.0010916 .0912197
fe	.0645672	.048721	1.33	0.185	-.0309243 .1600506
it	-.0225075	.013545	-1.66	0.097	-.0490551 .0040401
st	-.1188306	.0279898	-4.25	0.000	-.1736896 -.0639716
i	.0003553	.0016745	0.21	0.832	-.0029267 .0036373
_cons	1.016377	.0203951	49.98	0.000	.976521 1.056238
sigma_u	0				
sigma_e	.01810034				
rho	0	(fraction of variance due to u_i)			

The panel random effect model suggests that a mother's education, malnutrition and female access to ICT have a significant effect on the gender parity index in tertiary education while the father's education and average household income have an insignificant impact on the dependent variable. In the fig 3, The value of 0.32 implies that a unit increase in the mother's education will cause a 0.32 unit increase in the value of the gender parity index in primary education. The study indicated that educated mothers are more interested in the education of their children and are capable of funding their education (Sebates, 2011). The result implies that malnutrition has a positive impact on the gender parity index in tertiary education, that is if the value of malnutrition increases by 1 unit then it will cause the value of GPIT to increase by 0.24 units. The result stated that there is a positive relationship between female access to ICT and the gender parity index in tertiary education. The value of 0.14 implies that a unit increase in IT will cause a rise of 0.14 units in the value of GPIT. The reason can be more access implies more opportunities to learn and digital ways to include in the education system (UN, 2013). No significant impact of average household income and father's education on the gender parity index at any level of education may be due to cultural or societal norms where it is more important to educate boys instead of girls.

$$GPIT=(0.74)+(0.32)(ME)+(0.24)(ST)+(0.14)(IT)$$

Fig 3. Panel random effect model for tertiary education

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. xtreg genderparityindextertiary me fe it st i, re
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Random-effects GLS regression		Number of obs =	100
Group variable: state		Number of groups =	36
R-sq: within =	0.1822	Obs per group: min =	5
between =	0.6429	avg =	5.0
overall =	0.2412	max =	5
corr(u_i, X) = 0 (assumed)		Wald chi2(5) =	55.32
		Prob > chi2 =	0.0000

genderpari-d	Coef.	Std. Err.	z	P> z	[95% Conf. Interval]
me	.3191712	.0737298	4.33	0.000	.1746634 .4636789
fe	-.1413316	.1525396	-0.93	0.354	-.4403037 .1576406
it	.1383402	.0424076	3.26	0.001	.0552228 .2214575
st	.2462352	.0876327	2.81	0.005	.0744783 .4179921
i	-.0029126	.0052428	-0.56	0.579	-.0131082 .0073631
_cons	.7887942	.0636668	11.60	0.000	.6140096 .9635788
sigma_u	0				
sigma_e	.05629847				
rho	0	(fraction of variance due to u_i)			

Conclusion, Limitations and Suggestions

The current study focuses on the interlinkage between socioeconomic status and gender discrimination at different levels of education. Through panel data analysis, the study explored the effect of various proxies of socioeconomic status on the gender parity index at different levels of education. The finding of the study provides valuable insights for policymakers, researchers and stakeholders.

First, The findings exhibit the importance of mothers to be educated in order to move towards gender parity. It was shown that educated mothers were better able to recognise their children's educational requirements and actively encourage them in their basic schooling. In order to assure equal educational opportunities for boys and girls, it is essential to empower women via education (Shaheen, 2020). To ensure active participation of mothers in their children's education, efforts should be made to increase female literacy rates as well as to educate and assist them.

Second, it was determined that hunger was a substantial obstacle to establishing gender equity in the educational system. Children who are undernourished, especially females, have worse cognitive capacities and are less engaged in elementary and secondary education (Arati, 2018). In order to establish a healthy society, nutritional assistance programmes and tailored interventions must be used to address malnutrition.

Additionally, there is a need for attention given the inverse association between female access to ICT and the gender parity index at the primary and secondary school levels. Girls have difficulty in efficiently utilising digital resources for schooling despite having access to ICT. This demonstrates the necessity of programmes that provide females with the necessary digital literacy skills and internet resources. To fully realise the promise of ICT for improving educational opportunities and fostering gender equality, the digital gender disparity must be closed (Kerckaert, 2015).

It's crucial to recognise the limitations of this study, though. The study only considered the Indian environment, its conclusions may not apply to other nations with distinct socioeconomic and cultural situations.

Numerous suggestions may be made to lessen discrimination based on gender in education in light of the research findings. In order to enhance female literacy rates and give women access to educational opportunities, policymakers should place a high priority on investing in female education and empowerment. To assure the physical and cognitive development of kids, malnutrition treatments including school feeding programmes and nutritional assistance efforts should also be put into practise (McEwan, 2013).

Efforts should be made to encourage girls' digital literacy and give them fair access to technology and online resources in order to close the gender gap in the digital sphere (Meherali, 2021). Initiatives should concentrate on creating gender-responsive instructional materials and removing obstacles that prevent females from effectively utilising ICT.

In addition, it is critical to question societal and cultural practices that support gender inequality in education. The promotion of gender equality in educational settings can be aided through awareness campaigns, community involvement, and advocacy work (WHO, 2009).

The study highlights the importance of educating mothers to achieve gender parity in education, emphasises the need to address hunger and malnutrition as barriers to equitable education, and underscores the significance of closing the gender gap in access to digital resources for schooling (Durand, 2011).

Policymakers should invest in female education and empowerment, implement malnutrition treatments and nutritional assistance efforts, promote girls' digital literacy, and challenge societal and cultural practices that perpetuate gender inequality in education through awareness campaigns and community involvement.

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