GENDER DISPARITIES IN ELEMENTARY EDUCATION IN RURAL WEST BENGAL: A COMPARATIVE STUDY BASED ON NEP 2020

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Abstract

This paper examines gender disparities in mathematics learning outcomes among elementary school students in West Bengal, with a focus on two regions: Darjeeling (specifically, Phansidewa) and Purba Medinipur (specifically, Jerthan). The paper adopts a cross-sectional survey analysis that collected data from households and children. Student mathematics performance is assessed by a specific test, based on their grade level. Descriptive analysis reveals gender differences in the mathematics test performance of two regions. This paper analyses the effect of different variables, like mother's education, parental income, and private tuition, on the learning outcomes of students. Result shows that boys and girls perform equally in mathematics in Purba Medinipur, but in Darjeeling, has a variability in performance among boys and girls. Mother's education is positively and weakly correlated with children's education. The chi-square test shows that private tuition has a stronger effect on students' overall performance in mathematics scores among boys and girls.

Key Words: Learning Outcome, Private Tuition, Maternal Education, Gender

INTRODUCTION

Education plays a very important role in shaping an individual's intellectual and social development. Some important factors, like parental education, especially the mother's education, family income, and private tuition, had an impact on students' learning outcomes.

To prepare for highly competitive examinations, private tutoring widely helps students, and for weak students can compete with class instruction for extra individual attention private tutor is needed very badly .[3]

According to ASER 2016 that 46.7% mothers in rural India haven't been to school themselves, and 57.5 of children in class iii can read class I reading properly .[1]

It is believed that without any scientific evidence that mothers' education impact on children's education than total parental education, as the mother main provider of care to their children.[2]

The country has made improvements in female literacy and enrolment rates of women over the past decade.[4]

According to Kudare, the return on investment in the education of females is greater than males, as educated women increase national productivity.[5]

This study focuses on two districts in West Bengal – Darjeeling (Phansidewa) and Purba Medinipur(Jerthan), and collects primary data and observes the learning outcome of students through mathematics assessment. The finding can help to explore how policies can be shaped to improve performance of students in rural areas of West Bengal.

The future study can expand this study to cover a broader rural area in West Bengal and can identify regional differences in learning outcomes. Some factors can be taken of interest in studies, technological access.

BACKGROUND

- **ELEMENTARY EDUCATION:** Elementary education is the foundation of the entire education system in India. The elementary education in India is 8 years. The children between 6 to 14 years are considered under this system. According to the KOTHARI Commission, elementary education is divided into 2 sub-stages. This stage is very crucial for developing fundamental literacy and numeracy, which serve as building blocks for future learning.
  - **Lower Primary:** Grades I to IV, the age group comprised 6 to 10 years.
  - **Upper Primary:** Grades V to VIII, the age group comprised 11 to 14 years.

- **NATIONAL EDUCATION POLICY(NEP) 2020:**The NEP 2020 is a major reform of India's Education System, mainly in foundational learning and access to quality education for children. [5]

The aim of the NEP 2020 is a 100% Gross Enrolment Ratio(GER) in school education by 2030. Bring 2 crore children back into the open schooling system. The 10+2 system was replaced by the 5+3+3+4. The stages are explained below:

1. **The Foundation Stage** for 5 years (ages 3-8) and classes included in this stage are Anganwadi, class 1, and class II. This stage focuses on play-based activity-based methods and learn language skills.

2. **Preparatory Stage** for 3 years (ages 8 to 11) classes are III to V, which focus on numeracy skills, activity-based classroom interaction.
3. **Middle Stage** for 3 years (ages 11 to 14), classes are VI to VIII, in this stage is based on a multidisciplinary system combination that can be chosen as per skill and interest. Areas are divided into arts, science, and commerce.
4. **Secondary Stage** for 4 years(ages 14 to 18), classes are from class IX to class XII. The critical learning is the main focus of this stage, including experiential learning in science, mathematics, arts, social sciences, and humanities.

- **NEP 2020 (HIGHER EDUCATION):** Gross Enrolment Ratio in higher education to be raised 50% by 2035, and 3.5crore seats are added to higher education. The undergraduate curriculum was converted into a flexible one with multiple existing options in 3-4 years. M.Phil courses will be discontinued, and courses at undergraduate, postgraduate, and PhD levels are interdisciplinary.

Multidisciplinary Education and Research Universities (MERUs) as per to IITs and IIMs to set up models for the best multidisciplinary education system in global standards.

The **Higher Education Commission** of India **(HECI)** will be set up as a single umbrella of the entire higher education system. The four verticals are:

1. National Higher Education Regulatory Council (NHERC): This council is the regulator of the higher education system in India.

2. General Education Council(GEC): This council will be set to maintain academic standards.

3. Higher Education Grants Council(HEGC): This vertical will handle the founding and financing of higher education institutes.

4. National Accreditation Council (NAC): This council will be responsible for the accreditation of institutes.

NEP, 2020, provides for setting up the **Gender Inclusion Fund(GIF),** especially for girls and transgender individuals, for their education.

To reduce gender gaps at all levels in education, **Kasturba Gandhi Balika Vidyalayas (KGBVs)**, residential schools for girls from class VI to XII are sanctioned for SC, ST, OBC, and BPL section girls.

The **Samagra Siksha** is targeted to provide quality education to girls, which include opening of schools in the neighbourhood to make access easier, school uniform, and school books up to class VIII.

CONCEPTUAL LITERATURE REVIEW

Dongre & Tewary (2014); conducted a study **on "Impact of Private Tutoring on Learning Levels: Evidence from India"**. This paper examines the impact of private tutoring on the formal education level in schools. Forgetting this result, this paper conducts a household survey in rural India. The result of this is that there is a positive correlation between private tutoring on student results in elementary education. For a socio-economically weak background, the children whose parents are less educated, this correlation of private tutoring had a greater effect on government school than private school; other than that, this result is more effective in private school.[3]

Berry, J. (2011-12); on examinations, parents' education, mainly mothers' education, had a strong impact on children's academic performance in the paper **"Material literacy and participation programs for Child Learning in India"**. The main objective of this paper address whether mothers can be educated without formal education and learned how to participate in their own children's education can improve learning outcomes. In this research, 240 villages were randomly selected from the rural parts of Bihar and Rajasthan. In this research, conducted Mothers' literacy classes (ML),it helps to increase mother language proficiency and math skills, and another one, Child's Home activities and Materials Packet(CHAMP),which helps to monitor child progress by giving homework to children by their mother.ML-CHAMP helps mothers to contribute child's learning. Researcher finds that children's learning can be explained by mother participation, mainly ML sessions. This helps to improve the child's score through the mother's intervention in their child's education. [1]

The main goal of the paper **"The Impact of Parental Income and Education on the Schooling and their Children"** is to distinguish between the causal effects of parental income and parental education level and investigate to which early school leaving due to parental background (Chevalier et al.,2010). This paper used the instrumental variable method to take account of the endogeneity of both parental income and education. Through the least square method, this paper finds that material education has a stronger effect than parental education on sons than on daughters. The endogenous effect of parent income increases the elasticity of income on school decisions. [2]

"**Gender Disparity in Education and its Impact on Women Empowerment in India"** by Josephine, G., & et al. (2025), the main objective of this paper is to see the impact of gender disparity in education in India from 2015 to 2024 and on women's empowerment. This research mentioned that access to education has significantly improved. This paper analyses the multiple dimensions of women's empowerment, including economic, social, digital, and decision-making empowerment. Through descriptive and correlation models, assess the relationship between educational indicators and empowering measures. The result of this paper is that girls' education improved in India over the above-mentioned timeline. The gender gap in educational attainment of women decreases over time.[4]

Kudare, R. (2024), made a broad analysis based on the National Education Policy (NEP) 2020 in gender parity, **"Gender Parity in Education: Progress, Gaps, and Policy Implications".** This paper provides insight into NEP 2020 and suggests improved policies to maintain gender equality.[5]

Naidu, N. (2025), on his paper, examines the effectiveness of National Education Policy 2020 in promoting equitable and inclusive education in Srikakulam districts in Andra Pradesh, with a focus on male and female teacher in both rural and urban area, **"Equity and inclusion in Education under NEP-2020 Comparative Analysis between Urban and Rural Schools in Srikakulam District, Andhra Pradesh."** The finding suggested that urban teachers demonstrate a higher level of awareness about NEP2020 than rural and female teachers show slightly greater awareness than male teacher.[6]

OBJECTIVES

- To compare the gender differences in learning outcomes in mathematics in West Bengal, focusing on two districts, Darjeeling (North Bengal) and Purba Medinipur (South Bengal), respectively.
- To analyse the effect of parental education, especially mother education, on girls' learning outcomes in the two districts, Darjeeling and Purba Medinipur, respectively.
- To investigate the impact of socioeconomic status and family income influences gender differences in students' mathematics outcomes.
- To investigate the role of tuition support on gender disparities in mathematics learning outcomes.

METHODOLOGY

The methodology of this paper is explained below:

- **RESEARCH DESIGN**

This study adopts a cross-sectional survey-based design. This research paper combines primary data collection with household surveys with direct assessment of mathematics skills.

- **DATA COLLECTION**

This study adopts the quantitative approach based on survey-based analysis on primary data of two districts in West Bengal, one in the North Bengal site, the Darjeeling district. The selected block for data collection is Phansidewa, and another one, South Bengal site, is Purba Medinipur theThe selected block is Jarthan block.

- **SAMPLE SIZE**

A total of 200 samples were collected to analyse the research objectives, with 100 household survey data in each district, the Darjeeling and the Purba Medinipur. Specifically, the block covered the Phansidewa block, Darjeeling, and the Jerthan block in Purba Medinipur.

To collect learning outcome data of children through a household survey, a questionnaire was prepared for children and their family members.

During the survey, the data collector of the survey asked to parents some questions related to their income, access to electricity, television, computer, mobile phone, and internet, as well as newspaper and other reading materials. Information about parents' education, occupations is also collected.

The children were administered an assessment of mathematics assessment.

The questions are different based on grade.

Grade I - II: One-digit and two-digit number names.

Grade III – V: Two-digit number names and subtraction of two two-digit numbers with borrowing

Grade VI – VIII: Three-digit numbers divided by one-digit numbers with carryover

Total marks for all classes are the same, with a highest score of 15.

Parents' total income is divided based on the socio-economic quintile. The quintiles divide the population into five equal groups based on their income. This group was divided into five equal groups (each 20%) based on income distribution, each group ranging from the lowest income household (1^{st} quintile) to the highest income household (5^{th} quintile).

- **DATA ANALYSIS**

The boxplot in Figure I, shows the distribution of mathematics scores for boys and girls in two districts in West Bengal. In Darjeeling (Phansidewa), girls have a slightly higher median score compared to boys, but their scores are more spread out, showing variability in math score distribution. In Purba Medinipur (Jerthan), the median score for boys and girls is nearly equal, with fewer gender differences in mathematics outcomes in this district.

Figure II, bar chart, shows that the average math score of boys is higher by 0.2 in Darjeeling (Phansidewa). In Purba Medinipur (Jerthan) there is no difference between the average math score of boys and girls.

Table 1 indicates that there is a positive but weak relation between students' mathematics scores and mothers' education. Girls' math scores are slightly more influenced by mothers' education than boys'. The p-value for both genders is greater than 0.05, so the relationship is not statistically significant.

Table 2represents student mathematics performance based on socio-economic status (SES) quintiles. In Darjeeling (Phansidewa) math scores are generally low across all SES levels. In Jerthan (Purba Medinipur) overall score is much higher with a minor gender difference. There is no signification result of math performance based on SES or gender, but the regional difference is very significant.

Table 3 represents a chi-square test to understand the association between tuition support and math performance separately for boys and girls in two regions.

For boys, $\chi^2(4, N=200) = 15.96$, $p=0.003$.Boys who receive tuition haveachieved high performance.

For girls, $\chi^2 (4,N=200) = 21.89$, $P<.001$. Girls benefit more from tuition support than boys, with a larger proportion achieving very good and excellent scores. These results suggested that tuition results positively associate with mathematics achievement for both genders, with a stronger effect observed among girls.

CONCLUSION

This study concludes that boys' and girls' math performance in Purba Medinipur(Jerthan) is almost equal in mathematics assessment but in Darjeeling, there is a difference in performance in assessment between boys and girls. Correlation between Mothers' education and children's learning outcomes is low but positive. The daughters' education is more impacted by their mother's education than boys. By chi-square analysis, it can be concluded that tuition support reduces gender disparities in mathematics learning outcomes. Tuition support plays an important role in shaping better learning outcomes. This study aims to help in rural region education support and enhance mothers' education to support the learning outcomes of children.

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APPENDIX

Gender	Slope	Intercept	t_value	p_value	Correlation
Girls	0.217874	6.486824	1.280895	0.20345	0.132367
Boys	0.186376	7.185596	1.339813	0.183226	0.13026

Table 1: Gender Summary Mathematics performance by Districts

Region	SES_quintile	Gender	Mean_Math	Median_Math	Count
Darjeeling (Phansidewa)	Lowest	Female	0	0	1
Darjeeling (Phansidewa)	Low	Female	4	6	3
Darjeeling (Phansidewa)	Low	Male	0	0	2
Darjeeling (Phansidewa)	Medium	Female	4.952381	0	21

Darjeeling (Phansidewa)	Medium	Male	3.454545	4	11
Darjeeling (Phansidewa)	High	Female	1	0	12
Darjeeling (Phansidewa)	High	Male	5.1875	2	16
Darjeeling (Phansidewa)	Highest	Female	8.071429	10.5	14
Darjeeling (Phansidewa)	Highest	Male	6	5	20
Purba Medinipur (Jerthan)	Lowest	Female	9.352941	10	17
Purba Medinipur (Jerthan)	Lowest	Male	9.772727	12.5	22
Purba Medinipur (Jerthan)	Low	Female	13.33333	15	12
Purba Medinipur (Jerthan)	Low	Male	11.91304	15	23
Purba Medinipur (Jerthan)	Medium	Female	10	15	3
Purba Medinipur (Jerthan)	Medium	Male	15	15	5
Purba Medinipur (Jerthan)	High	Female	13	15	9
Purba Medinipur (Jerthan)	High	Male	9.666667	10	3

Purba Medinipur (Jerthan)	Highest	Female	15	15	2
Purba Medinipur (Jerthan)	Highest	Male	15	15	4

Table 2: SES Summary based on Maths performance, Region-wise

Gender	χ^2	df	p-value	Interpretation
Male	15.96391	4	.003	Significant
Female	21.88694	4	.0002	Highly Significant

Table 3: Chi-Square Test of Association between Mathematics Performance and Tuition Support

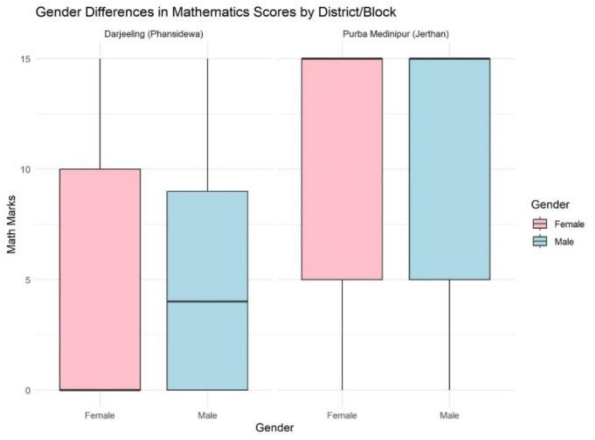

FIGURE 1: District-wise gender differences in mathematics score

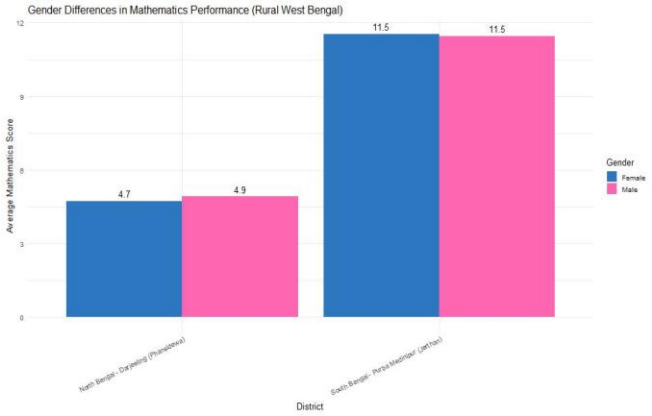

FIGURE 2: District-wise gender differences in mean mathematics scores

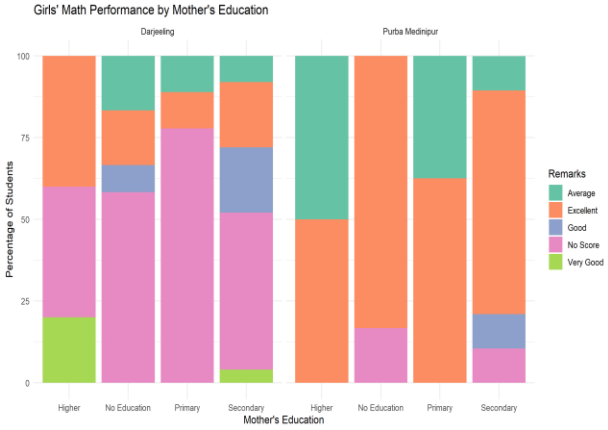

FIGURE 3: Girls' maths performance based on mother's education

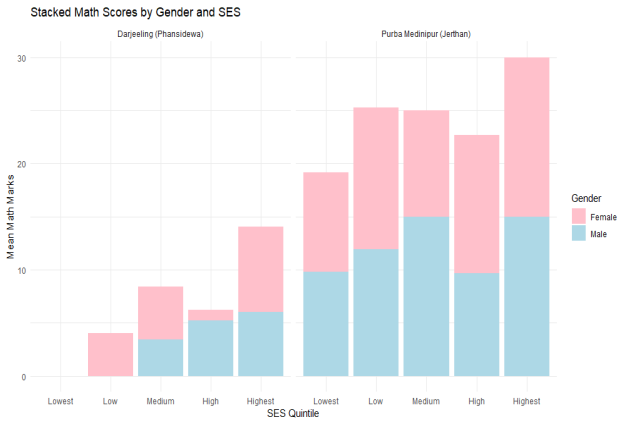

FIGURE 4: Learning performance based on socioeconomic status (SES-Socioeconomic Status – divided based on their total income into quintiles)