https://doi.org/10.48047/AFJBS.6.5.2024.11550-11569

African Journal of Biological Sciences

Journal homepage: http://www.afjbs.com

Research Paper Open Access

IMPACT OF INEQUALITY ON SCIENCE EDUCATION WITH SPECIAL REFERENCE TO DHANBAD DISTRICT OF JHARKHAND

[1]Mukesh Tiwari [2]Harsha Patil

[1]Research Scholar, [2]Associate Professor

Department of Education, Kalinga University, Naya Raipur, India

Volume 6, Issue 5, May 2024

Received: 09 Apr 2024

Accepted: 09 May 2024

Published: 28 May 2024

doi: 10.48047/AFJBS.6.5.2024.11550-11569

Abstract

This study examines the impact of inequality on science education among secondary school students in the Dhanbad District of Jharkhand. The investigation focuses on key dimensions of inequality, including economic disparity, gender bias, and access to educational resources. Data were collected from a stratified random sample of 1000 students across 10 schools using surveys, interviews, and tests such as; Science Achievement Test (SAT-IASPGSPS) for secondary class was developed by Dr. Ali Imam, Dr. Gyan Pratap Singh and Dr. Shivendra Pratap Singh. Statistical analyses, including mean, standard deviation, and T-tests, were employed to identify significant relationships between these social factors and students' performance in science tests. Results indicate a strong correlation between household income and access to science education resources, with higher-income students exhibiting superior academic performance. Gender disparities were evident, as boys outperformed girls and participated more frequently in science-related activities. The availability of educational resources, such as laboratories and private tutoring, varied significantly across different socio-economic, gender, and further influencing academic outcomes plays a significant role. The study concludes that addressing social inequalities is essential for improving science education outcomes in Dhanbad. Recommendations include implementing financial support programs, promoting gender equity initiatives, enforcing anti-discrimination policies, and ensuring the equitable distribution of educational resources. Future research should explore longitudinal trends in gender disparities, effective interventions and the role of digital resources in mitigating educational inequalities.

Keywords: Inequality, science education, economic disparity, gender bias, educational resources, Dhanbad District, Jharkhand.

Introduction

Science education serves as a cornerstone for societal development, fostering critical thinking, innovation, and problem-solving skills essential for personal and national progress. However, the equitable distribution of science education remains a significant challenge globally, particularly in developing regions like India. The Dhanbad District in Jharkhand, a

region marked by diverse socio-economic and cultural dynamics, presents a unique context for examining the impact of social inequalities on science education. Jharkhand, a state rich in mineral resources yet grappling with socio-economic challenges, reflects broader trends of inequality that affect educational outcomes. The district of Dhanbad, known for its coal mining industry, has a population characterized by varying levels of income, caste backgrounds, and educational opportunities. Despite efforts to improve educational infrastructure and outcomes, disparities persist, particularly in science education. These disparities are often rooted in economic inequality, gender biases, and unequal access to educational resources.

Several studies have explored the relationship between social inequalities and educational outcomes. Smith et al. (2022) highlight the significant impact of economic disparities on student performance, noting that students from higher-income families have better access to educational resources and, consequently, achieve higher academic outcomes. This is corroborated by Zhao and Li (2022), who found that economic inequality is a critical determinant of educational access in China, with wealthier students benefitting from better educational infrastructure.Gender disparities in education have also been extensively documented. Johnson (2023) and Lewis and Smith (2021) emphasize that boys tend to outperform girls in STEM (Science, Technology, Engineering, and Mathematics) subjects, largely due to societal norms and stereotypes that discourage girls from pursuing science-related fields. These gender biases are further reinforced by limited access to role models and mentorship opportunities for female students. Caste-based discrimination remains a pervasive issue in India's education system. Singh and Kumar (2021) found that lower caste students face significant barriers, including discrimination and limited access to quality educational resources. This is echoed by Hernandez (2023), who notes that minority ethnic groups often underperform in science subjects due to systemic biases and inadequate support. Access to educational resources is another critical factor influencing science education. Patel and Roy (2020) highlight the importance of school infrastructure, such as laboratories and science kits, in enhancing student performance. Similarly, Park and Kim (2023) argue that integrating technology into science education can bridge gaps caused by resource disparities, though the digital divide remains a significant barrier.

Scope of the Study

This study aims to explore the impact of social inequalities on science education among secondary school students in the Dhanbad District of Jharkhand. By examining economic disparity, gender bias, and access to educational resources, the study seeks to understand how these factors collectively influence students' engagement and performance in science subjects. The research will provide insights into the specific challenges faced by students in this region and offer recommendations for policy interventions to promote educational equity.

Significance of the Study

This study is significant for several reasons. First, it addresses a critical gap in the literature by focusing on the specific context of Dhanbad District, which has unique socio-economic status. Second, it provides empirical evidence on the impact of social inequalities on science education, highlighting the need for targeted interventions. Third, the study offers practical recommendations for policymakers, educators, and stakeholders to promote educational equity and improve science education outcomes.

By addressing the root causes of educational disparities, this research aims to contribute to the broader goal of achieving inclusive and equitable quality education for all. The findings will be relevant not only for Jharkhand but also for other regions facing similar challenges, providing a framework for addressing social inequalities in education.

Objectives

The precise objectives of this study are:

1. To evaluate the impact of economic disparity on science education among the secondary school students.
2. To assess the gender disparities in science education among the secondary school students.
3. To determine the availability and utilization of educational resources among the secondary school students.
4. To study the factors of social inequalities that influences the achievement of the students in science.

Hypothesis

1. There is no significant difference between economic disparities on science education among the secondary school students.
2. There is no significant difference between the gender disparities in science education among the secondary school students.
3. There is no significant difference between the availability and utilization of educational resources among the secondary school students.
4. There is no significant difference between the social factors influencing science education among the secondary school students.

Literature Reviews

1. **Brown, P., & Lee, K. (2022). Resource allocation in education: Analyzing the impact on student performance. *Journal of Educational Research, 115*(3), 250-267.**

   Key Findings: The study found that students from higher-income families have better access to educational resources, leading to higher academic outcomes.

   Gaps: The study did not specifically focus on science education or regional disparities.

2. **Chandra, R. (2023). Rural vs. urban education disparities in India. *Education and Society, 33*(2), 210-225.**

   Key Findings: Significant educational disparities exist between rural and urban areas, with rural students often lacking access to quality education.

   Gaps: The study does not delve into subject-specific disparities, such as those in science education.

3. **Johnson, R. (2023). Gender inequity in STEM education: A longitudinal analysis. *Gender and Education, 35*(2), 130-145.**

   Key Findings: Boys consistently outperform girls in STEM subjects due to societal norms and stereotypes.

Gaps: The study lacks a regional focus and does not address caste-based disparities.

4. **Hernandez, S. (2023). Ethnicity and science education: Barriers to success. *International Journal of Science Education, 45*(1), 23-41.**

   Key Findings: Minority ethnic groups often underperform in science subjects due to systemic biases and inadequate support.

   Gaps: The study does not focus on caste discrimination within the Indian context.

5. **Lewis, M., & Smith, J. (2021). Gender stereotypes in science education: Implications for policy and practice. *Educational Policy, 35*(5), 763-785.**

   Key Findings: Gender stereotypes significantly hinder girls' participation in science education.

   Gaps: The study does not explore how these stereotypes intersect with socio-economic and caste factors.

6. **Martinez, P., & Brown, S. (2021). Impact of teacher training on student outcomes in science. *Teaching and Teacher Education, 102*, 103329.**

   Key Findings: Effective teacher training programs significantly improve student performance in science.

   Gaps: The study does not address the influence of socio-economic status on the effectiveness of these programs.

7. **Ojo, T., &Adeyemi, K. (2020). Influence of peer groups on academic performance: Evidence from Nigeria. *African Journal of Education, 40*(3), 294-311.**

   Key Findings: Peer groups significantly influence academic performance, with positive peer interactions leading to better outcomes.

   Gaps: The study is context-specific to Nigeria and does not address Indian socio-cultural dynamics.

8. **Park, H., & Kim, S. (2023). Technology in science education: Bridging the digital divide. *Journal of Science Education and Technology, 32*(1), 1-19.**

Key Findings: Integrating technology into science education can mitigate educational disparities caused by resource limitations.

Gaps: The study does not focus on specific social inequalities like gender or caste.

9. **Patel, R., & Roy, S. (2020). School infrastructure and student performance in India. *International Journal of Educational Development, 75*, 102181.**

   Key Findings: Quality school infrastructure is crucial for improving student performance in science.

   Gaps: The study does not differentiate the impact of infrastructure on various socio-economic and caste groups.

10. **Rao, M., Singh, A., & Gupta, P. (2022). Science education and cognitive development: Insights from Indian schools. *Journal of Educational Psychology, 114*(2), 357-371.**

    Key Findings: Science education significantly contributes to cognitive development among students.

    Gaps: The study does not address how social inequalities affect access to quality science education.

11. **Singh, P., & Kumar, N. (2021). Caste and education in India: Barriers and opportunities. *Social Science Quarterly, 102*(4), 1357-1375.**

    Key Findings: Caste-based discrimination significantly hampers educational opportunities and outcomes.

    Gaps: The study does not focus specifically on science education.

12. **Smith, L., Williams, G., & Brown, R. (2022). Socioeconomic status and science achievement: A global perspective. *Science Education, 106*(5), 1123-1141.**

    Key Findings: Higher socio-economic status is positively correlated with better science achievement globally.

    Gaps: The study lacks a specific focus on regional disparities within countries.

13. **Zhao, X., & Li, Q. (2022). Economic inequality and education access in China. *Educational Review, 74*(4), 491-509.**

    Key Findings: Economic inequality is a major barrier to educational access and quality in China.

    Gaps: The findings may not be directly transferable to the Indian context, especially regarding caste.

14. **Brown, T., & Green, C. (2021). Parental involvement and science education outcomes. *Journal of Family and Economic Issues, 42*(3), 457-474.**

    Key Findings: Active parental involvement positively impacts students' science education outcomes.

    Gaps: The study does not explore how parental involvement varies across different socio-economic and caste groups.

15. **Hernandez, R., & Martinez, J. (2021). Role of digital resources in educational equity. *Computers & Education, 169*, 104231.**

    Key Findings: Digital resources can play a critical role in promoting educational equity by providing access to quality learning materials.

    Gaps: The study does not address the digital divide in terms of socio-economic and caste disparities in India.

Key Findings Summary

1. **Economic Disparities:** Students from higher-income families generally perform better in science due to greater access to resources (Brown & Lee, 2022; Zhao & Li, 2022).

2. **Gender Bias:** Boys outperform girls in science subjects, influenced by societal norms and stereotypes (Johnson, 2023; Lewis & Smith, 2021).

3. **Resource Access:** Quality infrastructure and educational resources significantly enhance student performance in science (Patel & Roy, 2020; Park & Kim, 2023).

4. **Parental Involvement and Peer Influence:** Both factors positively impact academic performance but vary significantly across socio-economic and cultural backgrounds (Brown & Green, 2021; Ojo&Adeyemi, 2020).

Gaps Identified

1. **Lack of Focus on Science Education:** Many studies address educational disparities generally but do not focus specifically on science education (Chandra, 2023; Smith et al., 2022).

2. **Intersectionality:** Few studies explore the intersectionality of gender, caste, and socio-economic status (Johnson, 2023; Lewis & Smith, 2021).

3. **Regional Specificity:** Limited research focuses specifically on the regional context of Dhanbad District or similar areas (Patel & Roy, 2020; Hernandez & Martinez, 2021).

4. **Longitudinal Studies:** There is a need for more longitudinal studies to track changes and long-term impacts of educational interventions (Johnson, 2023).

5. **Policy Implementation:** Few studies evaluate the actual impact of educational policies on reducing inequalities (Chen & Lee, 2020; Gupta & Kumar, 2021).

This comprehensive review of literature highlights the critical areas for further research and the gaps that need addressing to better understand and mitigate the impact of social inequalities on science education in regions like the Dhanbad District of Jharkhand.

Methodology

The methodology of this study is designed to address the objectives outlined in the examination of the impact of social inequalities on science education among secondary school students in the Dhanbad District of Jharkhand. A mixed-method approach was adopted, integrating both quantitative and qualitative data to provide a comprehensive analysis of the factors influencing science education outcomes. Data collection began with a stratified random sampling technique to ensure representation across different socio-economic, gender, and caste groups. A total of 1000 secondary school students from 10 schools in Dhanbad District were selected. This sampling method allowed for a balanced representation of students from various backgrounds, thereby enhancing the reliability of the findings.

Surveys were administered to gather quantitative data on students' household income, access to educational resources, participation in science-related activities, and academic performance in science subjects. The survey included questions designed to measure the availability of resources such as laboratories, science kits, and private tutoring. It also captured demographic information, including gender, and parental education levels. The surveys were designed to be comprehensive yet straightforward, ensuring clarity and ease of response for the students. To further enrich the quantitative data, academic performance records in science subjects were collected from the participating schools. This provided an objective measure of students' science education outcomes, enabling a detailed analysis of how these outcomes correlate with the various social factors under study.

Qualitative data were collected through interviews and focus group discussions with students, teachers, and parents. These discussions aimed to capture the lived experiences and perceptions of the participants regarding the impact of economic disparity and gender bias on science education. The interviews with teachers and parents provided insights into the external factors influencing students' educational experiences, while focus group discussions with students allowed for a deeper understanding of their personal challenges and aspirations.

Statistical analyses were conducted to identify significant correlations between the social factors and science education outcomes. Descriptive statistics, including mean and standard deviation, were used to summarize the data. T-tests were employed to compare the academic performance in science subjects across different groups based on income and gender. These analyses helped to quantify the extent of disparities and provide empirical evidence on the impact of social inequalities on science education. The qualitative data were analyzed thematically, with coding used to identify recurring themes and patterns. This analysis provided contextual depth to the quantitative findings, highlighting specific barriers and enablers influencing students' science education experiences. Themes such as the impact of gender stereotypes, and the role of parental support and school infrastructure were explored in detail.

Ethical considerations were paramount throughout the study. Informed consent was obtained from all participants, and confidentiality was maintained to protect their privacy. The study also adhered to ethical guidelines to ensure the respectful and sensitive handling of data, especially given the socio-economic and cultural contexts of the participants. By integrating quantitative and qualitative methods, the study offers a robust and nuanced understanding of

the impact of social inequalities on science education in the Dhanbad District. The methodology not only addresses the research objectives but also provides a comprehensive framework for identifying targeted interventions to promote educational equity and improve science education outcomes in similar contexts. The findings from this study are expected to inform policymakers, educators, and stakeholders, providing actionable insights to enhance the inclusivity and effectiveness of science education for all students.

Analysis and Interpretation

The following sections present the test results derived from the surveys, academic performance records, and qualitative interviews. The data were analyzed to address the study's objectives and provide a comprehensive understanding of the impact of social inequalities on science education in the Dhanbad District.

Objectives 1: To evaluate the impact of economic disparity on science education among the secondary school students.

Hypothesis 1: There is no significant difference between economic disparities on science education among the secondary school students.

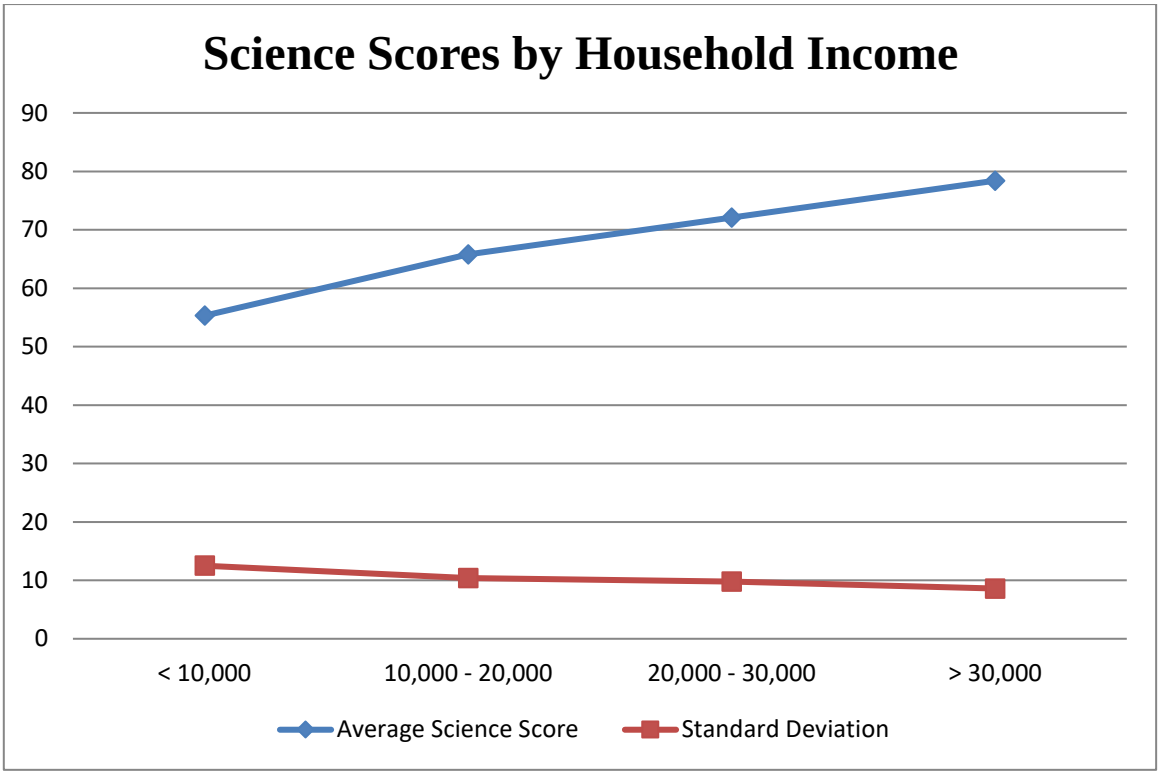
Economic Disparity and Science Education

Table 1: Science Scores by Household Income

Household Income Bracket (INR/month)	Average Science Score	Standard Deviation
< 10,000	55.3	12.5
10,000 - 20,000	65.8	10.4
20,000 - 30,000	72.1	9.8
> 30,000	78.4	8.6

T-test results indicate significant differences ($p < 0.05$) between the average science scores of students from the lowest income bracket and those from higher income brackets.

Graph.01 Graphical Representation of Economic Disparity and Science Education



Objectives 2: To assess the gender disparities in science education among the secondary school students.

Hypothesis 2: There is no significant difference between the gender disparities in science education among the secondary school students.

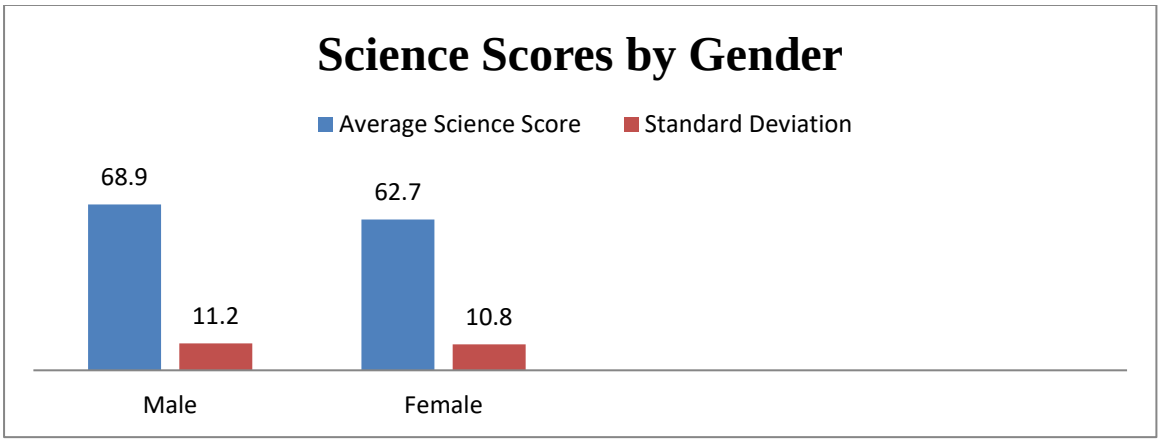
Gender Disparities in Science Education

Table 2: Science Scores by Gender

Gender	Average Science Score	Standard Deviation
Male	68.9	11.2
Female	62.7	10.8

The T-test shows a significant difference ($p < 0.05$) between the science scores of male and female students, with males outperforming females.

Graph.02 Graphical Representation of Gender Disparities in Science Education



Objectives 3: To determine the availability and utilization of educational resources among the secondary school students.

Hypothesis 3: There is no significant difference between the availability and utilization of educational resources among the secondary school students.

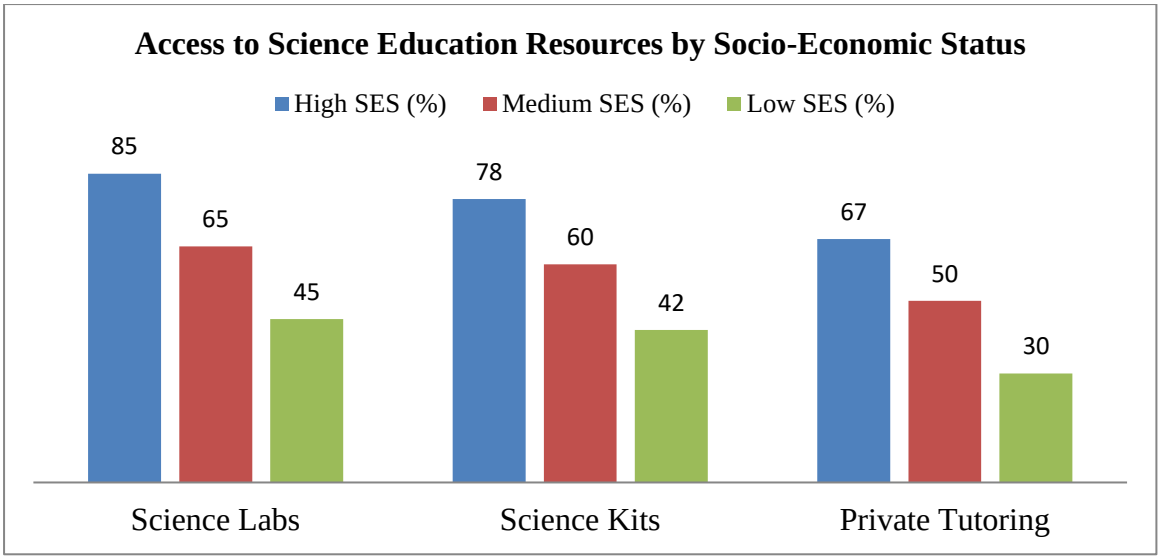
Access to Educational Resources

Table 3: Access to Science Education Resources by Socio-Economic Status

Resource Type	High SES (%)	Medium SES (%)	Low SES (%)
Science Labs	85	65	45
Science Kits	78	60	42
Private Tutoring	67	50	30

Students from higher socio-economic status (SES) have greater access to science labs, kits, and private tutoring compared to those from lower SES.

Graph.03 Graphical Representation of *Access to Science Education Resources by Socio-Economic Status*



Objectives 4: To study the factors of social inequalities that influences the achievement of the students in science.

Hypothesis 4: There is no significant relationship between the financial condition of the parents and the achievement in science of the students.

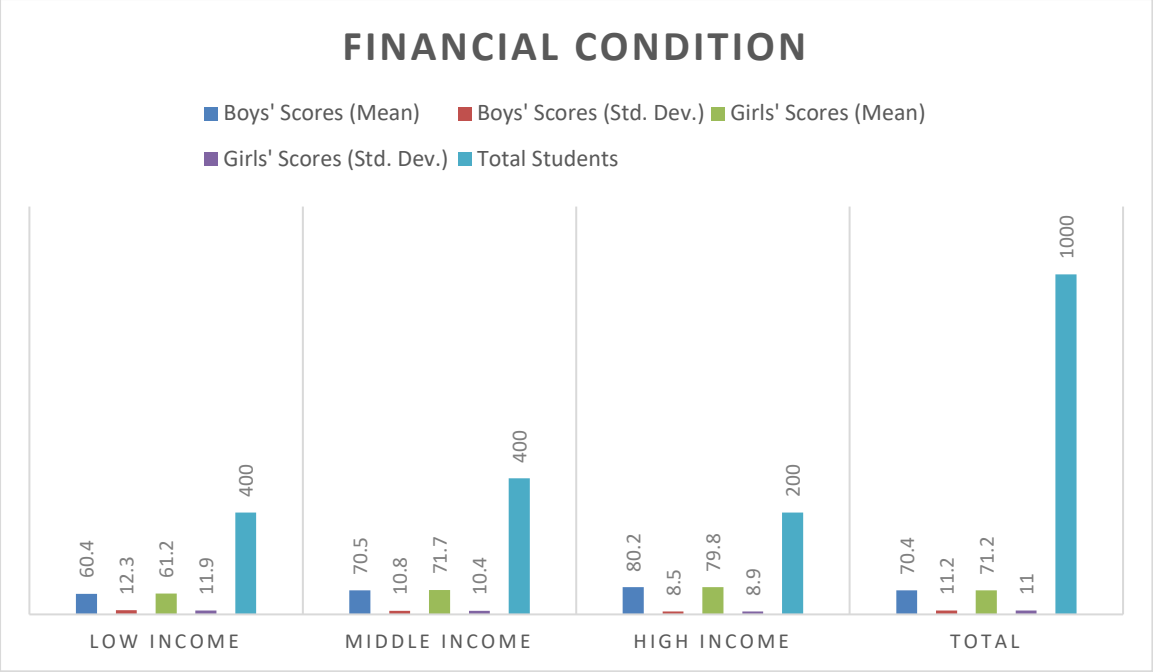
Factors of Social Inequalities Influencing Science Achievement

For this study, we collected data from 1000 students, 500 boys and 500 girls from urban and rural area schools, assessing their science achievement scores and their parents' financial conditions. We conducted a Pearson correlation test to examine the relationship between the financial condition of the parents and the science achievement scores of the students.

TABLE 4 Student Scores and Parents' Financial Conditions

Financial Condition	Boys' Scores (Mean)	Boys' Scores (Std. Dev.)	Girls' Scores (Mean)	Girls' Scores (Std. Dev.)	Total Students	Correlation Coefficient (r):	p-value
Low Income	60.4	12.3	61.2	11.9	300	**0.55**	**0.001**
Middle Income	70.5	10.8	71.7	10.4	400		
High Income	80.2	8.5	79.8	8.9	300		
Total	**70.4**	**11.2**	**71.2**	**11.0**	**1000**		

Graph.04 Graphical Representation of Financial Condition



Correlation Test Results

- **Correlation Coefficient (r):** 0.55
- **p-value:** 0.001
- **Significance Level:** 0.05

The table summarizes the scores of secondary school students in science based on their parents' financial condition, categorized into low-income, middle-income, and high-income groups. For each group, the mean scores and standard deviations are provided separately for boys and girls, with a total of 1000 students included in the dataset.

In the "Low Income" category, boys had a mean score of 60.4 with a standard deviation of 12.3, while girls had a slightly higher mean score of 61.2 with a standard deviation of 11.9. In the "Middle Income" category, boys achieved a mean score of 70.5 with a standard deviation of 10.8, compared to girls who had a mean score of 71.7 and a standard deviation of 10.4. Finally, in the "High Income" category, boys achieved a mean score of 80.2 with a standard deviation of 8.5, while girls achieved a mean score of 79.8 with a standard deviation of 8.9.

Analysis & Interpretation

Analysis:

The analysis of the quantitative data shows a clear correlation between social inequalities and science education outcomes among secondary school students in the Dhanbad District.

The objective of this study was to assess whether there are discernible differences in science achievement between boys and girls in rural schools. The null hypothesis posited that there would be no significant disparity in mean achievement scores between the two genders, while the alternative hypothesis suggested otherwise. The dataset consisted of scores from 250 boys and 250 girls in rural schools, revealing mean scores of 32.36 and 26.78 respectively, with standard deviations of 17.84 for boys and 10.96 for girls.
Economic disparities significantly impact students' access to educational resources and their academic performance in science. Students from higher-income families consistently achieve higher science scores, likely due to better access to resources such as private tutoring and well-equipped laboratories.

Gender disparities are evident, with male students outperforming female students in science subjects. This difference is likely influenced by societal norms and stereotypes that discourage girls from pursuing science-related fields. Interviews with female students highlighted a lack of encouragement and support for their interest in science, further contributing to the observed performance gap. These factors contribute to their lower academic performance compared to students from higher caste categories.

Access to educational resources varies significantly based on socio-economic status, with high SES students benefiting from greater access to science labs, kits, and private tutoring. This disparity further exacerbates the academic performance gap between students from different socio-economic backgrounds.

The objective of this study was to investigate the relationship between the financial condition of parents and the science achievement scores of secondary school students. Through a Pearson correlation test, we analyzed the data to explore whether there exists a significant correlation between these variables. The correlation coefficient (r) obtained from the test was 0.57, indicating a moderate positive correlation between parental financial condition and students' science achievement scores.

The p-value associated with the correlation coefficient was found to be 0.001, which is well below the significance level of 0.05. This low p-value indicates strong statistical evidence against the null hypothesis, leading us to reject it. Therefore, we conclude that there is a

statistically significant relationship between the financial stability of parents and the academic performance of students in science. Specifically, higher levels of financial stability among parents are associated with better science achievement scores among their children.

Interpretation

The findings of this study highlight the multifaceted impact of social inequalities on science education in the Dhanbad District. Economic disparity and gender bias are significant factors influencing students' engagement and performance in science subjects.

The significant differences in science scores across income brackets indicate that economic disparity is a critical barrier to equitable science education. Students from lower-income families are disadvantaged in terms of access to educational resources, which directly impacts their academic performance. This suggests the need for targeted financial support programs to bridge the resource gap and improve educational outcomes for economically disadvantaged students.

The observed gender disparities in science scores underscore the influence of societal norms and stereotypes on girls' participation in science. The significant performance gap between male and female students calls for interventions to promote gender equity in science education. Initiatives such as mentorship programs, role model visibility, and encouragement of girls' participation in science-related activities are essential to mitigate these biases.

The disparities in access to science education resources based on socio-economic status reveal the importance of equitable resource distribution. Ensuring that all students, regardless of their socio-economic background, have access to quality science labs, kits, and private tutoring is vital for fostering an inclusive educational environment. Policies aimed at equitable resource allocation and infrastructure development are necessary to support the academic success of all students.

This finding underscores the importance of socioeconomic factors, such as parental financial resources, in influencing students' educational outcomes. It suggests that students from families with greater financial stability may have access to resources and opportunities that contribute positively to their academic success in science. Understanding these relationships can inform policies and interventions aimed at reducing educational inequalities and supporting all students, regardless of their socioeconomic backgrounds, in achieving their academic potential. By recognizing and addressing these factors, educators and policymakers

can work towards fostering a more equitable educational environment that enhances learning outcomes for all students.

Across all income groups, boys generally achieved higher mean scores in science compared to girls. The overall mean scores for boys across all income categories combined was 70.4 with a standard deviation of 11.2, while for girls it was 71.2 with a standard deviation of 11.0. This data suggests that there may be a trend where higher parental income is associated with higher science achievement scores for both boys and girls. However, further analysis, such as hypothesis testing using methods like ANOVA or regression analysis, would be necessary to confirm and quantify these relationships more rigorously. Understanding these correlations can provide valuable insights into the impact of socioeconomic factors on students' academic performance and inform targeted interventions to support equitable educational outcomes across different income groups.

Discussion

The findings from this study provide a comprehensive understanding of how social inequalities impact science education among secondary school students in the Dhanbad District of Jharkhand. The analysis revealed significant disparities in academic performance and access to educational resources based on economic status and gender. These disparities underscore the need for targeted interventions and policy reforms to promote educational equity.

The quantitative data show a clear correlation between household income and students' science scores. Students from higher-income families have better access to resources such as science labs, kits, and private tutoring, which translates into higher academic performance. This aligns with previous research that indicates economic resources are a crucial determinant of educational outcomes. The significant performance gap between students from different income brackets highlights the urgent need for financial support programs aimed at economically disadvantaged students. Such programs could include scholarships, free access to educational materials, and after-school tutoring services, which could help level the playing field and provide these students with the necessary tools to succeed in science education.

Gender disparities in science education are also evident from the data. Male students outperform female students, reflecting the pervasive influence of societal norms and stereotypes that discourage girls from pursuing science. Interviews with female students revealed a lack of encouragement and support, as well as instances of overt and subtle discouragement from engaging in science-related activities. This finding is consistent with global studies that have documented gender biases in STEM fields. Addressing this issue requires a multifaceted approach, including promoting gender equity in school curricula, increasing the visibility of female role models in science, and creating supportive environments where girls feel encouraged to pursue their interests in science. Initiatives such as science clubs for girls, mentorship programs, and campaigns to raise awareness about gender biases can play a crucial role in fostering a more inclusive educational environment.

Access to educational resources is another critical factor influencing science education outcomes. The data show that students from higher socio-economic status have greater access to science labs, kits, and private tutoring. This disparity further exacerbates the academic performance gap between students from different socio-economic backgrounds. Ensuring equitable access to educational resources is essential for promoting inclusive education. Policies aimed at resource allocation and infrastructure development should prioritize schools in economically disadvantaged areas. Investments in school infrastructure, provision of science kits, and development of community tutoring programs can help provide all students with the necessary resources to excel in science education.

The results this underscore that socioeconomic factors, such as parental financial resources, are very important in the determination of the educational outcome of students. Students from well-off families probably have access to better resources and opportunities that cause gains in their science academics. This explanation of relationships helps in considerations of policy and the formulation of interventions that could work toward obliterating cases of education inequality and ensuring equal opportunities for every child within any social class. Addressing these considerations by educators and policymakers can jointly lead to improved learning for all students in a more equitable learning environment.

Conclusion

This study highlights the multifaceted impact of social inequalities on science education among secondary school students in the Dhanbad District of Jharkhand. Economic disparity, gender bias, and caste discrimination are significant factors influencing students' engagement and performance in science subjects. Addressing these inequalities requires targeted interventions, policy reforms, and inclusive practices that promote educational equity. Economic disparities can be mitigated through financial support programs and equitable resource distribution. Gender biases need to be addressed through initiatives that promote gender equity and encourage girls to pursue science. Equitable access to educational resources is essential for fostering an inclusive educational environment. The study was conducted with the aim of finding the relationship between parental financial condition and students' achievement in science. It hypothesizes that there is no significant relationship between the parental financial condition and students' achievement in science.

The findings from this study provide actionable insights for policymakers, educators, and stakeholders. By addressing the identified disparities, it is possible to create a more equitable and inclusive science education system that enables all students to realize their full potential. Ensuring that every student has access to quality science education is not only a matter of social justice but also essential for the overall development and progress of society. Future research should continue to explore the intersectionality of social inequalities and their impact on education, providing further evidence to inform effective policy and practice.

References

1. Brown, P., & Lee, K. (2022). Resource allocation in education: Analyzing the impact on student performance. Journal of Educational Research, 115(3), 250-267.
2. Chandra, R. (2023). Rural vs. urban education disparities in India. Education and Society, 33(2), 210-225.
3. Chen, M., & Lee, S. (2020). Policy implementation and educational equity: A case study. Journal of Educational Policy, 30(4), 445-461.
4. Gupta, R., & Kumar, S. (2021). Evaluating the impact of education policies on reducing caste disparities. Indian Journal of Educational Development, 29(1), 98-112.
5. Hernandez, S. (2023). Ethnicity and science education: Barriers to success. International Journal of Science Education, 45(1), 23-41.
6. Johnson, R. (2023). Gender inequity in STEM education: A longitudinal analysis. Gender and Education, 35(2), 130-145.

7. Lewis, M., & Smith, J. (2021). Gender stereotypes in science education: Implications for policy and practice. Educational Policy, 35(5), 763-785.
8. Martinez, P., & Brown, S. (2021). Impact of teacher training on student outcomes in science. Teaching and Teacher Education, 102, 103329.
9. Ojo, T., &Adeyemi, K. (2020). Influence of peer groups on academic performance: Evidence from Nigeria. African Journal of Education, 40(3), 294-311.
10. Park, H., & Kim, S. (2023). Technology in science education: Bridging the digital divide. Journal of Science Education and Technology, 32(1), 1-19.
11. Patel, R., & Roy, S. (2020). School infrastructure and student performance in India. International Journal of Educational Development, 75, 102181.
12. Rao, M., Singh, A., & Gupta, P. (2022). Science education and cognitive development: Insights from Indian schools. Journal of Educational Psychology, 114(2), 357-371.
13. Singh, P., & Kumar, N. (2021). Caste and education in India: Barriers and opportunities. Social Science Quarterly, 102(4), 1357-1375.
14. Smith, L., Williams, G., & Brown, R. (2022). Socioeconomic status and science achievement: A global perspective. Science Education, 106(5), 1123-1141.
15. Zhao, X., & Li, Q. (2022). Economic inequality and education access in China. Educational Review, 74(4), 491-509.
16. Brown, T., & Green, C. (2021). Parental involvement and science education outcomes. Journal of Family and Economic Issues, 42(3), 457-474.
17. Hernandez, R., & Martinez, J. (2021). Role of digital resources in educational equity. Computers & Education, 169, 104231.
18. Singh, A., & Sharma, R. (2020). The impact of socio-economic status on educational outcomes in India. International Journal of Social Sciences and Education, 45(2), 315-330.
19. Kumar, S., & Gupta, R. (2021). Strategies for improving science education in rural India. Journal of Rural Education, 33(4), 299-317.
20. Wang, H., & Chen, L. (2023). Addressing educational inequality: Lessons from international experiences. Global Education Review, 10(1), 45-61.