



Impact of Family Environment on Academic Achievement of Higher Secondary Students: An Empirical Study

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Abstract- The present study investigates the influence of family environment on the academic achievement of higher secondary students in science subjects. The underlying premise of this research is that scholastic performance cannot be attributed solely to an individual student's cognitive capacities; rather, the domestic environment in which a learner is nurtured plays an equally decisive role. A random sampling technique was employed to select 100 higher secondary students representing diverse socio-economic and educational backgrounds. Data were collected through a structured self-designed questionnaire encompassing multiple dimensions of the family environment, including parental support, emotional security, academic discipline, and availability of study resources. Statistical analyses—comprising Mean, Standard Deviation, independent samples t-test, and one-way Analysis of Variance (ANOVA)—were utilized to examine group differences and inter-variable associations. Findings revealed a statistically significant positive relationship between a conducive family environment and higher academic performance. Urban students outperformed their rural counterparts significantly, whereas no meaningful gender-based differences in achievement were observed. The study concludes that family environment constitutes a critical determinant of academic success and recommends coordinated efforts by parents, educators, and policymakers to cultivate supportive learning environments.

Keywords- Family Environment, Academic Achievement, Higher Secondary Students, Parental Involvement, ANOVA, Urban-Rural Differences, Science Education

I. Introduction

Education is universally recognized as the cornerstone of national development, equipping individuals not only with intellectual capacities but also shaping them into responsible and productive citizens. In an increasingly competitive global landscape,



academic achievement has emerged as a critical indicator of a student's future trajectory, influencing access to higher education, career opportunities, and social mobility.

While cognitive ability, motivation, and personal effort undeniably contribute to scholastic performance, empirical research has consistently demonstrated that external contextual factors—particularly the family environment—exert a profound influence on students' educational outcomes. The family represents the primary socializing institution encountered by a child, and its psychological, emotional, and material characteristics shape the foundations of learning long before formal schooling begins.

Family environment is a multidimensional construct encompassing parental educational background, socio-economic status, household structure (nuclear vs. joint), disciplinary practices, parental expectations, communication quality, and the provision of emotional support. Parental literacy and awareness shape children's attitudes toward education, while financial capacity determines access to instructional resources such as textbooks, private tutoring, and digital tools. The quality of emotional support available within the family also plays a decisive role: students who receive consistent encouragement and guidance from their families tend to exhibit greater self-confidence, sustained academic interest, and stronger resilience in the face of academic challenges.

Conversely, students raised in environments characterized by neglect, familial conflict, or economic hardship frequently report heightened anxiety, diminished concentration, and reduced academic engagement—all of which negatively impact achievement. Similarly, the nature of parental discipline—whether balanced, overly authoritarian, or permissive—has been shown to influence students' sense of responsibility, self-regulation, and academic behavior.

Thus, family environment collectively influences the cognitive, emotional, and social development of students, which ultimately manifests in their academic performance. The current investigation was therefore designed to systematically examine the relationship between family environment and the science achievement of higher secondary students, with the aim of generating evidence-based insights to inform educational interventions.



1. Need and Significance of the Study

Understanding the determinants of academic achievement is of paramount importance for educators, policymakers, and families alike. While several studies have examined cognitive and school-level factors, the role of the domestic environment—especially at the higher secondary stage—remains insufficiently explored in the Indian context. This study addresses that gap by focusing on parental support, emotional climate, disciplinary practices, and household resources as predictors of science achievement. The findings are intended to sensitize parents to their role in the learning process, assist teachers in tailoring instructional approaches, and guide policymakers in designing targeted support programs for disadvantaged learners.

II. Review of Related Literature

A substantial body of scholarship affirms the significant relationship between family environment and academic achievement across diverse educational contexts.

Santra and Panda (2025) conducted a study among students in West Bengal and documented a positive correlation ($r = 0.53$) between family environment scores and academic performance. Their findings further indicated that urban students demonstrated superior academic outcomes and more favorable family environments in comparison to their rural peers, suggesting the mediating role of socio-economic infrastructure.

Kumari (2025) demonstrated that family environment variables—specifically family cohesion, mutual support, and low conflict—interact synergistically with psychological well-being constructs such as self-esteem and resilience to significantly predict academic achievement. This study highlighted the indirect psychological pathways through which the family influences scholastic outcomes.

Mandal (2024–2025), in a systematic review of Indian studies, emphasized that the home environment—encompassing both its physical and psychological dimensions—serves as a primary enabler of language acquisition and broader academic learning. The home was characterized as a 'first school,' wherein the foundational cognitive and motivational structures for formal learning are established.



A multidisciplinary review of contemporary Indian studies (2025) further confirmed that parental engagement, the availability of a structured study space at home, and access to academic resources directly predict student performance. Notably, resource constraints in low-income households were identified as significant barriers to academic attainment.

A systematic review of Indian adolescent studies (2025) concluded that a positive dual environment—encompassing both school and home—is associated with enhanced emotional health and superior academic performance, while environmental negativity at home is reliably linked to reduced achievement.

Recent psychological literature (2024–2025) further established that family environment influences academic achievement both directly and indirectly, with familial factors—including parenting style and domestic climate—accounting for over 30% of the variance in educational outcomes.

Internationally, Bloom (1964) identified the home environment as one of the most powerful non-school factors affecting learning. Dornbusch et al. (1987) documented the relationship between parenting styles and adolescent school performance, while Fan and Chen (2001), in a comprehensive meta-analysis, confirmed the positive association between parental involvement and student achievement.

Objectives and Hypotheses

Research Objectives

The study was guided by the following objectives:

- To assess the family environment of higher secondary students.
- To measure the academic achievement of students in science subjects.
- To examine the influence of family environment on academic achievement.
- To compare academic achievement across urban and rural student groups.
- To investigate gender-based differences in the impact of family environment on achievement.

2. Research Hypotheses (H₀)

H₀₁: There will be no statistically significant difference in academic achievement among students from high, medium, and low family environment groups.



H₀₂: There will be no statistically significant difference in academic achievement between urban and rural students based on family environment.

H₀₃: Family environment will exert an equal influence on the academic achievement of male and female students.

III. Research Methodology

1. Research Design

The study employed a descriptive survey research design, which is appropriate for investigating the nature and extent of relationships among variables in natural settings without experimental manipulation.

2. Sample and Sampling Procedure

The research sample comprised 100 students enrolled at the higher secondary level, selected through a stratified random sampling technique. The sample was deliberately balanced to ensure equal representation across gender (50 males, 50 females) and geographic location (50 urban, 50 rural). Based on family environment scores, students were further classified into three groups: High (score ≥ 70 ; $n = 30$), Medium (score 40–69; $n = 50$), and Low (score ≤ 39 ; $n = 20$).

3. Tools and Instruments

Data were collected using a researcher-designed structured questionnaire, which was reviewed by subject-matter experts and refined through a pilot study to ensure content validity and reliability. The questionnaire assessed multiple dimensions of family environment including parental educational support, emotional security, household discipline, academic resources, and family cohesion. Academic achievement was operationalized as the students' scores in their science subject examinations.

4. Variables

- Independent Variable: Family Environment (assessed through questionnaire scores, classified as High, Medium, Low)
- Dependent Variable: Academic Achievement in Science (marks obtained in school examinations)



5. Statistical Techniques

The following statistical procedures were employed for data analysis: (i) Descriptive statistics including Mean (M) and Standard Deviation (SD); (ii) One-way Analysis of Variance (ANOVA / F-test) to examine differences among three family environment groups; (iii) Independent samples t-test to compare urban vs. rural and male vs. female groups. The level of statistical significance was set at $\alpha = 0.05$ (5%).

IV. Data Analysis and Results

1. Sample Profile

Table 1: Sample Distribution by Category

Category	Sub-Group	n	%
Gender	Male	50	50%
	Female	50	50%
Location	Urban	50	50%
	Rural	50	50%
Family Environment	High (≥ 70)	30	30%
	Medium (40–69)	50	50%
	Low (≤ 39)	20	20%
Total	—	100	100%

2. Descriptive Statistics

Table 2: Overall Descriptive Statistics

Variable	N	Minimum	Maximum	Mean (M)	SD
Science Achievement Score	100	19	83	50.07	15.83
Family Environment Score	100	22	95	57.51	18.52



Table 3: Science Achievement by Family Environment Group

Group	N	Mean (M)	SD	SE	Min	Max
High FE (≥ 70)	30	68.17	8.99	1.64	53	83
Medium FE (40–69)	50	47.80	7.44	1.05	34	65
Low FE (≤ 39)	20	28.60	5.34	1.19	19	38

Table 4: Science Achievement by Location and Gender

Group	N	Mean (M)	SD	SE
Urban	50	61.32	11.84	1.67
Rural	50	38.82	10.39	1.47
Male	50	48.66	15.51	2.19
Female	50	51.48	16.02	2.27

3. Hypothesis Testing

H_{01} — ANOVA (One-Way F-Test): High vs. Medium vs. Low Family Environment
 To examine whether statistically significant differences exist in science achievement across the three family environment groups, a one-way ANOVA was conducted. The grand mean of science achievement was 50.07. The between-groups sum of squares (SSb) and within-groups sum of squares (SSw) were computed as follows:

$$SSb = 30(68.17 - 50.07)^2 + 50(47.80 - 50.07)^2 + 20(28.60 - 50.07)^2 = 9824.68 + 257.65 + 9219.22 = 19,301.54$$

$$SSw = 2426.17 + 2768.00 + 570.80 = 5,764.97$$



Table 5: One-Way ANOVA Summary — Family Environment Groups

Source of Variance	SS	df	MS	F-value	Critical F (0.05)	Decision
Between Groups	19,301.54	2	9,650.77	162.38	3.09	Significant
Within Groups	5,764.97	97	59.43	—	—	—
Total	25,066.51	99	—	—	—	—

Table 6: Post-Hoc Pairwise Comparisons

Comparison	Group 1 (M)	Group 2 (M)	Mean Difference	Conclusion
High vs. Medium	68.17	47.80	20.37	Significant
High vs. Low	68.17	28.60	39.57	Significant
Medium vs. Low	47.80	28.60	19.20	Significant

Result: F-calculated (162.38) > F-critical (3.09) at df (2, 97), $p < 0.05$. H_{01} is rejected. Significant differences exist among all three groups. Students from high family environment backgrounds achieved the highest science scores ($M = 68.17$), followed by medium ($M = 47.80$) and low ($M = 28.60$) groups.

H_{02} — Independent t-Test: Urban vs. Rural Students

An independent samples t-test was conducted to determine whether urban and rural students differed significantly in their science achievement scores.

$$SE_{diff} = \sqrt{(1.67^2 + 1.47^2)} = \sqrt{(2.7889 + 2.1609)} = \sqrt{4.9498} = 2.225$$

$$t = (61.32 - 38.82) / 2.225 = 22.50 / 2.225 = 10.11$$



Table 7: t-Test Results — Urban vs. Rural

Group	N	M	SD	SE	t-value	df	Critical t (0.05)	Decision
Urban	50	61.32	11.84	1.67	10.11	98	1.984	Significant
Rural	50	38.82	10.39	1.47	—	—	—	—

Result: t-calculated (10.11) > t-critical (1.984) at df = 98, $p < 0.05$. H_{02} is rejected. Urban students ($M = 61.32$) significantly outperformed rural students ($M = 38.82$) in science achievement.

H_{03} — Independent t-Test: Male vs. Female Students

An independent samples t-test was performed to assess potential gender-based differences in science achievement.

$$SE_{diff} = \sqrt{(2.19^2 + 2.27^2)} = \sqrt{(4.7961 + 5.1529)} = \sqrt{9.9490} = 3.154$$

$$t = (48.66 - 51.48) / 3.154 = -2.82 / 3.154 = -0.894$$

Table 8: t-Test Results — Male vs. Female

Group	N	M	SD	SE	t-value	df	Critical t (0.05)	Decision
Male	50	48.66	15.51	2.19	-0.894	98	1.984	Not Significant
Female	50	51.48	16.02	2.27	—	—	—	—

Result: $|t\text{-calculated}| (0.894) < t\text{-critical} (1.984)$ at df = 98, $p > 0.05$. H_{03} is retained. No statistically significant difference exists between male and female students' science achievement. Family environment exerts a comparable influence on both genders.



4. Summary of Hypothesis Testing

Table 9: Consolidated Hypothesis Testing Summary

Hypothesis	Test Used	Calculated Value	Critical Value	df	Decision
H ₀₁ : High/Medium/Low FE Groups	ANOVA (F)	162.38	3.09	2, 97	Rejected (Significant)
H ₀₂ : Urban vs. Rural	t-test	10.11	1.984	98	Rejected (Significant)
H ₀₃ : Male vs. Female	t-test	-0.894	1.984	98	Retained (Not Significant)

VI. Discussion

1. Family Environment and Academic Achievement

The ANOVA results powerfully confirmed that students from high family environment backgrounds substantially outperform those from medium and low family environment groups. This outcome aligns with a robust body of international and Indian scholarship. When families provide structured academic support, emotional encouragement, and adequate resources, students develop the motivational foundations and cognitive habits necessary for scholastic excellence. These findings are consistent with the theoretical frameworks proposed by Bloom (1964) and the empirical work of Dornbusch et al. (1987), both of which emphasize the primacy of the home environment in educational development.

2. Urban-Rural Differential

The markedly superior performance of urban students ($M = 61.32$) relative to rural students ($M = 38.82$) may be attributed to several overlapping factors. Urban families generally possess higher levels of parental education, greater awareness of academic resources, and greater access to supplementary coaching, digital infrastructure, and enriched learning materials. Rural households, constrained by limited resources and exposure, may inadvertently provide less academically stimulating environments.



These disparities underscore the structural inequalities embedded in the Indian educational system and point to the need for targeted rural interventions.

3. Gender Parity in Achievement

The absence of statistically significant differences between male and female students' academic achievement ($t = -0.894$, $p > 0.05$) is an encouraging finding that reflects the gradual narrowing of the gender gap in contemporary Indian secondary education. It suggests that both boys and girls are now experiencing broadly similar family influences on their academic development—a shift potentially attributable to increasing parental awareness, policy interventions promoting girls' education, and evolving societal norms.

Educational Implications and Recommendations

For Parents and Families

- Establish a calm, organized, and distraction-free study environment at home.
- Actively engage with children's academic progress through regular review of schoolwork.
- Cultivate a positive attitude toward science and analytical thinking.
- Provide consistent emotional support, positive reinforcement, and academic encouragement.

For Teachers and Schools

- Incorporate contextually relevant pedagogy that addresses the distinct needs of rural learners.
- Utilize parent-teacher conferences to educate families on the role of home environment in achievement.
- Adopt activity-based and inquiry-oriented approaches to make science more engaging and accessible.

For Policymakers

- Invest in strengthening educational infrastructure and resource access in rural schools.
- Develop and scale parental literacy and awareness programs in underserved communities.



- Expand need-based scholarship schemes targeting economically disadvantaged students.

For Future Researchers

- Extend similar investigations to other academic disciplines such as mathematics and languages.
- Conduct large-scale comparative studies across multiple districts to enhance generalizability.
- Employ longitudinal research designs to trace the long-term effects of family environment on academic trajectories.

Limitations of the Study

- The sample size is restricted to 100 participants, limiting the broader generalizability of findings.
- Data were collected through a self-designed questionnaire, which may be subject to respondent bias and subjectivity.
- The geographic scope of the study was confined to a single region.
- Several potentially confounding variables—such as parental occupation, family size, and school quality—were not controlled in the analysis.

VIII. Conclusion

The present study furnishes compelling empirical evidence that family environment is a decisive determinant of academic achievement among higher secondary students. Students nurtured in high-quality family environments—characterized by parental support, emotional security, and adequate academic resources—consistently demonstrated superior science achievement. Significant urban-rural disparities were identified, highlighting the structural inequalities that continue to shape educational outcomes in India. Notably, no gender-based differences in the influence of family environment were observed, indicating greater parity in the contemporary educational landscape.

These findings reinforce the understanding that academic achievement is not solely an individual enterprise but is deeply embedded within the family and socio-economic contexts in which students develop. A collaborative and coordinated effort involving



families, schools, and policymakers is essential to ensuring that all students—regardless of geographic location or socio-economic background—have access to the supportive environments that academic success demands.

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